HEALTH AND SAFETY PLAN

TGRS Construction
Montrose Superfund Site
20201 S. Normandie Avenue
Los Angeles, California

November, 2012

Prepared for:

Montrose Chemical Corporation of California
600 Ericksen Avenue, NE, Suite 380
Bainbridge Island, Washington 98110

Prepared by:

AECOM Technical Services
3995 Via Oro Avenue
Long Beach, California 90810

HEALTH AND SAFETY PLAN APPROVAL

This Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Torrance Groundwater Remediation System (TGRS) Construction activities at the Montrose Superfund Site in Los Angeles, California. This HASP has been written for the use of AECOM, its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Plan Approved By:

Date: 11-19-12

Brian Dean
Senior Project Director

Date: 11-16-12

Shelley Brown, CSP
Regional SH&E Manager

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Acronyms and Abbreviations

ACGIH	American Conference of Government Hygienists
ANSI	American National Standards Institute
BHC	Benzene Hexachloride
Cal-OSHA	California Department of Industrial Relations, Division of Occupational Safety and Health
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CM	Construction Manager
COC	Chemical of Concern
CRZ	Contamination Reduction Zone
DCB	Dichlorobenzene
DDT	Dichlorodiphenyltrichloroethane
DOT	Department of Transportation
EC	Emergency Coordinator
EZ	Exclusion Zone
FP	Flash Point
FRC	Fire Resistant Clothing
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High Density Polyethylene
HiPOx	High Pressure Oxidation (patented APT technology)
IP	Ionization Potential
JSA	Job Safety Analysis
LADWP	Los Angeles Department of Water and Power
LEL	Lower Explosive Limit
LGAC	Liquid-Phase Granular Activated Carbon
mg/kg	Milligrams per kilogram
mg/m^3	Milligrams per cubic meter
MOC	Management of Change
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NPL	National Priorities List
PCE	Tetrachloroethylene
PEL	Permissible Exposure Limit
PFA	Personal fall arrest
PFS	Personal fall protection system
PID	Photoionization Detector
PM	Project Manager
PPE	Personnel Protective Equipment
ppm	part per million
ROD	Record of Decision
RQ	Reportable Quantity
SG	Specific gravity
SH&E	Safety Health and Environment

Acronyms and Abbreviations (continued)

SOL	Solubility in water
SOP	Standard Operating Procedure
SOW	Statement of Work
SPF	Solar protection factor
SSO	Site Safety Officer
SZ	Support Zone
TCE	Tetrachloroethylene
TGRS	Torrance Groundwater Remediation System
THA	Task Hazard Analysis
TLV	Threshold limit value
UEL	Upper explosive limit
ug/L	Microgram per liter
UPRR	Union Pacific Railroad
USA	Underground Services Alert
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
VD	Vapor density
VGAC	Vapor-Phase Granular Activated Carbon
VP	Vapor pressure
WBGT	Wet bulb globe thermometer

1.0 INTRODUCTION

This Health and Safety Plan (HASP) describes the levels of personal protection and safe operating guidelines expected of each AECOM employee, subcontractor, or visitor associated with construction of the Torrance Groundwater Remediation System (TGRS) at the Montrose Superfund Site (Site) in Los Angeles, California. A Partial Consent Decree for construction of the Dual Site Groundwater Operable Unit treatment system was finalized in August 2012 (USEPA, 2012). On behalf of Montrose Chemical Corporation of California (Montrose), this HASP was prepared as required under Item 3.1(b) of the Statement of Work included as Appendix B of the Partial Consent Decree.

This HASP identifies chemical and physical hazards known to be associated with the TGRS construction activities. This HASP also provides the specification for the minimum acceptable requirements for all subcontractor organizations. The practices and procedures presented in this HASP will be observed for all visitors to areas under AECOM's operational control. Additional Site information, background, and a description of the construction scope of work are provided in Section 2.0 of this HASP.

1.1 GENERAL

The provisions of this HASP are mandatory for all AECOM personnel engaged in fieldwork associated with construction of the TGRS at the Montrose Superfund Site. A copy of this HASP, any applicable HASP Supplements, and the AECOM *North America Safety, Health, and Environmental (SH&E) Manual* shall be available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs) provided in **Attachment A**. In the event of a conflict between this HASP, the SOPs, and federal, state, and local regulations, workers shall follow the most stringent/protective requirements.

1.2 POLICY STATEMENT

It is the policy of AECOM to provide a safe and healthy work environment for all of its employees. AECOM considers no phase of operations or administration is of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At AECOM, we believe every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident. This policy is detailed in AECOM's *Safety, Health, and Environmental Policy Statement* which is provided in **Attachment B**.

The practices and procedures presented in this HASP and any supplemental documents associated with this HASP are binding on all AECOM employees while engaged in the subject work. In addition, all site visitors shall abide by these procedures as the minimum acceptable standard for the work site. Operational changes to this HASP and supplements that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the AECOM Project Manager (PM) and the AECOM Regional Safety, Health, and Environmental Manager.

1.3 MANAGEMENT OF CHANGE/MODIFICATION OF THE HASP

This document discusses the physical hazards associated with the proposed activities. However, unanticipated site-specific conditions or situations might occur during the implementation of this project. Also, AECOM and/or the contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered a working document that is subject to change to meet the needs of this dynamic project.

Should significant information become available regarding potential on-site hazards, it will be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the AECOM Regional Safety, Health, and Environmental Manager before such modifications are implemented and then documented on the HASP Modification Tracking Log. Any significant modifications must be incorporated into

the written document as HASP addenda and issued. The AECOM PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the AECOM Field Manager. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

Any changes to this HASP that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the AECOM PM and the cognizant AECOM Safety, Health, and Environmental Manager. In the event of a conflict between this HASP and federal, state, or local regulations, the most stringent will apply.

1.4 REGULATORY GUIDANCE

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

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), *Occupational Safety and Health Standards* (with special attention to Section 120, *Hazardous Waste Operations and Emergency Response*).
- Title 8 of the California Code of Regulations (8 CCR), with special attention to Section 5192 *Hazardous Waste Operations and Emergency Response*.
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), *Safety and Health Regulations for Construction*.
- Title 8 of the California Code of Regulations (8 CCR), with special attention to Sub Chapter 4, Sections 1500 - 1938 *Construction Safety Orders.*
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, *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 Corporate SH&E Program requirements as specified in the North America SH&E Manual, a hard copy of which will be maintained on site at all times as well as appended to this HASP on CD-ROM.

1.5 ORGANIZATION OF THIS HASP

This HASP is organized into the following 10 sections:

- Section 2: Site Information and Scope of Work
- Section 3: Project Health and Safety Organization
- Section 4: Safety Programs
- Section 5: Chemical Hazard Assessment
- Section 6: Physical Hazard Assessment and Controls
- Section 7: Personal Protective Equipment
- Section 8: Site Control
- Section 9: Decontamination
- Section 10: Emergency Response Planning

Sections 2 through 4 describe the site background, construction scope of work, project organization, and an overview of the safety program requirements for working at the site. Sections 5 and 6 address the primary

chemical and physical hazards associated with the construction scope of work. Sections 7 through 9 provide general safety management requirements. Section 10 contains instructions and contact information for emergency response. A map showing the location of the nearest hospital (Harbor UCLA Medical Center) is provided in Section 10.

1.6 PERSONNEL ACKNOWLEDGEMENT

Prior to conducting any work on this project, all AECOM project personnel and subcontractors are required to acknowledge that they have read this HASP and will comply with all provisions contained therein. The acknowledgement form is provided in **Attachment C**.

2.0 SITE INFORMATION AND SCOPE OF WORK

AECOM will construct the TGRS in accordance with the Partial Consent Decree Statement of Work (SOW; USEPA, 2012) and Final Design Drawings and Specifications for the Dual Site Groundwater Operable Unit (Geosyntec, 2012). Deviations from the SOW will require that a Safety Professional review and approve changes to this HASP as needed to ensure adequate protection of project personnel.

2.1 SITE INFORMATION

This section provides a general description and historical information associated with the Site.

2.1.1 Montrose Property Description

The Montrose Property is located at 20201 South Normandie Avenue in the City of Los Angeles, California (**Figure 2-1**). The Site is located within a portion of the City of Los Angeles identified as the Harbor Gateway, which extends from Western Avenue to Normandie Avenue. The City of Torrance is located west of the Harbor Gateway, and unincorporated Los Angeles County is located east of the Harbor Gateway.

The Montrose Property occupies approximately 13 acres and is bounded by the Union Pacific Railroad (UPRR) right-of-way and Normandie Avenue to the east, the Jones Chemical Inc. property and a right-of-way owned by the Los Angeles Department of Water and Power (LADWP) to the south, the GLJ Holdings property to the north, and Frito-Lay, Inc. to the west. The Montrose Property and other surrounding properties are shown in **Figure 2-2**. The area east of the Property is occupied by manufacturing and commercial facilities. The area to the west is occupied by manufacturing and an oil refinery. Land uses south and southeast of the Property are mixed manufacturing, commercial, and residential zoning.

Currently, the Site is unoccupied, fenced, and covered with asphalt. Entrance to the Property is from Normandie Avenue through a locking gate located in the northeast corner of the Property. The on-Property features include three large, raised, asphalt building pads (constructed in 1985) and six temporary soil cells containing soil excavated from along the historical stormwater pathway in a portion of the residential neighborhood (i.e., Kenwood Avenue). Additionally, there is a storage container on-site for storage of field equipment and supplies. Water service is available through a metered line located at the northeast corner of the Property at this time. Electrical and telephone services are not available at the Property. Surface water drainage is toward the southeast corner of the Montrose Property and the Normandie Avenue Ditch.

2.1.2 Site Background

Montrose manufactured technical grade dichlorodiphenyltrichloroethane (DDT) at the Property from 1947 until 1982. Montrose manufactured DDT by combining chlorobenzene and chloral in the presence of a powerful sulfuric acid catalyst (oleum). The Montrose plant produced as much as eighty million pounds of technical grade DDT annually. Montrose supplied technical grade DDT to, among others, the Department of Defense, United Nations, and the World Health Organization. In addition to the Montrose operations, Stauffer Chemical Company operated a small benzene hexachloride (BHC) plant on the southeast corner of the Property from approximately 1954 until 1963 when the plant was dismantled and removed from the Site.

Montrose terminated its production process and completely ceased operating the plant in 1982. The plant was fully dismantled and demolished by early 1983. During 1984 and 1985, Montrose graded and covered the property with asphalt. The United States Environmental Protection Agency (USEPA) proposed the Site for the Superfund National Priorities List (NPL) in 1984, and the proposal was finalized in 1989.

Remedial investigations conducted at the Montrose Site have documented chemical impacts to the three upper water-bearing zones at the Site including chlorobenzene (USEPA, 1998). A Record of Decision (ROD) for

remediation of dissolved-phase chlorobenzene in groundwater was issued by USEPA in 1999 (USEPA, 1999). A number of groundwater pilot tests and studies were conducted over the last decade. Remedial design of the TGRS was completed in June 2012 and was subsequently approved by USEPA on September 20, 2012.

2.2 SCOPE OF WORK

The TGRS is a 700 gallon per minute pump and treat remedy for dissolved chlorobenzene plumes in the upper three water-bearing zones at the Site. Groundwater will be extracted from a series of wells, located primarily down the center of the dissolved plumes, and conveyed to the Montrose Property for aboveground treatment using a combination of advanced oxidation, air stripping, and carbon adsorption. Treated groundwater will be conveyed from the Montrose Property to a series of wells, located primarily along the perimeter of the dissolved plumes, for reinjection. Some of the extraction and injection wells were previously installed as part of field pilot testing activities. The remaining wells, underground conveyance pipelines, and groundwater treatment plant will be constructed under this HASP. The layout of the extraction and injection wells and pipelines is shown in **Figure 2-3**.

The TGRS construction scope of work was provided in Appendix B of the Partial Consent Decree. A brief description of the six primary construction work tasks is provided in the following sections.

2.2.1 Extraction Well Installation

A series of extraction wells will be installed to extract groundwater from the dissolved chlorobenzene plumes in each of the three upper water-bearing zones. A total of 14 extraction wells are planned as shown in Figure 2-3. Previous construction activities completed during the investigation stage of the program involved the installation of 6 extraction wells. Therefore, the remaining 8 extraction wells will be installed under this HASP and pursuant to the SOW including: 2 wells in the Upper Bellflower Aquitard, 4 wells in the Bellflower C Sand Aquifer, and 2 wells in the Gage Aquifer.

The installation phase will include drilling to the appropriate depth, disposing of the removed soils, placing the well casing, installing the filter pack and annular seal, placing the well cap, and developing and testing the extraction well. Following this installation and testing phase, drop pipes and submersible well pumps will be placed in the well casing. A concrete vault will be placed around the well head to provide protection and controlled access. Each well vault will be equipped with a float switch for level detection, a manual isolation valve and an automated flow control valve, and a leak detection sensor and valve to isolate the well from the rest of the extraction pipeline conveyance system, and electrical equipment for controlling the extraction pumps and monitoring pumping performance. The electrical equipment will be connected to instrumentation and controls, a meter, and a connection to a power supply.

2.2.2 Injection Well Installation

A series of injection wells will be installed to inject the treated groundwater back into the aquifer systems. A total of 8 injection wells are currently planned as shown in Figure 2-3. Additional injection wells may be required pending the results of on-going injection well testing. Previous construction activities completed during the investigation stage of the program resulted in the installation of 5 injection wells. Therefore, the remaining 3 injection wells will be installed under this HASP and pursuant to the SOW including: 1 well in the Bellflower C Sand Aquifer and 2 wells in the Gage Aquifer.

The installation phase will include drilling to the appropriate depth, disposing of the removed soils, placing the well casing, installing the filter pack and annular seal, placing the well cap, and developing and testing the injection well. Following this installation and testing phase, drop pipes will be placed in the well casing. A concrete vault will be placed around the well head to provide protection and controlled access. Each well vault will be equipped with a float switch for level detection, a manual isolation valve and an automated flow control valve, and a leak detection sensor and valve to isolate the well from the rest of the injection pipeline conveyance

system, and electrical equipment for controlling the extraction pumps and monitoring pumping performance. The electrical equipment will be connected to instrumentation and controls, a meter, and a connection to a power supply.

2.2.3 Extraction Pipeline Installation

The extraction pipelines will convey contaminated groundwater from the extraction wells to the treatment facility. Due to the highly developed land use of the area, a combination of trenching, directional drilling (if required), and a crossing under a pedestrian bridge will be used to route the pipes and electrical conduits between the wells and the treatment facility. Double-walled high density polyethylene (HDPE) pipes will be used for the extraction system as a leak prevention measure.

Installation of the extraction pipelines will involve trenching, directional drilling (if required), installing bridge crossings, assembling and installing the pipes, and installing the associated electrical wires, fiber optic cable, and conduits. Including separate piping for wells with high arsenic concentrations, approximately 13,000 linear feet of double-walled pipe will be installed under this HASP. The majority of the piping will be installed within approximately 10,000 linear feet of trenches located in City of Los Angeles and Los Angeles County streets. The existing asphalt and concrete overlying the trench area will be sawcut and removed. The excavated soil will be transported off-site for disposal, placed back into the pipeline trench or pipe-jack trench, or re-compacted and used as fill material on the Montrose Property for construction of the main treatment facility. Sand will be placed in the trench as pipe bedding, and following installation of the piping and conduit, the trenched area will be repaved.

One section of the pipeline, including pipes and conduits, will cross under the Javelin Street pedestrian bridge. This element of the construction will involve installing brackets on the undersides of the bridges, placing steel casing, installing a valve vault on each side of the bridge, and placing the piping and conduits.

2.2.4 Injection Pipeline Installation

The injection pipelines will convey treated water from the treatment facility on the Montrose Property to the injection wells. The treatment system effluent will be treated water, and therefore, single-walled HDPE pipes will be sufficient for the injection system piping. Due to the highly developed land use of the area, a combination of trenching, directional drilling (if required), and pipe crossings under a bridge will be used to route the pipes and electrical conduits between the wells and the treatment facility.

Installation of the injection pipelines will involve trenching, directional drilling (if required), installing bridge crossings, assembling and installing the pipes, and installing the associated electrical wires and conduits. Including injection well redevelopment return piping, a total of approximately 24,000 linear feet of injection piping will be installed under this HASP. The majority of the piping will be installed within approximately 8,500 linear feet of trenches beneath the City of Los Angeles and Los Angeles County streets. The existing asphalt and concrete overlying the trench area will be sawcut and removed. The excavated soil and pavement will be transported off-site for disposal, placed back into the pipeline trench or pipe-jack trench, or re-compacted and used as fill material on the Montrose Property for construction of the main treatment facility. Sand and gravel will be placed in the trench as pipe bedding, and following installation of the piping and conduit, the trenched area will be repaved.

One section of the pipeline will cross the Torrance Lateral Bridge at the intersection of Torrance Boulevard and Vermont Boulevard. This element of the construction will involve installing brackets on the undersides of the bridges, placing steel casing, installing a valve vault on each side of the bridge, and placing the piping.

2.2.5 Pipe Jacking

Pipe jacking will be used to place pipes under the UPRR railroad tracks in two locations, one on Normandie Avenue near Del Amo Boulevard and another near the treatment facility. This will involve excavating a thrust pit and a reception pit, constructing a thrust wall in the thrust pit, driving pipes through the soil with a hydraulic jack, connecting the pipes on each end, backfilling the pits, and compacting and repaving the disturbed area. The total length of pipe jacking will be approximately 300 feet.

2.2.6 Treatment Facility Construction

The purpose of the treatment facility is to remove groundwater contaminants from the Chlorobenzene Plume at or around the Montrose and Del Amo Superfund Sites, to the levels specified in the ROD. The treatment facility will be located on the Montrose Property. A Site Plan from the Remedial Design showing the treatment facility is provided as **Figure 2-4**.

Prior to any construction, the existing asphalt in the area of the treatment system will be removed from the Montrose Property and the foundation will be excavated. The plant site will be surveyed and treatment facility bedding materials will be installed. The ground floor slab and truck ramp will then be constructed. A control building and fence will be installed at the plant site. Treatment facility site lighting, power drops, electrical conduits, and electrical wires will then be connected.

Treatment components will be installed on the floor slab. Currently, the major treatment components include the following:

- An advanced oxidation system ("HiPOx");
- An air stripper system consisting of three air strippers;
- A liquid-phase granular activated carbon ("LGAC") adsorber system;
- A vapor-phase granular activated carbon ("VGAC") adsorber system; and
- A post-treatment filtration system.

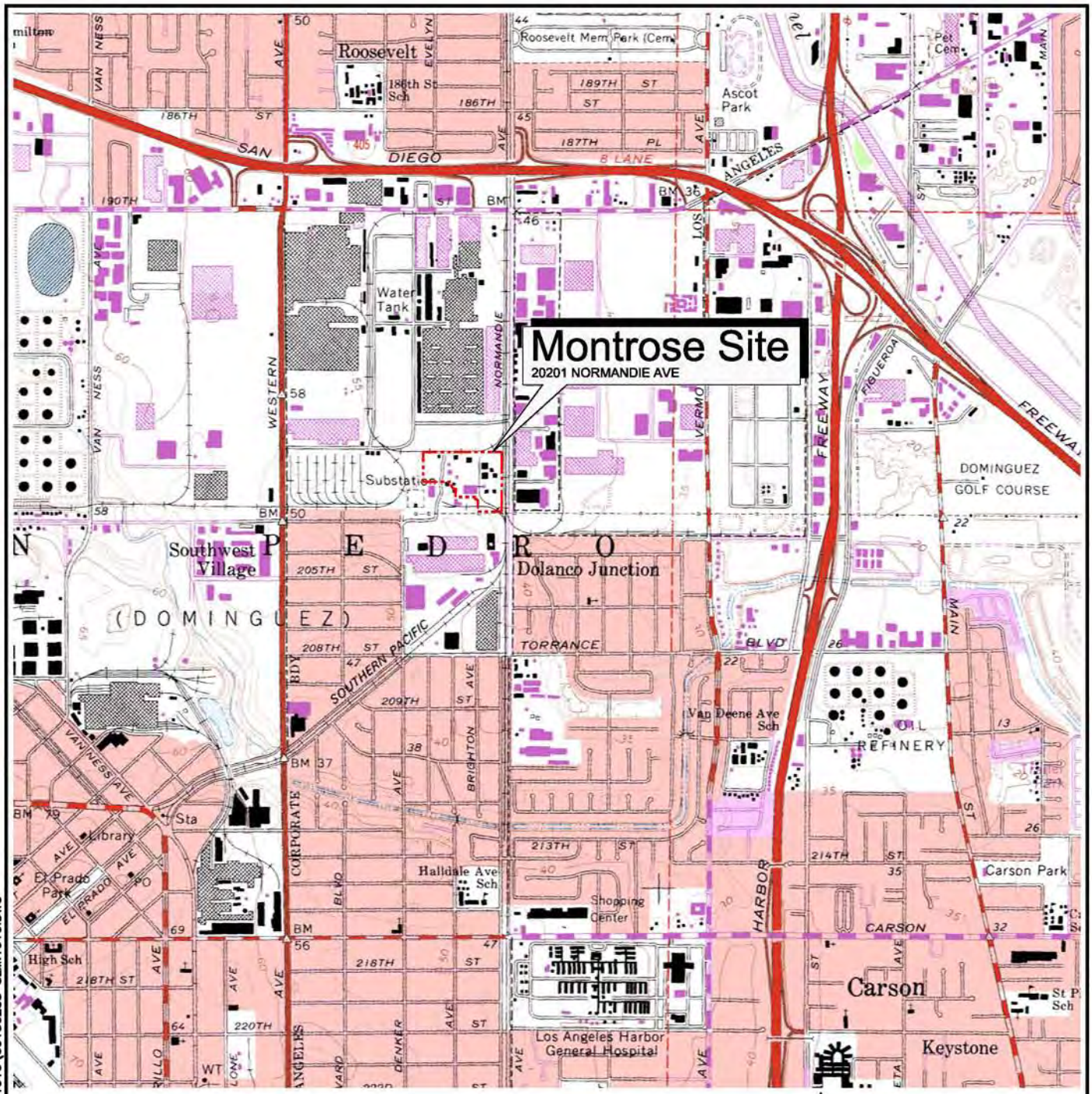
Several pumps, storage tanks, and other appurtenances required for operation of the TGRS will also be installed.

2.2.7 Project Assumptions

General assumptions used in preparing this HASP including the following:

- AECOM will control access to this HAZWOPER site during TGRS construction activities;

- All work can be performed using modified Level D or Level C Personal Protective Equipment. No Level B or A PPE is expected to be required during the performance of this work. If Level B or A PPE is found to be required to complete the work, a HASP Addendum will be prepared and approved prior to initiating the work activities.



Reference:

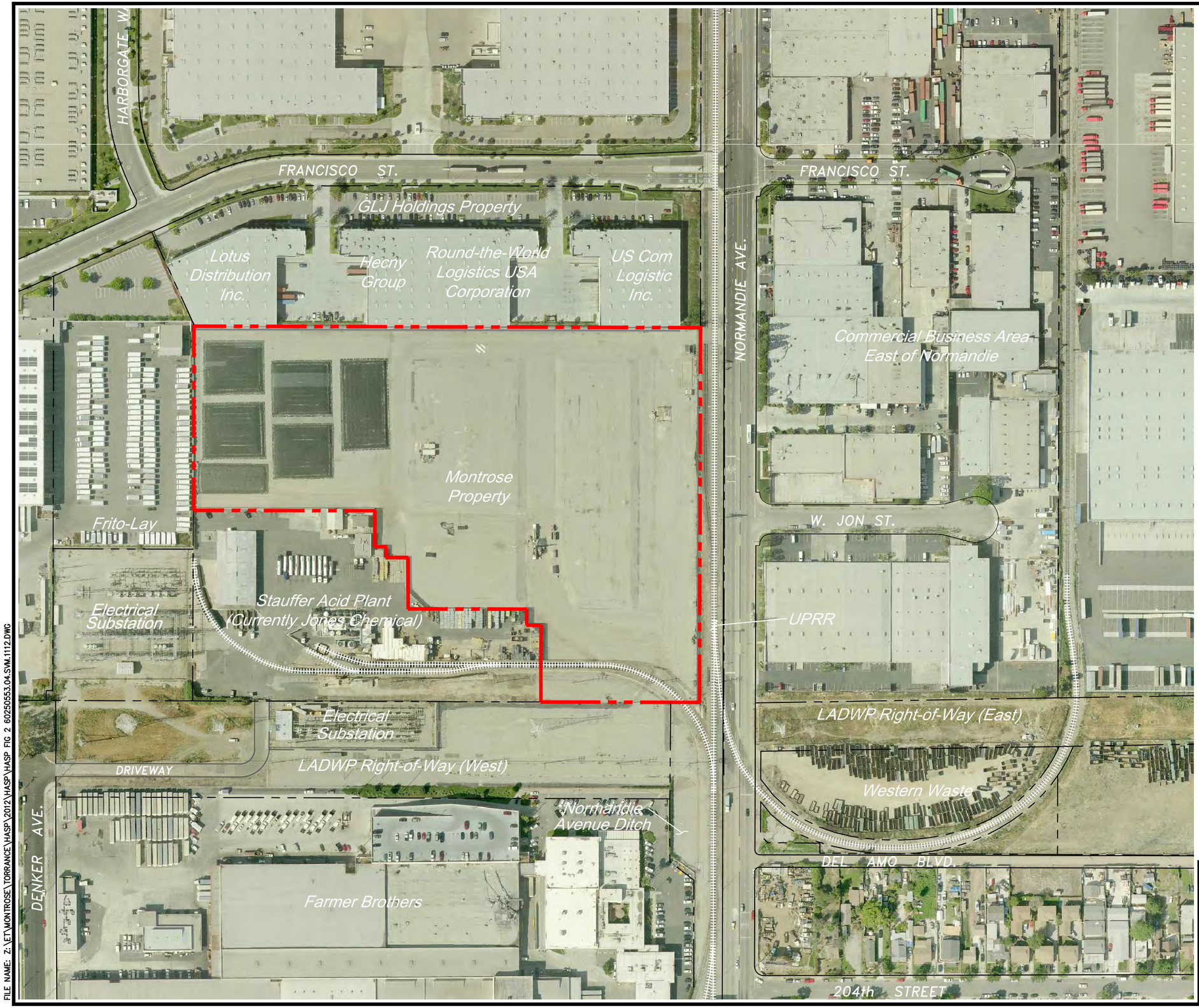
1. U.S.G.S. Topographic Map, Torrance, California 7.5 Minute Quadrangle. Georeferenced using the State of California's CASIL On-line GIS Database, Copyright 2010.

Montrose Chemical Corporation

Site Location Map

Date: 10-10	Montrose Superfund Site	Figure
Project No. 60150255	AECOM	2-1

FILE NAME: Z:\ET\MONTROSE\TORRANCE\SLM\2010\SLM.1010\60150255 SLM.1010.DWG



Legend:

- Location of Current Montrose Property Boundary
- Parcel Boundary / Right-of-Way
- LADWP — Los Angeles Department of Water and Power
- Existing Railroad Tracks

References:

1. Parcel Boundary Information from Los Angeles, CA, Department of Public Works, Online GIS data set, ©2009. Montrose Chemical Corporation Boundary Survey conducted August 13, 2001 by Dulin & Boynton Land Surveyors.
2. Satellite/Aerial Photos Reference: U.S.G.S Orthorectified Image, Dated July 29, 2009.

NORTH

0 100 200 FEET

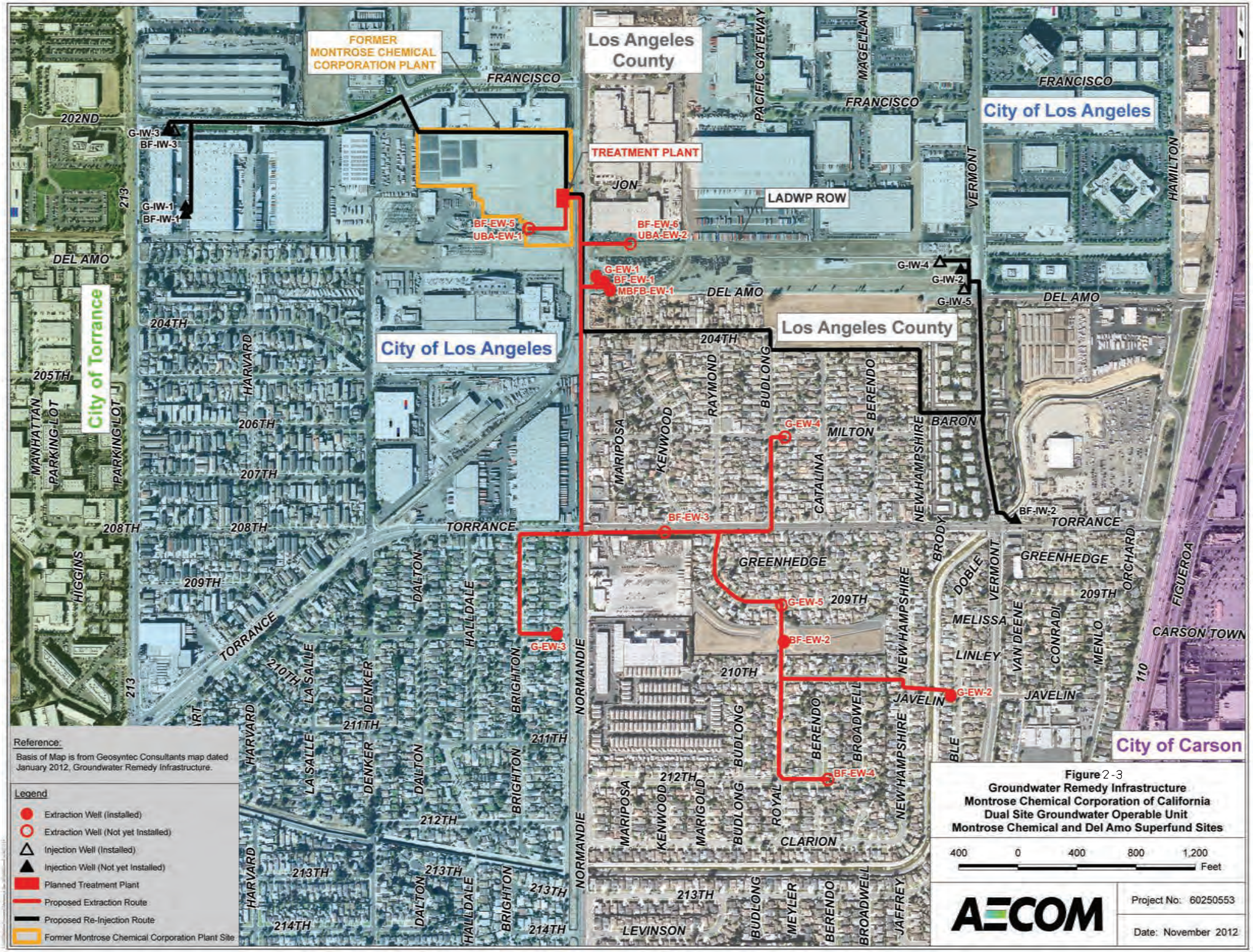
SCALE: 1"= 200'

Montrose Chemical Corporation

Site Vicinity Map

Date: 11-12	Montrose Superfund Site	Figure 2-2
Project No. 60250553	AECOM	

FILE NAME: Z:\ET\MONTROSE\TORRANCE\HASP\2012\HASP\HASP FIG 2 60250553.04.SVM.1112.DWG



Reference:

Basis of Map is from Geosyntec Consultants map dated January 2012, Groundwater Remedy Infrastructure.

Legend

- Extraction Well (installed)
- Extraction Well (Not yet Installed)
- Injection Well (Installed)
- Injection Well (Not yet Installed)
- Planned Treatment Plant
- Proposed Extraction Route
- Proposed Re-Injection Route
- Former Montrose Chemical Corporation Plant Site

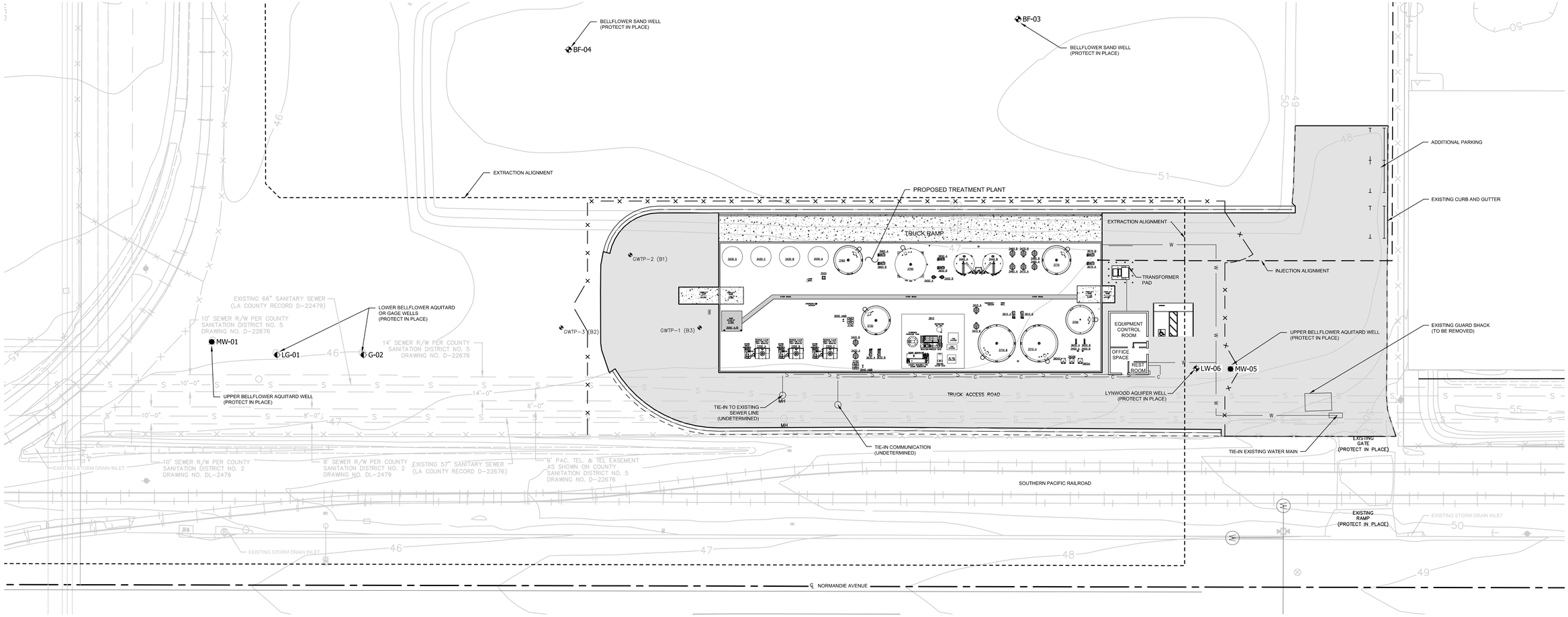
Figure 2-3
Groundwater Remedy Infrastructure
Montrose Chemical Corporation of California
Dual Site Groundwater Operable Unit
Montrose Chemical and Del Amo Superfund Sites

400 0 400 800 1,200 Feet

AECOM

Project No: 60250553

Date: November 2012



EXISTING SURVEY CONTROL POINTS

POINT ID	NORTHING	EASTING	ELEVATION
HV-32	1768032.180	6470070.390	56.85
HV-31	1767805.510	6469204.260	57.54
HV-33	1766030.050	6469316.510	42.31
HV-26	1766962.120	6471324.250	43.81
HV-23	1767897.950	6472617.380	36.32
HV-22	1765836.520	6472448.670	33.70

NOTE: POINTS MAY BE USED AS LOCAL DATUM FOR CONSTRUCTION.

LEGEND

- AECOM GEOTECHNICAL BORINGS
- INJECTION ALIGNMENT
- EXTRACTION ALIGNMENT
- PROPOSED CONCRETE
- PROPOSED A.C.
- PROPOSED TELECOMMUNICATION
- PROPOSED SEWER LINE
- PROPOSED ELECTRICAL LINE
- EXISTING SOUTHERN PACIFIC RAILROAD
- EXISTING FENCE LINE
- PROPOSED FENCE LINE
- EXISTING SEWER LINE
- TRAFFIC SIGNAL
- TRAFFIC CONTROL
- FIRE HYDRANT
- UTILITIES EXISTING WATER
- ELECT VAULT
- MANHOLE UNIDENT
- WATER VALVE

30 0 30 60
SCALE IN FEET

REV	DATE	DESCRIPTION	DRN	APP
A	06.01.12	FINAL COMPLETE SET SUBMITTAL	YBZ	BLP

Geosyntec consultants
2100 MAIN STREET, SUITE 150
HUNTINGTON BEACH, CALIFORNIA USA
PHONE: 714.969.0800

TITLE: SITE PLAN

PROJECT: TREATMENT PLANT
MONTROSE CHEMICAL CORPORATION OF CALIFORNIA

SITE: DUAL SITE GROUNDWATER OPERABLE UNIT
MONTROSE CHEMICAL AND DEL AMO SUPERFUND SITES

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED.

Mark Schultheis
SIGNATURE
6/03/12
DATE

REGISTERED PROFESSIONAL ENGINEER MARK D SCHULTHEIS No. C 30857 Exp: 3/31/14 CIVIL STATE OF CALIFORNIA

DESIGN BY:	CSC	DATE:	JUNE 1, 2012
DRAWN BY:	SLB	PROJECT NO.:	HM0450
CHECKED BY:	YBZ	FILE:	SB0450-C101.dwg
Figure No:	2-4	SHEET NO.:	_____ OF _____

US EPA ARCHIVE DOCUMENT

Jun 04, 2012 - 2:39pm SBandy - N:\CAD-GIS\M\MONTROSE - TORRANCE\MONTROSE - TORRANCE - HM0450\General\SB0450-C101.dwg

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 PROJECT MANAGER, MR. BRIAN DEAN

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The specific safety responsibilities for the PM are listed in SOP S3NA_209 Hazard Assessment and Project Planning provided in Attachment A. The PM will provide the Construction Manager with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations. Mr. Brian Dean of AECOM will serve as the PM for construction of the TGRS.

3.2 SAFETY PROFESSIONAL, MS. SHELLEY BROWN

The Safety Professional is the member of the AECOM Safety, Health and Environmental Department assigned to oversee health and safety requirements for the project and provide any needed technical support. The Safety Professional will be the first point-of-contact for all of the project's health and safety matters. Ms. Shelley Brown of AECOM will serve as the Safety Professional for construction of the TGRS. Duties include the following:

- Approving this HASP and any required changes.
- Approving the designated Site Safety Officer (SSO).
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

3.3 CONSTRUCTION MANAGER, MR. KEVIN THOMAS

The construction manager (CM) has the overall responsibility and authority to direct work operations at the job site in constructing the TGRS in accordance with Partial Consent Decree SOW (USEPA, 2012) and Final Remedial Design Drawings and Specifications (Geosyntec, 2012). Mr. Kevin Thomas of AECOM will serve as the CM for construction of the TGRS.

3.3.1 Responsibilities

The CM is responsible for:

- Reading and becoming familiar with the HASP
- Enforcing the HASP and other safety regulations
- Ensuring that no work is performed which is not properly addressed in this HASP (or approved supplemental guidance)
- Maintaining the presence of at least one qualified first aid provider on site at all times
- Contacting the Safety Professional for guidance regarding any health and safety related matters.
- Discuss deviations from the work plan with the SSO and PM.
- Discuss safety issues with the PM, SSO, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable SOPs.

3.3.2 Authority

The CM has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.

- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSO, the Safety Professional, and the PM.

3.3.3 Qualifications

In addition to being Hazardous Waste Operations and Emergency Response (HAZWOPER)-qualified (see Section 4.1), the CM is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

3.4 SITE SAFETY OFFICER, MR. KEVIN THOMAS

Mr. Kevin Thomas of AECOM will additionally serve as the SSO for construction of the TGRS. Mr. Thomas will be the supervising on-site representative for AECOM and will fulfill the responsibilities of the SSO in addition to the CM. Mr. Thomas is referred to as the CM/SSO in the remaining sections of this HASP.

3.4.1 Responsibilities

The SSO is responsible for:

- Conducting periodic safety reviews of the project site and project documentation.
- Performing regular and frequent site inspections to identify hazards and observe employees at work. Inspect the site for compliance with this HASP and the SOPs using the appropriate audit inspection checklist provided by an AECOM Safety Professional.
- Stopping work, as required, to maintain personal and environmental health and safety
- Conducting periodic safety reviews of the project site and project documentation
- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in AECOM Safety Policy.
- Monitor the lost time incidence rate for this project and work toward improving it.
- Work with the PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.
- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Stopping work, as required, to maintain personal and environmental health and safety
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Ensure that all site personnel and visitors have received the proper training and medical clearance prior to entering the site.
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation).
- Present tailgate safety meetings and maintain attendance logs and records.
- Implementing air monitoring according to directives in this HASP and forwarding all employee exposure monitoring information to the Safety Professional to enable the exposure notification
- Implementing the field elements of the AECOM Respiratory Protection Program
- Maintaining decontamination procedures, which meet established criteria.
- Discuss potential health and safety hazards with the Safety Professional and the PM.

- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site.

3.4.2 Authority

The SSO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a "Stop Work Order" under the conditions set forth in Section 4.7 of this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the Safety Professional and the PM.

3.4.3 Qualifications

In addition to being HAZWOPER-qualified (see Section 4.1), the SSO is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

3.5 EMPLOYEES

3.5.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.
- Notifying the CM/SSO, in writing, of unsafe conditions and acts.

3.5.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the CM/SSO or the Safety Professional at any time to discuss potential concerns.

3.6 SUBCONTRACTORS

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in S3NA_213_PR_Subcontractors provided in Attachment A. Each AECOM subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE).

AECOM considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the 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 to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the AECOM PM or the CM/SSO prior to beginning work operations. The CM/SSO or authorized representative has the authority to halt any subcontractor

operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

3.7 VISITORS

A number of parties are expected to visit the site during TGRS construction activities including client representatives (e.g., de maximis), regulatory agencies and oversight representatives (e.g., USEPA, State of California, and CH2M HILL), and municipal inspectors (e.g., City and County of Los Angeles). The visiting parties will be at the site to oversee but not conduct TGRS construction activities. Authorized visitors requiring entry to any work location on the site will be briefed by the CM/SSO on the hazards present at that location. Visitors will be escorted at all times 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 personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

Site personnel, including visitors, are required to immediately report any of the following to the CM/SSO:

- Accidents and injuries, no matter how minor
- Unexpected or uncontrolled releases of any hazardous substances
- Any symptoms of exposure to a hazardous substance
- Any unsafe or malfunctioning equipment
- Any changes in site conditions, which may affect the health or safety of project personnel.

4.0 SAFETY PROGRAMS

4.1 HAZWOPER QUALIFICATIONS

Personnel performing work at the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the CM/SSO), and must meet the medical monitoring and training requirements specified in the following safety procedures, which are provided in Attachment A:

- S3NA_509_PR_Hazardous Waste HAZWOPER Activities
- S3NA_519_PR_Respiratory Protection Program
- S3NA_605_PR_Medical Surveillance Program

Personnel must have successfully completed training meeting the provisions established in 29 CFR 1910.120 (e)(2) (40-hour initial training). As appropriate, personnel must also have completed annual refresher training in accordance with 29 CFR 1910.120 (e)(8); each person's most recent training course must have been completed within the previous 365 days. On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations shall receive at least eight additional hours of specialized hazardous waste operations management training meeting the provision established in 29 CFR 1910.120 (e)(4).

Personnel must also have completed a physical exam in accordance with the requirements of 29 CFR 1910.120 (f), where the medical evaluation includes a judgment of the employee's ability to use respiratory protective equipment and to participate in hazardous waste site activities.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document symptoms specific to the particular materials present.

4.2 SITE-SPECIFIC SAFETY TRAINING

All personnel performing field activities at the site will be trained in accordance with S3NA_003_PR_SH&E Training and the requirements specified in the following AECOM SH&E SOPs (copies of which are provided in Attachment A):

S3NA_001_PR_Safe Work Standards and Rules
S3NA_002_PR_Stop Work Authority for Unsafe Work
S3NA_004_PR_Incident Reporting
S3NA_005_PR_Vehicle and Driver Safety Program
S3NA_201_PR_Client Site Requirements
S3NA_202_PR_Competent Person Designation
S3NA_203_PR_Emergency Response Planning, Field
S3NA_204_PR_Environmental Compliance
S3NA_205_PR_Equipment Inspections & Maintenance
S3NA_206_PR_Fire Protection, Field
S3NA_207_PR_Medical Services and First Aid
S3NA_208_PR_Personal Protective Equipment Program
S3NA_209_PR_Hazard Assessment and Project Planning
S3NA_210_PR_Project Safety Meetings
S3NA_211_PR_Regulatory Inspections
S3NA_212_PR_Site Inspections
S3NA_301_PR_Confined Spaces
S3NA_302_PR_Electrical General
S3NA_303_PR_Excavation and Trenching
S3NA_304_PR_Fall Protection
S3NA_305_PR_Hand and Power Tools
S3NA_306_PR_Highway and Road Work
S3NA_307_PR_Housekeeping Worksite
S3NA_308_PR_Manual Lifting Field
S3NA_309_PR_Mobile or Heavy Equipment
S3NA_310_PR_Rigging, Hoisting, Cranes, and Lifting Devices
S3NA_312_PR_Stairways and Ladders
S3NA_313_PR_Wildlife Plants and Insects
S3NA_405_PR_Drilling Boring and Direct Push Probing
S3NA_406_PR_Electrical Lines, Overhead
S3NA_408_PR_Elevated Work Platforms and Aerial Lifts
S3NA_409_PR_Forklifts (operation of)
S3NA_410_PR_Hazardous Energy Control
S3NA_411_PR_Machine Guarding
S3NA_417_PR_Utilities, underground
S3NA_418_PR_Welding, Cutting and Other Hot Work
S3NA_505_PR_Cold Stress Prevention
S3NA_507_PR_Hazardous Materials Communication - WHMIS
S3NA_508_PR_Hazardous Materials Handling, Shipping, and Maintenance
S3NA_509_PR_Hazardous Waste Operations and Emergency Response
S3NA_510_PR_Hearing Conservation Program
S3NA_511_PR_Heat Stress Prevention
S3NA_519_PR_Respiratory Protection Program
S3NA_520_PR_Spill Response Incidental
S3NA_521_PR_Decontamination

In addition to the general health and safety training programs, personnel will be:

- Instructed on the contents of applicable portions of this HASP and any supplemental health and safety information developed for the tasks to be performed.
- Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure and heat stress.
- Made aware of task-specific physical hazards and other hazards that may be encountered during site work. This includes any client-specific required training for health and safety.
- Made aware of fire prevention measures, fire extinguishing methods, and evacuation procedures.
- The site-specific training will be performed prior to the worker performing the subject task or handling the impacted materials and on an as-needed basis thereafter. Training will be conducted by the CM/SSO (or his/her designee) and will be documented on the form attached to S3NA_210_PR_Project Safety Meetings provided in Attachment A.

4.3 COMMUNICATIONS

4.3.1 Hazard Communication

Section 5.3 provides information concerning the materials that may be encountered as environmental contaminants during the work activities. In addition, any organization wishing to bring any hazardous material onto any AECOM-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the CM/SSO for approval and filing (the CM/SSO will maintain copies of all MSDSs on site). In accordance with the requirements of S3NA_507_PR_Hazardous Materials Communication - WHMIS provided in Attachment A, all personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDSs. MSDSs will be updated as required during TGRS construction.

All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

4.3.2 Permit to Work Activities

The following TGRS construction activities pose specific safety hazards that require a safe work permit to be issued by the CM/SSO prior to the start of work.

Confined Spaces

Deep pipeline trenches, jack and bore pits, and concrete vaults are expected to be confined spaces and will require a safe work permit from the CM/SSO in order for construction personnel to enter these spaces. The CM/SSO will identify all potential confined spaces in accordance with SOP S3NA_301_PR_Confined Spaces provided in Attachment A. The AECOM CM/SSO, Kevin Thomas, has been trained as a confined space "Competent Person", and as such, is authorized to issue a safe work permit to enter a confined space. There are numerous requirements in order for personnel to enter a confined space. Trench boxes, shoring, or other form of mechanical support may be required. Other requirements may include atmosphere monitoring, communication system, ladders, harness and retrieval system, and rescue personnel.

Energized Work

Working on or near energized parts covers either potential direct physical contact or contact by means of tools or equipment and working close to the energized part to draw an arc. Energized work will be done in accordance with SOP S3NA_302_PR_Electrical, General and will require S3NA_302_FM_Energized Electrical Work Permit to be completed prior to the start of any energized electrical work. Only the CM/SSO is authorized to issue an energized electrical work permit.

Welding, Cutting and other 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 is defined as Hot Work. TGRS construction activities include trenching across gasoline/fuel and natural gas lines along some pipeline trenches. At these locations, Hot Work would pose a safety hazard and is prohibited unless authorized by both the CM/SSO and pipeline/utility company.
Hot Work will be performed in accordance with SOP S3NA_418_PR_Welding Cutting and Other Hot Work provided in Attachment A. Restrictions on Hot Work only apply to working around combustible gas or liquid lines. There are no combustible gas or liquid sources at the Montrose Plant Property, and there will be no restrictions on Hot Work when construction the treatment plant.

4.3.3 Project Initiation or Kick-off Meetings

A project initiation/kick-off safety meeting will be conducted prior to the start of field operations, in accordance with SOP S3NA_210_PR_Project Safety Meetings provided in Attachment A. This meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site. Topics for this meeting will include:

- Communication of all participants regarding on site SH&E responsibilities and authority,
- Communication of organizational SH&E performance expectations,
- Identification of significant project SH&E issues, risks, and solutions and
- Coordination of organizational SH&E conflicts and interactions.

If an employee or subcontractor joins the project after the Project Initiation or Kick-off Meeting has occurred, then a site specific orientation meeting will be held to bring the employee or subcontractor up to speed on SH&E requirements. Since multiple subcontractors will be providing services at various times throughout construction of the TGRS (not all at start of construction), multiple orientation/kick-off meetings will be conducted as needed to ensure that all employees/subcontractors receive this site-specific training.

4.3.4 Daily/Tailgate Safety Meetings

Site-specific tailgate safety meetings will be performed daily prior to the worker performing the subject task or handling the impacted materials. Tailgate safety meetings will be held on an as-needed basis thereafter, in accordance with SOP S3NA_210_PR_Project Safety Meetings provided in Attachment A. Tailgate safety meetings will be conducted by the CM/SSO (or his/her designee) and will be documented on the form in S3NA_210_PR_Project Safety Meetings. At a minimum the training will include:

- A review of the scope of work, including the Job Safety Analysis/Task Hazard Analysis and SH&E SOPs, applicable to that day's work (hazards and control methods including PPE),
- A review of emergency procedures and the location of emergency supplies (evacuation routes, fire extinguishers, first aid kits, eye wash stations),
- A review of any safety observations, near misses or incidents, and
- An opportunity to ask questions and discuss any unresolved or unclear items.

4.4 WASTE MANAGEMENT

TGRS construction activities are expected to generate a range of wastes requiring management including asphalt/concrete debris, used PPE, decontamination fluids, and development groundwater. Contaminated soils are not anticipated to be encountered during off-Property trenching activities, but DDT-impacted soils likely will be encountered on the Montrose Property. Impacted soils within the same Areas of Contamination will not be disposed off-site but will be used as backfill for trenches, excavations, and grading. Asphalt/concrete debris,

used PPE, or decontamination fluids generated during impacted soil handling will be managed, contained, and disposed in accordance with Federal, State, and/or local regulations.

4.5 GENERAL SAFETY RULES

All site personnel shall adhere to SOP S3NA_001_PR_Safe Work Standards and Rules provided in Attachment A, during site operations.

4.5.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. In addition, the housekeeping, sanitation, and personal hygiene requirements in SOP S3NA_307_PR_Housekeeping Worksite will be observed (Attachment A).

4.5.2 Smoking, Eating, or Drinking

Smoking is prohibited at the Montrose Superfund Site. Eating/drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at all AECOM sites.

4.5.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

> *Potable Water* - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
>
> *Non-Potable Water* - Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:
>
> ***Non-Potable Water***
> ***Not Intended for Drinking Water Consumption***

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities, on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities at each work location (e.g., buckets with water and Alconox or portable hand washing stations). The use of water and hand soap (or similar substance) will be required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.6 BUDDY SYSTEM/WORKING ALONE

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for AECOM personnel. Under no circumstances will any employee be present alone in a controlled work area. For areas not in controlled work areas, the procedures outlined in SOP S3NA_314_PR_Working Alone and Remote Travel will be followed at all times (Attachment A).

4.7 SAFETY OBSERVATIONS

Safety Observations are observations made by employees or subcontractors of a condition or behavior which could contribute to an incident, prior to the incident occurring. Observations can identify at-risk behaviors or conditions as well as positive behaviors or conditions which contribute to preventing an incident.

Safety Observations shall be documented on a Safety Observation Report, in **Attachment D**. All Safety Observations shall be submitted to the CM/SSO and Safety Professional by the end of the work shift.

4.8 STOP WORK AUTHORITY

All employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions as outlined in SOP S3NA_002_PR_Stop Work Authority for Unsafe Work provided in Attachment A. Whenever the CM/SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the CM/SSO is authorized and required to stop work, which shall be immediately binding on all affected AECOM employees and subcontractors.

Upon issuing the stop work order, the CM/SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

A Stop Work Order is located in S3NA_002_PR_Stop Work Authority for Unsafe Work.

4.9 SITE CONTROL

Controlled work areas will be established to protect personnel and non-personnel in the vicinity from any work-related hazards. Refer to Section 8.0 for site control procedures.

4.10 ENVIRONMENTAL COMPLIANCE AND MANAGEMENT

This project and the individual tasks will comply with all federal, state, and local environmental requirements.

5.0 CHEMICAL HAZARD ASSESSMENT

5.1 HAZARD ANALYSIS

Task hazard analysis (THA) or Job Safety Analysis (JSA) is a technique used to identify hazards and hazard controls associated with a specific job function. THAs/JSAs focus on the relationship between the workers, the task, the resources required to complete the task, and the work environment. These variables must be evaluated to identify the potential hazards associated with the task. Once identified, steps can be taken to eliminate, reduce, or control the hazards to an acceptable risk level. Guidelines for developing THAs/JSAs are located in SOP S3NA_209_PR_Hazard Assessment and Project Planning provided in Attachment A.

Section 2.2 describes the work activities anticipated to be performed during this project. Individual THAs/JSAs for the tasks associated with this work can be found in **Attachment E** including:

1. Underground Utility Clearance
2. Driving
3. General Site Visits
4. Mobilization and Demobilization
5. Sawcut, Breakout and Removal
6. Hand Auger
7. Hollow Stem Auger Drilling
8. Mud Rotary Drilling
9. Groundwater Well Development
10. Groundwater Well Extraction/Injection Testing
11. Trench and Pipe Installation
12. Backfill and Compaction
13. Asphalt Work
14. Grading Activities
15. Crane, hoisting, and lifting activities
16. Concrete Replacement
17. Form and Pour Concrete Pad
18. Electrical Work
19. Straight Ladder Use
20. Setting of Equipment
21. Above Ground Piping
22. Anchor Bolt Installation
23. Management and Handling of Derived Waste

5.2 UNANTICIPATED WORK ACTIVITIES/CONDITIONS

Operations at the site may require additional tasks not identified in Section 2.2 of this HASP. Before performing any task not covered in this HASP, a THA/JSA must be prepared, and approved by the Safety Professional.

5.2.1 Management of Change

AECOM and/or the contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions or change in scope of work. To ensure the right people are involved in addressing hazards associated with changes, the Management of Change (MOC) process, including completion of an AECOM MOC Report, will be used to ensure changes are captured and addressed. The MOC Report is provided in **Attachment F**.

5.2.2 Modification to the HASP

Should unanticipated work activities/conditions or changed to the field condition or scope of work required modification to the HASP, changes will be made by the Project Manager, then reviewed and approved by the Project Safety Professional. Changes and approvals will be documented on the HASP Revision Log. All changes will be reviewed with the affected workers, and their acceptance will be documented on Daily Safety Meeting Documentation. HASP revisions, if any, will additionally be submitted to USEPA for review and approval.

5.3 ENVIRONMENTAL CONTAMINANT EXPOSURE HAZARDS

The following is a discussion of the hazards presented to worker personnel during this project from on-site environmental contaminants known or suspected to be present on site. Hazards associated with chemical products brought to the site during work operations are addressed separately, under the Hazard Communication process described in Section 4.3.

Planned work activities present potential chemical hazards to which personnel may be exposed. Shallow soils at the Montrose Plant Property within the extent of TGRS construction are known to contain Total DDT concentrations up to approximately 10,000 milligrams per kilogram (mg/kg) and Total BHC concentrations up to approximately 1,000 mg/kg (see Revised Supplemental Soil Investigation Report, AECOM, 2012a). Certain TGRS construction activities (e.g., excavation and trenching) will involve handling of pesticide-impacted soils. Additionally, workers may be exposed to groundwater contaminants including volatile organic compounds (VOCs; primarily chlorobenzene) during installation and testing of the TGRS extraction and injection wells. The dissolved VOCs estimated to occur in TGRS influent groundwater at concentrations above USEPA In-Situ Groundwater Standards (USEPA, 1999) were presented in Drawing D-601 of the Final Remedial Design Drawings (Geosyntec, 2012) and the 2012 Groundwater Monitoring Report (AECOM, 2012b). Shallow soils within the TGRS construction area at the Montrose Property contain only trace levels of VOCs, so the primary exposure pathway to VOCs during construction is expected to be from handling groundwater.

The information presented below is intended to inform site personnel about chemical hazards associated with known or suspected environmental contaminants. Should previously unknown contaminants be identified at the site, the Safety Professional will update the information on hazards accordingly. The chemicals, their permissible action level and respiratory protection are provided in Tables 5-1 and 5-2. Chemicals of concern (COCs) associated with the TGRS construction activities are discussed in the following sections.

Table 5-1: Summary of Maximum Chemical Concentrations for TGRS Construction

Chemical Name	Concentration	Location
DDT and metabolites	10,000 mg/kg	Shallow On-Property Soils
BHC Isomers	1,000 mg/kg	
Chlorobenzene	130,000 ug/L	Groundwater at TGRS Extraction and Injection Wells
PCE	17,000 ug/L	
Chloroform	14,000 ug/L	
Benzene	7,000 ug/L	
TCE	1,100 ug/L	
Carbon Tetrachloride	81 ug/L	
1,4-Dichlorobenzene	53 ug/L	

mg/kg: milligrams per kilogram
ug/L: micrograms per liter

Chlorobenzene is the primary dissolved VOC occurring in groundwater beneath the site. Other VOCs are present in groundwater but occur at lower concentrations and frequencies. The more prevalent dissolved VOCs are listed in Table 5-1 above and discussed in this section. A more complete description of VOC occurrence in groundwater is provided in the 2012 Groundwater Monitoring Report (AECOM, 2012b). If VOCs other than those listed in the table above are detected at elevated concentrations likely to affect exposure levels during TGRS construction, then this section will be updated and submitted as an addendum to the HASP.

Chlorobenzene concentrations are highest near the Montrose Property and decrease in the downgradient direction. For TGRS extraction wells located in the downgradient areas, the exposure hazard to VOC-impacted groundwater during well drilling and testing is reduced. Additionally, the TGRS injection wells are located along the flanks of the chlorobenzene plume, where VOC concentrations are low and below in-situ groundwater standards. Installation and testing of TGRS injection wells is unlikely to pose an exposure hazard.

5.3.1 DDT and metabolites (2,4'- and 4,4'-DDT, DDE, and DDD)

DDT is a colorless to white crystalline material with a slight aromatic odor that is insoluble in water, but soluble in most organic solvents. DDT formerly saw widespread use as a pesticide, but it has not been used in

agriculture since 1973. Toxicity of DDT to humans is low, however in high concentrations, persons may experience headache, dizziness, sweating and confusion, and in extreme cases, tremors, or convulsions. Long-term chronic exposures can lead to liver damage, but claims of carcinogenicity have not been proven. DDT is not biodegradable; it can bioaccumulate within the food chain, and is ecologically damaging (especially to birds). Breakdown of DDT occurs through removal of chlorine atoms from the ethane group, producing the products DDD and DDE, which present similar hazards to DDT.

The American Conference of Government Hygienists (ACGIH) threshold limit value (TLV) and OSHA permissible exposure limit (PEL) for DDT is 1 milligram per cubic meter (mg/m^3)(but it is notable that the FDA tolerance is 5 ppm in foods). As a solid, DDT's primary exposure route is via inhalation. Protection can be provided using air purifying respirators equipped with N95 (or greater) cartridges. However, creation of airborne concentrations of DDT above the exposure limits is unlikely. A DDT in-soil concentration of 100,000 mg/kg would yield an airborne concentration of only 0.5 mg/m^3 (one-half the exposure limit) at a total airborne dust concentration of 5 mg/m^3, which is the HASP-specified limit. DDT can also present a limited skin contact hazard, and use of protective clothing to prevent such contact is necessary.

5.3.2 Benzene Hexachloride and Isomers (alpha, beta, delta, and gamma)

Benzene hexachloride (BHC) or any of several isomeric compounds (i.e. of the same composition but different structures) is formed by the reaction of chlorine with benzene in the presence of light; one of these isomers is an insecticide called Lindane.

Symptoms of exposure include vomiting and restlessness, muscle spasms, ataxia and seizures may occur. In addition to these symptoms exposure to vaporized benzene hexachloride or Lindane will produce irritation of eyes, nose and throat. Such symptoms disappear rapidly upon removal from further exposure.

No special PPE beyond what is listed in the THAs (Attachment E) are required for operations where there is potential contact with BHC. No Cal-OSHA PEL is established for BHC.

5.3.3 Chlorobenzene

Chlorobenzene is a colorless, flammable liquid with an aromatic, almond-like odor. Some of it will dissolve in water, but it can also evaporate into air. It does not occur naturally in the environment.

Chlorobenzene production in the United States has declined by more than 60% from its peak in 1960. It was used in the past to make other chemicals, such as phenol and DDT. Now, chlorobenzene is used as a solvent for some pesticide formulations, to degrease automobile parts, and as a chemical intermediate to make several other chemicals.

Chlorobenzene is not a human carcinogen. Workers exposed to high levels of chlorobenzene in the air complained of headaches, nausea, sleepiness, numbness, and vomiting. It is not certain that all of these effects were due to chlorobenzene exposure because the workers may have been exposed to other chemicals. Small amounts of chlorobenzene in the outdoors are not expected to cause harm to personnel. To avoid exposure through skin or ingestion, nitrile gloves are recommended while handling or collection soil, and personal hygiene is required before breaks and after each workday. The OSHA PEL for chlorobenzene is 75 parts per million (ppm), and the ACGIH TLV for chlorobenzene is 10 ppm. The Cal-OSHA PEL for chlorobenzene is 10 ppm.

5.3.4 Benzene

Benzene is a colorless aromatic liquid that is highly flammable. It will readily dissolve in water and evaporate into air. Benzene is approximately four times more soluble and nine times more volatile than chlorobenzene. Benzene occurs naturally as a component of petroleum and is widely used in the petrochemical industry.

Benzene is a known human carcinogen. Prolonged skin contact with benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. Continued exposure can cause collapse, bronchitis, and pneumonia. The most important health hazards are cancer (leukemia), bone marrow effects, and injuries to the blood-forming tissue from chronic low-level exposure. The OSHA PEL is 1 ppm, the ACGIH TLV is 0.5 ppm, and the Cal-OSHA PEL is 0.1 ppm.

5.3.5 Chloroform

Chloroform is a colorless liquid with a pleasant, non-irritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures.

Chloroform acts as a relatively potent anesthetic. Chloroform irritates respiratory tract and causes central nervous system effects, including headache, drowsiness, and dizziness. Chloroform may cause liver injury and blood disorders. Prolonged exposure may lead to death due to irregular heartbeat and kidney and liver disorders. Chloroform may be absorbed through the skin and causes skin irritation resulting in redness and pain. The TWA-TLV for chloroform is 10 ppm. The OSHA PEL for chloroform is 50 ppm (ceiling).

5.3.6 Carbon Tetrachloride

Potential exposure symptoms include: irritation of eyes, skin; CNS depression; nausea, vomiting; liver, kidney damage; drowsiness, dizziness, in coordination; dermatitis; abdominal pain; and diarrhea. The National Toxicology Program's has reasonably considered carbon tetrachloride to be a carcinogen. The OSHA PEL is 10 ppm, and the ACGIH TLV is 5 ppm for carbon tetrachloride.

5.3.7 Tetrachloroethylene (PCE)

Tetrachloroethylene or perchloroethylene (PCE) affects the central nervous system, causing lack of coordination, headache, vertigo (loss of balance), light narcosis, dizziness, and unconsciousness. In extremely high concentrations, death may occur. Various types of irritable effects have been attributed to PCE exposure. Some of the symptoms involved include: eye, nose, and throat irritation, indications of nausea and intestinal gas, and possible changes to both the liver and the kidneys. Skin exposure to PCE has not been seen to produce harmful effects in cases where the PCE was allowed to evaporate immediately after contact. However, in cases where skin was exposed to PCE frequently and for prolonged periods of time without evaporating, symptoms of dermatitis by defatting of the skin was evident. PCE is listed as an anticipated human carcinogen by the National Toxicology Program. The OSHA PEL is 100 ppm while the ACGIH TLV is 25 ppm, with an ACGIH STEL of 100 ppm. The Cal-OSHA PEL for PCE is 25 ppm.

5.3.8 Trichloroethylene (TCE)

Moderate exposures to trichloroethylene (TCE) cause symptoms similar to those of alcohol inebriation. Higher concentrations cause narcotic effects. Ventricular fibrillation has been cited as the cause of death following heavy exposures. Organ systems affected by overexposure to TCE are the central nervous system [CNS (e.g., euphoria, analgesia, anesthesia)], degeneration of the liver and kidneys, the lungs (tachypnea), heart (arrhythmia) and skin (irritation, dryness, and paralysis of fingers when immersed in liquid TCE). Contact with the liquid TCE may defat the skin, causing topical dermatitis. Certain people appear to experience synergistic effects from TCE exposure concomitant with exposure to caffeine, alcohol, and other drugs. Other reported symptoms of TCE exposure include abnormal fatigue, headache, irritability, gastric disturbances, and intolerance to alcohol.

The OSHA PEL is 100 ppm while the ACGIH TLV is 50 ppm. The ACGIH STEL is set at 100 ppm. Cal-OSHA PEL for TCE is 25 ppm. Protection against inhalation exposure can be provided through the use of air purifying respiratory protection (i.e. using organic vapor cartridges). Use of protective clothing is adequate to prevent skin contact.

5.3.9 1,4-Dichlorobenzene

Exposure to 1,4- Dichlorobenzene (1,4-DCB) may cause eye and upper respiratory tract irritation, headache, swelling around the eyes, runny nose, nausea, anorexia, weight loss, liver and kidney damage, and blood dyscrasias, including leukemia. Contact of the eye with particles of 1,4-DCB causes pain, and direct skin contact with this substance causes a burning sensation and slight skin irritation. If swallowed, it may cause a burning pain in the stomach, nausea, vomiting, diarrhea, and methemoglobinemia. 1,4-dichlorobenzene is listed as a carcinogen or potential carcinogen. The OSHA PEL is 75 ppm and the ACGIH TLV is 10 ppm for 1,4-dichlorobenzene. Cal OSHA enforces a PEL of 10 ppm.

Table 5-2: Summary of Hazardous Properties of Contaminant Exposure Hazards

Chemical Name	PEL[1]	TLV[2]	VP[3]	VD[4]	SG[5]	SOL[6]	FP[7]	IP[8]	LEL[9]	UEL[10]
Benzene (Ca.)	1	0.5	75	2.8	0.88	0.18	12	9.25	1.2	7.8
Chlorobenzene	75	10	9	3.9	1.11	0.05	82	9.06	1.3	9.6
Chloroform	50	10	160	4.3	1.48	0.80	NA	11.37	NA	NA
Carbon Tetrachloride	10	5	91	5.9	1.6	0.08	NA	11.47	NA	NA
1,4-Dichlorobenzene	75	10	1.3	5.1	1.25	.008	150	8.98	6.2	16.0
DDT and metabolites	1 mg/m^3	1 mg/m^3	<1	NA	1.5	Insul.	NA	NA	NA	NA
BHC Isomers	0.5 mg/m^3	0.5 mg/m^3	<1	NA	1.89	<0.001	NA	NA	NA	NA
PCE	100	25	14	4.9	1.62	.02	NA	9.32	NA	NA
TCE	100	50	58	4.9	1.46	.11	NA	9.45	8	10.5

1 Permissible Exposure Limit in ppm
2 Threshold Limit Value in ppm
3 Vapor Pressure in mm Hg
4 Vapor Density (air = 1)
5 Specific Gravity (water = 1)
6 Solubility in Water in %
7 Flash Point in °F
8 Ionization Potential (eV)
9 Lower Explosive Limit in % by volume
10 Upper Explosive Limit in % by volume
NA Not Available
Ca. Carcinogen (Title 8 5209)

5.4 ASSESSMENT OF ENVIRONMENTAL CONTAMINANT EXPOSURE HAZARDS

Inhalation - Personnel installing and testing TGRS groundwater extraction wells may become exposed to VOCs, but exposure durations will be short and are not expected to pose a significant hazard to personnel. Dissolved VOC concentrations decline in the downgradient areas, and therefore, the exposure hazard will be reduced during installation of some extraction wells. Additionally, TGRS injection wells are located in areas containing little or no VOC impacts, and therefore, there will be little or no exposure hazard during installation and testing of the injection wells. Exposure monitoring will be required during well installation and testing activities, although the use of respiratory protection is unlikely to be required. Personnel handling soil during excavation, trenching, and grading at the Montrose Plant Property may be exposed to DDT-impacted dust. Dust control methods will be used to minimize the exposure potential, but respiratory protection may still be required within the work area.

Skin Contact - There is possible dermal exposure to pesticides (DDT and BHC) contaminants when excavating, trenching, or grading soil at the Montrose Property, but protection against skin contact/absorption can be accomplished through the use of protective gloves/clothing (see Section 7.0)

Ingestion – If proper PPE and personal hygiene practices are followed, cross-contamination of food/beverages, which could lead to ingestion of contaminants is highly unlikely. Decontamination procedures will be implemented when exiting contaminated work areas to prevent such exposures (see Section 9.0).

5.5 ENVIRONMENTAL CONTAMINANT EXPOSURE CONTROL

Monitoring procedures will be employed during site characterization activities to assess employee exposure to chemical hazards and to control exposure. Monitoring will consist primarily of on-site determination of various parameters (e.g., airborne contaminant concentrations) but may be supplemented by more sophisticated monitoring techniques, if necessary.

5.5.1 Real-Time Exposure Measurement

Monitoring will be performed within the work area in order to detect the presence and relative concentrations of hazardous substances. The data collected throughout monitoring will be used to determine action levels and personal protective equipment requirements.

Additionally, monitoring will be performed during tasks where exposure to hazardous substances is possible. The instruments required for the assessment and on-going monitoring of worker exposure are outlined in Table 5-3.

5.5.2 Air Monitoring Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone.

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions, etc.) must be implemented prior to commencing activities at the specific work area. DDT and chlorobenzene are the primary contaminants of concern, and based on these primary chemicals, the following air monitoring methods and action levels are required during TGRS construction.

Table 5-3: Air Monitoring Equipment and Requirements

INSTRUMENT	REQUIRED FOR TASKS	LOCATION	FREQUENCY
Photo Ionization Detector (PID), 11.7 eV Lamp	All tasks where exposure to VOCs is possible, e.g., TGRS well installation and testing	Breathing Zone Work Area	Every 15 minutes during groundwater handling activities Initial entry, as needed
Colorimetric Tube (Chlorobenzene)		Breathing Zone Work Area	Confirmation when PID detects VOCs above background levels on a consistent basis.
Aerosols (total by miniRAM)	All tasks where dust generation is possible	Breathing Zone	Every 15 minutes during soil handling activities

Table 5-4: Air Monitoring Action Levels (Chlorobenzene)

Zone Location and Monitoring Interval	ACTION LEVEL Sustained Readings (for 5 minutes)	Response Activity
Breathing Zone, every 15 minutes during groundwater handling activities	PID reading > background and < 10 ppm chlorobenzene	Continue work in Level D PPE and continue monitoring.
	PID reading > background and 10 – 75 ppm chlorobenzene	Contact the CM/SSO, implement mitigation measures, and upgrade PPE to Level C (organic vapor cartridges).
	PID reading > background and >75 ppm chlorobenzene	Cease work, exit, and contact the CM/SSO[1].

Zone Location and Monitoring Interval	ACTION LEVEL Sustained Readings (for 5 minutes)	Response Activity
Edge of Exclusion Zone, every 15 minutes during groundwater handling activities	PID reading > background and < 10 ppm chlorobenzene	Continue work in Level D PPE and continue monitoring.
	PID reading > background and >10 ppm chlorobenzene	Cease work, exit, and contact the CM/SSO.

Note:
[1] Although Level C respiratory protection may be adequate for short-term chlorobenzene exposure at concentrations greater than 75 ppm, TGRS construction activities are not expected to produce breathing zone concentrations of this magnitude.

Table 5-5: Aerosol Monitoring Procedure Action Levels

PARAMETER	ZONE LOCATION AND MONITORING INTERVAL	ACTION LEVEL (ABOVE BACKGROUND)	RESPONSE ACTIVITY
Aerosols (total by miniRAM)	Breathing Zone, every 15 minutes during soil handling activities	< 5 mg/m^3	Continue work in Level D PPE and continue monitoring.
		5 – 10 mg/m^3	Continue work in Level D PPE, implement dust mitigation measures, and continue monitoring
		10 – 20 mg/m^3	Contact the CM/SSO, implement mitigation measures, and upgrade PPE to Level C (combination P100/organic vapor cartridge).
		> 20 mg/m	Cease work, exit, and contact the CM/SSO.
	Edge of Exclusion Zones, every 15 minutes during soil handling activities	< 5 mg/m^3	Continue work.
		> 5 mg/m^3	Stop work and contact the CM/SSO.

Note: All dust particulates monitoring will be conducted using PD3 miniRAM

In addition to dust monitoring within the EZ, dust levels will be monitored at the downwind extent of the EZ to ensure that contaminated dust is not migrating outside of the controlled work area. In accordance with South Coast Air Quality Management District requirements (Rule 403), dust levels on the downwind side of the work area must not exceed 0.05 mg/m^3 of the upwind or background dust levels. Stationary dust meters should be located on both the upwind and downwind side of the EZ in order to monitor dust levels in compliance with this requirement. The wind direction at the site can be determined using a wind sock or portable wind meter. Wind speed and direction readings can additionally be downloaded from the meteorology station on top of the Honda Motor Company building located less than one mile from the site. Based on past AECOM experience, controlling downwind dust levels can be problematic at wind speeds above 15 miles per hour. It may be necessary to suspend handling of pesticide-impacted soils when wind speeds exceed 15 miles per hour.

Dust levels will be controlled using a water spray or other dust suppressant. When not in use, soil piles will be covered with plastic sheeting or tarps, and the sheeting anchored with sand bags. The volumes of pesticide-impacted soils handled at any one time should also be minimized to reduce the potential for wind-blown dust.

5.5.3 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency or manufacturer for technical guidance for proper calibration. If equipment cannot be pre-calibrated to specifications, site operations requiring monitoring for

worker exposure or off-site migration of contaminants will be postponed or temporarily ceased (Stop Work) until this requirement is completed.

5.5.4 Personal Exposure Sampling

Should site activities warrant performing personal sampling to better assess chemical exposures experienced by AECOM employees, the CM/SSO, under the direction of a Certified Industrial Hygienist (CIH), will be responsible for specifying the monitoring required. Within five working days after the receipt of monitoring results, the CIH will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the project files.

If the site activities warrant, the subcontractor will ensure its employees' exposures are quantified via the use of appropriate sampling techniques. The subcontractor shall notify the employees sampled in accordance with health and safety regulations, and provide the results to the CM/SSO for use in determining the potential for other employees' exposure.

6.0 PHYSICAL HAZARDS ASSESSMENT AND CONTROLS

The following section summarized the physical hazards anticipated for the planned scope of work.

6.1 DRIVING SAFETY

Drivers must be licensed to drive the class of vehicle they are operating and trained in defensive driving. Only AECOM personnel may drive AECOM vehicles or vehicles rented for AECOM business; client, subcontractor, or other work-related personnel may ride as passengers in AECOM vehicles, but may not operate these vehicles. Drivers and passengers must comply with all traffic laws and posted signs, and will not operate a vehicle if under the influence of impairing medication, alcohol, or any other substance.

6.1.1 Department of Transportation

If you are to operate a vehicle exceeding 10,000 pounds (or vehicle and trailer with a combined weight over 10,000 pounds), or you are to transport hazardous materials, you must comply with Department of Transportation (DOT) regulations.

6.1.2 Distractions

You should avoid operating a vehicle while talking on your cell phone even when using a hands-free device. Do not allow other distractions to interfere with your safe operation of the vehicle.

6.1.3 Secure Packing

Do not move your vehicle unless all equipment and supplies are secured. Items and material which may roll, slide, or move about in your vehicle while traveling are a major hazard. Secure the load! Refer to SOP S3NA_005_PR_Vehicle and Driver Safety Program in Attachment A for details.

6.2 UNDERGROUND UTILITY HAZARDS

TGRS construction activities include trenching through public streets and across a number of underground utilities including gasoline/fuel, natural gas, water, and sewage. California law requires that a utility clearance survey must be performed before any subsurface activities are performed. This law applies to private property as well as public property and covers all subsurface activities, regardless of depth. The utility clearance survey must be requested from:

Underground Service Alert (USA) South at 1-800-227-2600.

The survey must be requested at least 2 full business days, but no more than 14 business days, prior to conducting the subsurface activities. USA will provide the caller with a confirmation number, which should be recorded. The USA confirmation number must be updated by requesting a remark every 14 days if subsurface activities continue. Prior to the survey, the law requires that you outline the area in which the subsurface activities will take place in white paint. Excavation outside of the originally specified boundaries requires that a new survey be performed.

Utility companies often cannot identify the exact location of all underground services on private property. Private property owners may have rerouted these services or installed their own. On private property, a representative of the client should pre-approve the location of all subsurface activities. Refer to SOP S3NA_417_PR_Utilities Underground in Attachment A for details.

6.3 OVERHEAD UTILITY HAZARDS

Canopies, ceilings, overhead electrical or telephone lines, and street lighting may all be present in the work area posing a risk of an striking an overhead obstruction. Refer to SOP SNA_406_PR_Electrical Lines, Overhead in Attachment A for further details. An evaluation of the construction area will be completed and all overhead obstructions will be indentified prior to starting work. Any vehicle or mechanical equipment that is capable of having parts of its structure elevated near energized overhead lines will be operated so that a minimum clearance of 10 feet is maintained at all times. A portion of the TGRS construction activities will be conducted in close

proximity to Los Angeles Department of Water and Power (LADWP) right-of-ways. In addition to the above requirements, TGRS construction activities will comply with LADWP requirements where applicable to the work area.

6.4 CRANE HAZARD

Prior to operating a crane to hoist equipment/parts, a lift plan will be provided by the crane operator to AECOM. AECOM will review and approve the plan before work can commence.

6.5 TRAFFIC SAFETY

TGRS construction activities will include trenching and well installation within public streets including some high traffic areas. Traffic control plans will be prepared and approved in advance of field mobilization in accordance with municipal requirements. Traffic control measures will be implemented in accordance with the approved plans to protect workers from vehicles, safely direct traffic around the work area, and minimize disruptions of traffic. Barricades and signs will be used as needed, and workers will wear orange traffic vests. Flag men will be used to assist slow moving or large construction equipment and vehicles moving in or out of the work area or Montrose Plant Property. In accordance with City of Los Angeles requirements, construction vehicles will not line up or otherwise significantly impair traffic during congested peak hours. Refer to SOP S3NA_306_PR_Highway and Road Work in Attachment A for details.

6.6 NOISE EXPOSURE

The operation of heavy equipment will generate noise levels that will require the use of hearing protection in the immediate vicinity. Appropriate earmuff or earplugs (i.e., with a noise reduction ratio greater than 27 decibels) should be worn to prevent overexposure. The general rule of thumb is that if you have to raise your voice to be understood by someone who is standing 3 to 5 feet away from you, the noise levels are likely to be above 85 decibels and therefore require the use of hearing protection.

AECOM has compiled noise monitoring data that indicate that work locations within 25 feet of operating heavy equipment (e.g., air compressors, earth-working equipment) can result in exposure to hazardous levels of noise (levels greater than 90 decibels). Accordingly, all personnel are required to use hearing protection (earplugs or earmuffs) within 25 feet of any operating piece of noisy equipment. Additionally, TGRS construction activities are required to comply with City of Los Angeles Noise Ordinance No. 161,574 including subsequent amendments. Refer to SOP S3NA_510_PR_Hearing Conservation Program in Attachment A for further details.

6.7 SLIPS, TRIPS, AND FALLS

A variety of conditions may exist that may result in injury from slips, trips, and falls. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. Cords and hoses associated with equipment can also pose a trip hazard. Utilize the following to identify and mitigate slip trip and falls:

- Identify open pits, holes, and trenches prior to commencement of field activities;
- Establish a working zone and decontaminant zone away from footing hazards if possible;
- Identify any footing hazards associated with the work, and remove/correct if possible, or otherwise place appropriate markers/cones, barricades, caution tape, etc. at locations with footing hazards prior to commencement of field activities; and
- Utilize good housekeeping to maintain orderly work areas during construction activities and report/clean up liquid spills.

Protruding objects are any objects that extend into the path of travel or working area that may cause injury when contacted by personnel. Personnel should always be aware of protruding objects and, when feasible, remove or label the protruding object with an appropriate warning. Refer to SOPs S3NA_307_PR_Housekeeping Worksite and S3NA_212_PR_Site Inspections in Attachment A for further details.

6.8 BACK SAFETY

Using the proper techniques to lift and move heavy pieces of equipment, such as generators or drums of investigation-derived wastes, is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects.

- Use mechanical devices to move objects, such as drums of investigation derived wastes or generators, that are too heavy to be moved manually;
- If mechanical devices are not available, ask another person to assist you;
- Items to be moved that weigh 50 pounds or more are not to be lifted by a single individual;
- Bend at the knees, not the waist. Let your legs do the lifting;
- Do not twist while lifting;
- Bring the load as close to you as possible before lifting; and,
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards.

Refer to SOP S3NA_308_PR_Manual Lifting Field in Attachment A for details.

6.9 ELECTRICAL HAZARDS

Electrically operated equipment may present the hazard of electrical shock, especially due to potentially wet operating environments. If using equipment or portable tools that are electrically powered, follow the safety precautions listed below:

- Lock out/tag out all energized equipment before performing maintenance on the equipment.
- Check to see that electrical outlets used to supply power during field operations are of the three wire grounding type.
- Extension cords used for field operations should be of the three wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO, or SJTO.
- Never remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings, or floors. Extension cords are not to be permanently attached to walls with staples, nails, etc.
- Protect the cord from becoming damaged, paying special attention at locations where the cord is run through doorways, windows or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades Must Be removed from service immediately.
- All portable or temporary wiring which is used outdoors or in other potentially wet or damp locations must be connected to a circuit which is protected by a ground fault circuit interrupter (GFCI). GFCI's are available as permanently installed outlets, as plug-in adapters and as extension cord outlet boxes. Do not continue to use a piece of equipment or extension cord which causes a GFCI to trip.
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.
- Do not touch a victim who is still in contact with current. Separate the victim from the source using a dry, nonmetallic item such as a broomstick or cardboard box. Be sure your hands are dry and you are standing on a dry surface. Turn off the main electrical power switch and then begin rescue efforts.

Refer to SOP S3NA_302_PR_Electrical General in Attachment A for details.

6.10 FALLS FROM THE SAME LEVEL OR LESS THAN 6 FEET

Falls to the same or fall from heights less than 6 feet (where fall protection would be required) expose employees to risks of injuries such as bruises, cuts, sprains, and factures. Falls to the same level commonly occur when conditions are wet, slippery, allow for the

accumulation of trip hazards in the work area, when workers are distracted, rushed, or carry items that block their view of their walking path. Changes in walking surface, such as walking from a carpeted surface to a tiles surface, is also commonly observed when a fall occurs. Descending or ascending stairs can also increase the risk for a fall.

The following safe work practices should be followed to prevent falls or minimize injuries related to a fall:

- Always use three points of contact when ascending/descending stairs.
- Use visual reminders at stair ways, steps or other access points that require a change in height.
- Do not perform distracting activities while walking
- Remove or control/isolate all trip hazards in a work area, walking paths, emergency routes.
- Keep walking surfaces clean and dry.
- Select proper footwear for the task.
- Keep footwear clean, dry and in good condition.

Identify changes in walking surfaces; use a visual warning to identify increase risk for falls.

6.11 FALLS FROM GREATER THAN 6 FEET

Falls, even from moderate elevation, are the cause of injuries and fatalities. Although many employees frequently perform tasks safely at elevations above grade, the consequences of a mistake in these circumstances are usually very serious. For this reason, OSHA has developed a number of fall protection regulations that can be found in both OSHA's General Industry and Construction standards.

AECOM employees shall not climb or work at heights that are not equipped with fall prevention as specified below unless they are using a personal fall protection system (PFS) including guardrails, safety nets, personal fall arrest systems (full body harness, lanyard and anchor point) and positioning devices. Fall prevention includes:

Guardrails:

- All open sides on work surfaces more than 6 feet above a base surface must be equipped with guard rails, guardrails must meet OSHA specifications and include a top rail, mid-rail and support posts.
- Access to the work surface shall be by means of a secured ladder, stairway, or other safe means. Free climbing a structure is not permitted.

Personal Fall Restraint

- A personal fall restraint system is designed to prevent an employee from falling. It includes anchorages, connectors, and a body belt or harness. It may also include lanyards, lifelines and rope grabs designed for that purpose.

When employees must work on elevated surfaces without fall prevention they must use a personal fall arrest (PFA) system to stop an employee during a fall from a working level and keep the employee from hitting a lower level or structure. This system will include an anchorage point, connectors and a body harness. It may include a lanyard, a lifeline a decelerations device or suitable combinations of these. A PFA system must meet the following requirements:

- Limit the maximum arresting force on an employee to 1,800 pounds
- Employee must not fall more than 4 feet or to come into contact with a lower level
- Anchorage points must be able to support 5,000 pounds per employee
- Lifelines must be able to support 5,000 pounds and each employee must have a separate lifeline. The lower end of the lifeline must extend to within 4 feet of the ground
- A qualified person must be used when designing a horizontal lifeline system or if a fall protection plan is required.

Before using any type of PFA all employees must,

- Inspect all components of the fall protection system prior to exposure to the fall hazard;

- Wear a full body fall protection harness connected to an anchor point by a lanyard that will restrict a fall to less than 4 ft;
- Have an observer within sight of the work who can summon emergency response in case of a fall; and
- Have completed fall protection training covering the proper use and care of fall protection equipment.

6.12 MANLIFTS

Manlifts are the preferred tool for performing work at elevations greater than 6 feet from the ground surface. Refer to SOP S3NA_408_PR_ Elevated_Work_Platforms_and_Aerial_Lifts in Attachment A for detailed instructions and procedures.

6.13 LADDERS

Use of ladders to perform maintenance work is strongly discouraged. Manlifts or scaffolds are the preferred methods. However, it is understood that from time to time, work must be performed at elevations above ground surface that require the use of ladders. Ladders may be used for elevated work only where use of a manlift or scaffolds is impractical such as accessing manholes on reactor vessels during inspections or performing maintenance work on equipment at elevations less than or equal to six feet above ground surface and in a confined area. Refer to SOP S3NA 312 PR Stairways and Ladders in Attachment A for detailed procedures.

6.14 MANUAL TOOLS AND HAND PROTECTION

All manually-operated hand tools and equipment will be used, handled, and stored in accordance with the requirements provided in SOP S3NA_208_WI5_Hand Protection Fact Sheet (Attachment A). To protect on-site workers from hand injuries, the following gloves will be used for when performing a specific duty:

Duty/Hazard	Type of Glove Material
Light Duty Abrasions/loss of grip/adsorption	Cotton, Leather, Rubber Coated or Kevlar separately or in combination with nylon/nitrile/Teflon®
Medium Duty Laceration/adsorption	Leather or Kevlar separately or in combination with nylon/nitrile/Teflon®
Heavy Duty Laceration/puncture	Kevlar (exposure to sharp or jagged metal, glass, box cutters, etc), stainless core (stainless steel woven into material),
Chemical Resistant	Materials and thinness per manufacturer recommendation
High Temperature	Kevlar/Nomex/Fiberglass
Low Temperature	Insulating Gloves
Puncture	Aramid, HexArmorTM

General safe work practice for using hand tools include:

- Select the right size tool for the job. Don't use "cheaters" and avoid pulling old tools from the waste stream. There's a reason why they were thrown away!
- Always inspect tools before use and replace or repair worn or damaged tools.
- Always keep the cutting edges sharp and never test a cutting edge with your finger.
- When working on an elevated surface (ladder, truck, scaffold), ensure your tools are secure. Falling tools can cause serious injury.
- Always carry your tools correctly and never put sharp or pointed tools in your pocket.

- When carrying hand tools, always point the cutting edge to the ground.
- Always keep your tools in a dry place to prevent rust.

6.15 HEAT RELATED ILLNESS PREVENTION

Risk for a heat related illness varies based upon work activities, PPE/clothing selection, geographical locations, personal conditions and weather conditions. To reduce the potential of developing a heat related illness AECOM has developed a site specific procedure incorporating:

- AECOM's SOP for Heat Illness Preventions (S3NA_511_PR_Heat Stress) provided in Attachment A, and
- California Occupational Safety and Health Administration Heat Illness Prevention Standard (8 CCR 3395).

6.15.1 Planning

The CM/SSO and Field Supervisor shall verify the risk of heat related illnesses based on:

- Weather forecasts: The National Weather Service forecasts the temperature in various locations in California. Weather forecasts and information are broadcast on NOAA Weather radio and can be accessed at: http://www.weather.gov/view/states.php?state=ca&map=on
- Planned work activities
- Planned personal protective equipment
- Personal risk factors

The CM/SSO and PM shall also ensure the appropriate equipment and resources are available to employees at risk of a heat related illness, example of necessary equipment may include (not limited to):

- Potable water (cooler), in sufficient quantity to allow each employee a minimum of 2 gallons of water per 8 eight shift.
- Drinking cups, insulated water bottles or other small sealable container which allow employees to have 1 quart of water readily available for consumption each hour.
- Sun protection (hats, long sleeves, sunscreen, sun glasses)
- Communication method (cell phone or similar)
- Shade – See Section 1.1.1.3 Access to Shade
- Reliable thermometer, a simple thermometer (like those available at hardware stores), can be used to measure the outdoor ("dry bulb") temperature.
- Cooling devices such as cooing vests or misters.

6.15.2 Provision of water

Employees shall have access to potable drinking water. The frequent drinking of water shall be encouraged by supervisors and field team members.

Each employee shall be provided with a minimum 2 gallons of water for each eight hour shift. Water will be located so that it is readily available. In order to keep water in close proximity to employees, employees may carry water bottles or smaller sealed container of water with them while they are working, and refill containers at the primary source (cooler or other designated source) during breaks or as needed. Containers and refill frequency shall provide for a minimum of one quart of water to be consumed per hour while working. Employees may not wait for water bottles or smaller sealed container to be empty prior to refilling.

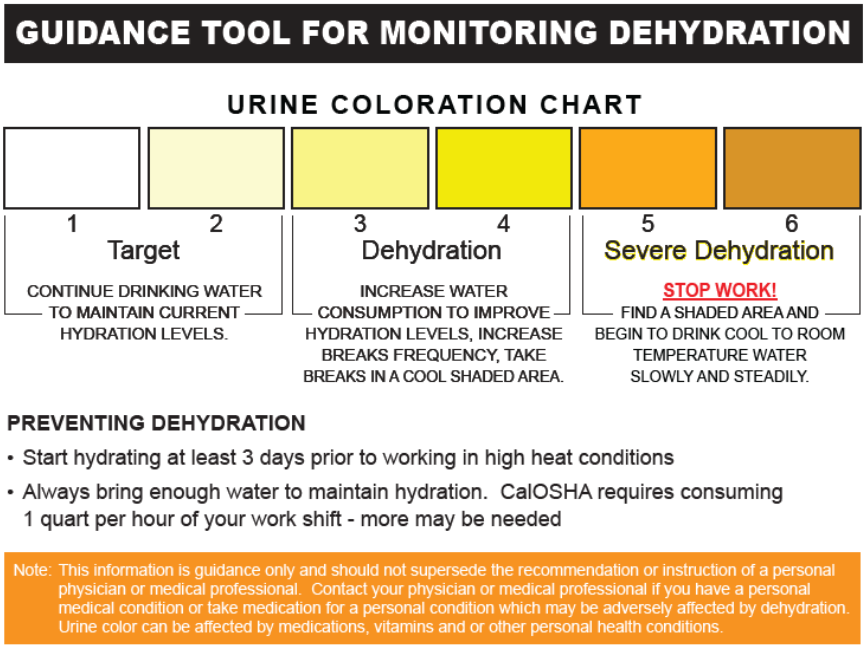
6.15.3 Dehydration

The 2006 Cal/OSHA Heat Illness Case Study showed that although 90% of the worksites had drinking water at the site, 96% of the employees suffering from heat illnesses were dehydrated. Dehydration occurs when the body loses too much fluid. This can happen when an employee stops drinking water and can be accelerated by work in hot or dry conditions. Not drinking enough fluids can cause muscle cramps, fainting and shock, which is a life-threatening condition.

Drinking water should increase with activity level. Dehydration can affect the body's ability to recognize thirst, so employees shall drink water on a time schedule.

In desert conditions it is important that employees drink enough water that urination is required at least every two hours. Tap water is the best hydration fluid. If sports drinks are used they should be diluted at least 50 percent with water prior to drinking. **Do Not Drink Distilled Water.**

Dehydration can be prevented by monitoring urine color, and adjusting water intake accordingly. The following guidance was developed to aid employees in monitoring hydration levels.



6.15.4 Access to shade

When temperatures do not exceed 85 degrees, access to shade for employee will be provided as needed, or as requested by field teams. Timely access to shade will be provided upon an employee's request.

Shade is required when the temperature exceeds 85 degrees Fahrenheit. One or more shaded areas will be established at all times, the shaded area will either open to the air or provided with ventilation or cooling (such as an air conditioned vehicle). The amount of shade present shall be at least enough to accommodate 25% of the employees on the shift at any time, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shaded area shall be located as close as practicable to the areas where employees are working, but no more than a 2.5 minute walk away

Employees shall be allowed and encouraged by supervisors and other field team members to take a cool-down rest in the shade when they feel the need to do so to protect themselves from overheating. Additionally, schedule breaks in accordance with the work-rest cycle shall be taken in the shaded area.

6.15.5 Work Rest Cycles and Breaks

It is necessary to implement a work routine that incorporates adequate rest periods to allow employees to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the CM/SSO based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the employees, and protective clothing being used. Two techniques can be used to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method – this method is preferred

- Adjusted Temperature Method – this method should be used only if WBGT data is not available.

Either procedure will provide the CM/SSO with a recommended routine. However, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

6.15.6 Procedures for Taking Breaks

- Breaks will be taken in a cool and/or shaded location, in an air conditioned environment when possible. A shaded break area is required when temperatures are above 85 degrees Fahrenheit.
- Dry clothing or towels should be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- It may be necessary to erecting a cover or partition to shade the work area.
- Water shall be consumed during breaks
- Each employee should self-assess and assess their co-workers for sign/symptoms of a heat related illness
- Pulse rate information should be collected to verify the effectiveness of the break, and work-rest cycle.

6.15.7 Training of Employees and Supervisors

All AECOM employees and supervisors shall receive training in the prevention of heat-related illnesses prior to starting work. Training will include:

- Environmental risk factors for heat illness, including added burden of heat load on the body caused by exertion, clothing and personal protective equipment.
- Personal Risk Factors for heat illness such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.
- SOP S3NA_511_PR_Heat Stress provided in Attachment A.
- Signs, symptoms and response measures for different types of heat related illnesses
- Procedure for stopping work and reporting signs and symptoms of a heat related illness in themselves or other people on site.
- First aid measure for managing a case of heat illness.
- AECOM's procedure for responding to heat related illnesses, including use of AECOM's Corporate Medical Provider (Work Care), and seeking emergency medical services (See Section 10, Emergency Action Plan).
- Obtaining accurate weather forecast and ambient temperature data;
- Access to potable water, the minimum recommended consumption rate (4 cups per hour), procedure for drinking (small quantities regularly thought out the day, increase intake for higher heat, increased work load or increased sweating;
- Provision of shade required when temperatures are greater than 85 degrees Fahrenheit;
- Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.
- How to obtain weather reports and monitor ambient temperatures during the work day;
- How to establish a work-rest cycle per S3NA_511_PR_Heat Stress;
- Specific high heat (95 degrees Fahrenheit) procedures

6.15.8 High Heat Procedures

The following procedures shall be implemented when the temperature equals or exceeds 95 degrees Fahrenheit. These procedures shall include the following to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Field team members shall observing each other for alertness and signs or symptoms of heat illness, if such symptoms are detected the team will Stop Work, seeks shade, rest and water and report the condition to the CM/SSO.
- Reminders to drink plenty of water throughout the work shift shall be provided by the CM/SSO or from peer to peer.
- New employees assigned to work in high heat conditions shall be monitored by the CM/SSO for the first 14 days of the employee's assignment on-site. An exception can be made if the employee indicates (and it is confirmable) at the time of assignment he or she has been doing similar outdoor work for at least 10 of the past 30 days for 4 or more hours per day.

6.15.9 Identifying and Responding to Sign and Symptoms of Heat Related Illnesses

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel working in the desert. Site personnel must be instructed in the identification of heat-stress symptoms of heat-related illnesses. Employees are required to immediately report any signs of symptoms that they may experience or observe in fellow employees. The guidance below will be used in identifying and responding to heat-related illness.

Table 6-1: Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Dehydration	*96% of the employees suffering from heat illnesses were dehydrated.* Dehydration results from in taking less water than your body is using (sweating). Dehydration results in reduce urine output, dark colored urine, shriveled skin which doesn't "bounce back" when pinched, extreme thirst (not always), sleepiness, lack of sweat, dry skin, headache, constipation.	• Stop work, and move employee to shaded rest/break area • Drink water, slowly and steadily • Report to CM/SSO, contact Safety Professional/Work Care for guidance on fluid intake and returning to work
Heat Rash	A heat rash occurs when sweat ducts become clogged and the sweat can't get to the surface of the skin. Instead, it becomes trapped beneath the skin's surface causing a mild inflammation or rash.	Avoid working in hot, humid weather, wear loose clothing made of breathable fabrics like cotton, use air conditioning, and keep the skin clean with frequent baths or showers to prevent sweat glands from becoming clogged. Change clothing that is wet or soiled. Heat rash can be treated by cleaning and cooling the area with cool water, and applying an over the counter hydrocortisone cream. There is risk of infection from heat rash, if sweat glands can become infected. The signs of infection include pain, increased swelling, and redness that does not resolve. Pustules may form at the site of the rash. This infection occurs because bacteria have invaded the blocked sweat gland. Antibiotic treatment may be required. Chronic and recurrent heat rash may need to be treated by a health care practitioner or dermatologist (skin specialist).
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (*avoid drafts or sudden chilling*). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (*Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing*). • If the victim is conscious, it may be helpful to give him/ her sips of water. • Transport victim to a medical facility as soon as possible.

Type of Heat-Related Illness	Description	First Aid
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness and nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	• Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back with the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

6.16 ULTRAVIOLET RADIATION PROTECTION

Check the anticipated ultraviolet (UV) Index (found at http://www.epa.gov/sunwise/uvindex.html) to minimize the potential sun exposure to outdoor workers. To protect against exposure to UV radiation, workers will observe the following requirements:

To protect against exposure to UV radiation, workers will observe the following requirements:

1. All workers will wear sunglass-type safety glasses at all times when working outdoors during daylight hours.
2. Workers will utilize a commercial sunblock with a minimum solar protection factor (SPF) of 30 or higher.
3. Wide-brim hard hats are recommended as they provide additional UV protection.

6.17 HEAVY EQUIPMENT AND MOVING PARTS

Vehicles, drill rigs, forklifts, and construction equipment have the potential for crushing or striking a person or property. Construction personnel should wear orange vests and avoid walking or standing near moving construction equipment, particularly behind equipment where the operator has reduced visibility. In tight spaces, spotters and a coordinated set of hand signals should be used to help direct the equipment operator. Equipment operators must have a direct line of sight with the spotters at all times.

Being caught by a drill auger or other rotating equipment is always a potential and at no time should personnel touch rotating or moving equipment. Hoodies, clothes with loose strings, and loose fitting clothes should not be worn around rotating equipment. Always wear the proper gloves for the proper task to avoid pinch point incidents, such as repositioning the forks on a forklift. Additionally, drill rigs should not be moved with the mast up; the mast must be lowered before moving even a few inches. Refer to SOPs S3NA_309_PR_Mobile or Heavy Equipment, S3NA_409_PR_Forklifts, and S3NA_411_PR_Machine Guarding in Attachment A for further details.

6.18 MATERIALS/DRUM HANDLING

Injury points exist when handling materials and drum. Opening and closing drums can result in a pinch point between the lid, ring and drum opening. Handling drums and result in a back injury, or pinching between drums

if a person or body part is placed between two drums. Be sure to double check bungs and lid for leaks before moving drum. Always use a drum dolly for partially filled to full drums, and if available, use a forklift to avoid crushing and spills. Refer to SOP S3NA_409_PR_Forklifts for further details.

6.19 BIOLOGICAL HAZARDS

Wild/stray dogs have previously been spotted in areas surrounding the Montrose Site. Always be aware of your surroundings.

6.19.1 Poisonous Insects

The potential for exposure to poisonous insects (ticks, mosquitoes, spiders, and bees/wasps) is discussed below and in SOP S3NA_313_PR_Wildlife Plants and Insects provided in Attachment A.

Ticks are bloodsuckers, attaching themselves to warm-blooded vertebrates to feed. Deer ticks are the most common carriers of Lyme disease, a bacterial infection that is transmitted to humans through the bite of the tick.

Personnel should carefully inspect themselves each day for the presence of ticks or any rashes. This is important since prompt removal of the tick can prevent disease transmission. Female deer ticks are about one-quarter inch in length and are black and brick red in color. Males are smaller and all black.

Removal of the tick is important in that the tick should not be crushed and care must be taken so that the head is also removed. If the head is not completely removed or if the tick is allowed to remain for days feeding on human blood, a condition known as **tick paralysis** can develop, this is due to a neurotoxin that the tick apparently injects while engorging. This neurotoxin acts upon the spinal cord causing loss of coordination, weakness and paralysis.

One characteristic symptom of Lyme disease is a bulls-eye rash that develops around the bite site. The rash appears in about 60-80% of all Lyme disease cases. Contact the Regional SH&E Manager immediately if you develop such a rash.

Tick season typically lasts from April through October; peak season is May through July; seasons can vary depending on climate. Wear light-colored clothing (easier to spot ticks) with long sleeves and make sure that shirts are tucked into pants and pants are tucked into socks or boots. Ticks have a tendency to crawl upwards. These procedures will make it more difficult for a tick to reach your skin.

Studies have determined that repellants containing DEET as a main ingredient are most effective against mosquitoes and ticks. DEET can be directly applied to the exposed skin of adults and/or clothing. Products containing DEET can't be used with Fire Resistant Clothing (FRC) as it diminishes the garments' capacity to resist ignition in a fire. Permethrin is another repellent; however, it can only be directly applied to clothing.

Mosquitoes, carriers of the West Nile Virus, Yellow Fever and other diseases, are indigenous to this area. As mentioned above, DEET is an effective mosquito repellent and is recommended. Although concentrated DEET formulations protect longer than those that are more dilute, little improvement is offered by concentrations of the active ingredient higher than 50 percent. Adverse effects, though documented, are infrequent and are generally associated with gross overuse of the product. Users should avoid the temptation to apply the most concentrated product available. The transient protection offered by more dilute preparations can be extended by reapplication. When using DEET, care should be taken to reapply the repellant when its effectiveness wears off.

Wasps (hornets and yellow-jackets) and **bees** (honeybees and bumblebees) are common insects that may pose a potential hazard to the field team if work is performed during spring, summer or fall. Bees normally build their nests in the soil. However, they use other natural holes such as abandoned rodent nests or tree hollows. Wasps make a football-shaped, paper-like nest either below or above the ground. Yellow-jackets tend to build their nests in the ground but hornets tend to build their nests in trees and shrubbery. Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once while

wasps sting multiple times because their stinger is barbless. Wasps sting when they feel threatened. By remaining calm and not annoying wasps by swatting, you lessen the chance of being stung.

Wasps and bees inject a venomous fluid under the skin when they sting. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers or by scraping a credit card or other blunt object against the sting site in the opposite direction in which the stinger is embedded. Some people may develop an allergic reaction, i.e. anaphylaxis, to a wasp or bee sting. If such a reaction develops, **seek medical attention at once**. Persons who are allergic to bee and wasp stings should carry an epinephrine pen, e.g. epi-pen, with them that is prescribed by a doctor and used to help abate swelling that occurs due to their allergy. Even if an employee utilizes their epi-pen, they still need to seek medical attention for follow-up care and observation.

Table 6-2: Identification of Poisonous Insects

Black Widow Spider

Abdomen usually shows hourglass marking.

The female is 3-4 centimeters in diameter.

Have been found in well casings and flush-mount covers.

Not aggressive, but more likely to bite if guarding eggs.

Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.

If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

Central and South U.S., although in some other areas, as well.

¼-to-½-inch-long body and size of silver dollar.

Hide in baseboards, ceiling cracks, and undisturbed piles of material.

Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.

If bitten, see physician as soon as possible.

6.20 GANG ACTIVITY

Historically, some of the areas surrounding the Montrose Property and within the extent of TGRS construction have been subject to gang-related activity and violent crimes including vandalism, robbery, and shootings. TGRS construction personnel should have an awareness of this activity and follow general safety precautions including:

- Limit construction activities to daylight hours to the extent possible. If not possible, work in well lit areas (never work in dimly lit areas);
- Conduct construction work in groups of two or more at all times;
- Carry mobile communication devices (e.g., cell phone or walkie talkies);
- Wear iridescent orange vests and construction apparel (i.e., appear as a construction worker and avoid misidentification to the extent possible);
- Have an awareness of your surroundings;
- Avoid passing through problem areas or streets if possible;

- Do not leave your work vehicle unattended and have a means for rapid evacuation of the work area if necessary;
- Immediately suspend construction activities if gang-related activity is observed; and
- Coordinate with and report gang-related activity to local law enforcement agencies.

If nighttime work is required in unsecured public areas, it may be necessary to hire private security to protect construction personnel. All field personnel have the authority to suspend or cease work if gang-related activity is observed or reported in the area. All gang-related activity should be reported to the PM and local law enforcement agencies.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. SOP S3NA_208_PR_Personal Protective Equipment Program provided in Attachment A lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs found in **Attachment E**.

By signing this HASP, you are agreeing that you have been properly trained in the use, limitations, care and maintenance of the protective equipment to be used for this project. If you have not received training on the proper use, cares, and limitations of the PPE required for this project, please see the PM or CM/SSO for the proper training prior to signing this HASP.

Table 7-1: Personal Protective Equipment

TYPE	MATERIAL	ADDITIONAL INFORMATION
Minimum PPE:		
Safety Vest	High-visibility	Must have reflective tape and be visible from all sides
Boots	Leather	ANSI approved safety toe
Safety Glasses		ANSI Approved
Hard Hat		ANSI Approved
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas
Tyvek-White	spun-bonded olefin garments	ANSI Approved; Zipper Front with 1" Flap
Tyvek - Yellow	Water and chemical proof	ANSI approved: hood + booties.
Goggles	ANSI Approved	For using when grinding, generating dust or flying debris or during high wind conditions.
Face Shield		ANSI Z87.1-2003
Chemical Splash Googles		ANSI Z87.1-2003, CSA Z94.3
Leather Gloves	Any	If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Best Safety N-DEX Outer: Ansell-Edmont Sol-Vex (optional)	When handling contaminated equipment or collecting environmental samples.
Air Purifying Respirator		Half or full-face; organic vapor or HEPA cartridges.

7.2 PPE DOFFING AND DONNING INFORMATION

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.
- When applying duct tape to PPE interfaces (wrist, lower leg, around respirator, etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.
- Have a "buddy" check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

7.3 RESPIRATORY PROTECTION

Respiratory protection as described below will be required if worker breathing zone photo-ionization detector (PID) or colorimetric tube concentrations are sustained above the chlorobenzene action levels in the following table. Field monitoring personnel should consult the PID equipment manual for chlorobenzene response factors (e.g., RAE Systems reports a 0.4 response factor for chlorobenzene when calibrated to isobutylene). Field PID readings require correction between the calibration gas and target VOC. Chemical specific action levels are provided in Section 5.0.

Table 7-2: Respiratory Protection for Chlorobenzene

Task	Action Limit	Respiratory Protection	Level
All tasks involving potential exposure to VOCs	< 10 ppm chlorobenzene, sustained for 5 minutes	Continue monitoring	D
	10 – 75 ppm chlorobenzene, sustained for 5 minutes	Half or full face respirator with organic vapor cartridges	C
	> 75 ppm chlorobenzene, sustained for 5 minutes	Cease work, exit, and contact the CM/SSO	--

Although Level C respiratory protection may be adequate for short-term chlorobenzene exposure at concentrations greater than 75 ppm, TGRS construction activities are not expected to produce breathing zone concentrations of this magnitude. Work activities producing VOCs in the breathing zone should be controlled to limit chlorobenzene concentrations at the edge of the exclusion zone to less than 10 ppm at all times.

Respiratory protection (half or full face mask respirator with combination organic vapor/HEPA cartridges) should also be donned if odors become objectionable at any time or if respiratory tract irritation is noticed. All employees who are expected to don respiratory protection must have successfully passed a qualitative or quantitative fit-test within the past year for the brand, model, and size respirator they plan to don. If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after

cleaning. Refer to the cleaning instructions provided with the respirator or specified by Attachment B-2 to the OSHA regulations at 29 CFR 1910.134.

Respiratory protection would additionally be effective against pesticide-impacted dust. However, sufficient dust control measures are required to keep dust levels in the work area below 5 mg/m^3 at all times. If the dust control measures are effective, respiratory protection against pesticide-impacted dust should not be required during TGRS construction activities. Additionally, to prevent migration outside of the EZ, dust levels downwind of the work area must not be exceed 0.05 mg/m^3 above the upwind or background dust levels.

8.0 SITE CONTROL

8.1 GENERAL

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. An example zone layout has been developed for drilling and is provided as **Figure 8-1**.

8.2 CONTROLLED WORK AREAS

Each HAZWOPER controlled work area will consist of the following three zones:

8.2.1 Exclusion Zone

The Exclusion Zone (EZ) is the area where primary construction activities occur, such as trenching, excavation, and installation of wells, piping, and equipment, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities and meeting the requirements specified in the applicable THA/JSA and Sections 4.1 and 4.2 will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with TGRS construction activities. The EZ must be large enough to accommodate vehicular or equipment movement. For well installation activities, the mast height of the drill rig should be cleared in all directions from the well location if feasible. For decontamination of large construction equipment, thirty feet should be cleared in all directions from the decontamination location, where practical, for large efforts conducted at a decontamination pad. For personal and small parts decontamination conducted at the work location, decontamination will occur within the applicable contamination reduction zone established for that operation.

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas. If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving the EZ.

8.2.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the transition area between the contaminated area (EZ) and the clean area (Support Zone). Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination. Decontamination procedures are explained in Section 7.3.

8.2.3 Support Zone

The Support Zone (SZ) is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels) and be accessible to vendors, inspectors and visitors.

Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

8.3 SITE ACCESS DOCUMENTATION

All personnel entering the site shall complete the "Site Entry/Exit Log" located at the construction trailer or primary site support vehicle if working remotely from the Montrose Plant Property.

8.3.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

1. A written confirmation must be received by AECOM documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
3. All visitors must be escorted by an AECOM employee.

If the site visitor requires entry to any EZ, but does not comply with the above requirements, entry will not be permitted.

8.4 SITE SECURITY

Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards.
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
- Prevent theft.
- Avoid interference with safe working procedures.

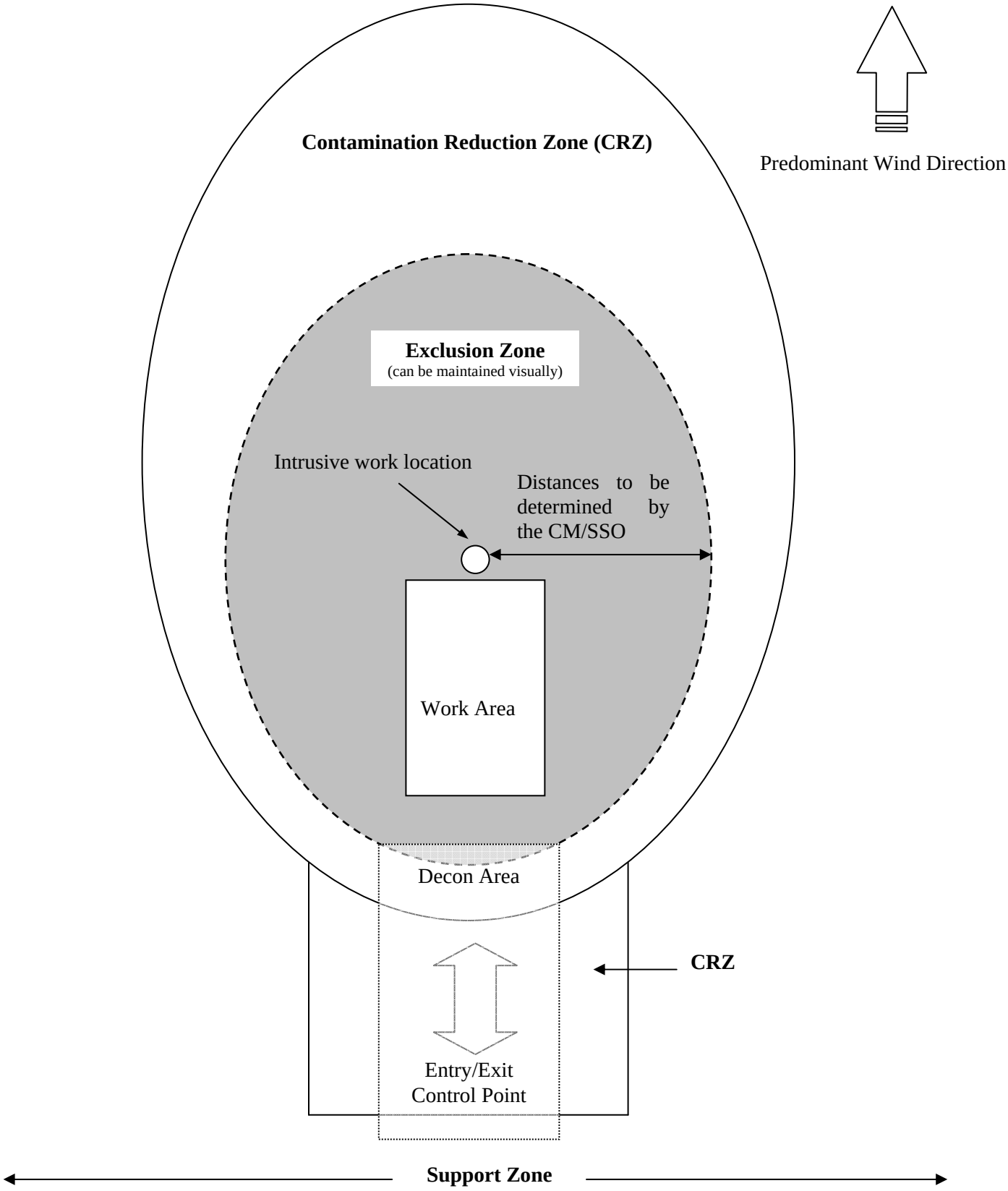
To maintain site security during working hours:

1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. When feasible, install temporary fencing or other physical barrier around the work area.
4. Have the PM or CM/SSO approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

1. Secure the construction trailer and any associated equipment storage containers. Remove and secure the keys from all heavy construction equipment (excavators, backhoes, front loaders, forklifts, etc...); do not leave the keys with the equipment. Engineering controls should be used where appropriate to secure the Exclusion Zones (e.g., plastic sheeting, tarps, trench plate, temporary fencing, barricades, etc…).
2. Secure all fences and gates using heavy duty locks and chains. Access to the work areas and exclusion zones must be restricted by locked security fencing during off-duty hours.
3. If necessary, hire security guards to patrol the site and maintain site security during off-duty hours.

Figure 8-1: Example Site Control Layout



9.0 DECONTAMINATION

9.1 GENERAL REQUIREMENTS

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials, etc).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the EZ. All persons and equipment entering the EZ will be considered contaminated and must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The applicable Material Safety Data Sheet (MSDS) must be reviewed, implemented, and documented by personnel contacting the chemicals/solutions. All contaminated PPE and decontamination materials shall be contained, stored, and disposed of in accordance with site-specific requirements determined by the PM and site management.

9.1.1 Decontamination Supplies

The supplies required to perform decontamination may vary based on site-specific conditions and the nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and
- Paper or cloth towels for drying protective clothing and equipment.

9.1.2 Equipment Decontamination

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE, support devices (e.g., hoses, cylinders, etc.), and various handheld tools.

For smaller equipment, use the following steps for decontamination:

1. Remove majority of visible gross contamination in EZ.
2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
3. Rinse equipment.
4. Visually inspect for remaining contamination.
5. Follow appropriate personal decontamination steps outlined above.

For larger equipment, use the following steps for decontamination:

1. Dry decontaminate large construction equipment with tire grate plates, brushes, and brooms.
2. If contaminated soil remains, rinse with a hose or pressure washer within a secondary containment area; all decontaminated fluids must be contained and not allowed outside the decontamination area.
3. If a water wash is insufficient to fully decontaminate the large equipment, rinse the equipment with a detergent or solvent. DDT can strongly adsorb to some surfaces, and a solvent (such as methanol) may be required to decontaminate heavily fouled equipment.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ (e.g., contaminated soils left on the equipment). Equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. If necessary, wipe samples can be collected and analyzed from decontaminated equipment to confirm the effectiveness of the decontamination procedures.

9.1.3 Personnel Decontamination

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of PPE required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures.

10.0 EMERGENCY RESPONSE PLANNING

10.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur during TGRS construction is unlikely, an emergency action plan has been prepared in accordance with SOP S3NA_203_PR_Emergency Response Planning_Field (Attachment A). The Emergency Action Plan (EAP) will be reviewed by all personnel prior to the start of field activities. A test of the EAP will be performed within the first three (3) days of the project field operations. This test will be documented in the project records.

TGRS construction activities include trenching across numerous active pipelines containing gasoline/fuels, natural gas, and water. A line break in a pressurized pipeline during TGRS construction has the potential to create an emergency situation. Additionally, some of the trenches and excavation pits will be greater than 5 feet deep and could result in an emergency situation if the shoring or trench support fails. The construction activities will include use of heavy construction equipment including a moderate-sized crane to unload and place large steel tanks and vessels. Finally, the Montrose Plant Property is located adjacent to the Jones Chemical Property where industrial bleach is manufactured, and there is a potential for a chlorine gas release.

10.1.1 Emergency Coordinator, Mr. Kevin Thomas

Mr. Kevin Thomas of AECOM will serve as the Emergency Coordinator (EC) for the project if required. The duties of the EC include:

- Implement the EAP based on the identified emergency condition
- Notify the appropriate project and SH&E Department personnel of the emergency (Table 10-3)
- Verify emergency evacuation routes and muster points are accessible
- Conduct routine EAP drills and evaluate compliance with the EAP

10.1.2 Employee Training

In addition to participating in a test of the EAP, workers will be instructed in the site specific aspects of emergency evacuation. Modification of evacuation routes or procedures will require refresher training.

10.1.3 Alarm and Emergency Signals

An emergency communication system must be in effect at all sites. The simplest and most effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight cannot be easily maintained between project personnel because of distance, terrain, or other obstructions. Portable radios (walkie talkies) will be used as needed to verbally communicate with construction personnel working in different areas of the site. The CM/SSO and all supervising AECOM project personnel are required to have mobile phones to ensure that communications with local emergency responders is maintained, when necessary.

10.1.4 Emergency Planning

Prior to the start of site operations, the EC will complete Table 10-1 with any site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures. Table 10-1 is provided below showing one possible emergency condition for TGRS construction. Similar to the example shown below, the EC will establish an evacuation route and muster location when trenching across pressurized pipelines with the potential to create an emergency situation.

Table 10-1: Emergency Planning

Emergency	Evacuation Route	Muster Location
Petroleum Pipeline Break	Upwind from break	West side of Normandie Ave at Montrose Property entrance ramp
Additional Information		
Communication Procedures	Call 911 (emergency response personnel) Call Brian Dean at (562) 221-0116	
CPR/First Aid Trained Personnel	All AECOM staff	
Site-Specific Spill Response Procedures	Use spill kits provided. All materials used to contain spill are to be contained in a DOT 55 gallon drum.	

10.1.5 Spill Containment Procedure

Work activities may involve the use of hazardous materials, if any, or work involving drums or other containers. Procedures in SOP S3NA_520_PR_Spill Response Incidental provided in Attachment A, as well as those outlined below, will be used to prevent or contain spills, if any:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri) shall be available at each work site (more as needed).

- All hazardous materials in use shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.

As a part of emergency planning, the PM shall identify the Reportable Quantity (RQ) of any hazard substance stored on site, anticipated substances are listed below in Table 10-2. **If reporting to a state or Federal regulatory agency is required, AECOM has 15 minutes from the time of the spill/release to officially report it.** In determining whether a spill or release must be reported to a regulatory agency, the CM/SSO will assess the quantity of the spill or release and evaluate the reporting criteria against the state-specific reporting requirements, your applicable regulatory permit, and/or client-specific reporting procedures.

Table 10-2: CERCLA Reportable Quantities

Hazardous Substance	Regulatory Synonyms	Final RQ (lbs)
Methanol	N/A	5,000
Hydrochloric Acid	N/A	5,000

Notes:
CERCLA RQs can be found at: http://www.epa.gov/oem/docs/er/302table01.pdf
5,000 pound RQ is equivalent to approximately 760 gallons of methanol or 510 gallons of hydrochloric acid

Methanol may be used to decontaminate construction equipment contaminated with pesticides but would be used at quantities much less than the RQ. Hydrochloric acid is unlikely to be used during TGRS construction activities but is a hazardous material likely to be used during operations for pH control. Releases of gasoline or crude oil (e.g., from a line break) are exempt under CERCLA and do not have a reportable quantity. Hydrogen peroxide, a raw material used for the HiPOx advanced oxidation system, also does not have a CERCLA reportable quantity.

10.1.6 Injuries and Illnesses

Responses to injuries and illnesses shall be conducted in accordance with SOPs S3NA_607_PR_Post-Incident Medical Management and S3NA_207_PR_Medical Services and First Aid provided in Attachment A.

Critical Injuries/Illnesses include, but may not be limited to, the following:

- Loss of consciousness
- Unexplained chest pain
- Breathing difficulty
- Uncontrollable bleeding
- Fractured bones
- Suspected internal injuries
- Suspected exposure to chemical/biological hazard
- Second or third degree thermal or chemical burns (i.e. any blistering)
- Electrocution
- Unexplained change in mental state following an injury (may indicate shock or other internal injuries)
- Blows to the head of any kind

Critical Injuries/Illness shall be immediately referred to medical attention at the Emergency Medical Facility outlined in Table 10-3. When employees require immediate medical attention as the result of a work-related injury/illness, transportation must be provided to the doctor's office, clinic, or hospital. Employees **shall not** be permitted to drive themselves unless authorized by the project and/or office manager. An ambulance may be necessary to safely transport employees suffering from a critical injury or illness.

Non-Critical Injuries/Illnesses are any work-related injury and/or illness that are not a critical injury/illness and do not require **emergency medical attention**. Examples include, but are not limited to, the following:

- Mild sprains/strains
- Mild bruising
- Minor cuts and scrapes
- Muscle/joint pain or soreness

Non-Critical Injuries/Illnesses shall be assessed by the Emergency Coordinator, or an available person trained in CPR/First Aid. If the injury is determined to require first aid, it may be treated on site using materials from the first aid kit or other local sources. All cuts and abrasions will be cleaned with potable water and a clean dressing applied. The injured employee will be evaluated at the end of the work day and the following day when the employee arrives at the project site to determine whether the wound has started the healing process. The wound will be protected from contamination during the project activities.

If medical treatment (non-emergency) is needed, or if the Emergency Coordinator cannot adequately assess the nature of the injury/illness, then additional support for the employee and supervisor in these situations can also be obtained from the AECOM Corporate SH&E Administrator, Business Line SH&E Director, and/or local SH&E professional. Emergency Coordinators, Site Safety Officer or Supervisors may also engage the AECOM Corporate Medical provider if necessary (Table 10-3)

10.1.7 Fire, Explosion or Flash

Due to the fire and explosion hazard, proper safety precautions will be required when trenching across gasoline/fuel or natural gas pipelines. Local police and fire departments will be notified in advance of gasoline/fuel and natural gas line crossings as a safety precaution and in accordance with a request from the City of Los Angeles (Montrose, 2012),. All field sites (including vehicles) will be equipped with a fire extinguisher and/or fire protection equipment appropriate to the number of staff, location of the work, and job task, as dictated by legislation or client requirements.

Fire protection equipment may include:

- Fire extinguishers, of the appropriate size, class, and type for the hazard
- Round-nosed shovel, as required
- Pulaski tool or mattock, as required
- Hand-tank pump containing at least 18 liters of water, as required to meet regulations

All **employees** shall be constantly on the alert for conditions that might contribute to a fire and shall remove or report the hazard.

All **employees** shall know the location of fire fighting equipment in their work area.

Access to firefighting equipment must never be blocked by material, equipment, or vehicles. A schedule for inspecting firefighting equipment shall be developed to confirm that it is in place, accessible, and fully charged. Inspection and maintenance shall be conducted in accordance with the manufacturer's instructions.

In the event of a fire:

- Activate the nearest fire alarm or call for help, if available, before attempting to extinguish a fire. If the fire is too big to control with the equipment at hand, retreat to designated muster area/meeting location.
- Only employees with fire extinguisher training may attempt to use a fire extinguisher. Fire in the incipient stage may be extinguished, beyond that employees should retreat and call fire authorities to respond.
- Never use water on an electrical fire.
- All fire extinguisher contents shall be applied from upwind and shall be directed at the base or outer edge of the fire with a sweeping motion.
- Never return a discharged fire extinguisher to its normal location. Take it out of service for recharging and replace it with a fully charged unit.

10.1.8 Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the CM/SSO and the PM in accordance with SOP S3NA_004_PR_Incident Reporting provided in Attachment A. If any AECOM employee is injured and requires medical treatment, the CM/SSO will contact the **Regional Safety Manager, AECOM's Incident Reporting Line at (800) 348-5046, and the PM immediately**. The CM/SSO will initiate a written report, using the ***Supervisor's Report of Incident*** form (see S3NA_004_PR_Incident Reporting). The CM/SSO will complete the first two sections of this form and forward to the PM for completion of Section 3. The report will then be provided to the SH&E Professional before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the CM/SSO within 24 hours after the accident has occurred.

All accidents/incidents will be investigated in accordance with SOP S3NA_603_PR_Incident Investigation and Review provided in Attachment A. Copies of all subcontractor accident investigations, whether accomplished in accordance with their own procedures or S3NA_603, will be provided to the CM/SSO within five (5) days of the accident/incident.

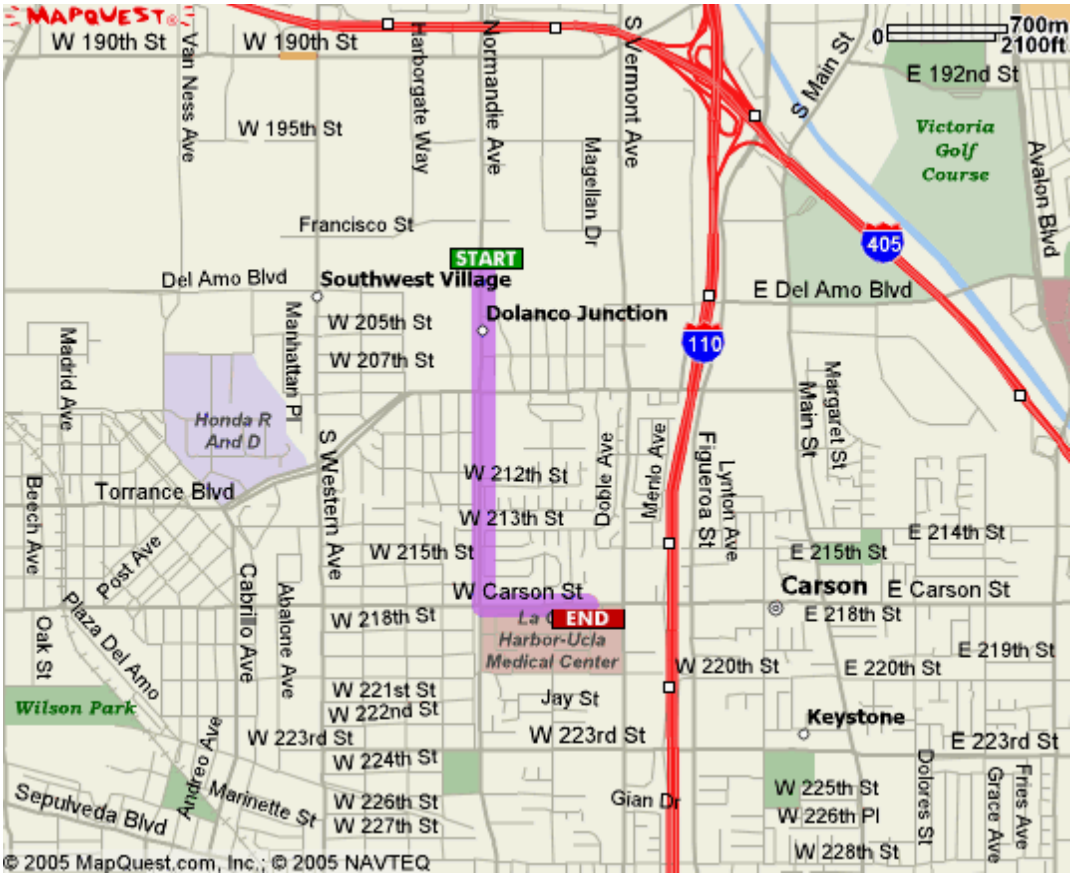
Table 10-3: Emergency Telephone Numbers

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Mobile Phone**
Kevin Thomas	Construction Manager	(562) 213-4113	(818) 970-7255
Brian Dean	Project Manager	(562) 213-4141	(562) 221-0116
Brian Dean	Account/Client Manager	(562) 213-4141	(562) 221-0116
Shelley Brown	Regional Safety Manager	NA	(562) 544-3506
Incident Reporting	**Incident Reporting Line**	**(800) 348-5046**	

Organization / Agency	
Name	**Telephone Number**
Police Department (local)	911
Fire Department (local)	911
State Police	911
Emergency Medical Facility ***(Use by site personnel for critical injuries requiring emergency medical attention)***	
LA County Harbor UCLA Medical Center	(310) 222-3528
1000 W. Carson Street,	
Torrance, CA	
Emergency Medical Facility Route: See Figure 9-1	
Ambulance Service ***(EMT may determine appropriate hospital for treatment)***	911
Non-Emergency Medical Clinic	
US Health Works	(310) 324-5777
1149 W 190th Street	
Torrance, CA 90248	
WorkCare: 24-hr On-Call Occupational Nurse	(800) 455-6155
Poison Control Center	(800) 222-1222
Pollution Emergency	(800) 292-4706
National Response Center	(800) 424-8802
Chem-Tel	(800) 255-3924
Title 3 Hotline	(800) 424-9346

Public Utilities	
Name	**Telephone Number**
Common Ground Alliance Nationwide *Call Before You Dig*	811

Figure 10-1: Hospital Location Map



11.0 REFERENCES

AECOM, 2012a — Revised Supplemental Soil Investigation Report, Montrose Superfund Site, 20201 Normandie Avenue, Los Angeles, California, April 23.

AECOM, 2012b — 2012 Groundwater Monitoring Report, Montrose Superfund Site, 20201 South Normandie Avenue, Los Angeles, California, October.

Geosyntec, 2012 — Final Design Drawings and Specifications, Dual Site Groundwater Operable Unit, Unilateral Administrative Order No. 2008-04A, Los Angeles, California, June 5.

Montrose, 2012 — Letter to Michael LoGrande, Director of Planning, City of Los Angeles, Work Plans for Torrance Groundwater Remedial System, September 21.

USEPA, 1998 — Final Remedial Investigation Report for the Montrose Superfund Site, Los Angeles, California, May 18.

USEPA, 1999 — Record of Decision for Dual Site Groundwater Operable Unit, Montrose Chemical and Del Amo Superfund Sites, Volume I: Declaration and Decision Summary, March.

USEPA, 2012 — Partial Consent Decree, Construction of the Dual Site Groundwater Operable Unit Treatment System, August 22.

ATTACHMENT A

AECOM North America, Safety, Health, and Environment Standard Operating Procedures

S3NA-001-PR Safe Work Standards and Rules

1.0 Purpose and Scope

1.1 Demonstrates AECOM's commitment to the establishment and maintenance of workplaces free from recognized hazards.

1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 **Safety Violation:** Not following verbal or written safety policies, rules and procedures (e.g., guidelines, rules, horse play, failure to wear selected PPE, abuse of selected PPE, etc.).

2.2 **Safe Work Practices:** The do's and don'ts about carrying out a task or use of equipment, informing the worker about the hazards present and providing direction on how to safeguard against the hazard. Safe Work Practices are generally guidelines only.

2.3 **Safe Job Procedures:** Written step-by-step set of instructions about completing a specific task safely including control measures and responding to emergency situations.

3.0 Attachments

3.1 S3NA-001-ST Safety Rules

4.0 Procedure

4.1 Standard Operating Procedures (SOPs)

4.1.1 Safe Work Practices and Safe Job Procedures are embodied in the SH&E Standard Operating Procedures and are available on AECOM's Americas SH&E website.

4.1.2 Specific Safe Work Practices and Safe Job Procedures have been developed in conjunction with employees and with particular input from those who have significant experience.

4.1.3 Standard Operating Procedures have been developed to provide clear instruction regarding the safety and reporting requirements of staff and operations.

4.2 Inspections and Audits

4.2.1 **Project Managers,** supervisors and **Office Managers** shall conduct project audits and office inspections to identify safe work practices and potential safety violations.

4.3 Roles and Responsibilities

4.3.1 All managers and supervisors are responsible for compliance with all SOP's and governmental requirements, and will be held responsible to prevent or bring any violations to the attention of the appropriate level of Management for corrective actions as per AECOM HR policies.

4.3.2 **District, Office, and Project Managers** (Including field task managers, supervisors) have overall responsibility for implementation of, and compliance with, this procedure.

4.3.3 **Region SH&E Managers** provide guidance as to safe work standards, rules, requirements and guidelines.

4.3.4 **Human Resource Managers** provide guidance and direction to managers and supervisors implementing the disciplinary process for safety violations (as defined in the Employee Handbook).

4.3.5 **Employees** are responsible for adhering to all AECOM safe work standards, rules, requirements and instructions and to provide input as appropriate.

4.4 Any employee who wilfully disregards AECOM or client safety standards, rules or requirements is subject to disciplinary action.

5.0 Records

None.

6.0 References

6.1 AECOM Employee Handbook

S3NA-001-ST Safety Rules

1.0 Rules for all Employees

1.1 Work in a manner that will not put oneself, other personnel or equipment or facilities at risk.

1.2 Identify hazardous conditions and activities in the work environment consistent with the job and training.

1.3 If a hazard cannot be eliminated, report it to the manager or supervisor promptly.

1.4 Implement established control methods consistent with project procedures and/or training.

1.5 Cooperate and comply with all AECOM Policies and Standard Operating Procedures.

1.6 Immediately report all acts of aggression, verbal or physical threats, assaults, sexual or other harassment to your supervisor, manager or the AECOM Hotline 1 888-299-9602.

1.7 Complete a Training Needs Assessment and take any safety training required for your job function or tasks.

1.8 Use or wear all personal protective equipment, devices or clothing required in accordance with manufacturers' instructions and AECOM training and/or procedures.

1.9 Do not perform any work task or activity which you believe is unsafe. Inform your supervisor immediately.

1.10 Immediately report all incidents (including near misses), injuries, property damage, spills, hazards, safety concerns and safety violations to your supervisor.

1.11 Report all observed unsafe acts, conditions, or behaviors that compromise the safety of AECOM employees, its clients, sub consultants, general contractors, or the public to your supervisor.

1.12 Keep all personal work areas clean from debris and tripping hazards.

1.13 Complete AECOM Vehicle and Driver Safety Program before operating any vehicle on AECOM business.

1.14 Operate all vehicles and mobile equipment in accordance with applicable regulations.

1.15 Do not use or operate any equipment, machine or device that may endanger you or another worker.

1.16 Do not remove damage, disable or make ineffective any protective safety, fire fighting or first aid equipment or devices.

1.17 Use only vehicles, equipment and tools that are in safe operating condition and maintained in accordance with manufacturer's specifications. Report, remove from service, or have repaired, any tool or equipment that is damaged, not working properly or may otherwise be hazardous if used.

1.18 Do not use any hand-held wireless device while driving a vehicle or performing other safety critical tasks like working near traffic or working with power tools.

1.19 When travelling, working alone or working away from the AECOM office, particularly in remote areas, follow applicable call-in procedures.

1.20 Do not bring firearms onto AECOM property or allow them on AECOM projects unless expressed permission is provided by management for the use in wildlife protection.

1.21 Do not smoke in areas designated as "NO SMOKING" or in any AECOM facility.

1.22 Do not use, sell or distribute, be under the influence, or have in their possession any controlled substances, drugs, or alcohol while performing work duties.

2.0 Project or Field Work

2.1 Always report to site supervisor before performing work on site to determine specific requirements for the site or project. Follow all safety requirements, including AECOM's, or that of a client or prime contractor, as applicable.

2.2 Use only designated project entrances, parking areas and facilities.

2.3 Show or produce evidence of identification or required training if requested to gain entry to or while on a project.

2.4 Obey all warning signs (e.g., "Do Not Enter," "Eye, Hearing or Respiratory Protection Required," "Permit Required Confined Space," "Authorized Personnel Only").

2.5 Do not block, deface or remove any signage, barricade or fencing without approval.

2.6 Keep passageways clean and clear of debris, materials, hoses, cords, and tripping obstructions. Items should be moved to low activity areas or storage.

2.7 Verify with the **Project Manager** that all required Permits are in place prior to commencing work.

2.8 Be aware of work going on, around or above you including contractor activities and public motor vehicles.

2.9 Do not work alone when performing high risk or remote work. Examples of high risk work activities include, but are not limited to:

2.9.1 Entering trenches/excavations

2.9.2 Entering permit-required confined spaces

2.9.3 Working at-height (i.e., donning a full-body harness)

2.9.4 Operating an aerial lift

2.9.5 Working over water

2.9.6 Boating

2.9.7 Working in atmospheres that have the potential to contain highly hazardous chemicals (e.g. hydrogen sulphide, explosive atmospheres, etc.)

2.9.8 Working near operating mobile and heavy equipment

2.9.9 Working in or adjacent to work zones containing vehicular activity

2.10 Personal cameras, video recorders, and other photographic equipment shall not be permitted on site without the **Project Manager** and client's approval.

2.11 Plan work tasks before beginning work and consider any hazards that may exist and how to avoid them through safe work practices or safe work procedures.

S3NA-002-PR Stop Work Authority for Unsafe Work

1.0 Purpose and Scope

1.1 This procedure establishes the requirements for AECOM personnel to stop work if they believe there is an imminent safety, health, or environmental risk as described below that will affect them, their co-workers, the public, or the environment.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Discrepancy/Deficiency**: An omission or commission, a condition, or a situation that is in conflict with the procedures and requirements of AECOM's SH&E standards.

2.2 **Imminent Danger**: An impending or threatening situation that, if left uncorrected, is likely to result in serious injury, property damage, or environmental impairment.

2.3 **Potentially Dangerous**: Minor violations that present a low potential for serious injury, property damage, or environmental impairment.

2.4 **Stop Work Order**: A directive to cease AECOM-controlled work issued for failure to follow procedures, imminent danger situations/conditions, accumulation of safety violations, etc. The Stop Work Order will apply to AECOM and its direct subcontractors placed at risk by the situations or conditions.

3.0 Attachments

3.1 S3NA-002-FM Stop Work Order

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees** are responsible for stopping all AECOM-directed work and for bringing it to the attention of the appropriate manager, Site Safety Officer, **Project Manager**, and/or Contractor representative any time an employee identifies a discrepancy, deficiency, or potentially dangerous condition or act that is likely to cause an unsafe or unhealthy situation or an imminent danger situation.

4.1.2 **Employees** may report unsafe working conditions anonymously, but they must provide sufficient detail and promptness to allow AECOM management and the SH&E staff to initiate corrective action.

4.1.3 **The Site Safety Officer** or **Local SH&E Representative** must initiate the development and implementation of corrective actions to eliminate the condition causing the Stop Work Order for AECOM employees and other personnel under AECOM's direct control affected by such condition. Report the details of the Stop Work Order and any corrective actions implemented to the **Project Manager** and the appropriate **Region SH&E Manager**

4.1.4 **Project managers (field task managers, supervisors)**

- Verify that corrective actions taken appropriately address the conditions leading to the Stop Work Order.
- If AECOM has control over the circumstance that led to the condition, initiate additional corrective actions necessary to correct the conditions leading to the Stop Work Order. Otherwise, remain in communication with the persons or entities that are taking the corrective measures.
- Communicate such corrective actions and the effects of such corrective actions on the project/office to the client and/or Region Management.
- Ensure that documentation related to the Stop Work Order and corrective actions is placed in the project/office file.

4.1.5 **Region Business line Managers (regional, district and office managers)**

- Provide support, in accordance with our contractual responsibilities for the project, for the implementation of corrective actions and communications with clients.
- Ensure that no reprimand or reprisal is associated with the initiation of a Stop Work Order.

4.1.6 **Region SH&E Managers**

- Provide technical guidance for the development and implementation of corrective actions.
- Communicate with the SH&E group and assist with the development of Shared Learning and Safety Alert notices.

4.2 Commitment

4.2.1 It is AECOM's policy and firm commitment that employees are expected to stop their work to prevent unacceptable exposure to workplace hazards, including unsafe conditions or worker behaviors, without fear of reprimand or reprisal.

4.2.2 Cases involving reprisal, reprimand, or any attempt to discourage the initiation of Stop Work Orders or reporting of unsafe or unhealthy conditions or situations within AECOM should be immediately reported to the employee's **Manager, Human Resources Representative**, and **Region SH&E Manager**.

4.3 Authority

4.3.1 AECOM's stop work authority applies to all work controlled by AECOM, its employees, and AECOM-controlled subcontractor work activities. All AECOM personnel are authorized to stop work in the event of an identified unsafe condition. If the responsible organization fails to provide resolution, or if at any time their acts or failure to act cause substantial harm or imminent danger to the health and safety of project employees, the public, or the environment, AECOM may issue an order stopping work in whole or in part. In the event that AECOM issues a Stop Work Order, an order issued by AECOM authorizing the resumption of work must be in place prior to restarting work.

4.3.2 In most cases, a Stop Work Order affects only those areas immediately involved in the hazardous situation. AECOM may issue a Stop Work Order for a portion of the work area(s) or for an entire work area when unacceptable risks exist that cannot be mitigated by reasonable engineering controls, administrative actions, or personal protective equipment. The Stop Work Order will remain in effect until the responsible organization resolves the problem(s) and brings the work area(s) to satisfactory conformance with established SH&E requirements. Work will not resume until appropriate corrective actions have been completed, ensuring that the condition has been rectified. The Stop Work Order will apply to AECOM and its direct subcontractors placed at risk by the situations or conditions.

4.4 Severity of Hazards

4.4.1 Imminent Danger Situations

- Upon becoming aware of an imminently dangerous situation that AECOM does not control, the employee should immediately inform the persons or entities in control of such imminently dangerous activities and his or her project manager about the situation. If the activities pertain to work that is controlled by AECOM, then the employee may stop the work upon discovering an imminently dangerous situation and then immediately notify his project manager, who may determine the appropriate further action to be taken (including the issuance of a formal Stop Work Order).
- "Stopping work" for AECOM-controlled work includes stabilizing an imminent danger situation to the extent that it can be left unattended for a prolonged period of time until the issue is resolved.
- The person requesting the work stoppage will notify the organization responsible for the work.
- The responsible organization will notify AECOM project/office management immediately of any stop work action(s) taken to rectify the situation.
- An AECOM's failure to comply with any Stop Work Order in whole or in part may result in disciplinary action. An AECOM subcontractor employee's failure to comply with any Stop Work Order may result in immediate removal from the project and/or office location.

4.4.2 Potentially Dangerous Situations

- Informal stop work interventions to correct minor conditions (e.g., to remind workers to put on their hard hats, safety glasses, etc.) do not require formal notification.
- If the minor condition cannot be corrected, a formal Stop Work Order must be issued and work must not be resumed until the situation has been eliminated.

4.5 Management-issued Stop Work Orders

4.5.1 **Region, District**, and **Office Managers, Project Managers** and/or **SH&E Managers** may issue a formal Stop Work Order for AECOM-controlled work in the following situations:

- Imminent danger exists involving the public or employee's safety and health or damage to the environment, facilities, or property.
- Continuing work or equipment usage will result in significant repair, rework, or removal.
- A project, or any segment of the project, is executed improperly or is out of compliance with applicable regulations or standards.

4.6 Resuming Work

4.6.1 Work associated with the affected area or operation will not resume unless all corrective actions identified in the applicable Stop Work Order have been completed and closed.

4.6.2 All personnel affected by the Stop Work Order will be instructed on the corrective actions and preventative measures taken.

5.0 Records

5.1 The completed Stop Work Order and any corrective action reports generated will be maintained at the project site for the duration of the project and placed in the closed project file.

6.0 References

6.1 None

S3NA-002-FM Stop Work Order

This form must be completed if any of the following Criteria are met:

1. Imminent danger exists involving the public or employees' safety and health, the environment, facilities, or property.
2. Continuing work or equipment usage will result in significant repair, rework, or removal.
3. There is a discrepancy, deficiency, or potentially dangerous condition or act that is likely to cause an unsafe or unhealthy situation or an imminent danger situation.

Project Name:			
Project Manager:		**Project #:**	
Reported by:		**Date/Time:**	
Office:		**Address:**	
Stop Work Order is the result of the following:			
Inspection/Audit ☐	**Environmental Impairment** ☐	**Injury/Incident** ☐	
Unsafe Condition ☐	**Unsafe Behavior/Act** ☐	**Improper Scope of Work** ☐	
Other ☐			
Stop Work Order (Describe):			

All Stop Work Orders will be sent to the Regional SH&E Manager for Review

Return to Work

The above Stop Work Order issues/concerns have been corrected and documented. By signing below, I certify that the above Stop Work Order scenario has been corrected and work is safe to resume.

Title	Print Name	Signature
Project Manager:		
Individual/party issuing Stop Work Order:		
Sub-Contractor Supervisor (if applicable):		

S3NA-003-PR SH&E Training

1.0 Purpose and Scope

1.1 AECOM's Safety, Health and Environmental (SH&E) Training Program is designed to provide training for all personnel which address the safety needs of their assigned job duties and responsibilities.

1.2 This procedure establishes procedure and standards through which training content is developed, delivered and documented.

1.3 This procedure applies to all AECOM North America based employees and operations.

1.4 Major objectives of the SH&E Training Program includes:

- Identify accountability, responsibility, and authority pertaining to the SH&E training program requirements.
- Establish minimum training course and/or instructor criteria to support compliance with applicable regulatory requirements as well as AECOM's SH&E Program requirements.
- Provide a framework to assess participant competency and understanding.
- Define documentation and corresponding archive requirements for the training program.
- Maintain consistency in SH&E training content throughout North America for AECOM.

2.0 Terms and Definitions

2.1 **Compliance Training**: Training meant to provide a safe and healthy workplace for AECOM employees and others through adherence to legislative and regulatory mandates (e.g. federal, state, provincial, territorial, local/municipal governments and agencies thereof), AECOM's SH&E policy and procedure, and client-specified requirements as defined in project specifications and contracts.

2.2 **Conformance Training**: Training developed by AECOM intended to further develop the AECOM SH&E culture, but is not required by legislative or regulatory requirements, SH&E policy and procedure, or client requirements.

2.3 **Competent Person**: One who is capable of identifying existing and predictable hazards in surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization and resources to take prompt corrective measures to eliminate them.

2.4 **Learning Management System (LMS):** An electronic data management system for recording the requirements of the TNA and the successful completion of assigned SH&E training.

2.5 **SH&E Administrators:** Employees that are located in various offices who coordinate the staff and/or trainers for delivery of SH&E training and record training completion data in the LMS or maintain hard copy files of training data for the location(s).

2.6 **Training Needs Assessment (TNA):** A tool in which a selection process identifies an employees' SH&E training requirements based on their job role(s), responsibility(s) and associated hazards, and reviews the selected course(s) with his/her supervisor for approval and provision.

3.0 Attachments

3.1 S3NA-003-FM1 SH&E Training Sign in Sheet

3.2 S3NA-003-FM2 Training Needs Assessment

3.3 S3NA-003-FM3 Training Needs Assessment – Administrative Employees

3.4 S3NA-003-FM4 Training Needs Assessment – Technical Employees

3.5 S3NA-003-FM5 Training Needs Assessment – Employee Supervisors & Project Managers

3.6 S3NA-003-FM6 Training Needs Assessment – On-Site Project Supervisors

3.7 S3NA-003-FM7 Training Needs Assessment – Line Managers

3.8 S3NA-003-FM8 SH&E Training Course and Instructor Evaluation

3.9 S3NA-003-WI1 Training Needs Assessment Process

3.10 S3NA-003-WI2 Training Delivery

3.11 S3NA-003-WI3 Training Documentation

3.12 S3NA-003-TP1 SH&E Training Syllabus Template

3.13 S3NA-003-TP2 SH&E Training Certificate Template

4.0 Procedure

The requirements included in this procedure are the minimum applicable for AECOM SH&E training activities. Further training may be identified to meet local jurisdiction or client requirements.

4.1 Roles and Responsibilities

4.1.1 **Region Executives** are responsible for establishing adequate resources (budget, training staff, etc.) to implement the identified SH&E training.

4.1.2 **Region Business Line Managers** are responsible for supporting the SH&E training program, and for the implementation and enforcement of this procedure within their region. This includes:

- Allocating resources (budget, training staff, etc.) for the effective implementation of this program.
- Participating with the **Region SH&E Manager** in the development of tools to identify, track and monitor the implementation of SH&E training.

4.1.3 **District or Office Managers, Project Managers** (including field task managers, employee supervisors) are responsible for verifying that all assigned personnel comply with the requirements of this program. They will also:

- Identify local **SH&E Administrators** to coordinate SH&E training and to handle the training program data for their district/department.
- Confirm that training requirements are reviewed with each employee, based upon anticipated hazards associated with current and probable job functions and past performance if the job has not changed.
- Confirm that a SH&E TNA is completed by each employee and their supervisor as part of an employee's new hire orientation and during annual review.
- Identify supplemental employee training courses based on local/client requirements.
- Identify additional employee SH&E training requirements based upon prudent risk management considerations and local performance issues.
- Implement corrective actions when employees fail to meet training requirements.
- Confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

4.1.4 **Americas SH&E Director** is responsible for the following**:**

- Establishing SH&E Training Program parameters and communicating with group executive management on training performance.
- Providing the necessary tools, support, and staff for development of the SH&E training program.
- Reporting/communicating training status to senior management.

4.1.5 **SH&E Training Manager** is responsible for the following:

- Developing and maintaining the LMS.
- Developing a list and schedule of training courses, including routine recurring training for standard courses. Communicating such information accordingly.
- Developing a resource of AECOM online, vendor or classroom training materials.

- Developing a library of approved SH&E courses and syllabi.
- Reviewing and approving qualifications of AECOM employees providing internal safety training.
- Collaborating with the **Region SH&E Managers** in course development and content.
- Auditing for compliance with training program parameters.
- Reviewing training evaluations to verify quality of training provided.
- Reporting the status of the SH&E Training Program to the **Americas SH&E Director** and **Region SH&E Managers.**

4.1.6 **Region SH&E Manager** is responsible for the following:

- Working with Region and Business Line management to verify all SH&E training needs are identified and captured in the LMS.
- Developing a schedule and performing internal safety training classes as requested by region, district, office or **Project Managers**.
- Reviewing and approving qualifications of AECOM employees providing internal safety training.
- Approving training lesson plans and course agendas for all internal training courses.
- Approving external safety training vendors and on-line (Internet) training providers.
- Offering all training participants the opportunity to evaluate training events.
- Reporting compliance with training program requirements to line management.

4.1.7 **SH&E Administrators** are responsible for the following:

- Inputting and maintaining records pertaining to all SH&E training courses into the LMS.
- Assigning training courses to employees, based on approved TNA results.
- Maintaining a file, hardcopy or electronic, of employee training records, sign-in sheets and other SH&E records related to training (such as quizzes and course evaluations where available).
- Supporting employees in obtaining refresher training prior to expiration.
- Providing office, department, location or business line managers training compliance reports at an interval agreed upon by manager.

4.1.8 **Employees** are responsible for the following**:**

- Reviewing with their supervisor the SH&E hazards they may be exposed to in their day-to-day functions, and requesting the training for that hazard by completing a SH&E TNA.
- Coordinating with their supervisor to take the required SH&E training course prior to performing tasks with identified hazards.
- Monitoring their own training expiration dates and coordinating with their local **SH&E Administrator** (and supervisor) for refresher training to prevent expiration of any required training certifications.
- Maintaining a personal record of all training certifications.
- Supplying copies of training completion certificates to the **SH&E Administrator** for inclusion in the LMS.
- Providing feedback on training through the evaluation process.

4.2 Training Needs Assessment

4.2.1 The purpose of the TNA is to provide employees with the ability to identify the job tasks that they perform and training associated with these tasks that is meant to provide employees with the knowledge and skills needed to work safely, control hazards and reduce the potential for an incident to occur.

4.2.2 Upon employment and annually thereafter in conjunction with their annual performance review, employees will review their SH&E training requirements by completing/updating their SH&E TNA.

4.2.3 The employee's supervisor will review, modify and/or confirm training recommendations identified on the TNA and confirm enrolment into the required training programs. Details for completing a TNA may be found in *S3NA-003-WI1 Training Needs Assessment Process*.

4.2.4 Training Needs Assessments must be reviewed if any employee has been assigned a significantly different job with new hazards or project reassignment.

4.2.5 A list of training approved by the supervisor will be provided to the employee's SH&E Administrator and assigned in AECOM's LMS.

4.3 Training Delivery

4.3.1 SH&E Training is delivered in several methods to meet AECOM's wide diversity of staff, office and project locations. The **Region or District SH&E Manager** will coordinate with local operations and **SH&E Administrators** to develop a region training schedule and appropriate methods of delivery.

4.3.2 Every employee must attend the required training to meet the requirement established in the TNA and to demonstrate successful participation and knowledge transfer by completing and passing the associated quizzes, examinations or other form of assessment.

4.3.3 Standards for developing and delivering training courses, as well as certification criteria are provided in Work Instruction *S3NA-003-WI2 Training Delivery*.

4.4 Internal Training

4.4.1 Internal training represents training that is performed by AECOM's internal resources and may include intranet and classroom-based training. Generally this training material is customized to meet the specific requirements of AECOM, a location or a project.

4.4.2 Courses that are self-taught, individually paced and delivered via AECOM's intranet are developed and maintained by the **SH&E Training Manager**. AECOM's intranet may also be used to provide training by an SH&E Instructor in a WebEx format to facilitate personnel training for multiple locations.

4.4.3 Courses taught by an AECOM instructor in a classroom format will be delivered by trainers that are SH&E Department-approved personnel using materials developed specifically to train AECOM employees. All training course curricula is reviewed and approved by the **SH&E Department** prior to provision of training.

4.5 External Training

4.5.1 External vendors conduct training that is not available through internal training sources. All external vendors are to be selected and pre-approved by the **SH&E Department** prior to any employee attending a training class.

4.5.2 AECOM will use Internet training to supplement internal training courses. All Internet-based safety training courses and providers must be approved by the **SH&E Department** prior to any employee participating in training. Employees will be provided sign-on privileges once approved.

4.6 Project Specific Training

4.6.1 In the course of employment with AECOM, employees may be asked to participate in project work incorporating activities new to them or activities for which they have let their SH&E training expire. Should this occur, they must immediately inform their supervisor and not participate in any tasks with hazards for which they have not been trained.

4.6.2 **Project Managers** must review all employees scheduled to work on their projects for compliance with SH&E training for hazards present or anticipated on their particular project. **Project Managers** must not let any employee that does not have current training for the identified hazards work on their projects.

4.7 Training Evaluation

4.7.1 At the conclusion of a training event, participants will be provided with the opportunity to anonymously evaluate the training session.

4.7.2 The training instructor will provide participants with a copy of *S3NA-003-FM8 SH&E Training Course and Instructor Evaluation*. Alternately, and for training conducted virtually and/or through teleconference, the training instructor will provide participants with a link to the online version of the form and provide instruction on how to complete the form.

4.7.3 Training instructors will collect evaluations at the conclusion of training, review feedback, and when appropriate, contact the **SH&E Training Manager** to request assistance addressing consistently noted deficiencies.

4.8 Training Tracking

4.8.1 Records documenting employee participation safety training will be maintained in accordance with applicable regulatory and AECOM SH&E Program requirements.

4.8.2 Each employee is responsible for maintaining a personal file that contains their history of training certifications.

4.8.3 Each region/district is responsible for maintaining documentation of course completion by each individual employee. **SH&E Administrators** will generally maintain such documentation.

4.8.4 For any employee who cannot be entered into the electronic database, i.e.: contract employees, sub consultant employees, or client personnel, the **District or Office SH&E Administrator** is required to maintain an individual non-employee training file with hard copies of certification from any safety training records.

4.9 Training Expiration

4.9.1 Training will expire in accordance with requirements specified on the training subject syllabus.

4.9.2 Expiration of training will be tracked electronically using the AECOM LMS.

4.9.3 Employees who are not managed within the AECOM LMS are responsible for tracking their individual training expiration dates.

4.9.4 If training expires for an employee, they will be disqualified from performing tasks associated with the training when training is required by legislation/regulation to perform the tasks. Once training has been renewed, the employee will be qualified to perform associated tasks.

4.10 Training Program Management

4.10.1 **Region SH&E Managers** will be responsible for verifying training vendors, Internet training courses, or any other external training programs used by their operating units to comply with applicable regulatory or legislative requirements and AECOM SH&E Program parameters. AECOM will not consider any training received through an unapproved vendor to be valid until reviewed and accepted by a **Region SH&E Manager.**

4.10.2 AECOM Americas Office of **Organization and Employee Development** may provide training support services for AECOM-approved programs in addition to training provided by individual business lines and outside vendors.

5.0 Records

5.1 None

6.0 References

6.1 S3NA-003-WI1 Training Needs Assessment Process

6.2 S3NA-003-WI2 Training Delivery

6.3 S3NA-003-FM8 SH&E Training Course and Instructor Evaluation

S3NA-003-FM1 SH&E Training Sign-In Sheet

Course Name:					
Region:		**District:**			
Business Line:		**Dept #:**			
Office:		**Address:**			
Date:		**Start Time:**		**Stop Time:**	

Certification Level (Check One): **Awareness** ☐ **Performance** ☐ **Competent Person** ☐

Lead Instructor:	**Instructor 1:**	**Instructor 2:**

	Employee Name: (PRINT LEGIBLY)	**Employee Signature**	**Region/Office Company (if not AECOM)**	**Employee ID #:**	**Instructor Initials verifying completion**
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
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11.					
12.					
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16.					
17.					
18.					
19.					
20.					

Course Agenda

Course Name/ Module	Approximate Duration	Learning Objectives	Comprehension Assessment	Certification
		•	•	•
		•	•	•
		•	•	•

Lead Instructor's Signature _____ **Date** _____

Instructor 1 Signature _____ **Date** _____

Instructor 2 Signature _____ **Date** _____

S3NA-003-FM2 Training Needs Assessment

First Name:	**Last Name:**	**Employee Number:**	**Department Number:**
Home Office:	**Date Completed:**	**Supervisor:**	
Region:	**Business Line:**	**District:**	

Instructions

- Answer each question as it pertains to your job now and for the coming year.
- Consider any potential changes to your job, new roles that you may be performing, and your business goals for the coming year.
- If you are uncertain if a job role or function applies to you now, or in the coming year, contact your Supervisor for assistance in making this determination.
- During completion of the Trainnig Needs Assessment (TNA) similar and/or duplicate training may be identified. When this occurs contact your SH&E Manager to discuss opportunities where training may be consolidated to avoid redundant training.

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
BASIC EMPLOYEE SH&E TRAINING						
	Are you in the Environment Business Line?	Behavior Based Safety (all three modules)	Initial - Training does not require renewal		US, Canada	2.5
	Do you only work in the office, i.e. you do not conduct Field Work (any work outside the office)? Work outside the office may include traveling to AECOM project and office locations, traveling to client locations and performing general administrative task	Office Ergonomics - Awareness Training	2	102	US	0.5
	Are you an employee of Canada?	SH&E Fundamentals - Awareness Training	Annual	003, 209	Canada	2
	Are you an employee of the US?	SH&E Fundamentals - Awareness Training	3	003, 209	US	2

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
OFFICE SAFETY						
	Do you spend at least 1 full day, or at least 10 total hours per week, working in an office setting? NOTE: This can be your assigned AECOM office, a client site office, a home office, or a job-site trailer or similar field office location if that is your	Office Ergonomics - Awareness Training	2	102	US	0.5
	Does your work ever involve using a computer for at least 2 hours continuously, a total of 4 hours in any work day, or at least half of your time in the office?	Office Ergonomics - Awareness Training	2	102	US	0.5
	Does your work ever involve using a computer for at least 2 hours continuously, a total of 4 hours in any work day, or at least half of your time in the office?	Office Ergonomics - Awareness Training*	2	102	Canada	0.5
	Is your office equipped with portable fire extinguisher for use on small, initial-stage fires (no larger than an office trash receptacle)?	OPTIONAL TRAINING - Fire Extinguisher - Awareness Training; AECOM will not require you to operate a fire extinguisher in the office, only evacuate the office safely.	Annual	106	US, Canada	0.5
	Are you designated as a First Aid certified employee in the office?	First Aid - Performance Training*	2	101, 207	US	2.5
	Are you designated as a CPR certified employee in the office?	CPR - Performance Training*	2	101, 207	US	2.5
	Are you designated as an AED trained employee within the office?	AED - Performance Training	2	101, 203, 207	US	0.5

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
OFFICE SAFETY						
	Do you receive and process shipments for your office (by FedEx, UPS, etc.) and/or are you the person who signs for incoming shipments and packages? NOTE: Regardless of shipment contents.	HzM(US)/TDG(CAN) Shipping - Awareness Training*	3	508	US, Canada	0.5
	Do you receive shipments of hazardous materials or dangerous goods? NOTE: This can include analytical laboratory samples, waste materials, calibration gases, other compressed-gas items, or any hazardous materials/wastes.	Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	3	508	US, Canada	4
	Do you co-chair an office Occupational Health & Safety (OHS) committee?	Workplace Safety & Health Committee - Performance Training (as per local jurisdictions)*	Initial - Training does not require renewal		Canada	16
	Do you perform office-based work for Shell (an AECOM Client), i.e. project oversight, planning, design, any billed labor, etc.?	Shell 12 Life Saving Rules	Initial - Training does not require renewal	201, Shell	US, Canada	1
	Are you a Fire Warden for your office and/or are you responsible for the inspection and maintenance of fire extinguishers?	Fire Extinguisher - Awareness Training*	1	106, 206	US, Canada	0.5
	Are you listed in an Office Safety Plan as a provider of First Aid, CPR, AED and other advanced life saving skills?	Standard First Aid, with CPR & AED Performance Training*	3	101	Canada	16
	Do you routinely (i.e. daily or more frequently) perform activities involving lifting heavy objects, repetitive motions and/or awkward postures?	Industrial Ergonomics - Awareness Training	3	308	US, Canada	0.7

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
VEHICLE OPERATIONS AND MOBILE EQUIPMENT						
	Do you regularly drive for work AND your supervisor has identified the need for expanded driver safety training; example: you have been assigned an AECOM owned or leased vehicle?	Complete AECOM Driver's Acknowledgement Form	2	5	US, Canada	0
		Driver & Vehicle Safety - Awareness Training	2	5	US, Canada	0.5
	Has AECOM provided you with a company owned or leased vehicle for long-term use, i.e. >30 days/year?	Def. Driver NSC(U.S.)/CMA(CAN) - Awareness Training	Initial - Training does not require renewal	005, 404	US, Canada	4
	Do you drive an ATV?	ATV Safety Performance Training	3	402	US, Canada	6
	Do you drive a Commercial Motor Vehicle (>10,001 GVWR U.S.) for business purposes?	Commercial Motor Vehicle (CMV) - Performance Training*	3	404	US	4
		Def. Driver NSC(U.S.)/CMA(CAN) - Awareness Training	Initial - Training does not require renewal	005, 404	US, Canada	4
	Do you work for a client that requires you complete Smith System Defensive Driver training?	Smith System Driver - Performance Training	3	201	US, Canada	8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
EMPLOYEE MANAGEMENT						
	Do you Manage or Supervise AECOM Employees, or do you work unsupervised?	Canadian Due Diligence - OH&S Training*	Initial - Training does not require renewal	C45	Canada	3

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
EMPLOYEE MANAGEMENT						
		Incident Investigation - Awareness Training*	Initial - Training does not require renewal	Varied depending upon province	Canada	2

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HAZWOPER AND EMERGENCY RESPONSE						
	Are you a HAZWOPER worker, are you Project Manger for HAZWOPER projects, or are you required to visit any designated HAZWOPER site AND enter into any Exclusion Zone areas?	HazCom(US)/WHMIS(CDN) - Awareness Training*	Annual	507	US, Canada	0.5
		HAZWOPER 40-Hour - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Initial - Training does not require renewal	509	US, Canada	40
		HAZWOPER 8-Hour Refresher - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	509	US, Canada	8
	Do you perform field management of HAZWOPER work (including supervising a work/investigation team) or people on a HAZWOPER site, and/or serve as a Site Safety Officer for any HAZWOPER site/activity?	HAZWOPER 8-Hour Supervisor - Awareness Training*	Initial - Training does not require renewal	509	US, Canada	8
	Do you perform HAZWOPER emergency response work, have you been issued respiratory protection PPE, have you been required to wear	Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	207	US, Canada	0.8

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HAZWOPER AND EMERGENCY RESPONSE						
	respiratory protection PPE by AECOM, and/or do you wear a respirator inside an Exclusion Zone for more than 30 days in any yea	Respiratory Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	519	US, Canada	0.8
	Do you perform HAZWOPER Emergency Response services as defined in 29 CFR 1910.120(q)(3)?	HAZWOPER Emergency Response Performance Training in accordance with assigned role, i.e. First Responder Operations Level, Hazardous Materials Technician, Hazardous Materials Specialist, and/or On Scene Incident Comander.* Consult your RSH&EM about the ne	Annual	509	US	8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
FIELD WORK						
	Do you perform any Field work NOT associated with Environmental Clean-up?	Field Safety - Awareness Training. Consult your RSH&EM about the need for Medical Surveillance.	2	209	US, Canada	4
		Natural Biological Hazards - Awareness Training	2	503	US, Canada	1
	Do you work in a location where First Aid and CPR skills were needed wherein emergency services were either unavailable or remote as defined in SH&E SOP 208, and/or have you been identified as the First Aid/CPR Responder in a project Safe Work Plan?	CPR - Performance Training*	2	101, 207	US	2.5
		First Aid - Performance Training*	2	101, 207	US	2.5

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
FIELD WORK						
	Do you routinely (i.e. daily or more frequently) perform field activities involving lifting heavy objects, repetitive motions and/or awkward postures?	Industrial Ergonomics - Awareness Training	3	308	US, Canada	0.7
	Do you work in close proximity to heavy equipment (i.e. skid steers, back hoes, excavators, bulldozers and other yellow iron)?	Heavy/Mobile Equipment Safety Awareness Training*	3	309	US, Canada	0.5
	Do you work on a project equipped with an AED where you are designated as an AED trained employee for the project?	AED - Performance Training	2	101, 203, 207	US	0.5
	Do you wear hearing protection (ear plugs, ear muffs, etc.) for a total of 2 hours or more in a single work shift on average at least two times per month, have you been issued hearing protection by AECOM, have you been required to wear hearing protection	Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	207	US, Canada	0.8
	Do you perform a task where a fire extinguisher is a required piece of equipment for the job (e.g., fire watch)? NOTE: The presence of fire extinguishers in the workplace does not indicate that you are required to use one.	Fire Extinguisher - Awareness Training*	1	106, 206	US, Canada	0.5
	Do you regularly work in remote and isolated locations where you have the potential to be isolated overnight?	Wilderness Survival - Awareness Training	Initial - Training does not require renewal	313, 503	Canada	16
	Do you work in locations where bears may be encountered?	Bear Safety - Awareness Training	2	313, 503	Canada	1
	Do you conduct or supervise permitted fish	AED - Performance Training	2	203, 207	Canada	

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
FIELD WORK						
	sampling/salvaging with the use of an electro-fisher?	Electrofishing Certification*	Initial - Training does not require renewal	407	US, Canada	16
	Do you work on or adjacent to a roadway that has live traffic?	Traffic Safety - Awareness Training	3	306	US, Canada	0.7
	Do you prepare Traffic Control Plans for the direction of traffic on an AECOM controlled project?	Traffic Control Planner, contact your RSH&EM to obtain training.*	Varied	306	Canada	
	Are you listed in a project Safe Work Plan as a provider of First Aid, CPR, AED and other advanced life saving skills?	Standard First Aid, with CPR & AED Performance Training*	3	101	Canada	16
	Do you use power tools, extension cords and other electrically powered devices on the job?	Electrical Safety - Awareness Training*	2	302, 410	US	0.8
	Do you work in a location with exposure to a fall of 6ft/2m or greater?	Fall Protection - Awareness Training*	3	304	US, Canada	0.8
	Do you wear a Personal Fall Arrest System (PFAS) while working at heights in excess of 6ft/2m, or on an elevated working platform or access way with an unprotected edge in excess of 1.2m/4ft and exposure to water, heavy equipment, chemicals, or other reco	Fall Protection - Performance Training*	3	304	US, Canada	4
	Do you work near open excavations and/or trenches, or do you enter an open excavation/trench >1.5m/5ft in depth?	Trenching & Excavation Safety - Awareness Training*	3	303	US, Canada	0.8
	Will you work outside for longer than one (1) hour exposed to temperatures at or below 40 F/4.5 C?	Cold Stress Prevention Awareness Training	3	505	US, Canada	0.5

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HAZARDOUS MATERIALS (HZM), HAZARDOUS WASTE (HZW) & DANGEROUS GOODS HANDLING, TRANSPORT AND SHIPMENT						
	Individually or on behalf of your office, do you offer for shipment, potentially package for shipment, or receive shipments (by FedEx, UPS, etc.)? NOTE: Regardless of shipment contents.	HzM(US)/TDG(CAN) Shipping - Awareness Training*	3	508	US, Canada	0.5
	Do you handle or work with any type of controlled materials, hazardous materials or chemicals? NOTE: Consider only materials procured or brought to the work site by AECOM, NOT environmental contaminants, asbestos, lead, commonly available consumer prod	HazCom(US)/WHMIS(CDN) - Awareness Training*	Annual	508	US, Canada	0.5
	Do you request that someone ship on your behalf, receive shipments of, or are you required to personally package, prepare for shipment, or fill out/complete shipping documents or paperwork (by FedEx, UPS, etc.) for any types of hazardous materials or dang	Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	3	508	US, Canada	4
	Are you required to develop, oversee, or direct the process for packaging/shipping any hazardous, dangerous, or radioactive materials, devices or items? NOTE: Checking YES here will require that you complete HAZMAT Level 2 shipper training. This traini	Level 2 Shipper - HzM(US)/TDG(CDN) - Performance Training*	3	508	US, Canada	6
	Are you required to personally package or prepare for shipment (by FedEx, UPS, etc.) any meters that contain radioactive materials? This includes transport within an AECOM owned or leased vehicle, or personal vehicle used for AECOM business purposes NOT	Level 1 - Nuclear Density Gauge Shipping- Performance Training*	2	508	US, Canada	6
	Do you sign HzM/HzW manifests or bills of lading while acting as an Authorized Agent on Behalf of	Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	3	508	US, Canada	4

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HAZARDOUS MATERIALS (HZM), HAZARDOUS WASTE (HZW) & DANGEROUS GOODS HANDLING, TRANSPORT AND SHIPMENT						
	a Client?	RCRA Part B Annual Training - Awareness Training*	Annual	415	US	2
	Do you ship HzM(US)/TDG(CAN) by Air Transportation/Courier Methods?	IATA - International Air Transportation Association HzM(US)/TDG(CAN) Training	2	508	US, Canada	6

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CONSTRUCTION, ENGINEERING & INSPECTION OVERSIGHT, MANAGEMENT AND PERFORMANCE						
	Do you perform work on active or inactive Construction, Engineering & Inspection projects?	Petroleum Safety Training Systems (PSTS) and/or Construction Safety Training System (CSTS) as required by the Client.*	PSTS/ CSTS - Initial		Canada	
	Do you work on active construction projects in MA or RI?	OSHA 10-Hour Construction - Awareness Training*	Initial - Training does not require renewal	State/Project Requirement	US	10
	Do you work on active construction projects in NV?	OSHA 10-Hour Construction - Awareness Training*	5	State/Project Requirement	US	10
	Do you work on PUBLICLY FUNDED projects in NH, CT, NY, MO?	OSHA 10-Hour Construction - Awareness Training*	Initial - Training does not require renewal	State/Project Requirement	US	10
	Are you the Site Safety Officer on an Army Corps of Engineers Project?	OSHA 30-Hour Construction - Awareness Training*	Initial - Training does not require renewal	State/Project Requirement	US	30

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CONSTRUCTION, ENGINEERING & INSPECTION OVERSIGHT, MANAGEMENT AND PERFORMANCE						
	Are you a site manager, foreman, or Site Safety Officer for job sites involving construction or demolition activities? NOTE: This can include HAZWOPER/environmental sites where significant construction/demolition is required.	Construction Awareness; consult your RSHE&M and Supervisor to determine specific training topics.	Initial - Training does not require renewal	Varied depending on job tasks	US	4
	Do you spend at least one day a week, or one-third of your total overall work time, on construction/demolition sites? NOTE: In this case, check YES whether you manage/perform the work, or provide inspector, engineering, or other support functions, as lo	Construction Awareness; consult your RSHE&M and Supervisor to determine specific training topics.	Initial - Training does not require renewal	Varied depending on job tasks	US	4
	Does your work have the potential to be affected by Lockout/Tagout?	Lockout/Tagout - Awareness Training*	3	302, 410	US, Canada	0.8
	Do you perform Lockout/Tagout Operations on systems (i.e. electrical, pressurized, equipment maintenance, etc.)?	Lockout/Tagout - Performance Training*	2	302, 410	US, Canada	4
	Do you ever work on electrically-energized (live) systems/circuits?	Arc-FLASH (NFPA 70E) Training*	Initial - Training does not require renewal	302, 410	US	1
		Electrical Safety - Awareness Training*	2	302, 410	US	0.8
	Do you have the potential to access scaffolding?	Scaffolding Safety - Awareness Training*	3	311	US, Canada	0.8
	Do you work near open excavations and/or trenches, or do you enter an open excavation/trench >1.5m/5ft in depth?	Trenching & Excavation Safety - Awareness Training*	3	303	US, Canada	0.8

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CONSTRUCTION, ENGINEERING & INSPECTION OVERSIGHT, MANAGEMENT AND PERFORMANCE						
	Do you wear a Personal Fall Arrest System (PFAS) while working at heights in excess of 6ft/2m, or on an elevated working platform or access way with an unprotected edge in excess of 1.2m/4ft and exposure to water, heavy equipment, chemicals, or other reco	Fall Protection - Performance Training*	3	304	US, Canada	4
	Do you perform or manage Quality Control (QC) oversight on U.S. Army Corps of Engineer (USACE) projects?	USACE CQC - Performance Training*	5	201	US	8
	Do you work in a location with exposure to a fall of 6ft/2m or greater?	Fall Protection - Awareness Training*	3	304	US, Canada	0.8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CHEMICAL EXPOSURE						
	Do you have potential to be exposed to Chemical Hazards?	HazCom(US)/WHMIS(CDN) - Awareness Training*	Annual	507	US, Canada	0.5
	Do you handle or work with any type of controlled materials, hazardous materials or chemicals? NOTE: Consider only materials procured or brought to the work site by AECOM, NOT environmental contaminants, asbestos, lead, commonly available consumer prod	HazCom(US)/WHMIS(CDN) - Awareness Training*	Annual	507	US, Canada	0.5
	Do you have potential to be exposed to Lead?	Lead Safety - Awareness Training*	Annual	513	US, Canada	0.8
	Do you have potential to be exposed to Asbestos?	Asbestos - Awareness Training*	Annual	501	US, Canada	0.8

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CHEMICAL EXPOSURE						
	Do you perform Asbestos inspections of buildings or other facilities?	Asbestos Inspector (State Specific) - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	501	US, Canada	8
	Do you write Asbestos Management Plans?	Asbestos Planner (State Specific) - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	501	US, Canada	8
	Do you perform Lead inspections of buildings or other facilities?	Lead Based Paint Inspector/Assessor (State Specific) - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	513	US, Canada	8
	Do you write Lead Management Plans?	Lead Based Planner (State Specific) - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	513	US, Canada	8
	Do you have the potential to be exposed to Hydrogen Sulfide (H2S), (i.e. Oil & Gas support services, WWTP, Landfills, etc.)?	H2S - Awareness Training*	Annual	507	US	0.8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CONFINED SPACE ENTRY						
	Do you have a responsibility to identify and characterize Confined Spaces?	Confined Space - Awareness Training*	3	301	US	1

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CONFINED SPACE ENTRY						
	Do you have a responsibility to identify and characterize Confined Spaces?	Confined Space - Awareness Training*	3	301	Canada	1
	Do you perform any of the following roles during a Confined Space Entry operation: Entrant, Attendant, Entry Supervisor?	Confined Space - Performance Training*. Consult your project Safety Plan and Regional SH&E Manager to determine training required per your job role and function.	2	301	US	8
	Do you perform any of the following roles during a Confined Space Entry operation: Entrant, Attendant, Supervisor?	Confined Space - Performance Training*	2	301	Canada	8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
MSHA						
	Do you work on any sites regulated by the Mine Safety and Health Administration (MSHA) that require miner training in accordance with 30 CFR 46?	MSHA Initial Miner Safety - Performance Training*. Consult your RSH&EM about the need for Medical Surveillance.	Initial - Training does not require renewal	30 CFR 46.5-.6	US	24
		MSHA Miner Safety Refresher - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	30 CFR 46.8	US	8

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
WORK IN/OVER WATER						
	Do you work near, on, in or over water?	Pleasure Craft Operator Card*	Initial - Training does not require renewal		Canada	
		Working Around Water Safety Awareness Training	3	315	US, Canada	1
	Do you work on, or operate, a powered vessel?	Boating Safety - Consult your project Safety Plan and Regional SH&E Manager to determine training required per your job role and function, i.e. Boater Safety, Water Rescue, etc.	Initial - Training does not require renewal	417	US	8
	Do you work on frozen water bodies infrequently?	Water Safety Awareness Training	Initial - Training does not require renewal	24	Canada	
	Do you work on frozen water bodies frequently or for extended periods of time?	Ice Rescue Training	Initial - Training does not require renewal		Canada	
	Do you regularly work in or on large and fast-flowing creeks, rivers, streams?	Swift Water Rescue Training	Initial - Training does not require renewal		Canada	
	Do you perform electo-fishing sampling operations?	Electrofishing Certification*	Initial - Training does not require renewal	407	US, Canada	16

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
RADIATION SAFETY						
	Does your work expose you to Ionizing Radiation (i.e. NORM, radioactive sources in manufacturing/O&G industry, etc.)?	Radiation Safety - Awareness Training*	Annual	516	US, Canada	1
	Do you operate a soil density/moisture gauge?	Nuclear Density Gauge Operator - Performance Training*	Annual	516	US, Canada	8
	Do you operate any devices containing non-exempt ionizing radiation sources or are you required to wear an AECOM-supplied thermoluminescent radiation dosimeter?	Radiation Worker I - PerformanceTraining*	Annual	516	US, Canada	8
	Are you a Radiation Safety Officer (project site or administrative RSO) for an AECOM radioactive materials (RAM) license?	Radiation Safety Officer - Performance Training *	Initial - Training does not require renewal	516	US, Canada	8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HEAVY AND MOBILE EQUIPMENT OPERATIONS						
	Do you ride in or operate a manlift or other type of aerial lift during the performance of your work?	Aerial Lift (Man-lift) Operation - Performance Training*	2	304, 408	US, Canada	4
		Fall Protection - Performance Training*	3	304	US, Canada	4
	Will you perform rescue operations if someone falls from an aerial lift?	Aerial Device Rescue - Performance Training*	2	304, 408	US, Canada	4
		Fall Protection - Performance Training*	3	304	US, Canada	4
	Do you operate (drive) a forklift or other powered industrial truck?	Forklift Operator - Performance Training*	3	409	US, Canada	6

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
HEAVY AND MOBILE EQUIPMENT OPERATIONS						
	Do you operate other types of heavy equipment or Yellow Iron?	Heavy Equipment Performance Training -Coordinate training with Regional SH&E Manager to receive training specific to the equipment being operated.	Varied	309	US, Canada	

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
RAILROAD SAFETY						
	Do you perform work within or adjacent to an active railroad right-of-way?	Client-Specific Railroad Safety Training - Awareness Training	Determined by Client	201	US, Canada	2
		E-Railsafe - Awareness Training*	2	201	US	1
		Railroad Worker Protection - Awareness Training (or client equivalent)*	Annual	201	US	1.5
		Railroad Worker Protection - Awareness Training (or client equivalent)*	Annual	201	Canada	1.5

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CLIENT TRAINING						
	Do you work for Oil & Gas Sector (i.e. Petroleum) Clients?	Petroleum Safety Training Systems (PSTS) and/or Construction Safety Training System (CSTS) as required by the Client.*	PSTS/ CSTS - Initial		Canada	

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
CLIENT TRAINING						
	Do you work for Chevron EMC?	Chevron HAZ ID Training - Awareness Training	Initial - Training does not require renewal	201, Chevron	US, Canada	2
		Chevron Loss Prevention System (LPS) - Performance Training	3	201, Chevron	US, Canada	8
		Smith System Driver - Performance Training	3	201	US, Canada	8
	Do you work for BP?	BP Business Unit Training (Coordinate with PM)	Varied	201, BP	US, Canada	
	Do you work for Shell Oil Company?	Shell 12 Life Saving Rules	Initial - Training does not require renewal	201, Shell	US, Canada	1
	Do you work for Anadarko?	SafeLand USA Training	Initial - Training does not require renewal	201, Anadarko	US, Canada	8

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
COMPETENT PERSON TRAINING						
	Asbestos	Competent Person (Asbestos) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 501, 514	US, Canada	

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
COMPETENT PERSON TRAINING						
	Blasting & Explosives	Competent Person (Blasting and Explosives) - Designation made by Project Manager in consultation with RSH&EM.*	2	202	US, Canada	
	Concrete & Masonry Construction	Competent Person (Concrete & Masonry) - Designation made by Project Manager in consultation with RSH&EM.*	2	202	US, Canada	
	Confined Space Entry	Competent Person (Confined Space Entry) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 301	US, Canada	
	Control of Hazardous Energy, i.e. Lockout/Tagout	Competent Person (Lockout/Tagout) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 302, 410	US, Canada	
	Cranes & Derricks	Competent Person (Cranes & Derricks) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 310	US, Canada	
	Demolition	Competent Person (Demolition) - Designation made by Project Manager in consultation with RSH&EM.*	2	202	US, Canada	
	Electrical Wiring Design & Protections	Competent Person (Electrical Wiring Design & Protection) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 302, 410	US, Canada	
	Fall Protection	Competent Person (Fall Protection) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 304, 408	US, Canada	
	Hearing Protection	Competent Person (Hearing Protection) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 207	US, Canada	

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
COMPETENT PERSON TRAINING						
	Heavy Equipment	Competent Person (Heavy Equipment) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 309	US, Canada	
	Ionizing Radiation	Competent Person (Ionizing Radiation) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 516	US, Canada	
	Lead	Competent Person (Lead) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 513	US, Canada	
	Material Hoists & Personnel Hoists	Competent Person (Material Hoists & Personnel Hoists) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 310, 409	US, Canada	
	Stairways & Ladders	Competent Person (Stairways & Ladders) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 312	US, Canada	
	Respiratory Protection	Competent Person (Respiratory Protection) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 519	US, Canada	
	Rigging Equipment	Competent Person (Rigging Equipment) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 310	US, Canada	
	Scaffolds	Competent Person (Scaffolds) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 311	US, Canada	
	Steel Erection	Competent Person (Steel Erection) - Designation made by Project Manager in consultation with RSH&EM.*	2	202	US, Canada	

* Indicates training required by legislation/regulation

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
COMPETENT PERSON TRAINING						
	Traffic Control Planning	Competent Person (Traffic Control & Planning) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 306	US	
	Trench & Excavations	Competent Person (Trench & Excavations) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 303	US, Canada	
	Underground Construction	Competent Person (Underground Construction) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 414	US, Canada	
	Welding & Cutting	Competent Person (Welding & Cutting) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 416	US, Canada	

X if yes	Question	Training	Frequency (years until topic expires)	SOP	Applies to	Estimated Hours to Complete
OTHER – Other training may be required based on the jurisdiction, client requirements or unique hazards.						

* Indicates training required by legislation/regulation

Acknowledgement**		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

** When *Acknowledgements* are completed the original goes to the SH&E Administrator (for inclusion in the employee's file and upload to the LMS) and copies are provided to the employee and supervisor.

* Indicates training required by legislation/regulation

S3NA-003-FM3 Training Needs Assessment – Administrative Employees

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees solely performing Administrative functions.

1.2 These employee will only work in an AECOM office location and will not travel to project sites, clients sites, or travel for any business purposes.

2.0 List of Compliance Training

2.1 Training listed is general in nature and will not address client-specific training requirements or specialized job functions including.

2.2 Although this list of training is provided as a guideline of training an employee needs to complete to do their job, it is the responsibility of the supervisor and/or project manager to confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

2.3 The list of training below is not to be considered an all inclusive list of training needs.

Training	Hours to Complete Training	Related SOP	Training Frequency (Years)	Applies to US/Canada Employees
HzM(US)/TDG(CAN) Shipping - Awareness Training	0.5	509	3	US, Canada
Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training	4.0	509	3	US, Canada
Office Ergonomics - Awareness Training	0.5	102	2	US, Canada
OPTIONAL TRAINING - Fire Extinguisher - Awareness Training; AECOM will not require you to operate a fire extinguisher in the office, only evacuate the office safely.	0.5	106	Annual	US, Canada
HazCom(US)/WHMIS(CDN) - Awareness Training*	0.5	508	Annual	US, Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US
Workplace Safety & Health Committee - Performance Training*	16.0		Initial - Training does not require renewal	Canada
Total (Initial)	**26.0**	**Total (Annual renewal)**		**~5.5**

Acknowledgement		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

S3NA-003-FM4 Training Needs Assessment – Technical Employees

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees performing Technical functions.

1.2 These employee perform work in AECOM office locations as well as active AECOM project sites.

1.3 Technical employees will not be expected to perform supervisory functions.

2.0 List of Compliance Training

2.1 Training listed is general in nature and will not address client-specific training requirements or specialized job functions including.

2.2 Although this list of training is provided as a guideline of training an employee needs to complete to do their job, it is the responsibility of the supervisor and/or project manager to confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

2.3 The list of training below is not to be considered an all inclusive list of training needs.

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
AED - Performance Training	0.5	101, 203, 207	Annual	US
Asbestos - Awareness Training*	0.8	501	Annual	US, Canada
Bear Safety - Awareness Training	1.0	313, 503	2	Canada
Biological Hazards - Awareness Training	1.0	503	2	US, Canada
Client-Specific Railroad Safety Training - Awareness Training	2.0	201	Determined by Client	US, Canada
Complete AECOM Driver's Acknowledgement Form	0.0	005	2	US, Canada
Confined Space - Awareness Training*	1.0	301	Annual	US
Confined Space - Awareness Training*	1.0	301	3	Canada
Construction Awareness; consult your RSHE&M and Supervisor to determine specific training topics.	4.0	Varied depending on job tasks	Initial - Training does not require renewal	US
CPR - Performance Training	2.5	203, 207	Annual	US
Driver & Vehicle Safety - Awareness Training	0.5	005	2	US, Canada
E-Railsafe - Awareness Training*	1.0	201	2	US
Fall Protection - Awareness Training*	0.8	304	3	US, Canada
Field Safety - Awareness Training. Consult your RSH&EM about the need for Medical Surveillance.	4.0	209	2	US, Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Fire Extinguisher - Awareness Training*	0.5	106, 206	1	US, Canada
First Aid - Performance Training*	2.5	101, 207	3	US
H2S - Awareness Training*	0.8	508	Annual	US
H2S - Awareness Training*	8.0	508	3	Canada
HazCom(US)/WHMIS(CDN) - Awareness Training*	0.5	508	Annual	US, Canada
Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	207	Annual	US, Canada
Heavy Equipment Operations & Safety - Awareness Training*	0.5	309	3	US, Canada
HzM(US)/TDG(CAN) Shipping - Awareness Training*	0.5	509	3	US, Canada
Industrial Ergonomics - Awareness Training	0.7	308	3	US, Canada
Lead Safety - Awareness Training*	0.8	513	Annual	US, Canada
Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	4.0	509	3	US, Canada
Lockout/Tagout - Awareness Training*	0.8	302, 410	3	US, Canada
Office Ergonomics - Awareness Training	0.5	102	2	US
Office Ergonomics - Awareness Training*	0.5	102	2	Canada
Railroad Worker Protection - Awareness Training*	1.5	201	Annual	US, Canada
Respiratory Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	519	Annual	US, Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US
Standard First Aid, with CPR & AED Performance Training*	16.0	101, 207	3	Canada
Traffic Safety - Awareness Training	0.7	306	3	US, Canada
Trenching & Excavation Safety - Awareness Training*	0.8	303	3	US, Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Workplace Safety & Health Committee - Performance Training*	16.0		Initial - Training does not require renewal	Canada
Estimated Initial Total (US/CAN)	**37.8/68.5**	**Estimated Annual Renewal Total (US/CAN)**		**19.9/24.5**

Acknowledgement		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

S3NA-003-FM5 Training Needs Assessment – Employee Supervisors & Project Managers

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees performing project and employee supervisory functions.

1.2 These employee perform work in AECOM office locations as well as active AECOM project sites.

2.0 List of Compliance Training

2.1 Training listed is general in nature and will not address client-specific training requirements or specialized job functions including.

2.2 Although this list of training is provided as a guideline of training an employee needs to complete to do their job, it is the responsibility of the supervisor and/or project manager to confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

2.3 The list of training below is not to be considered an all inclusive list of training needs.

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
AED - Performance Training	0.5	101, 203, 207	Annual	US
Asbestos - Awareness Training*	0.8	501	Annual	US, Canada
Bear Safety - Awareness Training	1.0	313, 503	2	Canada
Biological Hazards - Awareness Training	1.0	503	2	US, Canada
Canadian Due Diligence - OH&S Training*	3.0	C45	Initial - Training does not require renewal	Canada
Client-Specific Railroad Safety Training - Awareness Training	2.0	201	Determined by Client	US, Canada
Complete AECOM Driver's Acknowledgement Form	0.0	005	2	US, Canada
Confined Space - Awareness Training*	1.0	301	Annual	US
Confined Space - Awareness Training*	1.0	301	3	Canada
Construction Awareness; consult your RSHE&M and Supervisor to determine specific training topics.	4.0	Varied depending on job tasks	Initial - Training does not require renewal	US
CPR - Performance Training*	2.5	101, 207	Annual	US
Driver & Vehicle Safety - Awareness Training	0.5	005	2	US, Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Electrical Safety - Awareness Training*	0.8	302, 410	2	US
E-Railsafe - Awareness Training*	1.0	201	2	US
Fall Protection - Awareness Training*	0.8	304	3	US, Canada
Field Safety - Awareness Training. Consult your RSH&EM about the need for Medical Surveillance.	4.0	209	2	US, Canada
Fire Extinguisher - Awareness Training*	0.5	106, 206	1	US, Canada
First Aid - Performance Training*	2.5	101, 207	3	US
H2S - Awareness Training*	0.8	508	Annual	US
H2S - Awareness Training*	8.0	508	3	Canada
HazCom(US)/WHMIS(CDN) - Awareness Training*	0.5	508	Annual	US, Canada
Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	207	Annual	US, Canada
Heavy Equipment Operations & Safety - Awareness Training*	0.5	309	3	US, Canada
HzM(US)/TDG(CAN) Shipping - Awareness Training*	0.5	509	3	US, Canada
Incident Investigation - Awareness Training*	2.0	Varied depending upon province	Initial - Training does not require renewal	Canada
Industrial Ergonomics - Awareness Training	0.7	308	3	US, Canada
Lead Safety - Awareness Training*	0.8	513	Annual	US, Canada
Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	4.0	509	3	US, Canada
Lockout/Tagout - Awareness Training*	0.8	302, 410	3	US, Canada
Office Ergonomics - Awareness Training	0.5	102	2	US
Office Ergonomics - Awareness Training*	0.5	102	2	Canada
Railroad Worker Protection - Awareness Training*	1.5	201	Annual	US, Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Respiratory Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	519	Annual	US, Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US
Standard First Aid, with CPR & AED Performance Training*	16.0	101, 207	3	Canada
Traffic Safety - Awareness Training	0.7	306	3	US, Canada
Trenching & Excavation Safety - Awareness Training*	0.8	303	3	US, Canada
Workplace Safety & Health Committee - Performance Training*	16.0		Initial - Training does not require renewal	Canada
Estimated Initial Total (US/CAN)	**37.8/68.5**	**Estimated Annual Renewal Total (US/CAN)**		**19.9/24.5**

Acknowledgement		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

S3NA-003-FM6 Training Needs Assessment – On-site Project Supervisors

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees performing on-site project supervisory functions.

1.2 These employee perform work in AECOM office locations as well as active AECOM project sites.

2.0 List of Compliance Training

2.1 Training listed is general in nature and will not address client-specific training requirements or specialized job functions including.

2.2 Although this list of training is provided as a guideline of training an employee needs to complete to do their job, it is the responsibility of the supervisor and/or project manager to confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

2.3 The list of training below is not to be considered an all inclusive list of training needs.

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
AED - Performance Training	0.5	101, 203, 207	Annual	US
Asbestos - Awareness Training*	0.8	501	Annual	US, Canada
Bear Safety - Awareness Training	1.0	313, 503	2	Canada
Biological Hazards - Awareness Training	1.0	503	2	US, Canada
Canadian Due Diligence - OH&S Training*	3.0	C45	Initial - Training does not require renewal	Canada
Client-Specific Railroad Safety Training - Awareness Training	2.0	201	Determined by Client	US, Canada
Competent Person Function Specific Training - Designation made by Project Manager in consultation with RSH&EM.*		202 + Specific Technical SOP	2	US, Canada
Complete AECOM Driver's Acknowledgement Form	0.0	005	2	US, Canada
Confined Space - Performance Training*	8.0	301	3	Canada
Confined Space - Performance Training*. Consult your project Safety Plan and Regional SH&E Manager to determine training required per your job role and function.	8.0	301	Annual	US

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Construction Awareness; consult your RSHE&M and Supervisor to determine specific training topics.	4.0	Varied depending on job tasks	Initial - Training does not require renewal	US
CPR - Performance Training*	2.5	101, 207	Annual	US
Driver & Vehicle Safety - Awareness Training	0.5	005	2	US, Canada
Electrical Safety - Awareness Training*	0.8	302, 410	2	US
E-Railsafe - Awareness Training*	1.0	201	2	US
Fall Protection - Performance Training*	4.0	304	3	US, Canada
Field Safety - Awareness Training. Consult your RSH&EM about the need for Medical Surveillance.	4.0	209	2	US, Canada
Fire Extinguisher - Awareness Training*	0.5	106, 206	1	US, Canada
First Aid - Performance Training*	2.5	101, 207	3	US
H2S - Awareness Training*	0.8	508	Annual	US
H2S - Awareness Training*	8.0	508	3	Canada
HazCom(US)/WHMIS(CDN) - Awareness Training*	0.5	508	Annual	US, Canada
Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	207	Annual	US, Canada
Heavy Equipment Operations & Safety - Awareness Training*	0.5	309	3	US, Canada
HzM(US)/TDG(CAN) Shipping - Awareness Training*	0.5	509	3	US, Canada
Incident Investigation - Awareness Training*	2.0	Varied depending upon province	Initial - Training does not require renewal	Canada
Industrial Ergonomics - Awareness Training	0.7	308	3	US, Canada
Lead Safety - Awareness Training*	0.8	513	Annual	US, Canada
Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	4.0	509	3	US, Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Lockout/Tagout - Performance Training*	4.0	302, 410	2	US, Canada
Office Ergonomics - Awareness Training	0.5	102	2	US
Office Ergonomics - Awareness Training*	0.5	102	2	Canada
OSHA 10-Hour Construction - Awareness Training*	10.0	State/Project Requirement	Initial with varying renewal	US
Radiation Safety - Awareness Training*	1.0	516	Annual	US, Canada
Railroad Worker Protection - Awareness Training*	1.5	201	Annual	US, Canada
Respiratory Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	0.8	519	Annual	US, Canada
Scaffolding Safety - Awareness Training*	0.8	311	3	US, Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US
Standard First Aid, with CPR & AED Performance Training*	16.0	101, 207	3	Canada
Traffic Safety - Awareness Training	0.7	306	3	US, Canada
Trenching & Excavation Safety - Awareness Training*	0.8	303	3	US, Canada
Workplace Safety & Health Committee - Performance Training*	16.0		Initial - Training does not require renewal	Canada
Estimated Initial Total (US/CAN)	**59.3/86.0**	**Estimated Annual Renewal Total (US/CAN)**		**29.8/30.0**

Acknowledgement		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

S3NA-003-FM7 Training Needs Assessment – Line Managers

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees performing Line (Department, District, Region, etc.) Management functions.

1.2 These employees primarly perform work in AECOM office locations and may occasionally work on AECOM project sites.

2.0 List of Compliance Training

2.1 Training listed is general in nature and will not address client-specific training requirements or specialized job functions including.

2.2 Although this list of training is provided as a guideline of training an employee needs to complete to do their job, it is the responsibility of the supervisor and/or project manager to confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.

2.3 The list of training below is not to be considered an all inclusive list of training needs.

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
Canadian Due Diligence - OH&S Training*	3.0	C45	Initial - Training does not require renewal	Canada
Complete AECOM Driver's Acknowledgement Form	0.0	005	2	US, Canada
Driver & Vehicle Safety - Awareness Training	0.5	005	2	US, Canada
Field Safety - Awareness Training. Consult your RSH&EM about the need for Medical Surveillance.	4.0	209	2	US, Canada
HazCom(US)/WHMIS(CDN) - Awareness Training*	0.5	508	Annual	US, Canada
HzM(US)/TDG(CAN) Shipping - Awareness Training*	0.5	509	3	US, Canada
Incident Investigation - Awareness Training*	2.0	Varied depending upon province	Initial - Training does not require renewal	Canada
Office Ergonomics - Awareness Training	0.5	102	2	US
Office Ergonomics - Awareness Training*	0.5	102	2	Canada

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US
Workplace Safety & Health Committee - Performance Training*	16.0		Initial - Training does not require renewal	Canada
Estimated Initial Total (US/CAN)	**8.0/29.0**	**Estimated Annual Renewal Total (US/CAN)**		**3.8/5.2**

Acknowledgement		
Employee Name (Print)	Employee Signature	Date
Supervisor Name (Print)	Supervisor Signature	Date

S3NA-003-FM8 SH&E Training Course & Instructor Evaluation

Course Name:					
Date:		**Start Time:**		**Stop Time:**	

Type of Training (Check One): **AECOM Live (Classroom)**☐ **AECOM Live (WebEx/Teleconference)**☐ **AECOM eLearning**☐ **External Live**☐ **External eLearning**☐ **OTHER:** ☐

Lead Instructor:	**Instructor 1:**	**Instructor 2:**

	Excellent	Good	Average	Below Average	Poor	Not Applicable
1. Please rate the quality of the training materials in the following categories:						
a. The training was technically accurate.	☐5	☐4	☐3	☐2	☐1	☐NA
b. The training and discussion aligned with the training objectives.	☐5	☐4	☐3	☐2	☐1	☐NA
c. The training was practical and relevant to my job at AECOM.	☐5	☐4	☐3	☐2	☐1	☐NA
2. Please provide your assessment of the Trainer's presentation skills and abilities:						☐NA
a. Instructor was knowledgable in the subject matter.	☐5	☐4	☐3	☐2	☐1	☐NA
b. Instructor was capable of clearly and effectively communicating and teaching.	☐5	☐4	☐3	☐2	☐1	☐NA
c. Instructor was able to accurately answer my questions.	☐5	☐4	☐3	☐2	☐1	☐NA
d. Instructor was able to engage the class and maintain my attention.	☐5	☐4	☐3	☐2	☐1	☐NA
3. Please provide your assessment of the training event as a whole in the following categories:						☐NA
a. How do you rate the quality of audio/visual materials, handouts and other training aids?	☐5	☐4	☐3	☐2	☐1	☐NA
b. How do you rate the overall quality of the entire training event?	☐5	☐4	☐3	☐2	☐1	☐NA
c. Was the training location comfortable and large enough to accomodate your class?	☐5	☐4	☐3	☐2	☐1	☐NA

Please list any new skills, techniques, or ideas you learned during this training session that you will apply to your job.

Please provide any additional comments on the training.

S3NA-003-WI1 Training Needs Assessment Process

1.0 Requirements

1.1 This work instruction applies to all AECOM Americas Geography employees and provides options through which an employee can complete a SH&E TNA.

2.0 References

2.1 None

3.0 Process

3.1 Employees will complete a SH&E TNA upon hire, annually thereafter in conjunction with their annual performance review, and upon any significant changes in their job function.

3.2 Supervisors will verify that their direct reports have complete a TNA through one of the processes defined below. It is the responsibility of hte supervisor and/or project manager to confirm that hte appropriate level of training is being assigned to the employee with regard to their specific job task assignments and client needs.

3.3 Employes will complete a SH&E TNA through one of three processes:

- Through completion of the employee-specific SH&E TNA:
  - Electronic version – America's SH&E Training page
  - Paper version – S3NA-003-FM2 Training Needs Assessment
- Through adoption of the list of compliance training as specified in *S3NA-003-FM3– FM 7Training Needs Assessments*; or
- Through development of process that provides a comparable level of assessment as the SH&E TNA.

3.4 Completed SH&E TNA will be provided to SH&EA for capture within the AECOM LMS.

4.0 Records

4.1 None

5.0 Attachments

5.1 S3NA-003-FM2 Training Needs Assessment

5.2 S3NA-003-FM3 Training Needs Assessment – Administrative Employees

5.3 S3NA-003-FM4 Training Needs Assessment – Technical Employees

5.4 S3NA-003-FM5 Training Needs Assessment – Employee Supervisors & Project Managers

5.5 S3NA-003-FM6 Training Needs Assessment – On-Site Project Supervisors

5.6 S3NA-003-FM7 Training Needs Assessment – Line Managers

S3NA-003-WI2 Training Delivery

1.0 Training Courses & Content

1.1 Course Content

1.1.1 AECOM developed and delivered training will be designed to meet the organizational needs and goals of AECOM.

1.1.2 Training may be provided through external resources and in such cases training content will be evaluated for applicability and acceptability.

1.1.3 The structure of the course content will generally be consistent with the following:

- Introduction to the training topic.
- Standards applicable to the training, i.e. regulatory/legislative, AECOM SOP, etc.
- Training objectives
- Primary course content
  - Significance of topic as it relates to AECOM
  - Expectations to apply the skills and knowledge provided
  - Examples of the training being applied on specific AECOM projects
- Training summary
- Comprehension assessment

1.1.4 The specific content of the course will vary depending on the number of topics covered during the course, the complexity of the course content and the level of certification being offered.

1.1.5 A syllabus will be developed for AECOM developed training consistent with the syllabus template, *S3NA-003-TP1 SH&E Training Syllabus Template*.

1.1.6 The level of certification being offered will determine the level of comprehension assessment being performed.

1.2 Course Content Reviews

1.2.1 Course content shall be periodically reviewed, with no greater than three years between reviews.

1.2.2 The **SH&E Training Manager, Region SH&E Manager,** or their designee, shall conduct course content reviews. Reviews will be made to determine if training materials are still relevant to AECOM and the need to modify content accordingly.

1.2.3 Results from training evaluations will also be incorporated into course content reviews and modifications.

1.2.4 For courses where training is provided on an annual basis, course content will be updated annually, or multiple versions of training may be developed for rotating use, to provide participants with new learning materials and avoid stagnation.

1.2.5 All modifications made to SH&E training will be performed to maintain compliance with this SOP, and additional applicable SOP and regulatory/legislative standards.

1.2.6 When modifications to course syllabus and training materials are made, revisions will be approved by the **SH&E Training Manager, Region SH&E Manager,** or their designee and communicated to all Authorized Instructors for use and application.

2.0 Authorized Instructors

2.1 The **SH&E Training Manager**, **Region SH&E Managers**, or their designee, will authorize personnel to deliver SH&E training.

2.2 The **SH&E Training Manager** will assess instructor capabilities and provide feedback in order to promote the consistent delivery of training materials in alignment with known adult learning principles.

2.3 Instructor assessments will be performed through live observation of training delivery as well as the use of *S3NA-003-FM8 SH&E Training Course and Instructor Evaluation* or the Training Course & Instructor Evaluation Survey found on the Americas SH&E Training Calendar.

2.4 Results of the training evaluation will be complied and the **SH&E Training Manager** shall review evaluation results, provide feedback to instructors on areas of positive performance, as well as recommendations to improve delivery techniques.

3.0 Comprehension Assessment & Certification

3.1 The level of certification being sought will determine the level of comprehension assessment that participants must successfully complete in order to receive credit for completing the training module.

3.2 Comprehension assessments may take the form of structured tests and quizzes, proficiently demonstrating the performance of related skills, discussion of training materials, or other forms that demonstrate to the instructor that the participant has retained and can perform the objectives of the training.

3.3 The different levels of certification are detailed with recommended comprehension assessment techniques. Comprehension assessment techniques for each training course will be specified within the training syllabus.

3.4 The training instructor will validate the attendance form and provide certificates, where appropriate, to participants.

3.5 Results of training and certificates will be uploaded by local **SH&E Administrators** into the AECOM Learning Management System (LMS).

4.0 Certification Levels

4.1.1 **Information Dissemination**

- Information is provided to employees through verbal or written communication. This type of training may be used in scenarios where the goal is to provide information to employees with no expectation of implementation or executing a regulatory requirement or AECOM SOP.
- The communication is mostly one way and there is no confirmation or knowledge assessment (i.e. test, interactive discussion, etc.) that the employee must pass to demonstrate understanding and meet a training goal.
- Examples of this type of communication would be newsletters, safety alerts, webinar presentations, video only presentations, etc.

4.1.2 **Awareness Level Certification**

- Awareness-level certifications are applicable to training where the primary goal is to transfer knowledge from the organization to participants.
- Training will typically take the form of instructor-lead discussions, presentation of related video content, and/or self-directed e-learning modules.
- In most cases comprehension assessment will be performed through discussion of the training topic with the participants and/or a simple quiz.
- When quizzes are provided employees will successfully complete at least 75% of the questions.

4.1.3 **Performance Level Certification**

- Performance-level certifications will build upon the Awareness level.
- The goal of Performance Training is to have an employee successfully demonstrate that they can apply the knowledge discussed during training and perform the desired skills necessary to perform their job.
- Training materials are provided and discussed, and will incorporate a demonstration of the skills to be completed.

- The instructor will gauge the level of understanding through interactive discussion with participants and a pass/fail designation of demonstrated skills by the employee.
- A test or quiz of moderate difficulty will be provided, with participants scoring 80% or better, followed by the successful demonstration of the desired skill to receive certification.

4.1.4 **Competent Person Level Certification**

- Competent Person-level certifications may be applicable to, and dictated by, specific regulatory standards.
- When Competent Person-level certifications are offered, comprehension assessments will build upon Performance-level certification.
- Competent Person certifications will incorporate classroom training along with on-the-job mentoring provided by employees previously certified to the Competent Person-level in the area of competency being sought.
- Candidates for Competent Person certification will be required to score 85% or better on administered written exams. Additionally, candidates must be capable of repeatedly demonstrating the desired skills both in a classroom setting as well as in an actual work setting to the Instructor, Project Manager for the project the employee is seeking to gain and apply the certification to, and/or the mentoring Competent Person.
- Competent Person(s) will be designated on a project-by-project basis, in accordance with SH&E SOP S3NA_202_PR_*Competent Person Designation.* Forms to document certification and designation of a Competent Person are provided with the SOP and a record of the designation will be maintained within the project files and LMS.

5.0 Expiration of Training

5.1 Training expirations will be defined for each course offered in the course syllabus.

5.2 Employees with expired compliance training will not engage in activities associated with the training until training and certifications have been updated.

5.3 Supervisors will work with employees to determine when training is set to expire and develop individual training plans in order to maintain compliance.

5.4 AECOM will use its LMS to track completion of compliance and conformance training and report back to operations on overall training performance.

S3NA-003-WI3 Training Documentation

1.0 Employee Training File

1.1 Minimum Requirements

1.1.1 Supervisor-approved personal training requirements (Training Needs Assessment).

1.1.2 Certificates will be offered for all classes offered and completed, and must indicate:

- Employee name
- Course name, and applicable reference to specific regulatory requirement
- Instructor's printed name and signature
- Date(s) of class
- Company name
- Number of Continuing Education Units (CEU) or Professional Development Hours (PDH) credits, if eligible
- Course attendance or sign-in sheets shall have the signature and ID number of all employees

1.2 Data Formats

1.2.1 Electronic Records (Learning Management System) – An electronic database tracking system that maintains employee safety training information (dates, course name, certificates, etc.), including training certificates. Data will be entered by local SH&E Administrators, and each supervisor is responsible to see that the database is current for personnel under their responsibility.

1.2.2 Hardcopy Records (Paper) – Each employee is required to maintain a personal file with hardcopies of their certification(s) from all (internal, external, intranet, Internet) training providers.

2.0 Training Courses

2.1 Records

2.1.1 An individual training summary will be maintained for each course which must include:

- For each AECOM-delivered training call the sign-in sheet (*S3NA-003-FM1 SH&E Training Sign In Sheet*) will indicate:
  - Course Name
  - Training location information
  - Date(s)
  - Class start and stop time
  - Employee name, signature, location and employee identification number
  - Course outline (list of topics discussed) corresponding to the approved training syllabus
  - Instructors' name(s) and signature(s)
- For external vendor classes equivalent documentation is required.

2.1.2 Expiration of training will be tracked in the AECOM LMS with SH&E Administrators updating training expiration dates when entering/updating training certificates.

S3NA-003-TP1 Training Syllabus – [COURSE TITLE]

Course Title	(Insert Course Title)
Duration	# Hours
Regulatory/policy applicability	(Insert regulatory and/or SOP reference)
Comprehension assessment method	(Insert assessment method [Quiz, Test, Skill Performance] and the percentage required to pass)
Certification Level	(Insert certification level)
Duration of Training Validity	(Insert expiration, if applicable)
Intended Participants	(Use Regulatory citation or SHE SOP reference to describe who the training is applicable to, and should be or is required to participate.)
Learning Objectives	(Briefly describe learning objectives for the training and how they will be assessed.)

Training Prerequisites:

- Employee SH&E Orientation including SH&E Fundamentals eLearning

(Discuss any training that may need to be completed prior to attending this course. Examples may include completion of 40-Hour HAZWOPER for 8-Hour HAZWOPER Refresher, or Awareness training required to be completed prior to a Functional/Competency Certification course.)

Course Outline:

(Detail the contents of the course that will include duration and delivery methods. Provide additional description of who the training is applicable to and how participants will be assessed to ensure adequate knowledge transfer. Complete the table below that will be used in creating the attendance sheet that will serve as the record of training.)

Module Title	Module Duration*	Module Content (Specify eLearning provider where applicable)

* Indicates module is delivered as eLearning by AECOM or authorized provider.

Expiration of Training:

Training is valid for X years. Re-fresher training may utilize local resources or hands-on training to focus on elements which are unique to the location. Some AECOM Clients may require refresher training on a more frequent basis and it is the responsibility of the project team to ensure all employees meet the training needs of their client. If an employee is unable to produce a valid training certificate where one is needed they may be required to complete a new course.

Revision History:

Revision	Date	Change
Original	(Date)	N/A
Revision 1		

CERTIFICATE OF COMPLETION

[Course Name]

This is to recognize that

[EMPLOYEE]

Has completed AECOM SH&E Training Course [Title], required by [Regulatory and/or SOP Reference] on [DATE]. Training expires on [DATE].

[Trainer Name]
[Trainer Title]

S3NA-004-PR Incident Reporting

1.0 Purpose and Scope

1.1 To document and report all SH&E incidents in a timely and accurate manner. Additionally, to ensure appropriate data is collected and maintained to produce required reports from the AECOM SH&E Incident Reporting System.

1.2 This procedure applies to all AECOM Americas based employees and operations.

2.0 Terms and Definitions

2.1 **SH&E Incident Reporting Line: 1-800-348-5046**

2.1.1 Email: sri@aecom.com;

2.1.2 Fax: 804-515-8312

2.2 **SH&E Incidents: The following events or situations as applied to AECOM employees and/or AECOM-controlled operations are considered SH&E Incidents:**

2.2.1 Any injury or illness to an AECOM employee, that could be potentially work related or become aggravated by the work environment. This includes an AECOM subcontractor, temporary employee, or third party contractor that performs work under the control of an AECOM operation.

2.2.2 Any abnormal condition to include pain and soreness shall be reported.

2.2.3 Fire, explosion, or flash that is not an intended result of a remediation process, laboratory procedure, or other planned event.

2.2.4 Any incident involving company-owned, rented, or leased vehicles (including personal vehicles used for company business).

2.2.5 Any breach of a numeric limit attached to a governmental permit or consent.

2.2.6 Any failure to perform the requirements of a non-numeric requirement contained in a government permit or consent.

2.2.7 Any failure to obtain a government permit or consent when required (including failure to obtain revisions before an existing permit or consent expires).

2.2.8 Any notice of violation or notice of non-compliance received from a regulatory authority with enforcement powers.

2.2.9 Property damage resulting from any AECOM or subcontractor activity. This would include Motor Vehicle Accidents (MVA), buildings, equipment, and near miss events as described in 2.16.

2.2.10 Unexpected release or imminent release of a hazardous material.

2.2.11 Unexpected chemical exposures to workers or the public.

2.2.12 A safety, health or environmental related complaint from the public regarding AECOM activities.

2.2.13 SH&E-related incidents that could result in adverse public media interest concerning AECOM or an AECOM project.

2.2.14 Any inspection by a federal, provincial, or local safety, health, & environmental enforcement agency.

2.2.15 Any boating incident that includes the following:

- Fatality.
- A person disappeared from the vessel under circumstances that indicated death or injury.
- A person was injured and required medical treatment beyond first aid.
- Damage to vessels and other property totalled $2000 or more.
- The boat was destroyed (physically destroyed or sinks).

2.3 **Near-Miss Incidents: This is defined as an incident having the potential to cause injury, health effects, environmental impairment, or property damage as described in the above categories – but did not. For example:**

2.3.1.1 A crane drops a 454 kilogram (1,000 pound) beam during a lift – and nobody is hurt, no equipment or property is damaged.

2.3.1.2 A work crew is conducting a survey along the highway. A vehicle leaves the roadway and the vehicle enters the survey area at 80 kph (50 mph). The vehicle misses an employee by 1 metre (3 feet); the driver recovers control of the vehicle and leaves the area.

2.3.1.3 Awareness of a verified equipment recall or incident that occurs at another similar worksite.

2.3.1.4 Unsafe condition that could have caused an incident if not corrected.

2.4 **Significant Learning Experience**: Defined as a near-miss incident that the affected group (i.e. project team, office staff, etc.) believes could have wide-ranging impacts throughout AECOM.

2.5 **Serious SH&E Incident:** Any SH&E Incident that meets/involves the following criteria:

2.3.1.5 Fatality.

2.3.1.6 Amputation.

2.3.1.7 Hospitalization for treatment for more than 24 hours. (Admission).

2.3.1.8 Absence from work for more than thirty (30) calendar days due to work-related injury/illness.

2.3.1.9 Any single event resulting in more than one employee requiring medical treatment or more than one employee being away from work more than three (3) days.

2.3.1.10 Any SH&E-related Consent Agreement/Order/Lawsuit or enforcement action seeking more than $10,000 or alleging criminal activity.

2.3.1.11 Any spill or release of a hazardous material that is reportable to a regulatory agency.

2.3.1.12 Any Notices of Violation resultant of not operating within a government permit/license or consent.

2.3.1.13 Near miss incidents that, in the opinion of the Group Chief Executive, Business Line Manager, Region SH&E Manager, Region Chief Executive, Group or Corporate SH&E Director, may have otherwise resulted in any of the above**.**

2.4 **Fatality:** Loss of life of any AECOM employee, AECOM subcontractor personnel, client personnel or member of the general public that can be perceived to be related to work performed or controlled by AECOM.

2.5 **General Liability:** Incidents where AECOM could potentially be held liable.

2.6 **AECOM Recordable Injury:** A work related injury or illness that results in the following. **(**See S3NA-601-PR Recordkeeping for definitions).

2.6.1 Fatality

2.5.2 Medical Treatment beyond first aid

2.5.3 Days away from work

2.5.4 Restricted work or transfer to another job

2.5.5 Loss of Consciousness

2.5.6 A Significant injury or illness diagnosed by a medical professional

2.7 **Benefits Department:** Human Resource office which manages all North America based injury and illness claims.

2.8 **Lost Time Injury or Illness:** A work-related injury or illness that has caused a worker to be absent from his or her regular work following the day that the injury or illness occurred.

2.9 **Restricted Work (also called "Modified Work"): A work-related** injury or illness that results in the employee being unable to perform one or more of the routine functions of their job. The restricted duties are done within the limitation of the injured person's abilities. (Documentation may be required per regulatory requirements).

2.10 **Supervisor's Report of Incident (SRI):** Form used to document incidents which shall be completed within 24 hours.

2.11 **Business Services:** AECOM support functions of Legal, Human Resources, Communications, SH&E Department, etc.

2.12 **WCB:** Workers Compensation Board (Canada; known provincially by variations such as WCB, WSIB, CSST, WSCC, etc.).

2.13 **WC Carrier/Claims:** Workers Compensation Third Party Insurance Partner.

3.0 Attachments

3.1 S3NA-004-FM1 Supervisor's Report of Incident

3.2 S3NA-004-FM2 Near-Miss Incident Report

3.3 S3NA-004-WI1 Supervisor's Incident Reporting Flowchart

3.4 S3NA-004-WI2 Incident Response and Reporting Instructions

4.0 Procedure

4.1 **Roles and Responsibilities**

4.1.1 **Employees**. Each employee involved in an SH&E incident will:

- Notify his/her **Supervisor** immediately that an incident (including a near-miss) has occurred, the circumstances involved, the nature and extent of the injuries/illness, and whether medical treatment may be required. Except for emergency situations, affected employees are required to discuss their injury/illness status with their supervisor and **Region SH&E Manager** or project SH&E Professional prior to obtaining medical treatment.
- Assist **Supervisor** in completing appropriate reporting and investigation forms. If issues are raised regarding the content prepared in the SRI, contact the **Region SH&E Manager** for guidance.
- Document near misses using the Near Miss Incident Report, or comparable electronic form, and submit report to supervisor and **Region SH&E Manager**.

4.1.2 **Supervisors**. **Supervisors** will be responsible for the following:

- In an emergency/life-threatening situation, use the appropriate local emergency phone numbers and seek immediate medical care for the **employee**.
- Address any immediate corrective actions needed. Consult with the **Region SH&E Manager** if guidance is required.
- For all incidents other than near miss incidents, call the Incident Reporting Line as soon as the situation is stabilized, but not later than the end of the current work shift.
- For all incidents other than near miss incidents, complete the applicable forms and email to **sri@aecom.com** and the **Region SH&E Manager** within 24 hours of the incident.
    - Supervisor's Report of Incident (SRI) (completed with assistance and acknowledgment from affected employees).
    - Federal/State/Province Specific Forms, if required (contact applicable Business Services for guidance).
- For all near miss incidents, verify that the employee has submitted a report to the **Region SH&E Manager**.
- Notify the appropriate line or lead manager (i.e. manager responsible for personnel involved/project oversight/business line, etc.).
- As appropriate, initiate an Incident Investigation and Review per the requirements of *S3NA-603-PR Incident Investigation and Review*.
- Completion of any external reporting requirements. For example, the U.S. Coast Guard CG-3865, Recreational Boating Accident Report may be required if the incident involved a boat

(contact the **Region SH&E Manager** for clarification). See *S3NA-004-WI2 Incident Response and Reporting* for further instruction.

- Report all fatalities and/or serious SH&E incidents to the appropriate **Region SH&E Manager** and **Region Executive** as soon as reasonably possible but no more than two (2) hours after the incident.

4.1.3 **Region SH&E Manager or Designee**

- Coordinate with the appropriate Americas SH&E Incident Reporting Support Staff.
- Initiate electronic entry of incident information in the AECOM Injury Management System within 24 hours of the incident being reported and update as necessary.
- Enter Corrective actions in the AECOM Americas tracking system to ensure completion.
- For all incidents other than near miss incidents, upon receipt of an Incident Notification, contact the **Supervisor** to discuss the incident as well as short term and long term corrective actions.
- For all near miss incidents and when follow-up is determined to be necessary by the **Region SH&E Manager**, upon receipt of Incident Notification, contact the **employee** and potentially the **Supervisor** to discuss the near miss as well as short term and long term corrective actions.
- Coordinate Case Management with the AECOM Corporate Medical Provider for non urgent medical guidance, if needed.
- Notify and Coordinate with appropriate **Business Line** or **Operations Manager** of the incident.
- As appropriate, initiate or assist an Incident Investigation and Review.
- Report all fatalities and/or serious SH&E incidents to the **Americas SH&E Director, Business Line SH&E** VP and **Region Executive** as soon as reasonably possible but no more than two (2) hours after the incident.

4.1.4 **Incident Reporting Support Staff**

- Inform appropriate personnel that have not already been notified of incidents.
- Audit data of incident reporting system.
- Review electronic entry of incident information in the AECOM Injury Management System after 24 hours of the incident being reported and update as necessary.
- Coordinate with **Region SH&E Manager** or **designee** for management of medical support.
- Assist with Incident Investigation and Review per the requirements of *S3NA-603-PR Incident Investigation and Review*.
- Forward incident data to **Business Services** for insurance claims.
- Track incidents until closure plus 5 years in accordance with *S3NA 601 PR Recordkeeping* and State/Federal and Provincial regulations.

4.1.5 **The Workers' Compensation division of the Benefits Department will be responsible**

- Once an employee requires support under worker's compensation, the employee will be transferred over to HR for all support. The employee's manager shall also work with HR in support of the employee. Prior to the employee returning to work after any treatment provided by any medical provider a medical clearance is to be provided by the employee to HR, their manager and SH&E
- For working with the appropriate manager if the employee is off work for any length of time, if a modified work program will be created for the individual, or if there are any long-term implications from the incident.
- Coordinating Canada Claims with a third party administrator. The third party administrator works with the Workers Compensation division of the Benefits Department or other designated staff (Canada East HR). The third party administrator is familiar with the reporting requirements by province, which vary slightly between jurisdictions across Canada.

4.2 All incidents, regardless of type or severity, shall be reported to the on-site supervisor immediately.

4.3 All incidents, (other than near miss/observation) shall be reported to the Incident Reporting Line by the supervisor as soon as possible but no later than the end of the current work shift.

4.4 **Completed** SRI **shall be submitted to** sri@aecom.com and the Region SH&E Manager within 24 hours.

4.5 Where there is potential for criminal, civil or regulatory action against AECOM or any of its employees or subcontractors, AECOM's **Americas Chief Counsel** shall be contacted prior to any external communication, correspondence, or meeting concerning any incident, governmental investigation, or environment impact. AECOM's **Americas Chief Counsel**, or designee, may supplement this policy or require additional measures to protect the best interests of AECOM and its employees.

5.0 Records

5.1 Incident reports and supporting documentation are maintained in a secure file by the America's incident reporting support staff.

5.2 The completed Supervisor Report of Incident and supporting documents must be retained by AECOM. Records relating to occupational injury and incidents must be kept for up to 30 years (or permanently in the Northwest Territories), depending on the classification of incident.

6.0 References

6.1 S3NA-601- PR Recordkeeping

6.2 S3NA-603-PR Incident Investigation and Review

6.3 S3NA-606-PR Modified Duty Program

6.4 S2-001-PR1 Incident Reporting (Global Implementing Procedures)

S3NA-004-FM1
SUPERVISOR'S REPORT OF INCIDENT

AECOM

1. SEEK IMMEDIATE MEDICAL ATTENTION IF NECESSARY
2. EMPLOYEE MUST REPORT ALL INCIDENTS TO THEIR SUPERVISOR IMMEDIATELY.
3. REPORT THE INCIDENT TO THE APPROPRIATE INCIDENT REPORTING LINE. **(800) 348-5046**

ORGANIZATION INFORMATION

REGION: ☐ CAN-EAST ☐ CAN-CENTRAL ☐ CAN-WEST ☐ MID-ATLANTIC ☐ MIDWEST ☐ NORTHEAST ☐ South ☐ WEST ☐ Brazil

DISTRICT:

PROJECT NUMBER:

BUSINESS LINE: ☐ AECOM CORP ☐ GROUP SERVICES ☐ CONSTRUCTION SERVICES (CSG) ☐ ENERGY&POWER ☐ ENVIRONMENT ☐ PDD ☐ TRANSPORTATION ☐ WATER

CLIENT NAME:	**PROJECT NAME:**

ADMINISTRATIVE

EMPLOYEE NAME:	**EMPLOYEE NUMBER:**
WORK PHONE:	**CELL PHONE:**
EMPLOYEE STATUS ☐ FULL TIME ☐ PART TIME ☐ SUB ☐ TEMP AGENCY ☐ THIRD PARTY	**HOME OFFICE ADDRESS:**
	JOB TITLE:

DESCRIPTION OF EVENT

TYPE OF OCCURRENCE: ☐ INJURY/ILLNESS ☐ PROPERTY DAMAGE ☐ ENV DAMAGE/SPILL ☐ REGULATORY INSPECTION ☐ MOTOR VEHICLE ACCIDENT ☐ BOATING INCIDENT ☐ NOV/CITATION ☐ OTHER BE SPECIFIC

DATE OF INCIDENT:	**TIME OF INCIDENT:**
DATE REPORTED TO SUPERVISOR:	**TIME REPORTED TO SUPERVISOR:**
INCIDENT ADDRESS/LOCATION:	**CITY:**
STATE/PROVINCE/TERRITORY:	**ZIP/POSTAL CODE:**

WERE THERE ANY SUBCONTRACTORS, WITNESSES OR OTHER PERSONS INVOLVED: ☐ **YES** ☐ **NO**

IF YES, PLEASE PROVIDE DETAILS TO INCLUDE NAMES AND CONTACT INFORMATION

PERSONAL INJURY

TYPE OF INJURY: ☐ FIRST AID (TREATED ON-SITE) ☐ MEDICAL AID (TREATED BY PROFESSIONAL) ☐ FATALITY

DESCRIBE THE INJURY AND BODY PART AFFECTED: ***BE SPECIFIC STATEMENTS BELONG ON PAGE 2***

WAS A DOCTOR OR HOSPITAL VISITED? ☐ **YES** ☐ **NO**	**IF YES, WHEN:**
MEDICAL RECEIVED:	**DOCTOR/HOSPITAL NAME:**
PROVIDER ADDRESS:	**PHONE NUMBER:**

PROPERTY DAMAGE (COMPLETE FOR PROPERTY DAMAGE ONLY

TYPE OF DAMAGE: ☐ AECOM PROPERTY ☐ MOTOR VEHICLE (COMPLETE MVA REPORT PAGE 3) ☐ SPILL OR RELEASE OF A HAZARDOUS SUBSTANCE ☐ MAJOR STRUCTURAL FAILURE ☐ CLIENT, SUBCONTRACTOR, OTHER:

DESCRIBE THE SPECIFIC DAMAGE, STRUCTURAL FAILURE OR HAZARDOUS RELEASE:

RANK THE SEVERITY OF THE DAMAGE: ☐ MINOR ☐ SERIOUS ☐ MAJOR

S3NA-004-FM1
SUPERVISOR'S REPORT OF INCIDENT

WHERE CAN THE PROPERTY BE SEEN?	
PROPERTY OWNER NAME:	**CONTACT INFORMATION:**
IS THERE ANY POTENTIAL FOR CIVIL, CRIMINAL OR REGULATORY LIABILITY AGAINST AECOM OR AN EMPLOYEE? ☐ **YES** ☐ **NO** IF YES, DISCUSS WITH AECOM REGIONAL COUNSEL BEFORE PROCEEDING WITH ANY FURTHER REPORTING.	
INDICATE WHO HAS BEEN NOTIFIED OF THE EVENT (E.G., OWNER/OPERATOR, STATE (US) OR GOVERNING BODY OF LABOUR, ETC?	
What, when, where, why, how? Attached notes/diagrams as required and list any machinery or equipment involved.	
ON-SITE/CORRECTIVE ACTIONS	
INCIDENT IMMEDIATELY REPORTED ON-SITE TO:	
WHAT CORRECTIVE ACTIONS WERE IMMEDIATELY IMPLEMENTED ON-SITE?	
WHAT LONG-TERM OR PERMANENT CORRECTIVE ACTIONS ARE RECOMMENDED?	
ACKNOWLEDGEMENTS	
EMPLOYEE DESCRIPTION OF INCIDENT:	
What, when, where, why, how? Attached notes/diagrams as required and list any machinery or equipment involved	
EMPLOYEE PRINTED NAME AND PHONE	**SIGNATURE AND DATE**
SUPERVISOR REVIEW OF INCIDENT:	
SUPERVISORS PRINTED NAME AND PHONE	**SIGNATURE AND DATE**
MANAGER COMMENTS:	
MANAGER PRINTED NAME AND PHONE	**SIGNATURE AND DATE**
FOR REGIONAL SH&E MANAGER USE ONLY:	
NAME AND SIGNATURE:	**DATE:**
RECORDABILITY DETERMINATION ☐ FIRST AID ☐ RECORDABLE ☐ RECORDABILITY UNDETERMINED ☐ NON WORK ☐ PROPERTY DAMAGE ☐ GENERAL LIABILITY ☐ VANDALISM COMMENTS:	

ATTENTION:

THIS FORM MUST BE COMPLETED AND EMAILED TO SRI@AECOM.COM OR FORWARDED TO THE REGIONAL SH&E MANAGER WITHIN ONE (1) BUSINESS DAY FOLLOWING THE OCCURRENCE OF THE INCIDENT.

Submit Form

MOTOR VEHICLE ACCIDENT (MVA) REPORT

ONLY COMPLETE THIS PAGE FOR VEHICLE INCIDENTS

AECOM

ADMINISTRATIVE	
AECOM VEHICLE: ☐ **FLEET** ☐ **RENTAL** ☐ **PERSONAL**	**JOB ACTIVITY AT TIME OF MVA:**
DATE OF MVA: **TIME OF MVA:**	**LOCATION OF MVA:**
MANAGER:	**NUMBER OF VEHICLES INVOLVED:**

REMEMBER: **STAY CALM.**

Do not admit liability, agree to pay for any damage or sign any document except as required by law.

AECOM DRIVER INFORMATION		
DRIVER:	**AECOM PASSENGERS:**	**OTHER PASSENGERS:**
DRIVER'S LICENSE:	**PROVINCE/STATE ISSUED:**	**EXPIRATION DATE:**
INJURIES TO DRIVER:		
INJURIES TO PASSENGERS:		

AECOM VEHICLE INFORMATION		
YEAR:	**MAKE:**	**MODEL:**
SERIAL/VIN #:	**LICENSE PLATE #:**	**REGISTRATION #:**
OWNER:	**INSURANCE COMPANY:**	**POLICY #:**
COMMERICIAL MOTOR VEHICLE :	**I F RENTED OR PERSONAL, CONTACT INFORMATION OF OWNER:**	
RANK THE SEVERITY OF THE DAMAGE TO THE VEHICLE: ☐ 0 - $500 ☐ $500 - $1000 ☐ $1000 - $4000 ☐ >$4000		
DESCRIPTION OF DAMAGE TO THE BODY OF THE VEHICLE:		

OTHER DRIVER/VEHICLE INFORMATION		
YEAR:	**MAKE:**	**MODEL:**
SERIAL/VIN #	**LICENSE PLATE #:**	**REGISTRATION #:**
DRIVER'S NAME:	**CONTACT INFO:**	**LICENSE #:**
OWNER:	**INSURANCE COMPANY:**	**POLICY #:**
IF RENTED OR PERSONAL, CONTACT INFORMATION OF OWNER:		
DESCRIPTION OF DAMAGE TO THE BODY OF THE OTHER VEHICLE:		

ACCIDENT DESCRIPTION		
EXACT LOCATION OF MVA (HIGHWAY KM, INTERSECTION, EXACT ADDRESS, ETC.)**?**		
OTHER PROPERTY DAMAGED:		
DESCRIBE THE EVENTS LEADING UP TO AND THE INCIDENT (REPORT FACTS ONLY: SPEED OF VEHICLES, DIRECTION TRAVELING, WEATHER CONDITIONS, ETC. DO NOT GIVE OPINIONS REGARDING CAUSE OF ACCIDENT OR LOSS.)**:**		
DID THE POLICE ATTEND THE SCENE: ☐ **YES** ☐ **NO** **CITATION ISSUED:** ☐ **YES** ☐ **NO** **TO WHO:**		
POLICE :	**CONTACT INFO:**	
WITNESS:	**CONTACT INFO:**	
WITNESS:	**CONTACT INFO:**	

SUBMIT THIS MVA REPORT WITH A COMPLETED SUPERVISORS REPORT OF INCIDENT TO THE APPROPRIATE MANAGER

HAS AN SUPERVISORS REPORT OF INCIDENT BEEN COMPLETED? ☐ **YES** ☐ **NO**

COMPLETED BY:	**SIGNATURE:**	AECOM

S3NA-004-FM2 Near-Miss/Observation Report

Near-Miss/Observation Report

Please use this form to report any observation (e.g., at-risk acts/ at-risk conditions, or positive observations), as well as near-misses, you encounter as a part of your work. This may include office or field locations.

ADMINISTRATIVE

PROJECT NAME & NUMBER: ☐ **N/A**	**LOCATION:**
EMPLOYEE NAME:	**EMPLOYEE NUMBER:**
HOME OFFICE:	**DEPARTMENT NUMBER:**
MANAGER:	**JOB TASK/PROJECT DESCRIPTION:**
DATE AND TIME OF NEAR MISS/OBSERVATION :	**DATE AND TIME REPORTED:**

Work Activity	☐ Office	☐Driving	☐Field	☐Lab	☐Other: _____

REMEMBER: IDENTIFYING A NEAR MISS DOES NOT IMPLY GUILT BUT ASSISTS IN PREVENTING INCIDENTS OR INJURIES.

OBSERVATION, RISK OR NEAR MISS DETAILS

NEAR MISS POTENTIAL OUTCOME: ☐ INJURY/ILLNESS ☐ PROPERTY DAMAGE ☐ ENVIRONMENTAL DAMAGE

OBSERVATION: ☐ At-Risk Act/Behavior ☐ At-Risk Condition ☐ Positive

POTENTIAL SEVERITY: ☐ MINOR ☐ SERIOUS ☐ FATAL

DESCRIPTION OF NEAR MISS, OBSERVATION, RISK, OR POTENTIAL LIABILITY:

POTENTIAL IMMEDIATE CAUSES

- ☐ Procedures not followed
- ☐ Use of tools or equipment
- ☐ Use of protective measures
- ☐ Inattention/Lack of awareness
- ☐ Protective systems
- ☐ Tools, equipment, & vehicles
- ☐ Work exposures to…
- ☐ Work place environmental/layout

POTENTIAL SYSTEM CAUSES

- ☐ Physical capacity
- ☒ Physical condition
- ☐ Mental state
- ☐ Behavior
- ☐ Skill level
- ☐ Training/Knowledge transfer
- ☐ Mngmt/Supervision/Employee leadership
- ☐ Contractor selection & design
- ☐ Engineering/Design
- ☐ Work planning
- ☐ Purchasing, material handling/controls
- ☐ Tools & equipment
- ☐ Work rules/policies/stds/procedures
- ☐ Communication
- ☒ Other:_____

CORRECTIVE ACTIONS

Corrective Action Category Identified to Prevent Future Reoccurrence

(*Identify relevant issues in checkboxes and provide detail below, as applicable*)

- ☐ Different/New PPE needed
- ☐ New tool(s)/equipment needed
- ☐ Additional/proper personnel needed
- ☐ Change in working procedure
- ☐ New STOP WORK trigger identified
- ☐ Additional training/skills needed
- ☐ Improved housekeeping efforts
- ☐ Modified working behaviors
- ☐ Improved work planning
- ☐ Other:_____

WERE IMMEDIATE CORRECTIVE ACTIONS IMPLEMENTED? ☐ **YES** ☐ **NO** IF YES, PLEASE DESCRIBE:

WHAT LONG-TERM CORRECTIVE ACTIONS ARE RECOMMENDED?

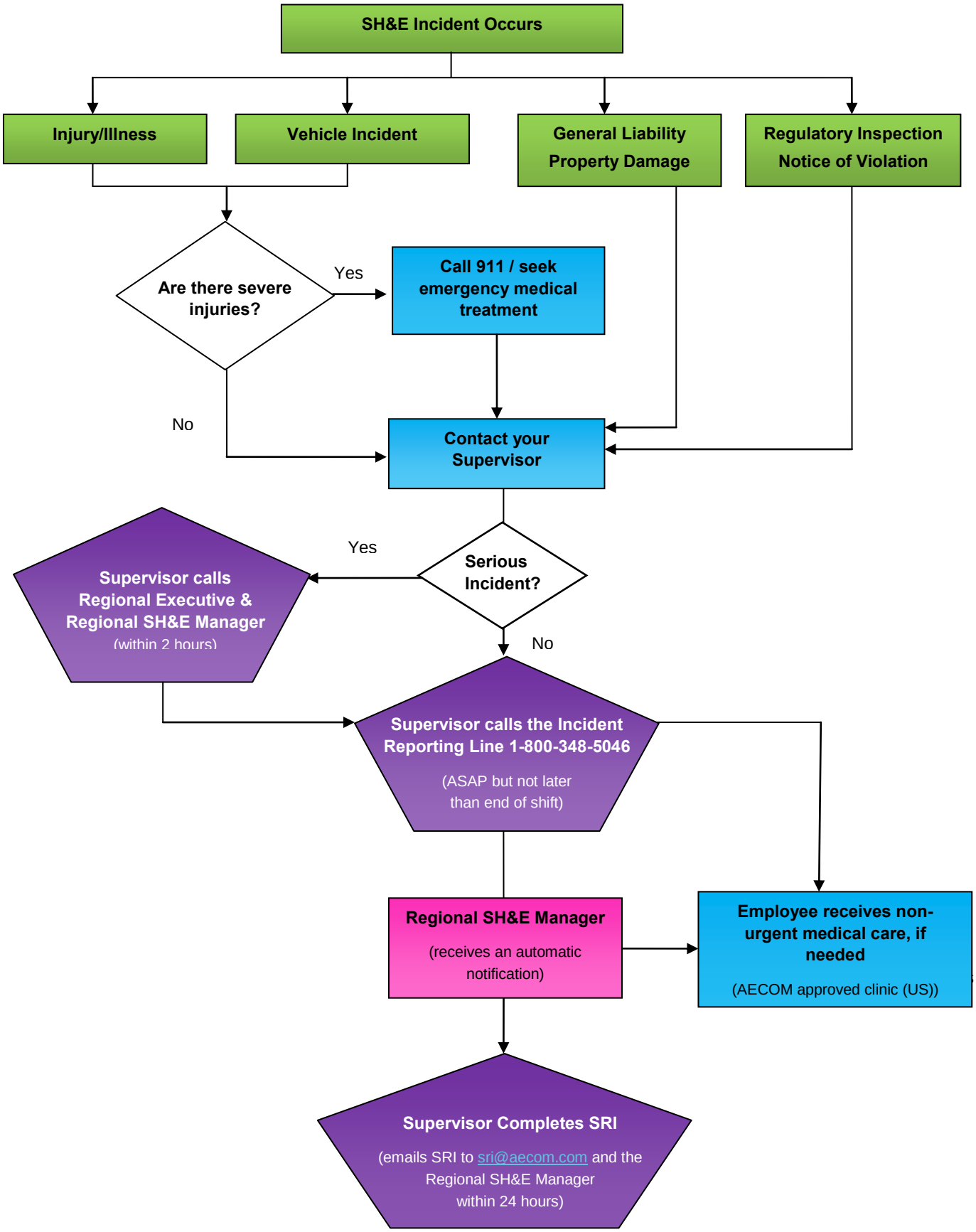
Near-Miss/Observation Report

Please use this form to report any observation (e.g., at-risk acts/ at-risk conditions, or positive observations), as well as near-misses, you encounter as a part of your work. This may include office or field locations.

AECOM

FOR SH&E MANAGEMENT USE ONLY:	
CORRECTIVE ACTIONS REQUIRING IMPLEMENTATION:	RATIONALE:
COMMUNICATED BACK TO EMPLOYEE: ☐	COMMUNICATED BACK TO MANAGER: ☐
COMPLETED BY:	DATE:

S3NA-004-WI1 Supervisor's Incident Reporting Flowchart



S3NA-004-WI2 Incident Response and Reporting Instructions

1.0 Steps for Initial Response

1.1 Take control of the scene (get everyone's attention and cooperation).

1.2 Provide first aid and/or call for emergency services.

1.3 Control secondary incidents (ensure hazards are removed or controlled; issue a stop work order, if required).

1.4 Identify sources of evidence.

1.5 Preserve evidence. In the event of a critical injury, the incident scene must be preserved for the potential site visit of a representative from the applicable government agency (if you are unsure, error on the side of caution and leave the site intact).

1.6 Report the incident to the immediate supervisor for implementing stop work orders or immediate corrective action as required.

1.7 Supervisor calls the SH&E Incident Reporting Line to initiate internal reporting and obtain guidance, as necessary. If a manager or supervisor is not available, any AECOM employee can make the call.

1.8 The Supervisor completes the applicable reporting forms.

2.0 Fatality or Serious SH&E Incident Notification

2.1 **Any fatality or serious SH&E incident** is to be directly reported as soon as practical (i.e. as soon as the site is secure and appropriate local emergency response is coordinated), but in no case more than 2 hours after the incident, to the SH&E Incident Reporting Line, the appropriate Regional SH&E Manager, and Regional Executive. .

2.2 Voicemail and/or email alone are not adequate to meet this requirement. The responsibility for this reporting belongs to the responsible line manager (i.e. **office/branch/business line/project manager**).

3.0 Internal Reporting Procedures

3.1 The call (from the scene of the incident, if possible) to SH&E Incident Reporting Line initiates the reporting procedures.

3.2 For observations or near miss, a Near Miss Report needs to be completed with 24 hours and forwarded to the RSH&E Manager.

3.3 The employee involved in an incident shall complete an SRI with their supervisor within 24 hours following the incident.

- If the employee is unable to complete the report because of the severity of the injuries, the supervisor, in conjunction with another employee who witnessed the incident, should complete the (SRI).
- If the employee is not comfortable submitting the report to their immediate supervisor or manager, they are encouraged to submit it to the SH&E Department directly.

3.4 The Supervisor will contact the RSHEM to:

- Confirm that on-site corrective actions were implemented,
- Determine the need for HR involvement (for medical aid incidents, WCB/WSIB/H&W/ WC reporting, and modified work cases),
- Determine the need for review by the District Manager,

- Identify and complete any other external reporting requirements (client, ministry responsible for labour, ministry responsible for environment), and
- Work with Regional Counsel or Media Communications as needed

3.5 The Regional SH&E Manager must:

- Initiate an internal or external investigation of the incident, as necessary (Regional Counsel may request/oversee an external investigation).
- Review and sign the SRI and provide it to SH&E support staff within 24 hours. If no investigation is required, identify any corrective actions that can be implemented at the program level (safe work practices, equipment, training, safety bulletins, policies or procedures) to safeguard against a recurrence of the incident.
- Work with the manager, Human Resources, and Regional Counsel or Media Communications, as required.

4.0 External Reporting Procedures

4.1 Notification to external regulatory agencies (i.e. OSHA, ministry of labour/environment, WCB, WSIB, WC, H&W, etc) is to be done in accordance with S3NA_601_PR_Recordkeeping

4.2 The Manager signing the SRI in conjunction with the Regional SH&E Manager will determine what (if any) external reporting obligations must be met. For example:

4.2.1 **Client.** To a Client whom the employee was conducting work for at the time of the incident or accident. Health and safety requirements will vary for different clients, and therefore client reporting will be handled on an individual basis by the manager(s) involved.

4.2.2 **State and OH&S Governing** Agency. Reporting to the State, governing body of labour or OH&S (Canadian provincial/territorial ministry responsible for labour) by the employer (AECOM management/representative) will be done in accordance with regulatory requirements. Since reporting requirements vary slightly between jurisdictions throughout North America, the following can only be used as rough guidelines for determining whether or not a call should be made to the governing body:

- If a fatality or permanent injury is incurred;
- If the accident/incident involved a major structural failure or collapse of a building, bridge, tower, crane, hoist, temporary construction support system or excavation; or
- If the accident/incident involved the major release of a hazardous substance.

4.2.3 Environmental Governing Agency. To the governing body for the environment and spill reporting (provincial/territorial ministry responsible for environment) by the employer (AECOM management/representative). Reporting requirements vary slightly between jurisdictions:

- Spills, releases or other damage to the environment. (For minimum quantities for reporting based on the type of product spilled or released, refer to the applicable legislation.).

4.3 Medical Treatment Injury, Hazardous Material Spill/Release, Permit Condition Notification

4.3.1 Any SH&E incident involving medical treatment for an AECOM employee, release of a hazardous material/substance and/or breach of a numeric or non-numeric permit/consent limit is to be reported as soon as possible, but not later than the end of the work-shift, to the Regional SH&E Manager, Regional/Business Line Manager and Group SH&E Director by using a direct communication method (face-to-face or phone call). Responsibility for this reporting belongs to the responsible project/location/department manager.

4.4 Worker's Compensation.

4.4.1 Human Resources will be responsible for working with the appropriate manager if the employee is off work for any length of time, if a modified work program will be created for the individual, or if there are any long-term implications from the accident.

4.4.2 **Canada.** Reporting to the WCB must be completed by both the employee(s) injured in the mishap and the employer (AECOM management/representative). Reporting requirements vary slightly between jurisdictions across Canada, therefore, the following can only be used as rough guidelines for determining whether or not a call should be made to the appropriate agency:

- If the employee requires medical treatment (by a medical practitioner, not just first aid);
- If the employee is off of work beyond the day of the accident;
- If the employee has to perform different or fewer work duties;
- If a fatality or permanent injury is incurred.

4.4.3 **United States.** US based employees who require treatment beyond first aid will be referred to H&W Benefits for WC processing. State requirements vary for different types of incidents. H&W and the RSH&E Manager will ensure that appropriate State reporting as been completed, as applicable. For property damage with possible liability to the company, they will be referred to the Insurance group and liability carrier. Fatalities or hospitalization of three or more employees must be called into OSHA within 8 hours.

S3NA-005-PR Vehicle and Driver Safety Program

1.0 Purpose and Scope

1.1 Establish an AECOM program for safe operation of vehicles in order to reduce the risks to which AECOM employees are exposed while operating a motor vehicle.

1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 **Authorized Driver:** AECOM employees who possess and provide proof of a current driver's license with full privileges and has completed, at a minimum the AECOM Driver & Vehicle Safety Awareness Training. Proof of insurance is also required when using personal vehicles on AECOM business.

2.2 **Distracted Driving:** Any activity that takes the driver's attention away from the primary task of driving.

2.3 **Incident:** An incident, for the purposes of this procedure, is a vehicle collision or other event where personal injury or property damage occurs, or where a citation is issued while on AECOM business under certain circumstances. This may also include acts of theft, vandalism, and criminal mischief. Circumstances for citations to be considered as incidents include, but are not limited to, an instance where the citation results in the restriction or suspension of the employee's ability to legally operate a motor vehicle, a governmental motor vehicle agency assigning points to the employee's license, or the employee receives a citation where AECOM insurance is provided as proof of insurance at the time of issuance.

2.4 **Local Laws:** All signs, postings, laws, regulations, ordinances and codes applicable for the jurisdiction in which the motor vehicle is being operated.

2.5 **Mobile Device:** Any 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/Cellular phones
- Personal Data Assistant (PDA)
- iPads or other tablet models
- Computers
- Global Positioning System receivers

2.6 **Operating Under the Influence (OUI):** OUI is the operation of any vehicle on company business 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 said substances produces impairment in violation of governmental laws for the location of the impairment.

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

3.0 Attachments

3.1 S3NA-005-FM Driver's Acknowledgement Form

3.2 S3NA-005-WI Driver Safe Work Practices

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **District Managers** will be responsible for the following:

- Verifying that any company vehicle under their operational control is in a preventative maintenance program
- Verifying that all company vehicles are properly insured per AECOM policy
- Verifying that a local pre-operational vehicle inspection program was established

4.1.2 **Supervisors** will be responsible for the following:

- Confirming employees are informed of the provisions of this procedure.
- Providing a copy of this procedure to any employee who will be driving an AECOM owned, leased or personal vehicle for company business.
- Verifying that each employee has completed the S3NA-005-FM Driver's Acknowledgement Form and submitted the completed form to:
  - For Canadian Employees, the Driver's Acknowledgement Form will be submitted to Canadahrssc@aecom.com, or by mail to: AECOM, Markham West, 105 Commerce Valley Dr. West, Markham, ON L3T 7W3
  - For U.S. Employees, the Driver's Acknowledgement Form will be submitted to HRRecords@aecom.com, or by fax to: 84-515-8304, or by US Mail to: HR Records, AECOM, 4840 Cox Road, Glen Allen, VA 23060.

4.1.3 **SH&E Department** will be responsible for the following:

- Maintaining and updating an eLearning course detailing AECOM's *Vehicle and Driver Safety Awareness* materials.
- Maintaining this procedure and updating it when regulatory or company policies dictate.
- Assisting operational leaders with determining the risk incurred by the use of motor vehicles.
- Making available supplementary driving safety training beyond AECOM's *Vehicle and Driver Safety Awareness*

4.1.4 **Employees** will be responsible for the following:

- Following this procedure and all applicable laws while operating a vehicle**.**
- Immediately reporting all vehicle incidents per our incident reporting policy.
- Notifying their Supervisor, Region SH&E Manager, and Region Counsel upon receipt of a legal summons associated with any moving violation related to the use of a company vehicle.
- Immediately reporting any change or limitation(s) to his or her Driver's License to his or her **Supervisor** and making the required modifications to their Driver's Acknowledgement Form.
- Conducting a pre-operational inspection of the vehicle for any damage or deficiencies; reporting any discovered deficiencies affecting the safe operation of the motor vehicle to the local office authority.

4.1.5 **Region Human Resources Manager** will be responsible for the following:

- Obtaining a copy of an employee's Motor Vehicle Record (MVR), as required.
- Supporting disciplinary action, as necessary.

4.1.6 **Region Counsel** will be responsible for the following:

- Providing direction to the employee and Supervisor relative to the receipt of any legal summons relative to a moving violation incurred in a company vehicle.
- Obtaining an official copy of the police/accident report associated with any company vehicle, as requested.

4.2 General Procedures and Practices

4.2.1 Only Authorized Drivers shall operate a motor vehicle (rental, personal, or AECOM owned/leased) while on AECOM business.

4.2.2 Drivers must comply with AECOM's Global Travel Policy and the applicable state laws on the use of cell phones and other mobile devices while operating a motor vehicle. [NOTE: *Individual state, provincial, and local laws vary*.]

4.2.3 Texting while driving is strictly prohibited.

4.2.4 Seat belts shall be worn by all occupants whenever the vehicle is in motion.

4.2.5 The number of passengers shall not exceed the manufacturer's specifications for the vehicle.

4.2.6 Loads shall be secured and shall not exceed the manufacturer's specifications and legal weight limits for the vehicle, or regulatory requirements (i.e., threshold for DOT)

4.2.7 Motorcycles may not be operated on company business unless:

- Specific approval is provided by the Supervisor.
- A hazard analysis is completed.
- Required training and license is in place.

4.2.8 Staff inexperienced in two-way radio communication protocols and/or driving on gravel roads shall get on-site training from experienced personnel.

4.2.9 Headlights or daytime running lights will be used at all times the vehicle is operating.

4.3 AECOM Owned or Leased Vehicles (additional requirements)

4.3.1 The granting of driving privileges for AECOM owned or leased vehicles shall include the following:

- Possession of the appropriate qualifications.
- Having a good driving record.
- Complying with the procedures set out in this section and with applicable Safe Work Practices adopted and issued through the AECOM SH&E program.

4.3.2 An **employee's** driving privileges for company business may be removed at any time at the sole discretion of AECOM.

4.4 Authorized drivers shall:

4.4.1 Perform pre-operation vehicle inspections.

4.4.2 Arrange for preventive maintenance services for the vehicle and maintain it in sound mechanical condition.

4.4.3 Not operate the vehicle if unsafe or if conditions exist that would likely result in vehicle damage or personal injury.

4.4.4 Not use the vehicle for any unofficial use including personal business unless specific permission is given by the Supervisor.

4.4.5 Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service.

4.4.6 Not pick up hitchhikers.

4.4.7 Not use the vehicle for transportation to or from work or park at a residence overnight unless approved by the employee's Supervisor.

4.4.8 Not smoke or allow anyone else to smoke in the vehicle.

4.4.9 Be responsible for any damage caused by abuse of the vehicle.

4.4.10 Secure the vehicle when left unattended.

4.4.11 Upon request the HR Representative will provide a copy of the **employee's** driving report to AECOM's insurance carrier.

4.4.12 An **employee** will be deemed to have an unsatisfactory driving record if, during the immediately preceding three (3) years, the employee has had their Driver's License suspended or revoked, or has had more than two (2) minor convictions, or a major conviction, or more than one (1) at fault claim, or more than six (6) demerits points for driving violations.

4.4.13 To maintain driving privileges, AECOM may require the **employee** to take a defensive driver course at AECOM's expense.

4.4.14 If the **employee's** driving privileges are revoked and their position requires the use of a vehicle for AECOM business, AECOM may, at its discretion, attempt to identify a suitable alternative position with AECOM for which use of a vehicle is not required and which is consistent with the **employee's** skills and AECOM's operating needs.

4.4.15 AECOM reserves the right to require **employees** to take in-car driver training should driving conditions, performance or their driving record warrant it.

4.5 Vehicle Maintenance

4.5.1 Vehicles shall be fit for purpose and shall be maintained in a safe working order, with seat belts fully functional. This applies to all vehicles owned or leased by AECOM and to personally-owned vehicles used for company business.

4.6 Safety Equipment

4.6.1 The following suggested items should be kept in all vehicles used for company business in remote project locations:

- First Aid kit, appropriate to the work and crew size, or per regulations.
- Emergency equipment (e.g., flares, flashlight, blanket, etc.) based on conditions.
- Supervisors Report of Incident

4.6.2 D**river Fitness**

4.6.3 Drivers are responsible for being appropriately licensed, trained and medically fit to operate the vehicle.

4.6.4 AECOM **employees** operating vehicles on AECOM business shall be alert and not operate a vehicle when fatigued.

4.7 Driver Impairment

4.7.1 Drivers shall not operate a motor vehicle while under the influence of alcohol or drugs, or any other substance or medication that impairs their ability to drive safely.

4.8 Vehicle Incident

4.8.1 In the event of a traffic accident while on AECOM business, an employee MUST follow *S3NA-004-PR Incident Reporting*, including seeking assistance, reporting the incident to the appropriate authority, completing and submitting the required forms. The AECOM Fleet Management Company will also be contacted when vehicle is a company leased vehicle.

4.8.2 Testing for Alcohol and/or Drugs – See the AECOM Employee Handbook; refer any questions to the HR Department. In the event that a police/regulatory officer responding to a vehicle incident administers field and/or laboratory impairment testing AECOM reserves the right to obtain copies of such testing results for inclusion in the incident report and consideration in a subsequent incident investigation.

4.8.3 Investigation Process – refer to *S3NA-603-PR Incident Investigation and Review*.

4.8.4 Consequences if determined to be at "fault" – taking a Defensive Driving Training course shall be among the considerations as a corrective action. The **Region SH&E Manager** can advise as to the availability of such training.

4.8.5 In addition, the employee will:

- If requested, provide police and other driver(s) with their liability insurance information.
- 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.
- If requested, provide and discuss the completed draft Supervisor's Report of Incident form with **Region Counsel**. The employee should then forward the completed form to the **Region Counsel** with copies to others as required.
- If the employee receives a Summons, Complaint or other legal documents relating to a traffic incident, note the date, time, place and method of delivery and immediately forward the original documents to **Region Counsel**.
    - **THE EMPLOYEE SHOULD NOT ADMIT LIABILITY, AGREE TO PAY FOR ANY DAMAGE OR SIGN ANY DOCUMENT EXCEPT AS REQUIRED BY LAW**. Statements made in haste or anger may be legally damaging.

4.8.6 In the event of an accident, the supervisor must follow the procedures set out in *S3NA-004-PR Incident Reporting* for reporting the accident.

4.9 Traffic Citations

4.9.1 The employee is personally responsible for payment of any fines for moving violations and parking citations incurred while driving any vehicle on AECOM business and for reporting such Incidents to his/her Supervisor, Region SH&E Manager, and Region Counsel.

4.10 Vehicle Insurance

4.10.1 For information about insurance carried by AECOM for AECOM owned or leased vehicles and any questions about insurance the employee may have as to business use of employee-owned vehicles, questions should be directed to the AECOM Insurance Department.

5.0 Records

5.1 Driver's Acknowledgement forms (and associated Motor Vehicle Driving Records) shall be filed in HR employee personnel files.

6.0 References

6.1 AECOM Employee Handbook (HR Department)

6.2 S3NA-004-PR Incident Reporting

6.3 S3NA-603-PR Incident Investigation and Review

S3NA-005-FM Driver's Acknowledgement Form

IF YOU DRIVE ON AECOM BUSINESS, YOU MUST READ THIS PROCEDURE AND FILL OUT AND RETURN THIS PAGE TO THE HUMAN RESOURCES SHARED SERVICE CENTER HRRecords@aecom.com (US) or Canadahrssc@aecom.com (Canada) FOR SECURE FILING.

Employee Name (Print): _____

Driver's License Number: _____

Expiry Date: _____

I acknowledge that I have read the attached Procedure and understand that it contains important information about AECOM's procedures regarding employee use of AECOM fleet or personal vehicles. I agree to adhere to the requirements set forth in the Procedure.

As a condition of driving a personal vehicle on AECOM business I will present my Driver's License and proof of insurance for validation purposes to my Supervisor as witnessed below.

In addition to completing this form, I understand that as a condition to operating an AECOM fleet vehicle, AECOM may run a Motor Vehicle Driving Record report and provide this report to my Supervisor.

I understand that I must notify AECOM immediately if there is any change in the status of my Driver's License and AECOM reserves the right to terminate my driving privileges and any associated benefits at any time, for any reason, in its sole discretion.

I understand that AECOM may require me to participate in a defensive driving course at AECOM's expense in order to continue my driving privileges for AECOM fleet vehicles.

This Procedure and my signed Acknowledgement are intended to and shall supplement the terms of my employment relationship with AECOM.

Date: _____ **Signature:** _____

(Employee)

I confirm that the Driver's License number and expiry date set forth above are consistent with the employee's Driver's License.

Date: _____ **Name of Witness (print):** _____

Supervisor Signature: _____

S3NA-005-WI Driver Safe Work Practices

1.0 General

1.1 When accessing any pickup truck box, staff will: step up into the box to avoid excess reaching and strain and; use three point contact getting in and out of the truck box (avoid jumping off the tailgate).

1.2 Drivers must comply with AECOM's Global Travel Policy and the applicable state laws on the use of cell phones and other mobile devices while operating a motor vehicle. [NOTE: *Individual state, provincial, and local laws vary*.]

1.3 Be familiar with all client health and safety rules and regulations when on their sites. The employee may be required to leave their keys in the ignition or to display a vehicle pass. When parking, it is recommended that employees back into the parking spot.

2.0 Before Vehicle Operation

2.1 Confirm that you have your driver's license and that the vehicle registration and proof of insurance is in the vehicle.

2.2 Prior to driving the vehicle, adjust rear view mirror, side mirrors, driver's seat and head restraint as needed.

2.3 Fasten the seat belt and have all passengers fasten their seat belts before starting the engine. Keep belts fastened while the vehicle is moving or the engine is running.

2.4 Check for the correct functioning of:

2.4.1 Parking Brake--holds against slight acceleration

2.4.2 Foot Brake--holds, stops vehicle smoothly

2.4.3 Clutch and Gearshift--shifts smoothly without jumping or jerking

2.4.4 Steering--moves smoothly

2.4.5 Lights--headlights, warning lights, and turn signals operational

2.4.6 Dash Control Panel--all lights and gauges operational

2.4.7 Moving Parts--no strange noises

2.4.8 Horn--operational

2.4.9 Hydraulic systems--no evidence of leaks and systems operate smoothly

3.0 During Vehicle Operation

3.1 Maintain a safe distance when travelling behind other vehicles.

3.2 Confirm the area behind your vehicle is clear prior to and while reversing a vehicle.

3.3 When parking the vehicle on the edge of a roadway, turn on the four-way indicators (hazard lights) prior to leaving the vehicle.

3.4 Check carefully for oncoming traffic before opening the door and exiting the vehicle.

3.5 If requested, provide police and other driver(s) with their liability insurance information.

3.6 Monitor weather reports for the travel route.

3.7 Observe extra caution in and around emergency and construction zones.

3.8 Avoid unattended rest areas, when possible, and especially at night.

3.9 If the vehicle breaks down and another person stops to assist, do not leave the vehicle. Ask the person to call the police for assistance.

3.10 Contact the police to help those with car trouble instead of stopping to assist.

3.11 When possible, staff should have a car mechanic change or repair a flat tire. If staff must change a tire, they must adhere to the manufacturer's specifications and observe all proper lifting technique and safety procedures. The tire should then promptly be checked by a qualified car mechanic to ensure proper alignment and properly tightened lug nuts. The flat tire should be promptly repaired or replaced.

4.0 If Vehicle is to be Left Unattended

4.1 Turn the ignition off, remove the key and set the emergency brake.

4.2 Lock and secure the vehicle.

4.3 Secure equipment and property in a locked trunk or tool chest.

4.4 Do not leave keys in an unattended vehicle.

5.0 Staff shall Drive Defensively

5.1 The driver should use another person to guide them in backing up if they do not have a clear view of where they are going or the movements of other vehicles and people in the vicinity.

5.2 Tools and other items shall not be left loose in the passenger compartment of a vehicle.

5.3 Road Rage

5.3.1 Road rage is a dangerous driving situation that can occur and should be avoided whenever possible, but NEVER instigated. Do not get drawn into a confrontation. Avoid any confrontational eye contact.

5.3.2 The driver should be aware of all vehicles around them, paying frequent attention to the vehicle's mirrors.

5.3.3 Get out of the way. Even if the other motorist is speeding, it is safest not to make a point by staying in your lane. The other driver may be dealing with an emergency situation.

5.3.4 Unless it is necessary to use the horn as an alert, do so sparingly.

5.3.5 If someone is following you after an on-the-road encounter, drive to a public place or to the nearest police station and seek assistance.

5.3.6 Attempt to note the offender's license plate number and write it down as soon as possible.

5.3.7 Report any aggressive driving to the police immediately. This action may aid in preventing further occurrences by the same driver.

6.0 Winter Driving

6.1 Clear snow from all exterior vehicle surfaces.

6.2 Avoid using cruise control on icy roads.

6.3 Accelerate and brake gently to reduce skids or spinouts.

6.4 Wear winter clothing that does not restrict movement, vision or hearing.

6.5 Where required, have snow chains for the vehicle and be familiar with their installation.

6.6 Use extra caution while driving during hazardous winter conditions.

6.7 Avoid sudden changes of speed or direction to reduce possibility of skidding.

6.8 Drivers should always leave extra distance between their vehicle and the vehicle ahead of them. Stopping on ice takes about eight times the distance that it takes on dry pavement.

6.9 Carry suitable warm clothing and emergency equipment during the winter months. Temperatures can plunge rapidly.

6.10 Be aware of icy patches and black ice on the road bridges and intersections that are especially prone to ice patches.

6.11 Be familiar with the skid control procedures for the type of vehicle being driven (i.e., front, rear or four-wheel drive).

7.0 Gravel Roads and Remote Locations

7.1 Prior to getting in the vehicle, inspect the vehicle and have any required maintenance performed before leaving for the job site.

7.2 Prior to driving on a road with an assigned radio frequency, the passenger will test the two-way radio to confirm that the proper radio frequency is set and that the transmission is being received clearly by other traffic. The passenger will operate the two-way radio.

7.3 Drivers will maintain appropriate speed for the road conditions.

7.4 Headlights will be used at all times that the vehicle is in operation.

7.5 Drivers will respect the understood road protocol, drive defensively, and respect intersections.

7.6 4WD options will be utilized at the discretion and comfort level of the driver. If road conditions are questionable even for 4WD use, the road will not be traveled and either another route found or the job postponed until road conditions improve.

8.0 Off-road

8.1 If inexperienced, seek supervisory advice and training.

8.2 Vehicles should only be driven off roads after all other options (ATV's, etc.) have been considered.

8.3 Prior to driving off-road check to see that the vehicle is in good operating condition and your tires are properly inflated. Realize the limitations of your vehicle and do not become over confident.

8.4 Seat belts should be kept fastened at all times and all loose objects in the vehicle securely fastened to prevent them from becoming projectiles.

8.5 Drive according to the ground conditions. Speed and power are not required in rough off-road driving. In many cases with manual transmissions, letting the clutch out slowly and allowing the vehicle to crawl over obstacles in the lowest gear is the best scenario.

8.6 Learn to read the surrounding terrain. Monitor the ground conditions ahead of the vehicle -- it is essential to know what to expect from the ground being driven on.

8.7 When slowly traversing difficult areas of soft ground, try to keep the vehicle in motion. Once stopped it will be far more difficult to get it going again. If the vehicle becomes stuck, do not spin the wheels, as it will only dig in further or deeper until the vehicle chassis rests on the ground. Try to go slowly backwards in the vehicle's own tracks, as these have been previously compressed by the vehicle. In most cases this will be successful. If not, place appropriate material (wooden planks, mats, branches, etc.) under the wheel to improve traction.

8.8 Before driving over rough terrain, the terrain should be inspected on foot first.

8.9 When climbing hills ALWAYS go straight up or down. It is also smart to know what is on the other side of the hill before going up. At the base of the hill the driver should apply more power. Ease up on the power while approaching the top and before going over the crest. If the vehicle stalls on the ascent, back straight down the hill in reverse. For downhill travel in a vehicle with manual transmission, always use the lowest gear, and do not disengage the clutch to allow the vehicle to coast. If the vehicle is equipped with an automatic transmission, use low range and the lowest drive setting. NEVER drive a hill at an angle.

8.10 If the hill is very steep and you do not feel confident that your vehicle can make it up, then do not attempt it.

8.11 If you come to an area that is covered with water, you will not know the depth of the water or the condition of the ground under the water. This is especially true at night, when your vision is more limited. As such, driving through water covered areas or driving around barricades setup by public safety officials to prevent access into areas impacted by flooding is strictly prohibited. Turn Around, Don't Drown®

8.12 Prior to returning to the road, do a vehicle inspection to confirm the vehicle is road worthy.

S3NA-201-PR Client Site Requirements

1.0 Purpose and Scope

1.1 Describes the manner in which AECOM employees (including Project Managers) interface with the operational, safety, and other management systems at client-owned industrial sites and addresses the resources available to meet our client's Prequalification requirements.

1.2 To address resources and meeting client requirements regarding safety documentation/questionnaires and safety Database Collection Consortiums.

1.3 This procedure applies to all AECOM North America based employees and operations.

1.4 Many of AECOM's clients and third party operators of industrial facilities (Owner/Operator) at which we work have health, safety, environmental, and security requirements that must be met by all contractors working at the industrial site in addition to US, Canada, and AECOM requirements.

2.0 Terms and Definitions

2.1 **Database Collection Consortiums:** Third party companies that collect and evaluate safety and health data and documents for AECOM's and other contractor's clients. The consortium will publish grades for each contractor and gap analysis to assist the clients with screening and selecting contractors. The majority of AECOM's clients using a consortium are members of ISNetworld, PICS, or PEC Premier.

2.2 **Hot Work:** Work involving electric or gas welding, cutting, brazing or similar flame or spark-producing operations.

2.3 **Owner/Operator:** The owner or operator of a facility at which contractors work. The Owner/Operator might or might not be AECOM's client

2.4 **Prequalification:** The process of demonstrating to the client that AECOM meets

2.5 **Prequalification Form (PQF):** The form (either paper or electronic) provided by the client for entering data that demonstrates AECOM is qualified to work for the client.

2.6 **Process Safety Management (PSM):** .The US OSHA regulation that prescribes management systems for facilities handling large amounts of hazardous chemicals. The PSM regulations are primarily applicable to chemical manufacturing, petroleum refining, explosives processing facilities.

3.0 Attachments

3.1 S3NA-201-GL Process Safety Management Requirements

4.0 Procedure

4.1 Owner/Operator SH&E Requirements

4.1.1 **Clients or Owner/Operators** may have established specific procedural requirements for the health and safety of all contractors working on their facility. Some of these requirements might address confined spaces, chemical hazard communication, hazardous energy control (lockout/tagout) and blood borne pathogens.

4.1.2 Client facilities subject to the US OSHA PSM regulations will require onsite training and proof of worker qualification prior to contractors being giving access to the facility.

4.2 AECOM Requirements and Responsibilities

4.2.1 **AECOM Project Managers**

- Advise the **Owner/Operator** of any unique hazards presented by the work to be performed by AECOM and its subcontractors and of any hazards found during the project.

- Obtain the applicable safety, health and environmental requirements and information from the client or **Owner/Operator** and communicate that information to AECOM employees and subcontractors to be assigned to work at that facility.

4.2.2 **Visitors** may be individuals, including AECOM employees, who will be working temporarily (even a few hours) in the office or on a field site. All **visitors** must:

- Be informed of the Emergency Response procedures.
- Sign in to ensure they will be accounted for in the event of an emergency and to confirm that they are aware of what they are required to do in an emergency.
- Wear and openly display any special visitor identification.
- Obtain approval from the site owner, prior to entering a restricted work site.
- Review, understand, and adhere to any governing health and safety requirements.
- Be supervised on a work site at all times by an employee familiar with the SH&E Program and the applicable Task Hazard Analysis and other safety plans.

4.2.3 **Region SH&E Manager**

- Provide assistance to the project team with interpreting and complying with **Owner/Operator** or client health and safety requirements.
- Assist **Account Managers**, **Project Managers**, and **Marketing** with the preparation of safety, health, and environmental information to be presented to the clients.

4.2.4 **Director of Safety, Health & Environment**

- Provide consistent and accurate data to be reported to clients and data base collection consortiums.
- Provide assistance to **Region SH&E Managers** and Marketing in the preparation of data to be submitted with proposals and marketing information.

4.2.5 **Employees**

- **Employees** are to comply with all AECOM and **Owner/Operator** SH&E requirements and report all injuries, incidents and new hazards encountered.
- **Employees** will maintain paper copies of their physical, training, respirator fit tests, and certifications with them at project sites for presentation to the client or **owner/operator** as proof of qualification to be on site.

4.2.6 **Onsite Requirements**

- Prior to starting any work, confirm with the client representative the location of the work, what and how the work will be performed as well as the expected completion date.
- Upon arrival at the site, check in with the client representative. All appointments shall be arranged with the client representative prior to visits to plants. Do not enter a plant without the knowledge of the client representative.
- Request that the client representative point out any safety risk areas and specific procedures to be followed at or around the work area.
- Avoid interfering with daily plant processes by causing interruptions or distractions to plant **employees**.
- Maintain a watch for moving plant equipment such as fork lift trucks, conveyors, material bins, and overhead equipment and stay clear of process equipment which may move unexpectedly.
- Be constantly aware of the environment as the work is performed and stay clear of hot process pipes, equipment, or live electrical conductors.
- Respect all safety guards, fencing, line markings, and other safety boundary markers.

- Do not touch or change any process controls. Do not open panels without a plant representative present or without specific client authorization. Discuss union regulations with the client before touching any equipment.
- Do not discuss the project with plant **employees**. Refer questions to the client representative.
- Do not enter enclosures or areas that might be “confined spaces”.
- Do not enter areas where fall arrest equipment will be needed, unless properly trained and equipped for this purpose.
- No staff shall enter a restricted area without proper authorization.
- AECOM employees and subcontractors shall not allow other personnel into a restricted area without first orienting them to the hazards and appropriate controls, or obtaining the necessary approvals.

4.3 Training

4.3.1 All AECOM and AECOM subcontract **employees** must be trained in the work practices necessary to perform assigned tasks at the work site. This training includes the skills needed to work safely performing assigned tasks and to work safely in the industrial environment at the facility.

4.3.2 Each AECOM and AECOM contract **employee** shall be instructed in the known potential fire, explosion or toxic release hazards related to his/her job, the process at the work site, and the applicable provisions of the emergency action plan.

4.3.3 The **Project Manager** shall document that each AECOM **employee** and subcontractor has received and understood the required training and prepared a record which contains the identity of the **employee**, date of the training, and means used to verify that the employee understood the training. This documentation shall be available at the project site for submission to the owner/operator of the facility upon request.

4.4 Incident Response and Investigation

4.4.1 All incidents which have the potential to cause injuries or property damage will be reported immediately (as soon as the incident is stabilized, but no later than the end of the shift following the incident) to the **Project Manager** and to the **Owner/Operator** and/or client.

4.4.2 An incident investigation must be initiated within 48 hours. Resolutions and corrective actions must be documented, offered to the **Owner/Operator**, and handled in accordance with AECOM’s Incident Investigation procedure.

5.0 Records

5.1 None

6.0 References

6.1 US OSHA Regulations: 29 CFR 1910.119 - Process safety management of highly hazardous chemicals.

6.2 S3NA-209-PR Project Hazard Assessment and Planning

S3NA-201-GL Working at Process Safety Management Sites

1.0 Purpose and Scope

1.1 Provides guidance to AECOM employees managing and/or working in client facilities covered by regulations equivalent to OSHA 29 CFR 1910.119 or Process Safety Management (PSM) regulations. Provinces in Canada and States in the US may have regulations that are equivalent or more comprehensive than the OSHA regulations.

1.2 This procedure applies to all AECOM North America based employees and operations.

1.3 The primary purpose of the PSM Standard is to prevent or minimize the unwanted release of hazardous chemicals, especially into locations that would expose personnel to serious hazards. The regulations apply directly to the owner/operator of a facility that stores, uses, or manufactures certain hazardous chemicals in quantities above a threshold listed in the regulations. The regulations require the owner/operator to pass the requirements on to contractors and subcontractors working at the facility and to include contractors and subcontractors in certain safety programs at the facility.

2.0 Terms and Definitions

2.1 **Process:** Any activity involving a highly hazardous chemical; including any use, storage, manufacturing, handling, or the on-site movement of such chemicals or combination of these activities.

2.1.1 A process consists of one or more unit operations such as mixing, filtering, distillation, etc. A process also involves input(s) and delivers output(s). A process can involve a chemical reaction, heat transfer or mass transfer, a phase change, and other transformations or exchanges.

2.1.2 An overall process can incorporate mini processes; these could be either continuous or batch, with closed or open systems to the atmosphere. A complicated process may require a separate control room(s) for different portions of the process. A process may involve all or one of the following either in the pure state or as a mixture, with or without heat addition or removal:

- Gases • Liquids • Solids

2.1.3 Some processes involve direct contact among streams (such as in fluidized beds) or provide an indirect contact such as through standard heat exchangers.

2.2 **Catastrophic Release:** A major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that leads to serious danger to persons both within and outside the workplace and results from uncontrolled developments.

2.3 **Dangerous Substance:** A material possessing flammable or explosive properties.

2.4 **Process Hazard Analysis (PHA):** The application of one or more analytical techniques that aid in identifying and evaluating process hazards.

2.5 **Uncontrolled Developments:** Occurrences that are likely to develop quickly, to be outside the normally expected range of operating problems, to present only limited opportunity for preventive action, and to require any such action to be in the nature of an emergency response.

2.6 **Hot Work:** Work involving electric or gas welding, cutting, brazing, or similar flame or spark producing operations.

3.0 References

3.1 OSHA Regulations: 29 CFR 1910.119 - Process safety management of highly hazardous chemicals.

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager

- Responsible for administering this procedure and development of the project Health and Safety Plan (HASP).
- Responsible for communicating with the client and/or owner/operator of the facility to determine site specific hazards, safety procedures, security, and emergency response requirements.
- Advise the Owner/Operator of any unique hazards presented by the work to be performed by AECOM and its subcontractors and of any hazards found during the project.
- Responsible to ensure that all AECOM employees and subcontractors are fully aware of, understand, and adhere to the appropriate safety procedures.

4.1.2 Field Task Manager/Supervisor

- Responsible for managing onsite activities in compliance with the HASP and site specific requirements.
- Responsible for ensuring that all AECOM employees and subcontractors on site can show documentation of required training, medical surveillance, fit testing, and certifications.
- Responsible for communicating with the **Project Manager**, client, and owner/operator about all changes in project hazards and conditions that could affect safety or security at the project site.

4.1.3 Region SH&E Manger

- Assists AECOM site management as needed by providing guidance and clarification as to issues that may arise.
- Review and approve the site specific HASP, THA and hazard assessments.

4.1.4 Employees

- **Employees** shall comply with established procedures and safe work practices, be on the alert for changing conditions and quickly report any accidental release or potential release of hazardous chemicals to a supervisor. The company will promptly investigate every incident that results in, or could have resulted in, a dangerous release of a hazardous chemical.
- All **employees** will attend the Owner's (refinery/chemical plant/facility) process overview and any site-specific training during the refinery/chemical plant/facility orientation, including the process overview and Emergency Action Plan. Attached is a summary of applicable information taken from the PSM standard.

4.2 Owner/Operator SH&E Requirements

4.2.1 Clients or **Owner/Operators** may have established specific procedural requirements for the health and safety of all contractors working on their facility. The employer (refinery/chemical plant/facility) shall develop and implement written procedures that provide clear instructions for safely conducting activities involved in each process. Some of these requirements might address confined spaces, chemical hazard communication, hazardous energy control (lockout/tagout) and blood borne pathogens.

4.2.2 Client facilities subject to the US OSHA PSM regulations will require onsite training and proof of worker qualification prior to contractors being giving access to the facility.

4.2.3 Onsite Requirements

- Prior to starting any work, confirm with the client representative the location of the work, what and how the work will be performed as well as the expected completion date.
- Upon arrival at the site, check in with the client representative. All appointments shall be arranged with the client representative prior to visits to plants. Do not enter a plant without the knowledge of the client representative.

- Request that the client representative point out any safety risk areas and specific procedures to be followed at or around the work area.
- Prepare and submit to the owner/operator for approval any hot work, hazardous work, road closure, permits required by the facility or regulations.
- Avoid interfering with daily plant processes by causing interruptions or distractions to plant employees.
- Maintain a watch for moving plant equipment such as fork lift trucks, conveyors, material bins, and overhead equipment and stay clear of process equipment which may move unexpectedly.
- Be constantly aware of the environment as the work is performed and stay clear of hot process pipes, equipment, or live electrical conductors.
- Respect all safety guards, fencing, line markings, and other safety boundary markers.
- Do not touch or change any process controls. Do not open panels without a plant representative present or without specific client authorization.
- Do not discuss the project with plant employees. Refer questions to the client representative.
- Do not enter enclosures or areas that might be “confined spaces”.
- Do not enter areas where fall arrest equipment will be needed, unless properly trained and equipped for this purpose.
- No staff shall enter a restricted area without proper authorization.
- AECOM employees and subcontractors shall not allow other personnel into a restricted area without first orienting them to the hazards and appropriate controls, and obtaining the necessary approvals.

4.3 Training

4.3.1 All AECOM and AECOM subcontract **employees** must be trained in the work practices necessary to perform assigned tasks at the work site. This training includes the skills needed to work safely, perform assigned tasks, and to work safely in the industrial environment at the facility.

4.3.2 Each AECOM and AECOM subcontract **employee** shall be instructed in the known potential fire, explosion, or toxic release hazards related to his/her job, the process at the work site, and the applicable provisions of the emergency action plan.

4.3.3 The **Project Manager** shall document that each AECOM **employee** and subcontractor has received and understood the required training and prepared a record which contains the identity of the employee, date of the training, and means used to verify that the employee understood the training. This documentation shall be available at the project site for submission to the owner/operator of the facility upon request.

4.3.4 **Employees** will receive initial and refresher training in the following:

- An overview of the refinery/chemical plant/facility process and operating procedures for the process that employees will be working with or near, including the hazards of the chemicals used in the process. This will include a complete review of the company Hazard Communications (HAZCOM) Program and all Material Safety Data Sheet (MSDS)s that are provided for each unit where the employees will be working;
- Specific safety and health hazards;
- Procedures and safe work practices applicable to the employee's job tasks, including personal protective equipment, permits (confined space, hot work and general safe permits, job hazard analysis and auditing;
- The site-specific Emergency Response Plan.

4.4 Incident Response and Investigation

4.4.1 Incident investigations are required for all incidents. When an incident occurs, an investigation will be immediately implemented, but not longer than 24 hours after the incident. Causal analysis and corrective actions will be documented and tracked for closure. Those records will be kept for a minimum of 5 years.

4.4.2 All incidents which have the potential to cause injuries or property damage will be reported immediately (as soon as the incident is stabilized, but no later than the end of the shift following the incident) to the **Project Manager** and to the **Owner/Operator** and/or client.

4.4.3 Resolutions and corrective actions must be documented, offered to the **Owner/Operator**, and handled in accordance with AECOM's Incident Investigation procedure.

5.0 Records

5.1 Records of training, medical surveillance, respirator fit testing, and certifications must be available at the project site for all AECOM employees and subcontractors working at the site.

S3NA-202-PR Competent Person Designation

1.0 Purpose and Scope

1.1 Outlines the process and minimum requirements necessary for classifying an AECOM employee as a "Competent Person" in one or more activity areas.

1.2 This procedure applies to all AECOM North America based employees and operations where AECOM is self-performing the identified activities and where AECOM controls projects performing the activities requiring a Competent Person. Client-mandated requirements may apply on a project-specific basis and shall be addressed in supplemental documents [e.g., Task Hazard Analysis (THA) or Health and Safety Plan (HASP).

1.3 It is recognized that regulations and legislation may contain alternate definitions for Competent Person and it will be the responsibility of the Project Manager to determine if conflicts exist between AECOM and applicable regulatory/legislative definitions and resolve the conflict.

1.4 When a qualified employee within AECOM is not available to be designated as the AECOM Competent Person, the Project Manager in coordination with their Region SH&E Manager may designate an appropriately qualified and trained Contractor employee as the Competent Person for the project.

2.0 Terms and Definitions

2.1 **Competent Person**: One who is capable of identifying existing and predictable hazards in surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization and resources to take prompt corrective measures to eliminate them.

2.2 **HASP**: Project Health and Safety Plan.

3.0 Attachments

3.1 S3NA-202-FM Competent Person Designation

4.0 Procedure

4.1 **Roles and Responsibilities**

4.1.1 A Competent Person in AECOM is an employee who functions in a technical role when either AECOM self-performs associated field work (above) or oversees and directs the work of subcontractors. For operations where AECOM is providing oversight of subcontractors (ex. drilling services), it is the subcontractors employee who is the Competent Person on-site for that phase of operation.

- Any AECOM employee considered for designation as a "Competent Person" shall:
  - Complete a Training Needs Assessment (TNA) with their Supervisor under the guidance of the **Region SH&E Manager**, regarding competent person's requirements;
  - Obtain approval from their supervisor prior to enrolling in any AECOM-sponsored safety competent person training program.
  - Track his or her own training anniversary dates and arrange for appropriate refresher training at least 30 days prior to expiration of certification.
- Contractor Competent Persons
  - Unless AECOM is self-performing, the Contractor is responsible for determining the safe means and methods of its work activities.
  - The Contractor is responsible for designating its Competent Person(s) for each category of work it undertakes as required above.
  - The Contractor's Competent Person is responsible for technically supporting the Contractor's site operations for the safe execution of its activities.

- The Contractor's Competent Person should be knowledgeable about the work activities, compliance with the associated safety and health regulations, identifying and removing any attendant field hazards and the Contractor's work practices and procedures.
- For work on AECOM controlled sites, the Project Manager confirms that the Contractor designates a Competent Person(s) for its activities. *S3NA-202-FM Competent Person Designation* or the equivalent may be use for this purpose.

4.1.2 **Project Manager/Field Task Manager/Supervisor** are responsible for ensuring that all assigned personnel, including personnel utilized from other offices to support their operations, comply with the requirements of this procedure. The **Project Manager** shall:

- Designate the Competent Person based on the work activity using *S3NA-202-FM Competent Person Designation*;
- Implement corrective actions when employees fail to meet training requirements;
- Identify supplemental employee training needs based on local/client requirements;
- Verify competent person training requirements are reviewed with each employee, based upon current and anticipated job functions and past performance on a routine basis;
- Identify additional employees requiring competent person training based on this procedure;
- For projects controlled by AECOM, when these activities are contracted to another party, secure the identity of the Contractor's Competent Person(s), provide them with a copy of this SOP to verify the Contractor's capability to comply with the requirements within, and obtain documentation to support the designation of the Contractor employee as a Competent Person for AECOM;
- Verify the designation of the Competent Person for a specific activity is effectively communicated to field personnel on site during daily tailgate safety meetings.

4.1.3 **The Region SH&E Manager** or designee will work with operations to assess the competency of all designated persons based on specific requirements outlined in this procedure. With the **Project Manager** or designee determining the work-specific Competent Person, the **Region SH&E Manager** provides guidance as needed. The SH&E Department (i.e., **Region SH&E Manager**) with operations is responsible for:

- Establishing competent person training/experience requirements and communicating these requirements to line management.
- Monitoring the overall implementation of this SOP.
- Monitoring field compliance of this procedure.
- Providing technical assistance/support as requested by **Region and District Managers**.
- Performing internal safety training classes as requested by **Region and District Managers**.
- Supporting the **Project Manager** in establishing minimum competent person requirements for regulated job activities based on individual job descriptions, applicable regulatory requirements, operational considerations, and management directives.
- Reviewing and approving as requested by designated operations representatives the Competent Person's qualifications for AECOM employees.
- Develop and maintain a process to track employee training compliance and anniversary dates.

4.2 **The following activities require an individual to be designated as a competent person:**

4.2.1 Asbestos

4.2.2 Blasting & Explosives

4.2.3 Concrete & Masonry Construction

4.2.4 Confined Spaces

4.2.5 Control of Hazardous Energy (Lockout-Tagout)

4.2.6 Cranes & Derricks

4.2.7 Demolition

4.2.8 Electrical Wiring Design & Protections

4.2.9 Fall Protection

4.2.10 Hearing Protection

4.2.11 Heavy Equipment

4.2.12 Ionizing Radiation

4.2.13 Lead

4.2.14 Material Hoists & Personnel Hoists

4.2.15 Stairways & Ladders

4.2.16 Respiratory Protection

4.2.17 Rigging Equipment

4.2.18 Scaffolds

4.2.19 Steel Erection

4.2.20 Trench & Excavations

4.2.21 Underground Construction

4.2.22 Welding & Cutting

4.3 The AECOM competent person field functions are dependent on the project activities and AECOM's field function. Refer to each SH&E Standard Operating Procedure (SOP) for the activities listed above and the associated legislative (e.g., OSHA) standard to determine the details of responsibility. Generally, it is the Competent Person's responsibility to be onsite at all times when AECOM staff are performing work governed by this SOP, make daily inspections of the conditions and work activities, and take actions to control any hazards associated with those activities.

4.4 The *S3NA-202-FM Competent Person Designation* shall be used on all projects for documenting Competent Person designations. It must be filled out completely and updated as necessary by the contractor.

5.0 Records

5.1 AECOM Competent Person Designation forms shall be maintained in the project file.

5.2 Documentation as to daily inspections and corrective measures by the AECOM Competent Person shall be maintained in the project file.

6.0 References

6.1 None

S3NA-202-FM Competent Person Designation

Company:			
Project Location:		**Job Number:**	
Designated Competent Person:		**ID Number:**	

Check the technical activity for which the Designation will apply:

☐ Asbestos	☐ Ionizing Radiation
☐ Blasting & Explosives	☐ Lead
☐ Concrete & Masonry Construction	☐ Material Hoists & Personnel Hoists
☐ Confined Space Entry	☐ Stairways & Ladders
☐ Control of Hazardous Energy (Lockout/Tagout)	☐ Respiratory Protection
☐ Cranes & Derricks	☐ Rigging Equipment
☐ Demolition	☐ Scaffolds
☐ Electrical Wiring Design & Protections	☐ Steel Erection
☐ Fall Protection	☐ Trench & Excavations
☐ Hearing Protection	☐ Underground Construction
☐ Heavy Equipment	☐ Welding & Cutting

Other (Explain):

The AECOM employee identified has been designated as the Competent Person in the technical area specified, and by the Project Manager identified. This designation is based on the following:

1. The Project Manager is authorizing the competent person to allocate whatever resources that are necessary to perform tasks associated with the area of competency to provide a safe work environment and comply with applicable regulatory and legislative requirements, and AECOM SH&E procedures and policies.
2. The Project Manager has confirmed that the individual is competent to perform the required tasks by way of:
    a. Documented training
    b. Practical experience (hands-on)
    c. Documented professional experience

Print name and sign below

Designated by: _____ **Date:** _____
(AECOM Project Manager)

Designated by: _____ **Date:** _____
(AECOM Office Manager)

Designated by: _____ **Date:** _____
(AECOM Regional SH&E Manager or Designee)

Comments:

Attach any related documentation of training, certifications, insurance coverages, or other related information that supports the designation of the person as Competent.

S3NA-203-PR Emergency Response Planning, Field

1.0 Purpose and Scope

1.1 Addresses the requirements for preparation and planning for potential emergencies that may occur at while AECOM staff are working in the field.

1.2 Applies to all AECOM North America staff working outside of an AECOM office in a field environment.

1.3 The intent of this plan is to:

1.3.1 Promote the safety of workers, visitors, and responders.

1.3.2 Reduce the potential for destruction of goods and other property.

1.3.3 Reduce the magnitude of environmental and other impacts.

1.3.4 Help responders quickly determine and initiate proper remedial actions.

1.3.5 Reduce recovery times and costs.

1.3.6 Make workers, visitors, and responders more confident that emergencies will be properly managed.

2.0 Terms and Definitions

2.1 **Emergency:** An unplanned situation or event (including natural disasters) resulting in involvement of the public emergency services, police, fire, paramedic, or the environmental regulatory authorities.

2.2 **First Aid Provider:** Occupationally required to be trained in first aid, although may not be required by law to render first aid. A first aid provider responds as a “Good Samaritan.” Uses a limited amount of equipment to perform initial assessment and provide immediate life support and care while awaiting arrival of emergency medical services.

2.3 **First Responder:** A designated individual who uses a limited amount of equipment to perform initial assessment and intervention and is trained to assist other emergency medical services.

2.4 **Emergency Medical Technician (EMT) Basic:** The second level of professional emergency medical care provider. An EMT is qualified to function as the minimum staff for an ambulance.

2.5 **EMT Intermediate:** The third level of professional emergency medical care provider. Can perform essential advanced techniques and administer a limited number of medications.

2.6 **Paramedic:** The fourth level of professional emergency medical care provider. Can administer additional interventions and medications.

3.0 Attachments

3.1 S3NA-203-WI Incident Response to Specific Hazards

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers and Supervisors** are responsible for developing and implementing emergency response plans for their field staff and projects.

4.2 Emergency Response Plan (ERP)

4.2.1 Project Managers and supervisors will establish and implement of an ERP, including communicating the plan to all employees.

4.2.2 Emergency contact lists and procedures that includes fire, police, ambulance, poison control, first aiders onsite, security, Site Safety Officer or Coordinator, SH&E Reporting number for reporting all AECOM incidents, and other required emergency contacts will be available.

4.2.3 The site specific Emergency Response Plan (ERP) will comply with all governing regulations.

4.2.4 Where an established ERP is not already in place or outlined in a Health and Safety Plan (or Safe Work Plan), a Task Hazard Analysis that includes emergency response plans appropriate to the site and circumstances will be developed.

4.2.5 If the hazard assessment for the project indicates a need for planned evacuation or rescue, appropriate written procedures will be developed and implemented and a worker will be assigned to coordinate their implementation.

4.2.6 Staff will be trained to their limited involvement in an emergency evacuation or rescue; however, all evacuations in the following circumstances will be carried out by professionals trained and properly equipped for the type of evacuation or rescue required:

- work at high angles,
- work in confined spaces or where there is a risk of entrapment,
- work with hazardous substances,
- underground work,
- work on or over water,
- work in remote isolation, and
- workplaces where there are persons who require physical assistance to be moved.

4.2.7 The ERP will address a clear path of travel to and from a working area, as applicable:

- The access will be made obvious and most direct with adequate illumination.
- The access will remain clear and unobstructed at all times.
- No material or equipment may be stored or temporarily left in path of egress.
- A traffic barrier will be used for facilitating vehicle and pedestrian traffic.
- The access route will have a clear line of vision into oncoming traffic lanes.

4.2.8 During project safety meetings, all staff will be advised of the location of first aid services, equipment, and supplies. As well, emergency contact information will be posted by all entrances on a worksite or left on the dash of the vehicle (mobile site office).

4.2.9 IT IS EXPECTED THAT MODIFICATIONS TO EMERGENCY PLANS MAY BE NECESSARY ONCE THE ACTUAL SITE HAS BEEN SET UP AND SITE CONDITIONS HAVE BEEN REVIEWED.

4.3 First Aid

4.3.1 An assessment shall be made for each project or site visit to determine the response time and availability of EMS.

- If the assessment identifies reasonable risks that are life threatening and EMS response is greater than 4 minutes, at least two people on site shall be trained in first aid and CPR.
- If no life threatening risks exist on site and EMS response is greater than 30 minutes, at least one person shall be trained in first aid and CPR.

4.3.2 All AECOM site offices or trucks (mobile worksites) will maintain adequate first aid kits in convenient and accessible locations as appropriate for the specific location. Contact the SH&E department for specific guidance.

4.3.3 In addition, training of employees in basic first aid and adult CPR is required to meet legislative requirements. Acceptable training shall be conducted by the Red Cross or equivalent service provider approved by the regulatory agency. First aid certification shall be renewed every third year (or as dictated by legislation). Additional training may be required for personnel who have access to automated external defibrillators (AED).

4.3.4 First aid attendants, floor safety wardens, and all other persons authorized to call for transportation for injured workers will be made aware of the emergency evacuation procedures specific to their project site.

4.3.5 First aid supplies and facilities that meet the applicable OSHA, provincial, or territorial OHS legislation will be made available on site. Where required, every first aid room will

- Be located in an area that is easily accessible to workers at all times, and be near both the work area it is to serve and toilet facilities;
- Have adequate lighting, ventilation, and heating, and be covered by a floor made of non-porous material;
- Be of an adequate size to accommodate a stretcher;
- Be equipped with:
    - Instructions on how and where to access a first aider,
    - A communication system capable of communicating with the medical facility to which an injured worker would be transported,
    - A permanently installed sink with hot and cold potable running water,
    - A cot or bed with a moisture-protected mattress and two pillows;
- Be clearly identified as a first aid room;
- Be used exclusively for the purposes of administering first aid and medical examinations and to provide rest for persons who are ill or injured;
- During working hours, be supervised by a first aider, as needed, who is readily available to provide first aid; and
- Be kept clean and sanitary.

4.3.6 All first aid equipment and supplies will be:

- Located at or near the work site they are intended to serve.
- Available and accessible during all working hours.
- Maintained in a clean, dry and serviceable condition.
- Contained in a material that protects the contents from the environment and be clearly identified as first aid equipment and supplies.

4.4 Other Emergency Response Equipment

4.4.1 Provide portable fire extinguishers of appropriate class, size, and number of extinguishers in accordance with *S3NA-206-PR Fire Protection, Field*.

4.4.2 Provide eye wash stations (where appropriate to hazards).

4.4.3 Maintain an emergency response plan and emergency kit appropriate to the hazards associated with the location (e.g., earthquakes, tornadoes, hurricanes, etc.).

4.5 Parking

4.5.1 Signs will be posted to indicate permissible parking areas.

4.5.2 Parking areas shall not restrict access by emergency personnel and vehicles.

4.6 Communications

4.6.1 Supervisors are responsible for confirming that crews have access to communication devices that are in good working order, have reception in the area in which the crews will be working, and meet the needs of the planned check-in and emergency response procedures. This may include

- 2-way radios,
- Cellular phones (or combination cell phone/2-way radio),
- Satellite phones,
- Car phones, or
- Personal Locator Beacons.

4.6.2 The project manager will be responsible for confirming that field crews have the appropriate means of communication before leaving for the field. The type of communication device will depend on the location and circumstances of the job task.

4.6.3 All staff are responsible for maintaining the communication devices in good working order before leaving for the field and for ensuring that battery-operated electronic devices have been recharged or have fresh batteries.

4.6.4 All staff are responsible for keeping communication devices clean and dry to facilitate their effective operation.

4.6.5 In the field, the communication device should be kept in a central location or with the crew if remote travel is necessary.

4.6.6 If a staff member is working outside of hearing or sight range of other crew members, they will have an understood check-in procedure and will carry the appropriate means of communication.

4.7 Visitors

4.7.1 All visitors to the site will review and acknowledge the safety plan or Task Hazard Analysis and associated Emergency Response Procedures.

4.8 Emergency Response

4.8.1 Employees responding to emergency situation should take no unnecessary risk. In the case of an emergency, the first aid attendant will promptly provide injured workers with a level of care within the scope of the attendant's training, objectively record observed or reported signs and symptoms of injuries and exposures to contaminants, and refer for medical treatment workers with injuries considered by the first aid attendant as being serious or beyond the scope of the attendant's training.

4.8.2 All incidents will be reported in accordance with *S3NA-004-PR Incident Reporting*.

4.8.3 If emergency action is required to correct a condition that constitutes an immediate threat to workers, only those qualified and properly instructed workers necessary to correct the unsafe condition may be exposed to the hazard and every possible effort will be made to control the hazard while this is being done.

4.8.4 Emergency procedures are outlined in *S3NA-203-WI Incident Response to Specific Hazards*; however, in situations where no specific procedures have been established, common sense and sound judgment should be followed to determine the safest course of action**.**

4.8.5 Upon evacuation or dismissal, no unauthorized or nonessential personnel are allowed access to the facility or project area during an emergency.

4.8.6 All accident and emergency sites will be immediately secured to prevent unauthorized access or the possibility of further risk to workers, property, or the public at large.

4.8.7 All emergencies will be handled by the highest-ranking AECOM representative at the site.

4.8.8 Employees should assist, as able to do so, and follow directions from a lead manager in any emergency operation.

4.8.9 Employees should render assistance in the safest possible manner, using appropriate personal protective equipment and precautions.

4.8.10 In the event of an emergency, the supervisor shall designate one area for all employees to gather for a roll call.

4.8.11 During an emergency, AECOM staff shall take direction from outside professional responders, as appropriate, who are in control of the situation.

4.9 Post-Emergency Follow Up

4.9.1 Prior to resuming operations, the work area will be inspected to confirm that conditions are under control and no longer pose a hazard to employees.

5.0 Records

5.1.1 The site specific Emergency Response Plan is included in the Task Hazard Analysis (HASP or Safe Work Plan, as appropriate) and will be filed in the project file once the work is completed.

5.1.2 Emergency Response Plans shall be part of site SH&E audits.

6.0 References

6.1 S3NA-206-PR Fire Protection, Field

S3NA-203-WI Emergency Response to Specific Hazards

1.0 Injury or Health-Related Emergencies

1.1 **In the event of serious illness or injury:**

1.1.1 Do not move the victim or leave them alone unless absolutely necessary.

1.1.2 Call for emergency medical assistance.

1.1.3 Provide first aid to the level of qualification. Record the first aid given in the First Aid Treatment Record.

1.1.4 Request assistance from other first aiders as necessary.

1.1.5 Notify the immediate supervisor or manager.

1.1.6 If you are the injured or ill party, call for help and do not drive yourself to the hospital.

1.1.7 Arrange for hospital emergency service, medical practitioner's office emergency service, or medical practitioner's appointment, as needed.

1.2 **In the event of minor injuries:**

1.2.1 If required, summon assistance.

1.2.2 Initiate first aid immediately as necessary.

1.2.3 Follow up as needed.

2.0 Fire

2.1 **If you discover a fire:**

2.1.1 If the fire is small and containable, use the appropriate fire extinguisher and/or fire fighting tools to extinguish the flames and cool the ashes.

2.1.2 Call 911 to advise the operator of your location and provide as much detail as possible about the fire, its potential source, surrounding buildings or flammable materials, and number of people in the area.

2.1.3 If the fire is of moderate or large size, evacuate the area and do not return until emergency fire crews give the all-clear.

2.2 **If you hear an alarm:**

2.2.1 Go to designated muster point, if there is one, or evacuate the area to a safe distance.

2.2.2 Do not return to the area until officials provide the all-clear.

3.0 Electrical Storms

3.1 **Guidelines**

3.1.1 Lightning can strike several miles/kilometres from its source, so early precautions are crucial. If thunderstorms are in the forecast, reassess your plans for outdoor activities.

3.1.2 If you can hear thunder, then you are close enough to the storm to be at risk.

3.1.3 You are considered to be in the high danger zone if you are less than 6 miles/10 kilometres away. Use the 30/30 Rule to help you. If you can count 30 seconds or less between seeing lightning and hearing thunder, you should seek shelter immediately.

3.1.4 Do not resume any outdoor activities until you have waited at least 30 minutes after hearing the last clap of thunder. It is crucial to ensure that the risk of a lightning strike has passed completely.

3.2 **Do:**

3.2.1 Stay clear of high ground and open spaces.

3.2.2 Seek shelter in a house, large building or motor vehicle (if there is no other shelter). Keep windows and doors shut.

3.2.3 If you are riding a bicycle, motorcycle, or ATV, get off and seek shelter immediately. The rubber tires will not protect you.

3.2.4 If you are boating, head for shore. If caught on the water, crouch low in the boat.

3.2.5 If you are in a flat, open field, bend down and put your hand on your knees. Maintain minimum contact with the ground.

3.2.6 Avoid contact with metal. Stay at least 30 metres away from metal fences and take off shoes that have metal cleats.

3.2.7 Stay away from water, including lakes and puddles.

3.2.8 Stay sheltered until the storm is over.

3.3 **Don't:**

3.3.1 Don't seek shelter under a tree, in a shed, or in a small, open building.

3.3.2 Don't lie down on the ground.

3.3.3 Don't take a shower or bath. If lightning strikes the plumbing system it can be conducted into the tub or shower.

3.3.4 Don't use the phone or electrical appliances unless absolutely necessary. Electricity travels through wires.

3.3.5 Don't use a mobile phone outdoors.

3.3.6 Don't hold a golf club, umbrella, or fishing rod.

3.3.7 Don't travel in a severe storm. If you are caught in your car, keep windows closed and park off the road away from power lines.

3.3.8 Don't try to finish your activity; find shelter and wait out the storm.

3.3.9 Staff will not travel in areas where there is a severe thunderstorm warning.

4.0 Tornadoes

4.1 **Guidelines**

4.1.1 When a tornado approaches, anyone in its path should take shelter indoors—preferably in a basement or an interior first-floor room or hallway. Avoid basement or first floor shelter areas with heavy equipment located on the floor directly above.

4.1.2 Make yourself as small as possible by crouching into a ball-like position, covering your head and neck.

4.1.3 Avoid windows and seek additional protection by getting underneath large, solid pieces of furniture.

4.1.4 Avoid automobiles and mobile homes, which provide almost no protection from tornadoes.

4.1.5 Those caught outside should lie flat in a depression or on other low ground and wait for the storm to pass.

5.0 Hurricanes

5.1 **Guidelines**

5.1.1 Coastal residents should form evacuation plans before a warning is issued to identify a safe shelter and a route to get there.

5.1.2 Stock up on emergency supplies including food, water, protective clothing, medications, batteries, flashlights, important documents, road maps, and a full tank of gasoline.

5.1.3 As a storm unfolds, evacuees should listen to local authorities on radio or television. Evacuation routes often close as a storm develops.

5.1.4 Dedicated professionals and improved technology have made hurricane forecasting more accurate than ever before, but it is far from precise.

5.1.5 If forced to weather a storm, get inside the most secure building possible and stay away from windows.

5.1.6 Remember that a lull often signifies the storm's eye—not its end. Anyone riding out a hurricane should wait for authorities to announce that the danger has passed.

6.0 Earthquakes

6.1.1 Drop down; take cover under a strong desk or table and hold on.

6.1.2 Stay indoors until the shaking stops and you are sure that it is safe to exit.

6.1.3 Stay away from bookcases or furniture that can fall on you.

6.1.4 Stay away from windows. In a high-rise building, expect the fire alarms and sprinklers to go off during a quake.

6.1.5 If you are in bed, hold on and stay there, protecting your head with a pillow.

6.1.6 If you are outdoors, find a clear spot away from buildings, trees, and power lines. Drop to the ground.

6.1.7 If you are in a car, slow down and drive to a clear place. Stay in the car until the shaking stops.

7.0 Gas Leak

7.1 Gas Odor

7.1.1 Leave the area immediately.

7.1.2 Notify the appropriate authorities and owner of the site.

7.1.3 Refrain from using ignition sources (cigarettes, electrical devices, etc including cell phones).

7.1.4 Do not turn on vehicles or other electrical switches.

7.1.5 Warn others in the area.

7.1.6 Meet with responding personnel to identify the location of the odor.

7.2 Major Leak

7.2.1 Leave the area immediately.

7.2.2 Notify the appropriate authorities and owner of the site.

7.2.3 Secure area and warn others.

7.2.4 Meet with responding personnel to provide additional information.

7.2.5 Refrain from using ignition sources (cigarettes, electrical devices, etc including cell phones).

7.2.6 Do not turn on vehicles or other electrical switches.

8.0 Violence or Potential for Violence

8.1.1 Remain calm

8.1.2 Do not put yourself at increased risk.

8.1.3 Speak in a soft, non-threatening manner.

8.1.4 Do not touch the person or try to disarm them.

8.1.5 Avoid hostile actions or interactions, except to maintain personal safety.

8.1.6 Try to leave the area.

8.1.7 Report the incident as soon as possible.

S3NA-204-PR Environmental Compliance

1.0 Purpose and Scope

1.1 This procedure is intended to describe how region business lines and project managers will manage/minimize environmental risks associated with the execution of individual projects and office operations.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 Applicable or Relevant and Appropriate Requirements (ARAR) – numerical concentration limit, an emission or effluent discharge limit, or as a methodology for establishing such limits. ARARs may be chemical-specific, location-specific, or action-specific in nature.

2.2 Compliance Map – a document defining and detailing a regulatory statute and its associated actions, limits, records retention requirements, and/or other applicable metrics.

2.3 Subject Matter Expert – a person who is an expert in a particular topic or area due to experience, technical/regulatory knowledge, and/or training.

2.4 Reportable Quantity (RQ) - quantities of hazardous substances, which when released to the environment, require notification to the National Response Center and the appropriate state agency. Multiple agencies and regulations have established RQs; RQ's may differ by agency.

2.5 Resource Conservation and Recovery Act (RCRA) – enacted in 1976, is the principal federal law in the United States governing the disposal of solid waste and hazardous waste.

2.6 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – enacted in 1980, is a United States federal law (also known as Superfund) designed to clean up sites contaminated with hazardous substances.

3.0 Attachments

3.1 S3NA-204-FM Office/Project Environmental Compliance Assessment Checklist

3.2 S3NA-204-GL Environmental Compliance

4.0 Procedure

4.1 AECOM activities will adhere to all applicable federal, provincial, state, local, and client environmental compliance, permitting, and licensure requirements.

4.2 Develop a Compliance Map, for those projects where AECOM is a permit holder or where AECOM is operating under a client's permit, to indicate the applicable actions, limits, records retention requirements, and applicable submittals to verify compliance with each cited regulation. See S3NA-204-GL for examples of a Compliance Map.

4.3 Where the possibility of an environmental release exists, due to AECOM's activities, identify the applicable Reportable Quantity prior to the start of work.

4.4 When necessary, project teams will consult with Subject Matter Experts to identify the necessary permitting/licensing and/or applicable regulations governing the planned scope of work. Example guiding questions that project teams may use to initially assess their project's environmental compliance needs include, but are not limited to:

- Will AECOM's activities have the potential to discharge any hazardous or other regulated chemicals/materials to the air?

- Is there any equipment on site that has an air permit or similar regulatory requirement governing air discharges to the environment? Note: This should include client-owned equipment that AECOM will operate and have contractual regulatory liability for during the planned scope of work.
- Will AECOM manage characteristic- or listed-hazardous waste for the client?
- Will your activities generate any solid, universal or characteristic/listed hazardous waste subject to requirements?
- Is this a site or facility where AECOM will perform activities under a RCRA or CERCLA permit, or a Consent Order?
- Is the site or facility a hazardous waste large generator (i.e.., large quantity, small quantity, or conditionally-exempt small quantity?
- What oil storage capacity does the site or facility have (count containers/equipment with capacities of 55 gal drum or greater)?
- Will AECOM's activities create a discharge into a waterway or other conveyance that feeds into a defined US waterway?
- Will AECOM's activities disturb ≥ 1 acre of land surface area?
- Will AECOM's activities physically disturb or impact a wetland?

4.5 Environmental Compliance Assessments

4.5.1 AECOM will periodically assess its operations (offices and project sites) and activities to verify ongoing activities adhere to the defined ARARs. Frequency should be based on complexity of the project/size of the office and the associated environmental compliance risks to AECOM; offices and projects requiring a Compliance Map will be assessed no less than annually.

4.5.2 The Office Facilitator or Project Manager will conduct the assessment or designate an appropriate individual to conduct the assessment.

4.5.3 Provide information to AECOM senior management on the environmental compliance performance of specific operations.

4.6 Environmental Compliance Assessments Documentation

4.6.1 Assessments will document compliance and non-compliance issues associated with the facility or AECOM's activities at the project site.

4.6.2 The assessments will be documented and tracked using an appropriate system (e.g., S3NA-704-TP, Corrective Action Plan or equivalent) that identifies and tracks all issues from recognition to closure. Documentation for each finding must include a designation of corrective action(s) to be taken, identifying the individual(s) responsible for implementing the corrective actions, the scheduled date of completion, and the actual completion date.

4.7 Roles and Responsibilities

4.7.1 The **Region Executive** will be responsible for the following:

- Identifying regionally-based environmental compliance resources, including but not limited to Subject Matter Experts.

4.7.2 **Region Business Line Manager** will be responsible for the following:

- Putting into practice a policy that all operations will comply with applicable federal, state, provincial, local, or client environmental compliance regulations during the performance of AECOM activities.

4.7.3 **District Managers** will be responsible for the following:

- Making available resources to implement the applicable environmental regulatory requirements during the execution of all AECOM activities.

4.7.4 **Project Managers** will be responsible for the following:

- Implementing all applicable requirements to facilitate compliance with the project's ARAR and documenting them in a project-specific Compliance Map, including but not limited to:
  - Identifying and understand the applicable environmental compliance regulations that apply to the project's activities.
  - Verifying that staff have the appropriate environmental training prior to performing the assigned activities.
  - Budgeting the necessary resources into each project to achieve compliance with the defined regulations.
  - As applicable, verifying that the Region Counsel and Office of Risk Management (ORM) has reviewed and approved the signed client's Agency Agreement authorizing AECOM to sign a waste manifest or sign shipping papers "as an agent of that client." NOTE: It is AECOM's policy that we do not sign client waste manifests or shipping papers unless authorized to do so by Region Counsel and ORM.
  - Obtaining all applicable environmental permits prior to the start of any regulatory permitted activity, including those permits held by the client which may impact AECOM's activities.
  - Assessing the compliance status of AECOM's activities.
  - Implementing any identified corrective actions relative to noted environmental compliance deficiencies.
  - Closing out any regulatory permit(s) at the end of the project.

4.7.5 Employees will be responsible for the following:

- Reporting all environmental releases or permit exceedances per *S3NA-003-PR*.
- Operating all equipment and performing all tasks within the ARAR as defined in the associated regulatory permit or Compliance Map.
- Signing waste manifests only if authorized by the Project Manager and Region Counsel.

4.7.6 The Region SH&E Manager will be responsible for the following:

- Assisting operations personnel to coordinate environmental compliance for activities undertaken by the Business Lines, including but not limited to:
  - Assisting operations in defining applicable regulatory requirements.
  - Supporting environmental compliance assessments of operation's activities as needed.
  - Reporting on the status of identified corrective actions.
  - Reporting those regulatory non-compliance events that result in a Notice of Violation, notice of non-compliance, or other state of noncompliance to both region management and region counsel.

4.7.7 Region Counsel will be responsible for the following:

- Reviewing, commenting on, and approving a client's signed Agency Agreement letter authorizing AECOM to sign a waste manifest or shipping papers "as an agent of the client."
- Taking appropriate action upon notification that AECOM received a Notice of Violation or any other written notice of non-compliance, or became aware of the existence that AECOM is operating in a state of noncompliance.
- Supporting operation's response to Notices of Violation or any other written notice of non-compliance issued to AECOM from a regulatory agency.

4.7.8 America's Office of Risk Management will be responsible for the following:

- Reviewing, commenting on, and approving a client's signed Agency Agreement letter authorizing AECOM to sign a waste manifest or shipping papers "as an agent of the client."

5.0 Records

5.1 S3NA-204-FM1, Office/Project Environmental Compliance Assessment Checklist

5.2 S3NA-704-TP, Corrective Action Plan

6.0 References

6.1 Although this listing appears comprehensive, it is not feasible to include every applicable environmental regulatory citation within this procedure; therefore, project teams are encouraged to use this listing as a starting point with the understanding that there may be other state, local, or client guidance which must also be implemented.

6.2 40 CFR (US only)

6.3 Canadian Environmental Protection Act, R.S.C. 1992, c. 37 (Canada Federal)

6.4 Environmental Protection and Enhancement Act (EPEC), R.S.A. 2000, c. E-12 (Alberta only)

6.5 Environmental Management Act, S.B.C. 2002, c. 53 (British Columbia only)

6.6 Environment Act, C.C.S.M. c. E125 (Manitoba only)

6.7 Clean Environment Act, R.S.N.B. 1973, c. C-6 (New Brunswick only)

6.8 Environmental Protection Act, S.N.L. 2002, c. E-14.2 (Newfoundland and Labrador only)

6.9 Environmental Protection Act, R.S.N.W.T. 1988, c. E-7 (Northwest Territories only)

6.10 Environment Act, S.N.S. 1994-95, c. 1 (Nova Scotia only)

6.11 Environmental Protection Act, R.S.O. 1990, c. E.19 (Ontario only)

6.12 Environmental Protection Act, R.S.P.E.I. 1988, c. E-9 (Prince Edward Island only)

6.13 The Environmental Management and Protection Act, 2002 S.S. 2002, c. E-10.21 (Saskatchewan only)

6.14 Environment Act, R.S.Y. 2002, c. 76 (Yukon Territory only)

S3NA-204-FM Office/Project Environmental Compliance Assessment Checklist

1.0 Scope and Purpose

1.1 This form applies to all North America AECOM employees solely performing Administrative functions.

1.2 Please use this checklist to assess the environmental compliance status of an office or project location. Assess all printing rooms, laboratories, maintenance areas, garages, or any other area where equipment or activities generate, store, treat, or dispose of wastewater, raw chemicals, air emissions, or solid waste.

1.3 After completion of the assessment, discuss findings with the Office Facilitator/Project Manager and document the findings/deficiencies in the applicable tracking system. Upon completion, submit this assessment to your Region or District SH&E Manager.

Office Location/Project Name: _____

Office Facilitator/Project Manager: _____

Subject Matter Expert (as applicable): _____

Compliance Map Completed: Yes ☐ No ☐ NA ☐ Date Last Reviewed? _____

Region /District SH&E Manager: _____

Self-Assessment Completed By: _____

Date Completed: _____

i. Are hazardous materials (e.g., lab chemicals, petroleum products, radioactive materials, gas cylinders, etc.) stored at this office or project location? Yes ☐ No ☐ *If yes, complete the table below*

Hazardous Material	Volume	How Stored	Where & is MSDS available
1.			
2.			
3.			
4.			
5.			

ii. Are any liquid or solid waste products (e.g., waste oil, waste solvents, toner cartridges, paints, used batteries, degreasing sludge, etc.) generated, stored, treated, recycled, or disposed of at this office or project location? Yes ☐ No ☐ *If yes, complete the table below*

Waste	Volume/yr	How Stored	Disposed (Y/N)	Recycled (Y/N)
1.				
2.				
3.				

4.				

iii. For recycled or disposed waste products defined above, identify the recycling/disposal company or facility. For material sent to a recycler, have you required and/or received a statement from the recycler that the material will be properly managed? Yes ☐ No ☐ *If yes, complete the table below*

Recycling/Disposal Company	Company Location	Recycling/Disposal Statement (Y/N)
1.		
2.		
3.		

iv. Do site-generated wastewaters (other than domestic wastewater) enter a sewer line, an NPDES outfall, or a drainage ditch/retention pond? This includes vehicle wash water, oil and grease, antifreeze, lab chemicals, etc. Yes ☐ No ☐ *If yes, complete the table below*

Waste Type	Discharge Point	Volume/yr	Permit Req'd (Y/N)
1.			
2.			
3.			

v. Is this office or project involved with hazardous material (HzM) shipping via ground and/or air? Yes ☐ No ☐ *If yes, complete the table below*

Typical HzM	Typical Frequency/Volume	Typical Destination
1.		
2.		
3.		

vi. If the answer to Item v. is yes, has DOT Level 1 Shipper, DOT Level 1 NDMG Shipper, IATA, or DOT Level 2 shipper training been conducted for applicable employees? Yes ☐ No ☐ *If yes, complete the table below (no need to list every person with this training)*

Employee Name	Training Date
1.	
2.	
3.	

vii. If the answer to Item v. is yes, are records of HzM shipments for the past three (3) years available on-site for review by regulatory auditors? Yes ☐ No ☐ *If yes, complete the table below (no need to list every person with this training)*

Shipment Date	HzM Shipped	HzM Shipper
1.		
2.		

3.		

viii. Does this office or project site store potentially contaminated samples (e.g., soil and groundwater samples from RCRA or CERCLA sites)? Yes ☐ No ☐ *If yes, complete the table below*

Where Stored	How Stored	How Disposed
1.		
2.		
3.		

ix. Does this office or project operate equipment which generates air emissions through a vented hood or other point source? Yes ☐ No ☐ *If yes, complete the table below*

Process	Air Emission Characteristics	Operation Frequency
1.		
2.		
3.		

x. Are grounds maintenance activities self-performed by this office or project location? Yes ☐ No ☐ *If yes, complete the table below*

Products Used	Approximate Quantities/yr
1.	
2.	
3.	

xi. Are underground storage tanks owned or operated at this office or project site? Yes ☐ No ☐ *If yes, complete the table below*

Number & Volume	Material Stored	Waste (Y/N)	Leak Detection (Y/N)	Registered (Y/N)	Released (Y/N)
1.					
2.					
3.					

xii. Are aboveground storage tanks owned or operated at this office or project site? Yes ☐ No ☐ *If yes, complete the table below*

Number & Volume	Mat'l Stored	Waste? (Y/N)	Secondary Containment (Y/N)	Release? (Y/N)
1.				

2.				
3.				

xiii. Does this office or project site own or operate a potable water well, septic system, stormwater discharge, or water softening process? Yes ☐ No ☐ *If yes, complete the table below*

Type	Description	Permitted? (Y/N)
1.		
2.		
3.		

xiv. Does this office or project site operate under any EPA or State permit conditions?
Yes ☐ No ☐ *If yes, complete the table below*

Type	Purpose	Permit No.	Expiration	Noncompliance Issues
1.				
2.				
3.				

xv. Does this office or project site generate hazardous wastes requiring an EPA or state ID Number?
Yes ☐ No ☐ *If yes, complete the table below*

ID Number	Company Name associated with ID	Process Covered by the ID Number	Agency who Issued the ID Number
1.			
2.			
3.			

S3NA-204-GL Environmental Compliance

1.0 Recommendation

1.1 Project teams supporting complex projects requiring environmental/regulatory permitting, Operation & Maintenance (O&M) of client- or AECOM-permitted systems, or other licensing of processes or equipment should develop a *Compliance Map* to identify the associated permit, license, or Applicable or Relevant and Appropriate Requirement's (ARARs) defined actions, limits, and records retention requirements.

1.2 The project team should confirm the accuracy of a Compliance Map with an appropriate Subject Matter Expert.

1.3 The project team should review the Compliance Map at least annually or when a change in regulations, permit, equipment, or process occurs to verify continuing compliance with the associated permit, license, or ARARs.

1.4 The project team should authorize an individual to take prompt corrective measures when a deviation from the Compliance Map is reported. A deviation resulting in a known or possible state of regulatory non-compliance involving AECOM will be immediately reported per *S3NA-003-PR Incident Reporting*. The project team will ascertain the need to further report the known or possible non-compliance event to the client and/or applicable regulatory agency. If AECOM is not the designated permittee or licensed organization, AECOM should not report a known or possible state of regulatory non-compliance without first notifying the client and receiving verbal or written communication directing AECOM to report the event to the applicable regulatory agency.

2.0 Examples of Typical Compliance Maps

2.1 Environmental Sampling for an National Permit Discharge Elimination System (NPDES) Outfall

Topic	Task	Task Description	Frequency	Regulatory Citation
Storm Water	Sample Outfall 001 for benzene and pH	Quarterly sample Outfall 001 for benzene and pH. Limit is 5 ug/L and 6.5 - 9 s.u. Record inspector, location, date and time of sampling using Form 3. Maintain records for at least 3 years.	Quarterly by December 31, March 31, June 30 and October 31.	Part A.3 in NPDES Permit
Storm Water	Collect weekly flow measurements from Outfall 001	Record inspector, location, date and time of sampling using Form 4. Maintain records for at least 3 years.	Weekly.	Part A.4 in NPDES Permit
Storm Water	Submit the Discharge Monitoring Report (DMR) Form	Complete the agency DMR form and have client or responsible party sign and certify DMR. If outfall did not have a discharge, fill out form stating as such. If additional monitoring is performed, submit those results also. Submit by the 28th of the month following the end of the quarter. Maintain records for at least 3 years.	Quarterly by January 28, April 28, July 28 and October 28.	Part B.2 in NPDES Permit

2.2 Nuclear Density/Moisture Gauge Radioactive Materials License

Requirement	Due Date	Submit To	Requiring Document (State of Florida, Radioactive Materials License No.: xxxx-1, Amendment No.: 7)	Comments
Authorized storage location is [insert address]	As required	State of Florida DOH	Conditions 10.B.	If the office relocates, the RSO must submit the change to the State of Florida and request Amendment No.: 8.
Maintenance of training for NDMG users	Quarterly	File	Conditions 12.A.	NDMG operator and DOT shipping training must be maintained for the duration of employment of the individual or 5 years, whichever is greater. Training certificates should be uploaded into LMS.
Leak test on moisture/density gauges	At least every 12 months	File	Conditions 16.	Leak test should be scheduled no later than the 10th month following the most recent leak test
Physical inventory and inspection of all sealed sources received/possessed under License No.: xxxx-1	At least every 6 months	File	Conditions 17.	
Maintenance of inventory records	Quarterly	File	Conditions 17.	Inventory records will be filed for 3 years from the date of the inventory inspection. The inventory records must include the following: 1. Manufacturer's name 2. Model and Serial Nos. of each sealed source 3. Identify of each sealed source's radionuclide and it's estimated activity 4. The location of each sealed source 5. The date the inventory was completed 6. RSO's signature

S3NA-205-PR Equipment Inspections and Maintenance

1.0 Purpose and Scope

1.1 This procedure establishes the AECOM requirements for the maintenance, inspection, and repair of AECOM-owned equipment used by AECOM staff to prevent unsafe conditions from developing.

1.2 This procedure applies to all AECOM North America-based staff and operations.

1.3 This procedure does not apply to Personal Protective Equipment.

2.0 Terms and Definitions

2.1 **Equipment**: Any machinery, tools, or other devices that serve a function and are used during work for AECOM business.

2.2 **Inspection**: A formal (planned, documented) or informal (ongoing observations/physical checks, not documented) review of the condition and function of the equipment, the purpose of which is to identify any damage or condition that might pose a hazard or impair the proper functioning of the equipment.

2.3 **Maintenance**: Regular care and upkeep of equipment in accordance with manufacturers' instructions, at a minimum, and with AECOM specified schedules and requirements where applicable.

3.0 Attachments

3.1 S3NA-205-FM1 Equipment Maintenance Inventory

3.2 S3NA-205-FM2 Equipment Inspection Report

4.0 Procedure

4.1 Inspections and maintenance of AECOM-owned or -leased equipment shall be completed by qualified/competent persons.

4.2 Supervisors and managers will confirm that staff assigned to use equipment are familiar with the specific inspection and maintenance requirements of that equipment.

4.3 **Maintenance**

4.3.1 All AECOM-owned or -leased equipment shall be maintained in good working order, free of defects or conditions that may pose a risk to employees, the public, or the environment.

4.3.2 Large mobile equipment or equipment that has associated high risk exposures (e.g., electrical or radiation) shall have an established, documented, preventative maintenance program. Examples of equipment that will have documented maintenance inspections include

- Nuclear densometers
- AECOM leased or owned vehicles
- AECOM leased or owned boats, ATVs, or snowmobiles
- Electrofishers
- Lab equipment

4.3.3 The maintenance program 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.

4.3.4 **District Business Line Managers** and **Office Managers** shall determine and inventory the equipment within their operation requiring scheduled maintenance. Using applicable regulations, industry standards, best practices, and manufacturer's recommendations, the office must develop a maintenance schedule with defined responsibility, required actions, and frequency (*S3NA-205-FM1 Equipment Maintenance Inventory*).

4.3.5 Employees who are assigned equipment or tools that require maintenance under this program will review maintenance schedules for that equipment and will confirm that required maintenance has occurred or see that it is undertaken.

4.4 Inspections

4.4.1 Employees will inspect all tools and equipment before using them to identify:

- Damage
- Unsafe conditions
- Need for recertification
- Suitability of the tool or equipment for the intended work process

4.5 Repairs and Out of Service

4.5.1 All tools or equipment that an employee deems defective will immediately be repaired, or, if repair is not practicable, tagged "Out of Service" and sent for repairs or discarded.

4.5.2 Defects or other unsafe conditions observed during an AECOM inspection shall be recorded and tracked until the equipment is repaired and ready to return to service (*S3NA-205-FM2 Equipment Inspection Report*).

4.6 Rented or Personal Equipment

4.6.1 Any equipment that is not owned by AECOM (e.g., rental or personal equipment used for AECOM business) will be inspected by employees prior to use.

4.6.2 Any defects or unsafe conditions will be reported to the supervisor, rental agency, or owner of the equipment, and the equipment will not be used until the equipment is repaired, the condition is corrected, or alternate equipment is found.

5.0 Records

5.1 Completed maintenance inventories (*S3NA-205-FM1 Equipment Maintenance Inventory*) and associated maintenance records will be stored in local office files.

5.2 Completed inspection reports (*S3NA-205-FM2 Equipment Inspection Report*) and associated repair records will be stored in local office files.

6.0 References

6.1 None

S3NA-205-FM1 Equipment Maintenance Inventory

Equipment	Frequency of service	Manufacturer's Standards	Industry Standards	Legislated Requirements	Location of Equipment

S3NA-205-FM2 Equipment Inspection Report

EQUIPMENT	DATE	RESULTS	ACTION REQUIRED	COMPLETED (DATE)

S3NA-206-PR Fire Protection, Field

1.0 Purpose and Scope

1.1 This procedure establishes the AECOM requirements for the selection, placement, use, and inspection of fire extinguishing and fire detection equipment.

1.2 This procedure applies to all AECOM North America-based field work.

2.0 Terms and Definitions

2.1 **Combustible liquid:** Liquid that must be heated to a temperature of 100° F or 37.8° C to emit sufficient vapors to form an ignitable mixture with the air.

2.2 **Flammable liquid:** Liquid that gives off enough vapor to form an ignitable mixture with air at ambient temperatures (less than 100° F or 37.8°C).

3.0 Attachments

3.1 S3NA-106-WI Portable Fire Extinguishers

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 The **Project Manager** shall confirm that fire protection equipment is available at all field sites or in vehicles as required.

4.1.2 The **Project Manager** shall confirm that any fire extinguishing and detection equipment established at AECOM temporary worksites (and vehicles) are appropriately maintained and inspected in accordance with local fire codes.

4.1.3 The **Project Manager** shall confirm that all field staff who may have to use a portable fire extinguisher or other fire protection equipment are adequately trained in their use.

4.1.4 **Employees** shall familiarize themselves with the fire response and protection procedures that apply to the site on which they are working.

4.2 Planning

4.2.1 All field sites (including vehicles) will be equipped with a fire extinguisher and/or fire protection equipment appropriate to the number of staff, location of the work, and job task, as dictated by legislation or client requirements.

4.2.2 Fire protection equipment may include:

- Fire extinguishers, of the appropriate size, class, and type for the hazard
- Round-nosed shovel, as required
- Pulaski tool or mattock, as required
- Hand-tank pump containing at least 18 liters of water, as required to meet regulations

4.2.3 All **employees** shall be constantly on the alert for conditions that might contribute to a fire and shall remove or report the hazard.

4.2.4 Do not use gasoline or other flammable liquids as degreasing or cleaning agents. Use only approved solvents or other combustible liquids.

4.2.5 All work sites housing large volumes of chemicals shall ensure that placards identifying the chemicals are in place.

4.3 Planning

4.3.1 All field sites (including vehicles) will be equipped with a fire extinguisher and/or fire protection equipment appropriate to the number of staff, location of the work, and job task, as dictated by legislation or client requirements.

4.3.2 Fire protection equipment may include:

- Fire extinguishers, of the appropriate size, class, and type for the hazard
- Round-nosed shovel, as required
- Pulaski tool or mattock, as required
- Hand-tank pump containing at least 18 liters of water, as required to meet regulations

4.3.3 All **employees** shall be constantly on the alert for conditions that might contribute to a fire and shall remove or report the hazard.

4.3.4 Do not use gasoline or other flammable liquids as degreasing or cleaning agents. Use only approved solvents or other combustible liquids.

4.3.5 All work sites housing large volumes of chemicals shall ensure that placards identifying the chemicals are in place.

4.3.6 All **employees** shall know the location of fire fighting equipment in their work area.

4.3.7 Access to fire fighting equipment must never be blocked by material, equipment, or vehicles.

4.3.8 A schedule for inspecting fire fighting equipment shall be developed to confirm that it is in place, accessible, and fully charged. Inspection and maintenance shall be conducted in accordance with the manufacturer's instructions.

4.4 In the Event of a Fire

4.4.1 Activate the nearest fire alarm or call for help, if available, before attempting to extinguish a fire. If the fire is too big to control with the equipment at hand, retreat.

4.4.2 Never turn your back on a fire. Always back away until you are at a safe distance.

4.4.3 Never use water on an electrical fire.

4.4.4 All fire extinguisher contents shall be applied from upwind and shall be directed at the base or outer edge of the fire with a sweeping motion.

4.4.5 Never return a discharged fire extinguisher to its normal location. Take it out of service for recharging and replace it with a fully charged unit.

4.5 Fire Extinguishers

4.5.1 Vehicles used for field work may be required to carry fire extinguishers as well, depending on client and/or industry standards. These fire extinguishers must be secured to the vehicle and never carried in the cab. It is the responsibility of all field staff to confirm that these fire extinguishers are kept charged, secured, and available in good working condition.

4.5.2 Fire extinguishers are to be readily available wherever the potential for fire exists (e.g., during welding, grinding, or open flame operations).

4.5.3 Fire extinguishers must be available in locations where flammable or combustible materials are stored, handled, or used.

4.5.4 Fire extinguishers will be readily accessible, properly maintained, regularly inspected, and promptly refilled immediately after use.

4.5.5 Fire extinguishers will be secured to all mobile equipment.

4.5.6 Only trained personnel should use a fire extinguisher. In the event of a fire, follow the site or project-specific emergency procedures for contacting the local fire department.

4.6 Location and Identification of Fire Extinguishers

4.6.1 Fire extinguishers will be located and installed as follows:

- Located where they are readily seen. If an obstruction is unavoidable, then a sign indicating the location of the extinguisher and/or color symbol (e.g., red markings) will be used.
- Fire extinguishers will always be positioned with the label visible.
- If extinguishers of different classes (e.g., one Class A and one Class B) are stored together, then they will be marked using stencils or signs clearly indicating the type of fire for which each should be used.

- If an extinguisher contains an electrically conductive agent (e.g., water), it will be clearly labeled with a sign that states “Not for Electrical Fires” with letters visible from at least 3 feet away.
- Extinguishers will not be left on the floor, but will be hung on a wall, column, or other appropriate support or shall be of the wheeled or cart type. Extinguishers of not more than 40 pounds will be hung so that the top is not more than 5 feet above the floor. Extinguishers greater than 40 pounds will be hung so that the top is not more than 3-½ feet from the floor. The bottom of the extinguisher will not be less than 4 inches from the floor.
- Extinguishers will be suitable for use at temperatures of 40°F to 120°F. The mounting locations will allow the fire extinguishers to be kept within this temperature range.

4.7 Inspection of Fire Equipment

4.7.1 Inspection, Maintenance, and Testing of Portable Extinguishers

- The use or discharge of any fire extinguisher by an AECOM employee shall be immediately reported to the Supervisor. A Supervisor's Incident Report shall be developed and submitted in accordance with S3NA-004-PR Incident Reporting.
- Extinguishers are to be inspected monthly to ensure they are still in the proper location, have not been used or tampered with, are still properly charged, and that they have no obvious external damage. The initials of the inspector and the date of inspection will be noted on the tag attached to the extinguisher.
- Any extinguisher showing damage will be replaced.
- A thorough inspection will be performed annually by personnel specifically trained in the inspection (e.g., extinguisher supplier).
- Extinguishers will be tested and recharged by qualified contractors as required by the applicable regulations and standards.

4.8 Forest Fires

4.8.1 If a crew discovers an uncontrolled, unattended forest fire, they will:

- Notify the appropriate authorities;
- If possible, use the fire fighting equipment at their disposal to suppress the fire; or
- If the fire is out of control or the crew determines the area to be unsafe, evacuate the area; and
- Immediately notify their project manager and other AECOM personnel in the area.

4.8.2 If a crew is to be working in an area where a known wildfire is burning or a wildfire starts, they will:

- Monitor the current status of the fire using radios and contact with the local authorities;
- Evacuate the area if an evacuation alert is given; and
- Immediately notify their project manager and other personnel in the area if the hazard or circumstances change.

4.8.3 If crews must start or monitor a fire for any reason, they will:

- Obtain the appropriate permits;
- Monitor any fire bans in the area; and
- Take every precaution to keep the fire in control and in a designed containment area.

5.0 Records

5.1 Fire extinguisher inspections shall be maintained in the appropriate office safety files.

6.0 References

6.1 S3NA-004-PR Incident Reporting

S3NA-206-WI Portable Fire Extinguishers

1.0 Portable Fire Extinguishers

1.1 Selection Requirements

Portable extinguishers will be selected based on the following classifications:

Classification	Type of Fire
Class A	Combustible materials
Class B	Flammable liquid, gas, or grease
Class C	Electrical equipment
Class D	Combustible metal

In addition, portable fire extinguisher selection, placement, and fire protection systems designed for use on a project or in an AECOM office will be made in conjunction with an AECOM SH&E representative, the local fire department, or a professional fire protection systems contractor. Unless otherwise approved by an AECOM SH&E representative, fire extinguishers selected for use will be of the Type A, B, and/or C variety, typically charged with water, carbon dioxide, nitrogen, a dry chemical, or other approved extinguishing agent.

1.2 Class A Extinguishers

The number of Class A extinguishers will be based on the following:

	Light (low) Hazard Occupancy	Ordinary (moderate) Hazard Occupancy	Extra (high) Hazard Occupancy
Minimum rated single extinguisher	2-A	2-A	2-A
Maximum floor area per unit of A	3,000 sq. ft.	1500 sq. ft.	1000 sq. ft.
Maximum floor area for extinguisher	11,250 sq. ft.	11,250 sq. ft.	11,250 sq. ft.
Maximum travel distance to extinguisher	75 ft.	75 ft.	75 ft.

The availability of Class A extinguishers can be satisfied with the use of extinguishers with multiple ratings (e.g., Class A, B, and C). In addition, where automatic sprinkler systems are present, the maximum floor area for each extinguisher does not apply; however, the 75-foot travel distance does.

1.3 Class B Extinguishers

Class B extinguishers will be provided according to the severity of the hazard as listed below:

Fire extinguishers labeled prior to June 1, 1969	
Type of hazard	**Basic minimum extinguisher rating**
Light	4B
Ordinary	8B
Extra	12B
Fire extinguishers labeled after June 1, 1969	

Type of hazard	Basic minimum extinguisher rating
Light	5B, 10B
Ordinary	10B, 20B
Extra	20B, 40B

An open tank in a building having flammable liquids in depth exceeding ¼ inch will be provided with sufficient extinguishers to provide 1 numerical unit of Class B or each square foot of tank surface area, the minimum extinguisher being a 5B (using labels after June 1, 1969). So, for example, a tank with a surface area of 50 square feet would require two Class 20B (or one 40B) and one Class 10B extinguisher. For tanks exceeding 100 square feet in surface area, a fixed extinguisher will be provided in addition to sufficient portable extinguishers for the numerical unit of Class to equal 100 (e.g., two Class 40B and one Class 20 B).

All Class B extinguishers will be located on the same floor as the hazard, with a travel distance of no more than 50 feet. For widely separated hazards (e.g., boiler rooms, paint storage areas, kitchens), a separate extinguisher for each class of hazard will be provided if the travel distance is more than 25 feet.

1.4 Class C Extinguishers

Class C extinguishers (one 15-pound carbon dioxide or equivalent) will be provided within 25 feet of a high hazard area containing an electrical distribution source such as a generator, transformer, or main switchgear. Also, the extinguisher size and locations will be determined based on the expected type of fire (combustible-Class A, or flammable-Class B) as noted above.

1.5 Class D Extinguishers

A Class D extinguisher for the specific type of combustible metal will be kept within 25 feet of the area where the metal is machined or processed.

S3NA-207-PR Medical Services and First Aid

1.0 Purpose and Scope

1.1 The purpose of AECOM's Medical Services and First Aid Program is to define the types of first aid providers within AECOM, to explain duties and responsibilities of first aid providers, and to maintain sufficient quantities of basic first aid kit supplies at each field office or project location.

1.2 This procedure applies to all Americas AECOM operations. .

2.0 Terms and Definitions

2.1 **AED**: Automated external defibrillator or AED is a portable electronic device that automatically diagnoses the potentially life threatening cardiac arrhythmias of ventricular fibrillation and ventricular tachycardia in a patient, and is able to treat them through defibrillation, the application of electrical therapy which stops the arrhythmia, allowing the heart to re-establish an effective rhythm, are used in the resuscitation of a patient in full cardiac arrest.

2.2 **First Aid Provider:** A first aid provider responds as a "Good Samaritan." They use a limited amount of equipment to perform initial assessment and provide immediate life support and care while awaiting arrival of emergency medical services.

2.3 **First Responder:** A designated individual who uses a limited amount of equipment to perform initial assessment and intervention, and is trained to assist other emergency medical services.

2.4 **Emergency Medical Technician (EMT) Basic:** The second level of professional emergency medical care provider. An EMT is qualified to function as the minimum staff for an ambulance.

2.5 **EMT Intermediate:** The third level of professional emergency medical care provider. Can perform essential advanced techniques and administer a limited number of medications.

2.6 **Paramedic:** The fourth level of professional emergency medical care provider. Can administer additional interventions and medications.

2.7 **Reasonable Risks:** For the purpose of this Standard Operating Procedure, a traumatic injury with the potential for immediate life threatening consequences. Injuries may include, but are not limited to:

- Falls from heights in excess of six (6) feet/1.8 meters.
- Electrical Shock
- Loss of Consciousness
- Severe bleeding.
- Concentrated chemical exposure above a short-term exposure limit (STEL) or immediately dangerous to life and health (IDLH) value.
- Crushing and/or severing injuries.

3.0 Attachments

3.1 S3NA_207_GL_Recommended First Aid Kit Contents

4.0 Procedure

4.1 An injured employee's survival and recovery from incidents in the field are dependent upon the availability of appropriate first aid supplies and equipment, as well as the availability of a first aid-trained attendant.

4.2 The level of first aid attendant, the type of first aid kit and additional requirements such as blankets and qualified first aid attendants vary depending upon the number of workers, location of job site and associated job hazards. Prior to conducting field work, the employee must

discuss these requirements, in addition to other required Personal Protective Equipment, with their **Project Manager**.

4.3 An assessment shall be made for each project site to determine the response time and availability of Emergency Medical Services (EMS). In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.

4.4 First Aid Kits

4.4.1 It is required that all AECOM project or field sites maintain adequate first aid kits in convenient and accessible locations as appropriate for the specific location. Where the eyes or body of any person may be exposed to injurious materials, suitable facilities shall be provided within the work area for rinsing the material from eyes and off skin. Contact the SH&E Department for specific guidance.

4.4.2 All field sites (including vehicles) must be equipped with a complete first aid kit appropriate to the number of staff, location of the work, and job task, as dictated by the applicable legislation and regulation.

4.4.3 A log to track usage and a monthly inspection form should be included with the first aid kit.

4.4.4 The **Safety Local representative** (or **Site Safety Officer**, site supervisor, etc.) identified on each individual project site will be responsible for the inspection of field based kits for their assigned projects, including all vehicles.

4.4.5 Entries into the log are to be made by each employee that takes something from the kit. Employees are to indicate if the items were taken as a result of a work related incident and whether a Supervisor Report of Incident Form (SRI) was completed. During the monthly inspection, the **Safety Local representative** is to initial next to each entry which indicates there was a workplace exposure to verify the status of the affected employee.

4.4.6 Staff working away from the vicinity of a first aid kit shall carry a personal first aid kit.

4.4.7 The first aid equipment and supplies must be maintained in a clean, dry and serviceable condition, contained in a material that protects the contents from the environment, and clearly identified as first aid equipment and supplies.

4.4.8 AED's were required, must be maintained in optimal working condition. AED's will be inspected monthly by a properly trained and qualified employee. At a minimum, the AED manufacturer's recommended service schedule is to be followed; records of all servicing and testing is to be maintained. Only staff who have a valid first aid training certificate (which includes instruction on the use of an AED), and who have reviewed all manuals and DVD training resources which accompany the machine, may use an AED.

4.5 Postings

4.5.1 The location of first aid kits will be conspicuously posted at all AECOM field project sites. At field project sites, and other locations where 911 may not be readily available, the first aid kit should be posted along with applicable emergency contact, and hospital route information for the location.

4.6 Training

4.6.1 Required training shall be conducted by the Red Cross or equivalent. First Aid and CPR training will be renewed every 2 years. Additionally, annual training may be required for personnel who have access to AED. Employees will receive AED training for the device(s) which they may use and training certification will be renewed annually. Specific training may also be considered for such topics including wilderness survival and rescue for employees performing work in remote locations where access by EMT is limited by extreme terrain.

4.6.2 First Aid/CPR Training is required for the following AECOM employees:

- As required in accordance with applicable regulatory and project requirements;
- Employees conducting field work with reasonable risk for life threatening injuries where EMS are not accessible within four (4) minutes; and
- Employees conducting field work in remote areas that are not accessible by EMS within the regulatory or legislative requirement.

4.6.3 As there is potential for exposure to blood borne diseases, it is necessary for anyone who may render first aid and CPR to be aware of the hazards associated with contact with human blood and certain body fluids. AECOM's Blood Borne Pathogen (BBP) program (*S3NA-503-PR Blood Borne Pathogen Program*) is designed to protect all AECOM personnel from exposure to potentially infectious organisms found in human blood and other body fluids. (**29 CFR 1910.1030(g)(2))**

4.7 Providing Assistance to Injured Employees

4.7.1 In the case of an emergency, the first aid attendant may provide injured workers with a level of care within the scope of the attendant's training, objectively record observed or reported signs and symptoms of injuries and exposures to contaminants, and refer for medical treatment workers with injuries considered by the first aid attendant as being serious or beyond the scope of the attendant's training.

4.7.2 The location of the first aid kit must be obvious and made clear to all staff members. All on-site personnel should be made aware of the location and contents of the first aid kit at a worksite.

4.7.3 All on-site personnel must be aware of the first aid attendant location and contact information, as required.

4.8 Roles and Responsibilities

4.8.1 **Regional SH&E Manager** is responsible for the following:

- Coordinate assessments of each office for response time and availability of Emergency Medical Services (EMS).
- Coordinate first aid/adult cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training with the local Operations Manager(s) for applicable personnel.

4.8.2 **Safety Local representative** is responsible for the following:

- Conduct monthly inspections of first aid kits and follow-up with employees which used for a Work Related purpose.
- Inform office/location manager of any discrepancies between usage log and actual contents of kit.
- Order replacement supplies and re-stock first aid kits.

4.8.3 **Site Safety Officers** (field based project sites) are responsible for the following:

- Conduct monthly inspections of first aid kits and follow-up with employees which used for a Work Related purpose.
- Inform office/location manager of any discrepancies between usage log and actual contents of kit.
- Order replacement supplies and re-stock first aid kits.

4.8.4 **Employees** are responsible for the following:

- Complete entry into first aid kit log for items used.
- Contact supervisor and assist with the completion of the SRI.

4.8.5 **Operations (Regional, District, Department) Manager** is responsible for supporting the assessment of office and field employees in the need for first aid, CPR and/or AED training and making training available to employees who require the training.

5.0 Records

None.

6.0 References

6.1 Title 29, Code of Federal Regulations, Sections 1910.151, 1910.266(i)(7), 1910.1030(g)(2) and 1926.50

6.2 S3NA_003_PR Training

6.3 S3NA_208_PR_Personal Protective Equipment Program

6.4 S3NA-503-PR Blood Borne Pathogen Program

6.5 CANADA OCCUPATIONAL HEALTH AND SAFETY REGULATIONS SOR/86-304

6.6 WORKPLACE SAFETY AND HEALTH ACT 217/2006

6.7 OCCUPATIONAL HEALTH AND SAFETY ACT O.C. 91-1035

S3NA-207-GL Recommended First Aid Guidelines

1.0 Recommendations

1.1 The following recommendations are from the contracted AECOM Third Party Medical Provider

1.2 First aid kits should be periodically restocked according to a schedule and contain appropriate items that would be useful to deal with specific events that relate to a specialized occupation.

2.0 Regulations

2.1 All guidelines must comply with

2.1.1 29 CFR 1910.151;

2.1.2 29 CFR 1926.50;

2.1.3 Canada Labour Code, Part II, R.S.C. 1985, c.L-2;

2.1.4 Canada Occupational Safety and Health Regulations, SOR/ 86-304; and

2.1.5 Any local State, Provincial or Territorial regulations.

3.0 General Guidelines for a Workplace First Aid Kit

3.1 The type of business and the number of employees can alter this list. The list below is for approximately 25 employees in an office environment:

3.1.1 Gauze pads - sterile – 4” x 4” (10)

3.1.2 Large wound dressing – 5x9” or 8x10” (2)

3.1.3 Eye patch (3)

3.1.4 Band-aids (25)

3.1.5 Elastic bandage – 3” (2)

3.1.6 Roller gauze – 3” (2)

3.1.7 Triangular bandage (2)

3.1.8 Cold pack (2)

3.1.9 Gloves – non-latex (6 pair minimum)

3.1.10 Antiseptic wipes for wound care (6)

3.1.11 Packets of burn cream, antibiotic ointment, sting relief wipes (6 each)

3.1.12 Scissors (1 pair)

3.1.13 Tweezers (1 set)

3.1.14 Analgesic packets of 2 (acetaminophen, ibuprofen) (12) depending on policy

3.1.15 Eye flush – 4 oz (1)

3.1.16 Adhesive tape – (1 roll)

3.1.17 Waterless hand sanitizer (Purell) (1 bottle)

3.1.18 CPR pocket mask or Microshield (1)

3.1.19 First aid guidelines and emergency contact instructions

S3NA-208-PR Personal Protective Equipment Program

1.0 Purpose and Scope

1.1 Provide an effective Personal Protective Equipment (PPE) Program to protect AECOM employees from potential workplace safety and health hazards.

1.2 This procedure applies to all AECOM North America-based employees and operations.

1.3 The proper use of appropriate PPE, in combination with effective engineering and administrative controls, can provide AECOM employees with protection against potential workplace hazards and can reduce the potential for workplace injury and illness.

2.0 Terms and Definitions

2.1 **PPE**: Personal Protective Equipment

2.2 **ANSI:** American National Standards Institute

3.0 Attachments

3.1 S3NA-208-FM PPE Hazard Analysis

3.2 S3NA-208-WI1 PPE Selection

3.3 S3NA-208-WI2 Eye and Face Protection Fact Sheet

3.4 S3NA-208-WI3 Head Protection Fact Sheet

3.5 S3NA-208-WI4 Foot Protection Fact Sheet

3.6 S3NA-208-WI5 Hand Protection Fact Sheet

3.7 S3NA-208-WI6 Protective Clothing Fact Sheet

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Region SH&E Manager

- Provide guidance to **Project Managers, Field Task Managers, Supervisors**, and field staff on the assessment of hazards and the selection of PPE.
- Provide training materials to **Project Managers, Field Task Managers** and **Supervisors** for **employee** training.

4.1.2 Project Managers (Field Task Managers, Supervisors)

- Conduct Hazard Assessments to identify hazards present and to specify PPE appropriate for those hazards.
- Determine which of your staff members will require **employee**-issued PPE.
- Approve the purchase of company-issued PPE.
- Verify that appropriate PPE is utilized by your **employees** when required or necessary.

4.1.3 Employee

- In accordance with your training and instructions, utilize appropriate PPE that has been issued to them when required or necessary.
- Inspect your PPE prior to use to confirm that it is functional, and maintain your PPE in a clean and functional condition.
- Follow instructions and manufacturers' guidance on the care, use, and storage of your PPE.
- Prior to using any type of PPE, confirm that it is in good shape, free of dirt and debris, and that you are familiar with its correct use. Always make sure PPE fits adequately to perform the use intended.

- Refrain from wearing PPE outside of the work area for which it is required if doing so would constitute a hazard.

4.2 Hazard Assessment for Office Locations

S3NA-209-FM PPE Hazard Analysis will serve as the certificate of hazard assessment, as defined in 29 CFR 1910.132 (d) (2), for office activities that require PPE. This checklist will also be used to determine the PPE requirements for nonroutine maintenance tasks that may not be evaluated during the initial hazard assessments.

4.3 Hazard Assessment for Off-Site Locations

4.3.1 HAZWOPER Locations

- Each Health and Safety Plan (HASP) that is prepared for waste site investigations/remediation includes a hazard assessment for each proposed field activity. Task-specific PPE requirements are listed in the HASP. Therefore, the HASP will serve as the certificate of hazard assessment for each project that involves off-site work activities that require the use of PPE.

4.3.2 All Other Off-Site Locations

- The Task Hazard Analysis will serve as the certificate of hazard assessment for projects that involves offsite work activities that require the use of PPE. The checklist will be reviewed with the entire field team prior to arriving at the site.

4.4 Training

4.4.1 Staff will receive adequate instruction on the correct use, limitations, and assigned maintenance duties for the equipment to be used. The following information, at a minimum, will be covered during PPE training:

- What PPE is required.
- When it is required.
- Why it is required.
- How to properly don, doff, adjust, and wear the PPE described.
- The limitations of the PPE, including its expected useful life.
- How to properly care for, maintain, and dispose of the PPE.

4.4.2 Field staff are responsible for confirming that they have reviewed the operation manual for the PPE before work commences.

4.4.3 All staff will receive an orientation to the hazards on the job site as well as initial Field Safety orientation that outlines appropriate PPE requirements.

4.4.4 AECOM **employees** who have participated in the 40-hour HAZWOPER training course are considered to have met the **employee** training requirements of the PPE standard. The training certificates that are issued as documentation of successful completion of the 40-hour HAZWOPER course will also serve as documentation of training as required by the PPE standard. **Employees** who have not participated in the HAZWOPER training will be provided PPE training specific to your assignment and/or location. The PPE Facts Sheets (attached) can serve as the basis for training.

4.5 Determining the Need for PPE

4.5.1 Using the Task Hazard Assessment or HASP, the need for the following types of PPE will be evaluated.

4.5.2 PPE will:

- Be selected and used in accordance with recognized standards and provide effective protection.
- Not in itself create a hazard to the wearer.
- Be compatible, so that one item of PPE does not make another item ineffective.
- Be maintained in good working order and in a sanitary condition.

4.5.3 Prior to entering any regulated work area, confirm that you have access to or are equipped with the following CSA-approved PPE, appropriate to the site hazards:

- Head Protection
- Eye & Face Protection
- Foot Protection
- Hi-Visibility Vests
- Hearing Protection

4.5.4 After the hazard assessments have been completed, the **Project Manager** will select the appropriate PPE for each job category or task, as necessary. The selected equipment will be indicated on the hazard assessment. PPE will be provided to each **employee** appropriate for the hazards present. All PPE selected and purchased by AECOM will meet or exceed the American National Standards Institute (ANSI) standards, Canadian Standards Association (CSA) standards, or other standards as dictated by provincial, territorial, or state legislation.

4.6 Eye and Face Protection

4.6.1 The OSHA standard requires that AECOM **employees** use appropriate eye and face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acid and caustic liquids, chemical gases or vapors, and injurious light radiation. The standard further requires that eye protection provide side protection when there is a hazard from flying objects.

4.7 Head Protection

4.7.1 Protective helmets (hard hats) are required when **employees** are working in areas where there is a potential for falling objects to cause injury to the head. When working near exposed electrical conductors that could contact the head, helmets designed to reduce electrical shock will be worn.

4.8 Foot Protection

4.8.1 Protective footwear is required when **employees** are working in areas where there is a danger of foot injuries from falling and rolling objects or from objects piercing the sole and where an **employee's** feet are exposed to electrical hazards.

4.9 Hand Protection

4.9.1 Appropriate hand protection is required when **employee's** hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts and lacerations, severe abrasions, punctures, chemical burns, thermal burns, or harmful temperature extremes.

4.10 Chemically Resistant Clothing

4.10.1 Chemically resistant clothing is required when there is significant potential for the **employee** to come in direct contact with the chemicals he/she is handling. Tasks that involve chemical handling will be evaluated for the potential of splashing or spilling.

4.11 High-Visibility Apparel

4.11.1 High-visibility apparel with reflective banding (ANSI Class II and III garment) is required for all field activities in close proximity to moving traffic and other modes of transportation (transit, airlines, marine, etc.), in proximity to heavy equipment operations, or whenever otherwise specified in a project HASP. Color of apparel (orange or lime) may be client/project-specific.

4.12 Personal Clothing

4.12.1 For personal safety on the job site, do not wear

- Loose or unsecured clothing or loose fitting cuffs.
- Greasy or oily clothing, gloves, or boots.
- Torn or ragged clothing.

4.12.2 Neck chains are hazardous and will be worn under clothing so that they do not hang out. Long hair will be tied back or otherwise confined.

4.12.3 Clothing made of synthetic fibres can be readily ignited and melted by electric flash or extreme heat sources. Cotton or wool fabrics are recommended for general use.

4.13 Specialized PPE

4.13.1 In addition to basic PPE, additional specialized PPE may be required to provide appropriate protection to the **employee**. Refer to applicable OH&S legislation and related Standard Operating Procedures for additional information on PPE requirements.

- Fall Protection: Only full body harnesses with shock-absorbing lanyards will be used for personal fall arrest.
- Respiratory Protection: Respiratory protection shall be selected based on the contaminant and concentration to which the **employee** will be exposed. Refer to*S3NA-519-PR-Repiratory Protection Program* and the task- or project-specific Baseline Hazard Assessments for specific requirements.
- Fire Resistant Clothing: Approved fire resistant outer clothing may be required at work locations with flammable or explosive materials or environments.
- Other Head Protection: Operators and passengers (if permitted) of all terrain vehicles and snowmobiles will wear approved helmets.
- Chemical Protective Clothing: Approved chemical protection appropriate to the hazard will be worn. Review applicable Material Safety Data Sheets (MSDSs) for appropriate PPE.
- Protection from Drowning: **Employees** being transported by boat are required to wear life jackets. **Employees** exposed to any other drowning hazards are required to wear personal flotation devices. Life jackets and personal flotation devices will have the proper regulatory approval.

4.14 PPE Supplies

4.14.1 Each AECOM office will maintain a supply of safety equipment including safety glasses, gloves, and chemically resistant clothing based on the nature of their field activities. The **Office Manager** or designee will be responsible for maintaining this inventory. PPE that is required for large field efforts will be ordered by the **Project Manager** or their designee.

4.14.2 At a minimum, the office will review its PPE program annually.

4.15 Obtaining Personalized Safety Gear

4.15.1 The OSHA standard in 29 CFR 1910 - Subpart I / 29 CFR 1926 requires that protective equipment, including PPE for eyes, face, head, and extremities, protective clothing, and respiratory devices, be provided to **employees** wherever necessary by reason of hazards.

4.15.2 **Employees** are not expected to provide their own general PPE. Although each AECOM office stocks and issues various general issue safety gear such as hard hats, plan safety glasses, disposable gloves and coveralls, fall protection, and hearing protection, certain personalized safety gear such as prescription safety glasses, safety-toed (capped) boots, and cotton coveralls will be ordered and sized specifically for the user.

4.15.3 Most PPE will be provided to the **employee** at no charge, with the exception of the above personalized safety equipment (safety glasses, safety toed boots, washable coveralls). A partial cost reimbursement to the **employee** may be made based on legacy company practice or project stipulations.

4.15.4 Prescription Safety Glasses

- As with all hazards, staff will be notified of their potential for injury and will be provided with the appropriate PPE. If wearing contact lenses poses a hazard to the worker's eyes during work, the worker will be advised of the hazards and the alternatives to wearing contact lenses.
- Eligibility
    - **Employees** will wear safety glasses during activities that involve exposure to eye hazards such as flying particles, chemical splash, or certain types of radiation such as ultraviolet

light from welding operations. Typically, the following types of field activities will require the use of safety glasses:

- Site investigation or remediation and construction activities.
- Stack monitoring and other types of air emissions monitoring.
- Audits and assessments in industrial or manufacturing facilities.
- Activities conducted within laboratories.
- Activities at client facilities where safety glasses are required.
    - Eligibility to obtain prescription safety glasses will be determined by the **employee's supervisor** based upon the guidance above.
- Procurement of Prescription Safety Glasses
    - **Employees** who have been authorized to purchase prescription safety glasses by their **supervisor** should consult the AECOM SH&E Department's Intranet for obtaining detailed instructions on how and where to purchase the equipment. **Employees** will be able to choose from several styles of approved frames, all equipped with permanently attached sideshields. Various lens materials are also available, although polycarbonate is recommended.
    - Except for eye examinations, associated prescription eyewear costs will be paid by AECOM. The **employee** may be asked to pay an optician's dispensing fee, which may be submitted on an expense report for reimbursement. Because eye examinations are not covered, **employees** who have had recent eye examinations should contact the eye care professional in advance to determine their procedure for handling a current prescription.
    - **Employees** who are eligible will be allowed to order one pair of prescription safety glasses every other year from the selection of glasses offered by the program.
    - Contact the **Region SH&E Manager** for guidance on the procurement of prescription safety glasses.

4.15.5 Safety Toed Boots/Shoes

- Eligibility
    - **Employees** will wear safety boots/shoes during activities that pose the potential for foot injury from dropped objects or penetrations through the sole. Typically, safety toed boots/shoes will be required for the same type of activities, with the exception of laboratory activities, for which safety glasses are required. In addition, work around all types of heavy equipment will typically require the use of safety shoes.
    - Eligibility to obtain safety shoes will be determined by the **employee's supervisor** based upon the guidance above.
- Procurement of Safety Shoes
    - Eligible **employees** will be allowed to purchase one pair of safety shoes every other year.
    - **Employees** who have been authorized to purchase safety shoes by their **supervisor** should consult the **Region SH&E Manager** for obtaining for detailed instructions on how and where to purchase the equipment. The style chosen (i.e., boot or shoe) should be determined based upon the application. For example, low cut shoes may be appropriate for audits and assessments in light industry applications, while safety boots will be more appropriate for environmental remediation, construction, and heavy industry work with significant foot hazards. Before purchasing, the **employee** is required to verify that the safety boots or shoes meet the specifications above.
    - After the purchase, an **employee** expense report, including a dated receipt for the shoes, should be submitted for approval and reimbursement. AECOM will reimburse the **employee** up to a amount that is specified by the **SH&E Department** or **Region Operations** management.

4.15.6 Reusable Coveralls

- Eligibility

- Reusable cotton (or some other washable fabric) coveralls may be made available to **employees** who regularly perform field work based on conditions. Coveralls can be worn over personal clothing to help protect and keep them clean.
- Eligibility to obtain washable coveralls will be determined by the **employee's supervisor** based upon the guidance above.

- Procurement of Reusable Coveralls
  - AECOM has established a master services agreement with a work clothing vendor that supplies us with long- sleeved, blue coveralls bearing the AECOM logo. These coveralls can be ordered through a standard purchase requisition authorized by the **employee's supervisor**. The cost of the coveralls will be covered entirely by your region.
  - **Employees** who are eligible will be allowed one pair of coveralls per year.

5.0 Records

5.1 Completed *S3NA-209-FM PPE Hazard Analysis* forms will be maintained in local office safety files.

6.0 References

6.1 Occupational Safety and Health Administration (OSHA) PPE standard (29 CFR 1910.132) requires AECOM to assess workplace(s) to determine if hazards that necessitate the use of PPE exist in the workplace, and, if such hazards are present, to

6.1.1 Select the appropriate types of PPE and

6.1.2 Provide employees with training about the use and care of the selected PPE.

S3NA-208-FM PPE Hazard Analysis

This form will be used for office activities that require PPE. It will also be used to determine the PPE requirements for nonroutine maintenance tasks that may not be evaluated during the initial hazard assessments.

1. Job Title(s): This hazard analysis describes the tasks and required personal protective equipment for the following job titles:

2. Description of Tasks: The tasks performed by personnel in the above job titles include:

3. Potential Hazards and PPE Selection (see *S3NA-208-GL1 PPE Selection Guidelines* for assistance).

TASK	POTENTIAL HAZARDS (1)	PPE SELECTION

The signature of the certifying manager below verifies that the tasks are accurately described:

Signature Date

Print Name Date

S3NA-208-FM PPE Hazard Analysis

This form will be used for office activities that require PPE. It will also be used to determine the PPE requirements for nonroutine maintenance tasks that may not be evaluated during the initial hazard assessments.

1. Job Title(s): This hazard analysis describes the tasks and required personal protective equipment for the following job titles:

2. Description of Tasks: The tasks performed by personnel in the above job titles include:

3. Potential Hazards and PPE Selection (see *S3NA-208-GL1 PPE Selection Guidelines* for assistance).

TASK	POTENTIAL HAZARDS (1)	PPE SELECTION

The signature of the certifying manager below verifies that the tasks are accurately described:

Signature Date

Print Name Date

S3NA-208-WI1 PPE Selection

1.0 Lists of Potential Hazards

	POTENTIAL HAZARDS
HEAD	**Falling overhead objects**
	Spark contact
	Chemical contamination
	Cold/heat
	Electrical (>600 volts)
HANDS	**Cuts, punctures, abrasions**
	Burns
	Dermatitis
	Chemical absorption
	Cold
FEET	**Falling or rolling objects**
	Chemical absorption
	Dermatitis
	Burns
	Cold
	Slips, trips
FACE	**Burns (chemical, spark, UV radiation)**
	Chemical splashing
	Flying particulates
	Abrasions, cuts
EYES	**Burns (gas, liquid, spark)**
	Abrasions-flying particulates
	Absorption
	Retinal/corneal damage (UV/IR radiation)
EARS	**Noise**
	Cold

BODY PROTECTION	**Chemical splashing**
	Burns (chemical, UV radiation)
	Absorption
	Spark contact
	Cuts/abrasions/punctures
	Heat/cold stress
	Moving vehicles/heavy equipment
MISCELLANEOUS	**Insects (ticks, spiders, mosquitoes, bees/wasps)**
	Animals (dogs, bears, wild boars, raccoons)
	Reptiles (snakes)
	Poison plants (poison ivy, poison sumac, poison oak)
	Biological (fungus, bacteria, fungus, viral)

2.0 Eye & Face Protection Selection Chart

		ASSESSMENT	PROTECTOR TYPE (see Table 2)	PROTECTOR	LIMITATIONS	NOT RECOMMENDED
IMPACT	Chipping, grinding, machining, masonry work, riveting, and sanding.	Flying fragments, objects, large chips, particles, sand, dirt, etc.	B, C, D, E, F, G, H, I, J, K, L, N	Spectacles, goggles, faceshields SEE NOTES (1) (3) (5) (6) (10) For severe exposure Add N	Protective devices do not provide unlimited protection. SEE NOTE (7)	Protectors that do not provide protection from side exposure. SEE NOTE (10) Filter or tinted lenses that restrict light transmittance, unless it is determined that a glare hazard exists. Refer to OPTICAL RADIATION.
HEAT	Furnace operation, pouring, casting, hot dipping, gas cutting, and welding.	Hot sparks	B, C, D, E, F, G, H, I, J, K, L, *N *N N	Faceshields, goggles, spectacles. *For severe exposure, add N SEE NOTE (2) (3) *Faceshields worn over goggles H, K SEE NOTE (2) (3) Screen faceshields. Reflective faceshields. SEE NOTE (2) (3)	Spectacles, cup and cover type goggles do not provide unlimited facial protection. SEE NOTE (2) SEE NOTE (3)	Protectors that do not provide protection from side exposure.
		Splash from molten metals				
		High temperature exposure				
CHEMICAL	Acid and chemicals handling, degreasing, plating	Splash	G, H, K *N	Goggle, eyecup and cover types. *For severe exposure, add N	Ventilation should be adequate but well protected from splash entry	Spectacles, welding helmets, handshields
		Irritating mists	G	Special purpose goggles	SEE NOTE (3)	
DUST	Woodworking, buffing, general dusty conditions.	Nuisance dust	G, H, K	Goggles, eyecup and cover types	Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleaning may be required.	

	ASSESSMENT	PROTECTOR TYPE	PROTECTOR	LIMITATIONS	NOT RECOMMENDED
OPTICAL RADIATION	WELDING: Electric Arc	O, P, Q	**TECTORS FILTER LENS PRO-SHADE TECTORS** SEE NOTE (9) 10-14 Welding Helmets or Welding Shields	Protection from optical radiation is directly related to filter lens density. SEE NOTE (4). Select the darkest shade that allows adequate task performance.	Protectors that do not provide protection from optical radiation. SEE NOTE (4)
	WELDING: Gas CUTTING TORCH BRAZING	J, K, L, M, N, O, P, Q	SEE NOTE (9) 4-8 Welding Goggles or Welding Faceshield 3-6 3-4	SEE NOTE (3)	
	TORCH SOLDERING	B, C, D, E, F, N	1.5-3 Spectacles o Welding Faceshiel		
	GLARE	A, B	Spectacle SEE NOTE (9) (10)	Shaded or Special Purpose lenses, as suitable. SEE NOTE (8)	

NOTES

(1) Care shall be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards must be provided.
(2) Operations involving heat may also involve optical radiation. Protection from both hazards shall be provided.
(3) Faceshields shall only be worn over primary eye protection.
(4) Filter lenses shall meet the requirements for shade designations in Table 9-2.
(5) Persons whose vision requires the use of prescription (Rx) lenses shall wear either protective devices fitted with prescription (Rx) lenses or protective devices designated to be worn over regular prescription (Rx) eyewear.
(6) Wearers of contact lenses shall also be required to wear appropriate covering eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
(7) Caution should be exercised in the use of metal frame protection devices in electrical hazard areas.
(8) Refer to Section 6.5, Special Purpose Lenses. (ANSI A87.1-1989)
(9) Welding helmets or handshields shall be used only over primary eye protection.
(10) Non-sideshield spectacles are available for frontal protection only.

3.0 Eye and Face Protector Selection Guide

A. SPECTACLE, No sideshield
B. CUP GOGGLE, Direct ventilation
C. CUP GOGGLE, Indirect ventilation
D. SPECTACLE, Headband temple
E. COVER WELDING-BURNING
F. GOGGLES, Indirect Ventilation
G. FACESHIELD
H. WELDING HELMET, Hand held
I. WELDING HELMET, Stationary window
J. WELDING HELMET, Lift front
K. COVER GOGGLE, Direct ventilation
L. SPECTACLE, Half sideshield
M. SPECTACLE, Full sideshield
N. SPECTACLE, Detachable sideshield
O. SPECTACLE, Non-removable lens
P. SPECTACLE, Lift front
Q. COVER GOGGLE, No ventilation
R. COVER GOGGLE, Indirect ventilation

4.0 Filter Lenses for Protection Against Radiant Energy

OPERATIONS	ELECTRODE SIZE 1/32 INCH	ARC CURRENT	MINIMUM PROTECTIVE SHADE
Shielded metal-arc welding	Less than 3	Less than 60	7
	More than 3-5	60-160	8
	More than 5-8	161-250	10
	More than 8	251-550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
		60-160	10
		161-250	10
		251-500	10
Gas tungsten arc welding		Less than 50	8
		50-150	8
		151-500	10
Air carbon	(Light)	Less than 500	10
Air cutting	(Heavy)	500-1000	11
Plasma arc welding		Less than 20	6
		20-100	8
		101-400	10
		401-800	11
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

4.1.1.1 OPERATIONS	PLATE THICKNESS (INCHES)	(MM)	4.1.1.2 MINIMUM* PROTECTIVE SHADE
Gas welding:			
Light	Under 1/8	Under 3.2	4
Medium	1/8 to ½	3.2 to 12.7	5
Heavy	Over 1/2	Over 12.7	6
Oxygen cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6	25 to 150	4
Heavy	Over 6	Over 151	5

S3NA-208-WI2 Eye and Face Protection Fact Sheet

1.0 Introduction

1.1 Personal protective equipment (PPE) is designed to protect you from health and safety hazards that cannot be removed from your work environment. PPE is designed to protect many parts of your body including eyes, face, head, hands, and feet. AECOM has evaluated each of the job tasks performed in AECOM offices. The purpose of these evaluations was to assess the hazards associated with a specific task and to determine what type or types of PPE will adequately protect you from those hazards. It has been determined that your job will require the use of eye and/or face protection. This fact sheet has been developed to inform you about why eye and face protection is needed, when it should be worn, how to wear and adjust it properly, the limits of this type of PPE, and how to properly maintain and clean the eye and face protection you are issued.

2.0 Types of Eye and Face Protection

There are three major types of eye and face protection, including:

2.1 **Primary Protectors**

2.1.1 Safety glasses

The most widely used form of eye protection is safety glasses. To prevent lateral exposure to impact fragments, safety glasses are often equipped with side shields. Depending on the hazard, side shields can be either a cup-type or flat-folded. The cup-type provides more complete protection.

2.1.2 Safety goggles

- Vented goggles—impact only
- Indirectly vented—chemical splash and impact
- Non-vented—chemical fumes

2.1.3 Glasses offer excellent protection against impact; however, goggles form a tight-fitting seal to the skin around the entire eye and are more appropriate for chemical concerns.

2.2 **Secondary Protectors**

2.2.1 Faceshield

- Wear faceshields when there is a severe danger from impact or chemical splash. Faceshields are secondary protectors and must be worn over safety glasses or goggles.

2.2.2 Welding Helmet or Faceshield

- When welding, employees must use equipment with filter lenses that have a shade number appropriate for protection against injurious light radiation.

3.0 Cleaning and Maintaining Safety Eyewear

3.1 Clean lenses and frames regularly with soap and water. Store in a clean, dry area.

3.2 Replace scratched, pitted, cracked, or broken safety eyewear immediately.

4.0 Proper Fit/Adjusting Glasses

4.1 PPE that fits poorly will not afford the necessary protection. When fitting devices for eye protection against dust and chemical splashes, be sure that the devices are sealed to the face. If the temple bars of the glasses are too long, the glasses will have a tendency to fall forward and slide down your nose. Check with your SH&E coordinator if you need glasses with adjustable temple bars. Standard safety glasses are 58 mm; however, smaller sizes (54 mm) are also available.

WHEN TO WEAR PROTECTION

Hazard	Concern	Glasses	Goggles	Faceshield
Impact	Flying fragments from front/sides.	Safety glasses with sideshields.	Vented goggles.	Severe danger from impact. Wear with glasses/goggles.
Chemicals	Splash.		Indirectly vented.	Severe splash. Wear with goggles.
Chemicals	Fumes.		Non-vented.	
Injurious Light			Welding goggles with appropriate shaded lens.	Welding helmet with appropriate shaded lens.
Dust	Dust entering the eye.	Safety glasses with sideshields.	Vented goggles.	

5.0 Prescription Glasses/Contact Lenses

5.1 AECOM has selected several types of safety glasses and goggles that meet the standards specified in the OSHA PPE Standard. Prescription eyeglasses must not be substituted for safety eyeglasses. Regular eyeglasses do not offer the same impact resistance of the lens and frame assembly as safety glasses and are not ANSI-approved. Goggles can be worn over eyeglasses. If you wear corrective lenses, contact your SH&E coordinator for information about how to obtain prescription safety glasses.

5.2 Contact lenses are not recommended for any industrial job. Dust caught underneath the lens can cause painful abrasions. Some chemicals can react with your contacts to cause permanent injury.

6.0 Guidelines

6.1 Eye Protection

The following standards apply to eye and face protection:

Association	Standard
American National Standard (ANSI)	Z87.1-2003, Practice for Occupational and Educational Eye and Face Protection Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection
Canadian Standards Association (CSA)	Z94.3-02, Eye and Face Protectors Z94.3.1-02, Protective Eyewear: A User's Guide Z94.3-99, Industrial Eye and Face Protectors CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors

6.1.1 AECOM will offer safety glasses with permanently attached sideshields or directly vented goggles to all employees working in an area or at a process that involves flying particles.

6.1.2 Non-vented and indirectly vented goggles will be worn when employees are handling chemicals.

6.1.3 Faceshields, in combination with glasses or goggles, will be required where a severe splash or impact hazard has been identified.

6.1.4 When welding, employees must use equipment with filter lenses that have a shade number appropriate for protection against injurious light radiation.

6.1.5 Supervisors and staff are responsible for ensuring that crews have access to the eye and face protection necessary to ensure their safety. This may include:

- Safety glasses with side shields,
- Safety goggles, or
- Face shield.

6.1.6 CSA/ANSI-approved eye and face protection shall be worn by all employees while engaged in activities where a risk of injury to the eyes or face may exist. Refer to Industrial Eye and Face Protectors, Canadian Standards Association.

6.1.7 Face shields shall be worn when using grinding, drilling, buffing, or striking tools.

6.1.8 Eye protection shall be worn when handling liquid or powder chemicals and when draining or breaking joints on any pressure vessel, line, or equipment. In some situations, a face shield should be used in conjunction with goggles for additional eye and face protection.

6.1.9 Face shields shall be made available or installed whenever they may be required. Goggles shall be provided, as required.

6.1.10 Hardened glass prescription lenses and sport glasses are not an acceptable substitute for proper, required industrial safety eye protection.

6.1.11 Comfort and fit are very important in the selection of safety eyewear. Lens coatings, venting, or fittings may be needed to prevent fogging or to fit with regular prescription eyeglasses.

6.1.12 Sunglasses should be worn when glare is a concern. Glare from sun and snow or water should be taken seriously as it can cause reduced vision and fatigue.

6.1.13 A combination of types of PPE may be necessary if more than one type of hazard exists. For example, where the potential hazards are chemical splashes and flying objects, chemical splash goggles used in combination with safety glasses may be required.

6.1.14 When contact lenses are worn (and where a hazard exists), extra precautions are required to reduce the potential for injury. As previously stated, contact lenses are not protective devices. PPE for contact lens wearers includes splash or dust-resistant goggles, and safety glasses. Other workers not wearing contact lenses would wear the same PPE when exposed to the same hazards.

6.1.15 Prescription eyewear may be worn if it is safety eyewear meeting CSA/ANSI standards and appropriate to the hazard or if it is worn behind equipment that meets the above requirements.

6.1.16 Personal eye and face protection is regulated for specific job tasks. For the most up-to-date information and for guidance, application or interpretation of these laws or guidelines, you should contact your local regulatory authority directly.

6.1.17 DO:

- Replace pitted, scratched, bent, and poorly fitted PPE (damaged face/eye protection interferes with vision and will not provide the protection it was designed to deliver).
- Wear proper fitting eye protection (close to the face).
- Clean safety glasses daily, more often if needed.
- Store safety glasses in a safe, clean, dry place when not in use.

6.1.18 DON'T:

- Modify eye/face protection.
- Use eye/face protection that does not have CSA/ANSI certification (a CSA stamp for safety glasses is usually on the frame inside the temple near the hinges of the glasses).

S3NA-208-WI3 Head Protection Fact Sheet

1.0 Introduction

1.1 Personal protective equipment (PPE) is designed to protect you from health and safety hazards that cannot be removed from your work environment. PPE is designed to protect many parts of your body including eyes, face, head, hands, and feet. AECOM has evaluated each of the job tasks that are performed in the office. The purpose of these evaluations was to assess the hazards associated with a specific task and to determine what type or types of PPE will adequately protect you from those hazards.

1.2 Because there is no potential for injury to the head from falling objects, head protection is not required. However, some nonroutine maintenance tasks or construction activities may require such equipment. The need for this type of PPE while performing such nonroutine tasks will be evaluated by your health and safety coordinator.

2.0 Types of Head Protection

2.1 The main type of head protector is the helmet. Helmets are designed to protect you from impact and penetration caused by objects hitting your head and from limited electrical shock or burns. The shell of the helmet is designed to absorb some of the impact. The suspension, which consists of a headband and strapping, not only holds the helmet in place but is critical for absorbing and distributing impact shock loads.

Hard Hat Impact Types

Type I Hard Hats

Type I hard hats are intended to reduce the force of impact resulting for a blow only to the top of the head.

Type II Hard Hats

Type II hard hats are intended to reduce the force of impact resulting from a blow that may be received off center or to the top of the head. A Type II hard hat typically is lined on the inside with thick, high-density foam.

Electrical Classes

Class G (General)

Class G hard hats are intended to reduce the danger of contact exposure to low voltage conductors. Test samples are proof-tested at 2,200 volts (phase to ground). However, this voltage is not intended as an indication of the voltage at which the hard hat protects the wearer. Please note: Class G hard hats were formerly known as Class A.

Class E (Electrical)

Class E hard hats are intended to reduce the danger of exposure to high voltage conductors. Test samples are proof-tested at 20,000 volts (phase to ground). However, this voltage is not intended as an indication of the voltage at which the helmet protects the wearer. Please note: Class E hard hats were formerly known as Class B.

Class C (Conductive)

Class C hard hats are not intended to provide protection against contact with electrical conductors.

3.0 Proper Fit/Maintenance

3.1 The suspension of the hard hat must be adjusted to fit the wearer and to keep the shell a minimum distance of 1-1/4 inches above the wearer's head. Periodically inspect the suspension of your hard hat. Look for loose or torn cradle straps, loose rivets, broken sewing lines, or other defects. Replace the hat after a major impact.

4.0 Guidelines

4.1 Head Protection

The following standards apply to PPE for the head:

Association	Standard
American National Standard (ANSI)	Z89.1-2003, American National Standard for Industrial Head Protection Z89.1-1997, American National Standard for Industrial Head Protection
Japanese Industrial Standard (JIS)	JIS T8131 - 1990, Industrial Safety Helmets
CEN Standard	EN 397: 1995, Industrial safety helmets
Canadian Standards Association (CSA)	CAN/CSA-Z94.1-92 (R1998), Industrial Protective Headwear CSA Standard Z94.1-05, Industrial Protective Headwear - Performance, Selection, Care and Use

4.1.1 On all construction projects and in the event that an overhead hazard exists, a four-point suspension Type II, Class G or E hard hat will be provided to affected employees.

4.1.2 Supervisors and staff are responsible for confirming that crews have the head protection necessary for their safety. This may include, as required by the specific job task:

- Hard hat, or
- Helmet

4.1.3 CSA/ANSI approved industrial protective headwear that is appropriate to the hazards and meets applicable legislative requirements shall be worn by all personnel while engaged in construction, operation, maintenance, or other activities where there exists a foreseeable danger of injury to a worker’s head at a work site and/or a significant possibility of lateral impact to the head.

4.1.4 Visitors to areas where the above activities are being conducted shall comply with the hardhat requirement.

4.1.5 Helmets, hard hats, and hard hat accessories (as required) shall be provided by AECOM.

4.1.6 Proper care is required for headgear to perform efficiently. The service life is affected by many factors including temperature, chemicals, sunlight, and ultraviolet radiation (welding). The usual maintenance for headgear is simply washing with a mild detergent and rinsing thoroughly.

4.1.7 DO:

- Replace headgear that is pitted, holed, cracked, or brittle.
- Replace headgear that has been subjected to a blow even though damage cannot be seen.
- Remove from service any headgear if its serviceability is in doubt.
- Replace headgear and components according to manufacturers’ instructions.
- Consult OH&S or your supplier for information on headgear.

4.1.8 DON’T:

- Drill, remove peaks, or alter the shell or suspension in any way.
- Use solvents or paints on the shells.

- Put chin straps over the brims of Class B headgear.
- Use any liner that contains metal or conductive material.
- Carry anything in the hard hat while wearing the hard hat.

S3NA-208-WI4 Foot Protection Fact Sheet

1.0 Introduction

1.1 Nearly 2 million people are expected to receive disabling work-related injuries this year. More than one-fourth of these injuries will involve the head, eyes, hands, or feet. Personal protective equipment (PPE) is designed to protect you from health and safety hazards that cannot be removed from your work environment. PPE is designed to protect many parts of your body including eyes, face, head, hands, and feet.

1.2 AECOM has evaluated each of the job tasks that are performed in the offices. The purpose of these evaluations was to assess the hazards associated with a specific task and to determine what type or types of PPE will adequately protect you from those hazards. It has been determined that your job will require the use of foot protection.

- Foot injuries are most likely to occur:
- When heavy or sharp objects fall on your foot.
- When something rolls over your foot.
- When you step on an object that pierces the sole of your shoe.

2.0 Types of Foot Protection

2.1 Safety shoes and boots must meet the regulated standard. Safety shoes and boots are made with a steel-reinforced box toe to protect your foot from being pierced or crushed by a falling object. Safety shoes or boots with flexible steel insoles provide puncture resistance. They will stop or deflect nails or other objects that have penetrated the sole of the shoe. Oil resistant soles provide the added safety feature of preventing slips and trips on slippery work floors.

3.0 Limitations of Foot Protection

3.1 Wearing safety shoes will adequately protect your feet from most impact hazards. However if the load on the toebox becomes too great (75 foot-pounds or greater), the toe box will be crushed.

4.0 Proper Fit

4.1 With most PPE, the more comfortable it is to use, the more likely you will be to use it. The fit of the safety shoe is of the utmost importance. You must try on safety shoes before purchasing them. When selecting shoes, be sure that they are ANSI-approved. Consult with your health and safety coordinator about how to obtain safety shoes.

5.0 Guidelines

5.1 Foot Protection

The following standards apply to foot protection equipment:

Association	Standard
American National Standard (ANSI)	Z41-1991, American National Standard for Personal Protection - Protective Footwear
British Safety Institution Standard	BS EN 345:1993 Specification for Safety Footwear for Professional Use BS EN 346:1993 Specification for Protective Footwear for Professional Use

Canadian Standards Association (CSA)	Z195-02, Protective Footwear Z195.1-02, Guideline on Selection, Care, and Use of Protective Footwear Z195-M92 (R2000), Protective Footwear

5.1.1 Work shoes or boots shall have leather or rubber uppers, an oil-resistant sole, and a distinctive heel (defined as a raised section 3/8" – ½" across the entire heel). When required by the regulations or the client, AECOM will provide affected employees with safety-toed shoes/boots that meet the requirements of the applicable ANSI or CSA standard.

5.1.2 Supervisors and staff are responsible for confirming that crews have foot protection necessary to ensure their safety. This may include the following types as required by the specific job task:

- Steel-toed boots
- Caulk boots
- Chemical-resistant boot covers
- Non-slip wading boots
- Rubber boots

5.1.3 CSA approved safety-toed boots shall be worn by all employees while engaged in construction, operation, maintenance, or other activities where a risk of injury to the feet may exist.

5.1.4 The purchase of normal footwear for work is the responsibility of the employee.

5.1.5 Where hazards are identified (or client/industry demands it), AECOM will supply safety-toed work boots or other protective footwear.

5.1.6 Choose the right footwear for the job to mitigate the identified hazards.

5.1.7 Project Managers must notify staff of all possible hazards and that staff have the PPE to mitigate those hazards.

5.1.8 Staff are responsible for confirming that the PPE they are provided with is in good working condition before work commences.

5.1.9 DO:

- Choose a high cut boot to provide ankle support.
- Choose footwear according to job hazard and CSA Standards.
- Lace up boot and tie laces securely. Boots do not protect if they are a tripping hazard or fall off.

5.1.10 DON'T:

- Wear defective safety footwear (e.g., exposed steel toe caps).
- Underprotect your feet or modify safety footwear.

S3NA-208-WI5 Hand Protection Fact Sheet

1.0 Introduction

Personal protective equipment (PPE) is designed to protect you from health and safety hazards that cannot be removed from your work environment. PPE is designed to protect many parts of your body including eyes, face, head, hands, and feet. AECOM has evaluated each of the job tasks that are performed in the office. The purpose of these evaluations was to assess the hazards associated with a specific task and to determine what type(s) of PPE will adequately protect you from those hazards. It has been determined that your job will require the use of hand protection. This fact sheet will inform you about why and when hand protection is needed, the limits of gloves, and how to properly clean and dispose of gloves.

1.1 Gloves most commonly used in the construction industry are made from:

1.1.1 Leather

1.1.2 Cotton

1.1.3 Rubber

1.1.4 Synthetic rubbers and other manmade materials

1.1.5 Combinations of materials

2.0 Types of Hand Protection

2.1 Hand protection is required when there is a potential for

2.1.1 Skin absorption of harmful substances.

2.1.2 Severe cuts or lacerations, abrasions, or punctures.

2.1.3 Vibration.

2.1.4 Temperature extremes.

2.2 Gloves are the most common protectors for the hands. Unfortunately, no one type of glove provides adequate protection against all potential hand hazards. Leather gloves provide good protection from cuts and lacerations but offer no protection against chemicals. Nitrile or neoprene rubber gloves offers good resistance to chemicals but they tear and rip easily when sharp objects are handled. The chemically resistant gloves used by AECOM were selected based on the manufacturer's chemical compatibility data, which indicates how each glove material performed in breakthrough time tests against certain chemicals. Do not substitute another type of glove for the chemically resistant gloves that have been selected. They may not offer adequate protection for the chemicals you handle.

3.0 Proper Fit/Cleaning Disposal

3.1 Gloves will deteriorate over time depending on the types and amount of chemicals with which they come into contact. Remove excessive chemical residue that builds up on the glove. Replace cracked, ripped, or torn gloves or when breakthrough occurs. Breakthrough is the time between initial contact of the chemical on the glove surface and the detection of the chemical on the inside of the glove. Tight-fitting gloves can cause fatigue while loose-fitting gloves can be hazardous. Measure the circumference of your hand around the palm area. This measurement, in inches, is closest to your actual glove size. For example, 7" is equal to a size 7 glove. Always select the right size glove from the safety supply cabinet. Dispose of chemically resistant gloves in accordance with the established protocols at your office.

4.0 Guidelines

4.1 Hand Protection—Performance Characteristics as Listed by the Manufacturer

4.1.1 Leather or Kevlar gloves should be used as appropriate to prevent cuts, lacerations, abrasions, and punctures. Chemically resistant gloves such as neoprene or nitrile rubber will be issued to employees

who are likely to come into direct contact with chemicals. When selecting chemically resistant gloves, AECOM will review the manufacturer's data tables regarding degradation of the glove material when exposed to the chemicals of concern, penetration of the chemicals of concern through imperfections in the gloves, and permeation (breakthrough times) of the chemicals of concern through the glove material.

- PPE must be provided to protect a worker's skin from harmful substances that may injure the skin on contact or may adversely affect a worker's health if it is absorbed through the skin.
- Employees shall wear appropriate gloves or mitts to protect their hands from workplace hazards, including hazardous material, heat, cold, abrasion, and sharp edges.
- Vinyl coated or leather gloves are good for providing protection while handling wood or metal objects.
- Inspect and maintain hand PPE regularly. If in doubt about the selection or need for glove or hand PPE, consult your safety supplier, Material Safety Data Sheet (MSDS), or local SH&E office.

4.1.2 DO:

- Inspect hand PPE for defects before use.
- Wash all chemicals and fluids off gloves before removing hand PPE.
- Use gloves that fit properly.
- Use the proper hand PPE for the job.
- Follow manufacturer's instructions on the care and use of the hand PPE you are using.
- Cover exposed skin (no gap between the sleeve and the hand).

4.1.3 DON'T:

- Wear gloves when working with moving machinery (gloves can get tangled or caught).
- Wear hand PPE with metal parts near electrical equipment.

S3NA-208-WI6 Protective Clothing Fact Sheet

1.0 Introduction

1.1 Some projects require job tasks where there is a recognized hazard of injury to a person if protection is not provided to the legs or body of the individual. These hazards are effectively mitigated through the use of proper personal protection equipment (PPE).

1.2 Staff will dress appropriately for the climate & weather (cold, heat, wet, dry)

1.3 Supervisors and staff are responsible for confirming that crews have the limb and body protection necessary to ensure their safety. This may include, as required by the specific job task:

1.3.1 Leg chaps.

1.3.2 Gloves (leather, cotton, latex, chemical-resistant, etc.).

1.3.3 Fire-retardant overalls.

1.3.4 High visibility vests.

1.3.5 Retro-reflective strips.

1.3.6 Chemical resistant suits or overalls.

2.0 Chemically Resistant Clothing

2.1 Whenever there is a potential for chemical splashing, chemically resistant, disposable clothing, such as a coated-Tyvek coverall or apron, will be worn. Examples of when such clothing may be required include:

2.1.1 Cleaning of small spills.

2.1.2 Washing and rinsing of the printing presses.

2.1.3 Nonroutine tasks involving the use of chemicals.

2.1.4 The transfer of large quantities of chemicals from large containers to smaller ones.

2.2 The process for selecting chemically resistant clothing will be similar to that described for the selection of chemically resistant gloves. The need for chemically resistant clothing will be determined by your health and safety coordinator. The SH&E coordinator will issue the required clothing to you. If an item is routinely used by a specific group of employees within one department, the department manager can assume the purchasing responsibilities.

3.0 Types of Chemically Resistant Clothing

Like gloves, the objective of whole body protection is to separate the person from a contaminating or hazardous material. Disposable garments, such as Tyvek coveralls or aprons, provide this type of barrier. Uncoated Tyvek coveralls are made of a porous fabric and are designed to prevent contact with particulates. Coated Tyvek coveralls provide a nonporous barrier to protect the worker from chemical splash and vapors. Protective aprons are made from nitrile or neoprene rubber like that used to make chemically resistant gloves.

4.0 Proper Fit/Cleaning/Disposal

Before donning a protective coverall, inspect it for rips or tears. Promptly remove any protective clothing that becomes ripped or torn during a particular task. Be sure the garment fits properly. The garment-to-glove seam will be taped when there is a potential for liquids to directly contact the skin if the arm of the suit shifts upward.

Single-use garments, such as Tyvek coveralls, will be disposed of in accordance with the environmental protocols at your office. Some clothing, such as rubber aprons, is meant for repeated use. Wipe down the apron using soap and water to remove any remaining liquids or residues.

5.0 Guidelines

5.1 High-Visibility Safety Apparel – ANSI/ISEA 107-104

5.1.1 “High visibility safety apparel” means personal protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage and that meets the Performance Class II or III requirements of the ANSI/and CSA standards.

5.2 Chemically Resistant Protective Clothing – Performance Characteristics as Listed by the Manufacturer

5.2.1 Whenever there is a potential for chemical splashing, disposable, chemically resistant clothing, such as a coated Tyvek coverall or apron will be worn. Examples of when such clothing may be required include the cleaning of small spills, nonroutine tasks involving the use of chemicals, and the transfer of large quantities of chemicals from large containers to smaller ones. The process for selecting chemically resistant clothing will be similar to that described for the selection of chemically resistant gloves.

5.3 The following standards apply to limb and body protection equipment:

Association	Standard
BC WCB	WCB Standard PPE 1-1997 Leg Protective Devices WCB Standard Personal Protective Equipment Standard 2-1997, High Visibility Garment
Canadian Standards Association (CSA)	CAN/CSA-Z96-02, High-Visibility Safety Apparel

5.4 All employees shall wear suitable clothing for the existing conditions and the work being performed.

5.5 If there is a specific need to be visible to the passing public, to machine operators, or to other crew members, high visibility vests shall be worn (and retro-reflective striping on arms and legs at night).

5.6 If there is a danger that a worker’s hand, arm, leg, or torso may be injured, an employer ensure that the worker wears properly fitting hand, arm, leg, or body protective equipment that is appropriate to the work, the work site, and the hazards identified.

5.7 In the presence of a flash fire or electrical equipment flashover hazard, staff must wear flame resistant outerwear (overalls) and use other protective equipment appropriate to the hazard.

5.8 Where there is a risk of drowning, a personal flotation device or lifejacket must be worn, as per the applicable regulations.

5.9 Rubber gloves and rubber boots must be worn when working around electricity (waders must also be worn for electro fishing where there is an electric current passing through the water).

5.10 When wearing flame resistant outerwear (coveralls), staff must not wear against their skin clothing that is made of a fabric or material that will melt when exposed to heat (e.g., fleece).

S3NA-209-PR Project Hazard Assessment and Planning

1.0 Purpose and Scope

1.1 AECOM and its employees must assess all projects and sites for anticipated hazards and plan to mitigate those hazards through a series of controls. This procedure establishes the requirements and provides the tools for this process of pre-work planning and risk assessment.

1.2 The objective is to enhance SH&E performance, to reduce losses due to injury, illness, property damage, or environmental impairment incident, and maintain regulatory compliance.

1.3 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 **Task Hazard Analysis (THA):** A THA *(S3NA-209-FM Task Hazard Analysis)* is a technique for evaluating the component parts of any work method or procedure for the purpose of:

2.1.1 Identifying the SH&E hazards and risks connected with the work;

2.1.2 Identifying and implementing control methods to eliminate, nullify, or reduce to a minimum the consequences of such hazards and risks; and,

2.1.3 Evaluating the effectiveness of risk control measures and making modifications as needed.

2.2 **Plan:** A comprehensive document which outlines at length, in a report-style format, all of the operational controls necessary to mitigate the anticipated hazards for a project's sites and activities. AECOM will use two established planning templates:

2.2.1 Health and Safety Plan (HASP) for work involving environmental contaminants (e.g., HAZWOPER), or

2.2.2 Safe Work Plan (SWP) for all other SH&E planning documentation.

2.3 **High Risk Classification:** Any task where the identified hazard, if further controls are not implemented, has a combined severity and probability that is either catastrophic or very likely, or some combination thereof (but where the result is not minor or rare). (Refer to *S3NA-209-WI Hazard Identification, Classification and Controls* for further details.) The following may be classified as High Risk; consult the SH&E Department for clarification:

2.3.1 Confined space,

2.3.2 HAZWOPER,

2.3.3 Contaminated sites,

2.3.4 Radiation,

2.3.5 Lead,

2.3.6 Asbestos,

2.3.7 AECOM camp or construction sites,

2.3.8 Competent person requirements,

2.3.9 Sites with potential for client system failures,

2.3.10 Significant physical hazards (e.g., fall, water, equipment, etc.),

2.3.11 Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO) Ops

2.3.12 Potential for significant environmental incident, or

2.3.13 Sites with medical surveillance requirements.

3.0 Attachments

3.1 S3NA-209-FM Task Hazard Analysis

3.2 S3NA-209-WI Hazard Identification, Classification and Controls

3.3 S3NA-209-TP1 Safe Work Plan

3.4 S3NA-209-TP2 Health and Safety Plan Template

3.5 S3NA-209-TP2a HASP Assistant

3.6 S3NA (US)-209-TP2b HASP Chemical Guidelines

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **SH&E Department** responsibilities include the following:

- Assisting project management personnel to identify any necessary project-specific SH&E planning documentation required for all new and ongoing projects.
- Assisting in the preparation of necessary SH&E planning documentation.
- Reviewing and approving all SH&E planning documentation prior to its implementation for field activities.

4.1.2 **Project Manager (or their designee)** responsibilities include the following**:**

- Confirming the completion of SH&E planning documentation (THA, SWP or HASP), as required, that addresses the full range of project activities, safety risks and that all requirements and procedures are implemented and enforced during the field activities.
- Confirming SH&E requirements and Standard Operating Procedures are implemented successfully, including but not limited to:
    - Subcontractor evaluations
    - SH&E Training
    - Personal Protective Equipment
    - First aid and emergency response
    - Client requirements
- Contacting the SH&E Department to discuss SH&E planning documentation needs/ requirements at the start of each new project involving AECOM and at designated intervals (not to exceed one year) or when changes occur to the work operations or work location/ conditions, when work activities are modified/ changed, or when additional tasks are added to the work scope.
- Confirming that all SH&E planning documentation (draft or final) has been reviewed and approved by the **SH&E Department** prior to its use by AECOM personnel, or prior to release to outside agencies or organizations.
- Making appropriate resources available to protect the health and safety of AECOM employees, the environment and to comply with occupational health and safety, and environmental legislation and for the effective implementation of this procedure.

4.1.3 **Employee** responsibilities include the following**:**

- Participating in hazard identification training at the commencement of their employment with AECOM or prior to commencing field preparations.
- Reviewing and understanding the potential hazards and controls of the project before work commences.
- Complying with all required controls as identified in the THA and/or associated safety plans.

4.2 Procedure

4.2.1 All projects must have a completed Task Hazard Analysis at a minimum. In addition, all field projects must have an Emergency Response Plan. These two documents may be all a project needs for administrative safety requirements, depending on the hazards identified.

4.2.2 The table below helps illustrate the further planning documentation which may be required, depending on the hazards identified in the THA.

Task Hazard Analysis	• Most basic requirement • All sites and tasks including walk-through site visits	• Prepared by employees/supervisors • Confirmed by **Project Manager** or designee
Safe Work Plan (SWP)	• High risk activities • Complex projects with multiple stakeholders, long-duration • AECOM controlled sites • Non-HAZWOPER	• SH&E Department review and guidance required
Health & Safety Plan (HASP)	• HAZWOPER regulated sites and all other sites with potential chemical exposures • Client directed	• Only for sites with potential chemical exposures and Hazardous Waste Operations and Emergency Response (HAZWOPER) • SH&E Department review and guidance required

4.3 Task Hazard Analysis (THA)

4.3.1 A THA must be completed for all (routine and non-routine) tasks and sites.

4.3.2 A THA must be completed prior to the commencement of work so that all controls can be planned, equipment purchased/inspected, and staff adequately trained for the hazards.

4.3.3 The THA must identify all known and potential physical hazards as well as potential occupational exposures for noise, biological, or chemical contaminants, and environmental issues.

4.3.4 The assessment must include the identification and implementation of control measures to prevent worker injury, exposure and contamination.

4.3.5 Hazard identification and risk assessment must be ongoing. This requires the project team to consider the timing and frequency of the THA reviews, as affected by the following types of issues:

- The need to determine whether existing risk controls are effective and adequate,
- The need to respond to new hazards,
- The need to respond to changes that AECOM itself has made,
- The need to respond to feedback from monitoring activities, incident investigation, emergency situations or the results of testing of emergency procedures,
- Changes in legislation,
- External factors, e.g. emerging occupational health issues,
- Advances in control technologies,
- Changing diversity in the workforce, including contractors, or
- Changes proposed by corrective and preventive action.

4.3.6 THAs will be prepared by the supervisor and employee(s) directly responsible for the work.

4.3.7 Final drafts shall be submitted for review and approved by the **Project Manager** prior to commencing work activities.

4.3.8 AECOM subcontractors will prepare their own THA and submit them to the **Project Manager** for review and acceptance prior to the start of subcontracted work activities. These reviews are not approvals, and do not relieve the subcontractor for being responsible for their own safety on the project site.

4.3.9 The **Project Manager** shall maintain all approved/signed THA copies (including revisions) in the project files and make them available during project audits and for use during the training of new project personnel.

4.3.10 THAs shall be used to facilitate project SH&E tailgate meetings. Comments and suggestions relative to the completed THA shall be encouraged from attendees and incorporated into revised documents. Any modifications must be reviewed as corrective measures to confirm that no new hazards are created.

4.3.11 THAs that have been found to be inadequate or incomplete should be suitably annotated by the project management team to be used as lessons learned.

4.3.12 The THA will be reviewed by all personnel involved in the task, as well as any visitors or additional or new crews brought on to perform the work. This is a minimum of a one-time review and signature with supplement reviews conducted on a pre-determined basis by the **Project Manager** or their designee.

4.4 Planning Documents

4.4.1 An SH&E plan (in addition to the THA) may be required in the following circumstances:

- Tasks with high risk classification designations,
- Tasks with medium risk classification designations, where circumstances warrant, and/or
- Complex AECOM controlled projects where it is necessary to communicate to numerous stakeholders and clearly define all controls including emergency response, incident reporting, inspections, security requirements, or other details.

4.4.2 The planning document shall be titled a Safe Work Plan UNLESS it involves Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements, then it will be called a Health and Safety Plan (HASP) and will clearly address the specific requirements associated with the hazardous waste exposures.

4.4.3 Specific plan needs will vary for each project. In some cases it may be acceptable to utilize general (non-site/non-project-specific) SH&E procedural documentation prepared for the type of work activities being performed, while in others project/site/activity-specific documentation is required to be developed as part of the project planning process. The specific operational needs of individual projects will be determined as part of the initial coordination between the **Project Manager** and the **SH&E Department.**

4.4.4 The following requirements apply to all AECOM SH&E planning documentation:

- Preparation of the SH&E documentation can be performed by a member of the project team or the **SH&E Department**.
- All SH&E documentation (including draft versions of documents) will be approved by the **SH&E Department** prior to release for outside agency review (e.g., clients, regulatory agencies, etc) and prior to its field implementation.
- All changes to approved SH&E documentation require concurrence from a designated member of the **SH&E Department.** This includes those made in response to changing field conditions or operational requirements and those made in response to regulator/client comments. Any written responses made to regulator/client comments also must be reviewed and approved by the **SH&E Department**.
- The SH&E documentation for any project lasting twelve (12) months or longer will be reviewed at periodic intervals determined by the **SH&E Department**, but at least annually. The SH&E Representative will review the changes and determine whether modifications are required to the existing SH&E planning documentation. This confirms that the documentation continues to reflect the current project scope and knowledge of site conditions, and that any revised regulatory requirements are properly addressed. The **Project Manager** will provide a master copy of the SH&E documentation to be maintained on site for reference by personnel, together with copies of any required SH&E-related records or operational documentation. The master copy must be current in all respects, and will include any changes or modifications made as work progresses.
- **Project Managers** will confirm that ALL plans and THAs have been reviewed with project personnel prior to implementation of field work. Sign-off and concurrence is mandatory and to be kept in the project records.

5.0 Records

5.1 Completed THAs, SWPs, and HASPs will be filed in their appropriate project file.

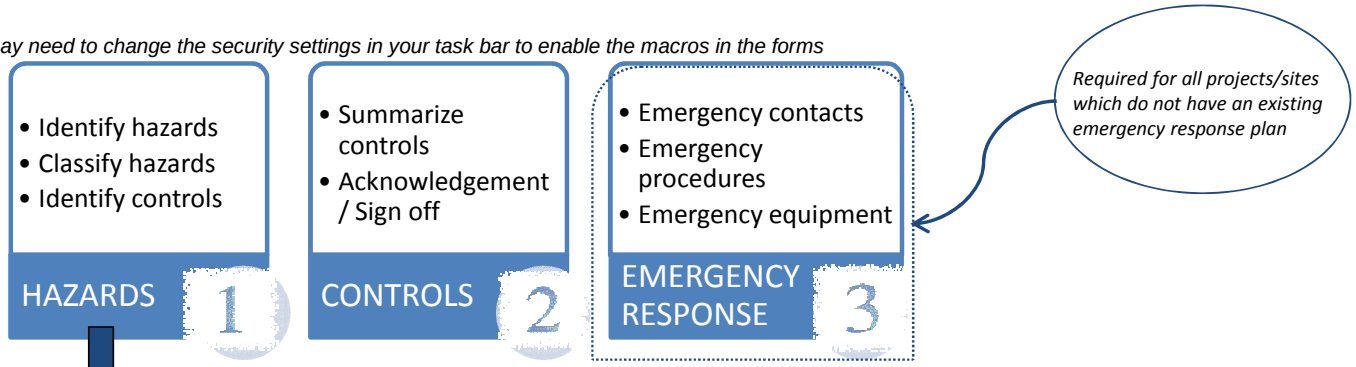
6.0 References

6.1 None

S3NA-209-FM TASK HAZARD ANALYSIS

This THA (worksheets 1 & 2) must be completed for all field work.

***you may need to change the security settings in your task bar to enable the macros in the forms*



Hazard Identification

- **Natural (biological)** – bacteria, viruses, insects, plants, birds, and animals
- **Chemical** – exposure to chemical toxins, acute or chronic, by way of inhalation, injection, ingestion or absorption
- **Physical** – slipping/tripping, being struck by moving objects, repetitive movement, strains from lifting
- **Environmental** – extreme heat or cold, noise, vibrations, magnetic fields, pressure extremes and air quality
- **Psychosocial** – stress, violence

Hazard Classification

- Considers the potential severity of the outcome
- Considers the likelihood of the occurrence
- Used to prioritize and determine extent of required controls

Controls

- **Elimination (first)** – choose a different process; modify an existing process; substitute with less hazardous substance
- **Engineering Controls (second)** – physically alter the plant or equipment design in order to circumvent possible hazards; place guards on machinery
- **Administrative Controls (third)** – change the job procedure and/or process; limit the amount of time an individual is in a hazardous environment through job rotation
- **Personal Protective Equipment (last option)** – provide employees with direct physical protection while working in a hazardous environment

S3NA-209-FM TASK HAZARD ANALYSIS

AECOM	Project Name:	Project Number:	Client:
	Supervisor:	Project Manager:	Location:
	THA Developed By:		Date:
TASK HAZARD ANALYSIS	Task Name:	Regularity of Task: One-time ☐ Routine ☐	

	Job Event Sequence *(List the major steps of the individual task)*	Hazards *(List primary hazards)*	Hazard Classification (*before controls*) Severity	Likelihood	Risk Level	Hazard Classification	Controls *(List controls that AECOM will implement)*
1					0		
2					0		
3					0		
4					0		
5					0		
6					0		
7					0		
8					0		
9					0		
10					0		
11					0		
12					0		
13					0		
14					0		
15					0		
16					0		
17					0		

Hazard Classification Guidelines

Severity

1 Remote potential for injury, property damage/$ loss, or env damage

2 Potential for minor first aid injury, property damage/$ loss, or environmental damage

3 Potential for moderate personnel injuries, including medical treatment, property damage/$ loss, environmental damage, or negative public impact

4 Potential for a serious injury, major property damage/$ loss, serious impact to the environment, and public health

5 Catastrophic damage to people, property/equipment, environment, or public health

Likelihood of Occurrence

1 Very unlikely

2 Unlikely

3 Likely

4 Very likely

5 Certain

Hazard Classification Matrix

Likelihood \ Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Risk Level: Low / Medium / High

Risk Level = Likelihood x Severity

S3NA-209-FM TASK HAZARD ANALYSIS

AECOM	Project Name:	Project Number:	Client:
	Supervisor:	Project Manager:	Location:
	THA Developed By:		Date:
SUMMARY OF CONTROLS	Task Name:		Regularity of Task: One-time ☐ Routine ☐

Personal Protective Equipment (*check all that apply*)	Air Monitoring (reference HASP monitoring plan)			
☐ CSA/ANSI Safety-Toed Boots (Leather or Rubber)	☐ No air monitoring required		☐ Air monitoring required (*see procedures below*)	
☐ CSA/ANSI Safety Glasses or Goggles	Parameter	Location/Monitoring Interval	Response/Action Levels	Response Activity
☐ CSA/ANSI-approved Hard Hat				
☐ CSA/ANSI Type II/III Reflective Traffic Safety Vest				
☐				
☐				
☐				
☐				
☐				
☐				

Required Training (associated with this THA)	Key SOPs (associated with this THA)		Client & Other Requirements
1			
2			
3			
4			
5			
6			

Acknowledgement / Signatures

Project Manager / Supervisor (signature): Date:

Name	Signature	Company	Date	Name	Signature	Company	Date

S3NA-209-FM TASK HAZARD ANALYSIS

AECOM	Project Name:	Project Number:	Client:
	Supervisor:	Project Manager:	Location:
	THA Developed By:		Date:
EMERGENCY RESPONSE PLAN	Task Name:	Regularity of Task: One-time ☐ Routine ☐	

Check-in Procedures

Check-in Times	Check-in Person	Phone Number	Cell Phone Number
Alternate:			

Emergency Coordinators / Key Personnel

Name	Title	Phone Number	Cell Phone Number
	On-site First Aid Attendant		
	Project Manager		
	Site Supervisor		
	Regional SH&E Manager		
	Incident Reporting Line (BY THE END OF THE SHIFT)	1.800.348.5046	
	Client Contact		

Emergency Agencies / Public Utilities

Name	Type	Details	Phone Number
	Police		
	Fire		
	Ambulance		
	Nearest Hospital / Clinic		
	Poison Control Center		
	Pollution / Environmental		

Emergency Equipment & Supplies

- ☐ First Aid Kit - Type:
- ☐ Blankets / Survival:
- ☐ Fire Extinguishers Type:
- ☐ Communication Device
- ☐ Vehicle Safety Equipment
- ☐ Eye Wash
- ☐ Spill Kit
- ☐ Other:

Other Emergency Plan Details

S3NA-209-WI Hazard Identification, Classification & Controls

The following information is intended to guide staff in completing the Task Hazard Analysis.

1.0 Hazard Identification

1.1 Hazards occurring in the workplace may be:

1.1.1 Natural (biological) – bacteria, viruses, insects, plants, birds, and animals

1.1.2 Chemical – exposure to chemical toxins, acute or chronic, by way of inhalation, ingestion or absorption

1.1.3 Physical – slipping/tripping, being struck by moving objects, repetitive movement, strains from lifting

1.1.4 Environmental – extreme heat or cold, noise, vibrations, magnetic fields, pressure extremes and air quality

1.1.5 Psychosocial – stress, violence

1.2 When identifying hazards, remember to consider the following:

1.2.1 Routine and non-routine activities;

1.2.2 Activities of all persons having access to the workplace (including contractors and visitors);

1.2.3 Human behavior, capabilities and other human factors;

1.2.4 Identified hazards originating outside the workplace capable of adversely affecting the health and safety of persons under the control of AECOM;

1.2.5 Hazards created in the vicinity of the workplace by work-related activities under the control of AECOM;

1.2.6 Infrastructure, equipment and materials at the workplace, whether provided by AECOM or others;

1.2.7 Changes or proposed changes within AECOM;

1.2.8 Modifications to the OH&S management system, including temporary changes, and their impacts on operations, processes, and activities;

1.2.9 Any applicable legal obligations relating to risk assessment and implementation of necessary controls;

1.2.10 The design of work areas, processes, installations, machinery/equipment, operating procedures and work organization, including their adaptation to human capabilities.

1.3 It is often useful to break the job or task down into a sequence of steps (“Job Event Sequence”) to help identify the primary hazards which may be encountered when you complete a job task. The “events” identified should be only as detailed as required to identify the primary hazards (e.g., drive to worksite; inspect bridge decking; take water samples, etc.)

2.0 Hazard Classification

Once identified, all hazards should be classified based on both their potential outcome and the probability of its occurrence as follows:

2.1 Severity

2.1.1 Insignificant – no injuries, low environmental/financial impact = 1

2.1.2 Minor – first aid required, some environmental/financial impact = 2

2.1.3 Moderate – medical treatment required, contained environmental impact, high cost = 3

2.1.4 Major – serious injury, severe environmental damage, major cost = 4

2.1.5 Catastrophic – death, environmental disaster, extensive damage, extended downtime for company or site, huge cost = 5

2.1.6 Likely – Likelihood of incident occurring sometime during the work activity = 4

2.1.7 Very Likely – Likelihood of incident happening often during course of the work activity = 5

2.2 High Hazard – Practice or condition whose sum of severity and probability is greater than or equal to 8.

2.3 Medium Hazard – Practice or condition whose sum of severity and probability is equal to either 6 or 7.

2.4 Low Hazard – Practice or condition whose sum of severity and probability is less than or equal to 5.

2.5 Inputs to the hazard classification can include, but are not be limited to, information or data on the following:

2.5.1 Details of location(s) where work is carried out,

2.5.2 The proximity and scope for hazardous interaction between activities in the workplace,

2.5.3 Security arrangements,

2.5.4 The human capabilities, behavior, competence, training and experience of those who normally and/or occasionally carry out hazardous tasks,

2.5.5 Toxicological data, epidemiological data and other health related information,

2.5.6 The proximity of other personnel (e.g. cleaners, visitors, contractors, the public) who might be affected by hazardous work,

2.5.7 Details of any work instructions, systems of work and/or permit-to-work procedures, prepared for hazardous tasks,

2.5.8 Manufacturers' or suppliers' instructions for operation and maintenance of equipment and facilities,

2.5.9 The availability and use of control measures (e.g. for ventilation, guarding, personal protective equipment (PPE), etc.),

2.5.10 Abnormal conditions (e.g. the potential interruption of utility services such as electricity and water, or other process failures),

2.5.11 Environmental conditions affecting the workplace,

2.5.12 The potential for failure of plant and machinery components and safety devices or for their degradation from exposure to the elements or process materials,

2.5.13 Details of access to, and adequacy/condition of emergency procedures, emergency escape plans, emergency equipment, emergency escape routes (including signage), emergency communication facilities, and external emergency support, etc.,

2.5.14 Monitoring data related to incidents associated with specific work activities,

2.5.15 The findings of any existing assessments relating to hazardous work activity,

2.5.16 Details of previous unsafe acts either by the individuals performing the activity or by others (e.g. adjacent personnel, visitors, contractors, etc.),

2.5.17 The potential for a failure to induce associated failures or disabling of control measures,

2.5.18 The duration and frequency at which tasks are carried out,

2.5.19 The accuracy and reliability of the data available for the risk assessment,

2.5.20 Any legal and other requirements which prescribe how the risk assessment has to be performed or what constitutes an acceptable risk, e.g. sampling methods to determine exposure,

2.5.21 Use of specific risk assessment methods, or permissible exposure levels.

2.6 Considering all of the hazards associated with the job task, provide an overall classification for the job/task in the Task Hazard Analysis. This classification can be used as a guideline for prioritizing and determining the level and number of controls required.

2.7 In considering the hazard, there are numerous tools to help you classify the risk of an incident. The hazard classification matrix, below, is one such tool:

Hazard classification matrix

Severity		Probability				
		Very Likely	Likely	Possibly	Rarely	Unlikely
		5	4	3	2	1
Catastrophic (death, environmental disaster, extensive damage, extended downtime for company or site, huge cost)	5	10	9	8	7	6
Major (serious injury, severe environmental damage, major cost)	4	9	8	7	6	5
Moderate (medical treatment required, contained environmental impact, high cost)	3	8	7	6	5	4
Minor (First aid required, some environmental/financial impact)	2	7	6	5	4	3
Insignificant (no injuries, low environmental/financial impact)	1	6	5	4	3	2

Probability: How likely is it to happen?	
Very Likely	Likelihood of incident happening often during course of the work activity
Likely	Likelihood of incident occurring sometime during the work activity
Possibly	Possibility of incident occurring sometime during the work activity
Rarely	Incident will rarely occur during the work activity
Unlikely	Incident will probably not occur during the work activity

Hazard Classification:

HIGH

MED

LOW

3.0 Hazard Control

Once identified and classified, all hazards must have an effective means of control which can be accomplished by using one or more of the following means of control:

3.1 Elimination/Removal (first)

3.1.1 Choose a different process

3.1.2 Modify an existing process

3.1.3 Substitute with less hazardous substance

3.2 Engineering Controls (second)

3.2.1 Physically alter the plant or equipment design in order to circumvent possible hazards

3.2.2 Place guards on machinery

3.2.3 Construct catwalks to divert traffic from hazardous areas

3.3 Administrative Controls (third)

3.3.1 Affect the job procedure and/or process in order to reduce hazards

3.3.2 Implement rules to change unsafe behaviors

3.3.3 Limit the amount of time an individual is in a hazardous environment through job rotation

3.4 Personal Protective Equipment (fourth)

3.4.1 Provide employees with direct physical protection while working in a hazardous environment

3.5 All identified hazards must have an effective means of control to minimize the potential for an incident; however, hazards with higher classifications should be addressed first and will undoubtedly require a variety of the types of controls mentioned above.

S3NA-209-TP1 Safe Work Plan

[PROJECT NAME]

[PROJECT LOCATION]

Prepared for:

[Client]
[Address]
[City, State, Zip]

Prepared by:

AECOM
Safety, Health, and Environmental Department
[Address]
[City, State, Zip]

[Month XX, 20XX]

Project No.:[00000.00]

Safe Work Plan Expiration Date:

[insert date 1 year from approval date]

Safe Work Plan
Project Name
Project Location

By signing below, I acknowledge that I have reviewed and hereby approve the Safe Work Plan for the [insert project name]. This procedure has been written for the exclusive use of AECOM, its employees, and its subcontractors.

***Prepared by*:**

[Preparers Name]
[Preparers Title]
[Preparers Phone Number]

Date

Reviewed by:

[Safety Prof Name]
[Safety Prof Title]
[Safety Prof Phone Number]

Date

Accepted by:

[Proj Mgr Name]
Project Manager
[Proj Mgr Phone Number]

Date

EXECUTIVE SUMMARY

The purpose of this Safe Work Plan (SWP) is to address health and safety concerns related to AECOM-managed activities at the [site name] site, located at [site address] in [city, state]. The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees and the scope of services are discussed herein. The document is intended to identify known potential hazards and to facilitate communication and control measures to prevent injury or harm. Additionally, provisions to control the potential for environmental impact from these activities are included where applicable.

[Insert brief scope of services and responsible party]

AECOM will be…

Subcontractor X will be…

Subcontractor Y will be…

The primary physical hazards that may be encountered include:

[list PRIMARY physical hazards]

The chemical hazards that may be encountered include:

[list anticipated chemical hazards]

All staff are bound by the provisions of this SWP and are required to participate in a preliminary project safety meeting to familiarize them with the anticipated hazards and respective onsite controls. The discussion will cover the entire SWP subject matter, putting emphasis on critical elements of the plan; such as the emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, daily tailgate safety meetings will be held to discuss the anticipated scope of work, required controls, incident reporting, and any lessons learned or concerns from the previous day; to identify new hazards and controls; and to review the results of inspections.

Attachments

Attachment A	Task Hazard Analyses
Attachment B	Standard Operating Procedures
Attachment C	Client Required Health and Safety Guidelines

1.0 INTRODUCTION

This Safe Work Plan (SWP) addresses the requirements for AECOM and subcontractor personnel to conduct field activities to support the [Project Name, Scope of Work, and Location].

The requirements of this SWP apply to AECOM-managed operations only. No change to this SWP that could affect the health or safety of personnel, the community, or the environment may be made without prior approval of the AECOM Project Manager (PM) and the Safety, Health, and Environmental (SH&E) Professional.

1.1 Classification of Activities

1.1.1 The work activities addressed in this SWP are [describe the planned services] and do not meet the requirements for characterization as hazardous waste operations or emergency response (HAZWOPER) activities as defined in *S3NA-509-PR Hazardous Waste Operations and Emergency Response.*

1.2 Regulatory Requirements

1.2.1 This SWP meets the requirements and follows the OH&S legislative requirements in Canada and the guidelines established by the Federal Occupational Safety and Health Administration (OSHA):

- Code of Federal Regulation Title 29, Part 1910 (29 CFR Part 1910), Occupational Safety and Health Standards
- Code of Federal Regulation Title 29, Part 1926 (29 CFR Part 1926), Safety and Health Regulations for Construction
- [insert state or other requirements]

1.2.2 The requirements specified in this SWP also conform to AECOM's Corporate SH&E Program requirements as specified in AECOM's North America Operations SH&E Manual. Individual Standard Operating Procedures (SOPs) from this manual that are applicable to the work activities planned during this project may be found in Attachment B.

1.3 Project Safety and Health Organization

1.3.1 Project Manager [Insert Name, if available]

1.3.2 The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The PM will provide the **site supervisor** with work plans, staff, and budgetary resources that are appropriate to meet the safety needs of the project operations.

1.3.3 Site Supervisor [Insert Name, if available]

1.3.4 The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. The **PM** may act as the **site supervisor** while on site.

1.3.4.1 RESPONSIBILITIES

The site supervisor is responsible for:

- Discussing deviations from the work plan with the SSO and PM.
- Discussing safety issues with the PM, SSO, and field personnel.
- Assisting the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assisting the SSO with the implementation of this SWP and with ensuring compliance.
- Assisting the SSO with inspections of the site for compliance with this SWP and applicable SOPs.

1.3.4.2 Authority

The site supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this SWP and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the SWP pending consideration by the SSO, the Safety Professional, and the PM.

1.3.5 Employees

1.3.5.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the policies and procedures specified in the SWP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the SWP or other safety policies.
- Notifying the SSO, in writing, of unsafe conditions and acts.

1.3.5.2 Employee Authority

The safety and health authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this SWP or other safety policies are not being followed.
- The right to contact the SSO or the Safety Professional at any time to discuss potential concerns.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions.

2.0 SITE DESCRIPTION AND PLANNED WORK OPERATIONS

2.1 General Description

The [site name] site is located at [site address]. [Insert description. This should include any *significant* physical features of the site (i.e., terrain, buildings, size, location, bodies of water etc.)].

2.2 Planned Work Operations

[Provide a verbal description of the overall objective for what is being done for the job and what is supposed to be accomplished. This does not have to actually spell out the steps for the job, as that will be covered in the bullets below.]

- [Provide a bulleted list of the tasks that will be accomplished throughout the job]

3.0 HAZARD ASSESSMENT

3.1 Physical Hazards

[Discuss the specifics of hazards that will/may be encountered, like haz noise, heavy equip. etc... Limit the discussion to the scope and magnitude of the hazard on this job, don't discuss hazard control.]

See SWP Description and Assistance document for examples

3.2 Wildlife, Plant and Insect Hazards

Below is a series of tasks typically encountered on projects. While the text below may be used to describe your work, it must be elaborated on and sufficient detail included making it site specific.

See SWP Description and Assistance document for examples

3.3 Radiological Hazards

[Discuss any on-site radioactive materials that are environmental contaminants (ignore RAM in devices, etc. that we bring to site].

3.4 Ultraviolet Hazards

[The 2009 historical UV Index for the (Insert City here) area showed that worker's UV exposures were in the HIGH category beginning in March and lasting until November with worker's exposures in the EXTREME category from July through August. In 2009, (City Name) had 44 days in the HIGH category, 133 days in the VERY HIGH category, and 0 days in the EXTREME category. Workers performing field work outdoors may be susceptible to sunburn if not properly protected with sunscreen or protective clothing and hats. Skin can burn in minutes when the UV Index is VERY HIGH.] Protective measures are advisable.

3.5 Weather Hazards

The Site Safety Officer will be attentive to daily weather forecasts for the project area each morning. Predicted weather conditions of potential field impact are to be included in safety briefings and the Task Hazard Analysis (THA) for that day. Weather changes should initiate a review and updates (THA) as necessary.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events.

3.6 Other Hazards

[Address anything not already covered that might be significant, like UXO. Don't provide control procedures here (that's for Section 5.0), just discuss what's there and what it can do].

3.7 Hazard Analysis

Task Hazard Analyses (THAs) have been completed for all tasks identified in the Scope of Work (Attachment A):

[List all Tasks which have been addressed in THAs]

Unanticipated Work Activities/Conditions

As a result of unanticipated work activities or changing conditions, additional THAs may be required. All additional THAs will be reviewed and approved by the SH&E Professional.

3.8 Task-Specific SH&E Procedures

Personnel may be exposed to a variety of chemical, physical, and radiological hazards resulting from task or equipment-specific activities. The controls for many of these hazards are discussed in SOPs found in the **Series 300 to 500** of the North America SH&E SOPs.

	SOP#	TITLE		SOP#	TITLE
S3NA 300 Series Field (Common)			S3NA 500 Series Industrial Hygiene		
☐	S3NA-301-PR	Confined Spaces	☐	S3NA-501-PR	Asbestos
☐	S3NA-302-PR	Electrical, General	☐	S3NA-502-PR	Benzene
☐	S3NA-303-PR	Excavation and Trenching	☐	S3NA-503-PR	Blood borne Pathogen Program
☐	S3NA-304-PR	Fall Protection	☐	S3NA-504-PR	Cadmium
☐	S3NA-305-PR	Hand and Power Tools	☐	S3NA-505-PR	Cold Stress Prevention
☐	S3NA-306-PR	Highway and Road Work	☐	S3NA-506-PR	Compressed Gases
☐	S3NA-307-PR	Housekeeping, Worksite	☐	S3NA-507-PR	Hazardous Materials Communication / WHMIS
☐	S3NA-308-PR	Manual Lifting, Field		S3NA-508-PR	Hazardous Materials Handling and Shipping
☐	S3NA-309-PR	Mobile or Heavy Equipment	☐	S3NA-509-PR	Hazardous Waste Operations and Emergency Response Activities
☐	S3NA-310-PR	Rigging, Hoisting, Cranes and Lifting Devises	☐	S3NA-510-PR	Hearing Conservation Program
☐	S3NA-311-PR	Scaffolding	☐	S3NA-511-PR	Heat Stress Prevention
☐	S3NA-312-PR	Ladders and Stairways	☐	S3NA-512-PR	Laboratory Safety
☐	S3NA-313-PR	Wildlife, Plants and Insects	☐	S3NA-513-PR	Lead
☐	S3NA-314-PR	Working Alone & Remote Travel	☐	S3NA-514-PR	Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO)
☐	S3NA-315-PR	Water, Working Around	☐	S3NA-515-PR	Nanotechnology
			☐	S3NA-516-PR	Radiation Safety Programs
S3NA 400 Series Field (Uncommon)			☐	S3NA-517-PR	Radiation, Non-Ionizing
☐	S3NA-401-PR	Aircraft Charters	☐	S3NA-518-PR	Radiation, Gauge Source program
☐	S3NA-402-PR	All Terrain Vehicles (ATVs)	☐	S3NA-519-PR	Respiratory Protection Program
☐	S3NA-403-PR	Avalanches	☐	S3NA-520-PR	Spill Response, Incidental
☐	S4NA(US)-404-PR	Commercial Motor Vehicles			
☐	S3NA-405-PR	Drilling and Boring			
☐	S3NA-406-PR	Electrical Lines, Overhead			
☐	S3NA-407-PR	Electro-fishing			
☐	S3NA-408-PR	Elevated Work Platforms and Aerial Lifts			
☐	S3NA-409-PR	Forklifts (operation of)			
☐	S3NA-410-PR	Hazardous Energy Control			
☐	S3NA-411-PR	Machine Guarding			
☐	S3NA-412-PR	Powder-Actuated Tools			
☐	S4NA(US)-413-PR1	Process Safety Management			
☐	S4NA(US)-414-PR	Railway Sites			
☐	S4NA(US)-415-PR	RCRA Regulated Facilities			
☐	S3NA-416-PR	Tunnel and Underground Work			
☐	S3NA-417-PR	Utilities, Underground			
☐	S3NA-418-PR	Welding, Cutting and Other Hot Work			
☐	S3NA-419-PR	Water, Marine Operations, Boating			
☐	S3-NA420-PR	Water, Underwater Diving			

4.0 HEALTH AND SAFETY REQUIREMENTS

4.1 Site-Specific Safety Training

All AECOM personnel performing activities at the site will be trained in accordance with *S3NA-003-PR SH&E Training*. All personnel are required to remain current in all of their required training and evaluate their need for additional training when there is a change in work. In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training developed for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager. Any additional required training that is completed will be documented and tracked in the project files.

4.2 Competent Person Training Requirements

In order to complete the planned scope of work, an (OSHA or OH&S conformance) competent person must be designated to perform the required daily on site inspections of operations and/or equipment. The competent person may be an AECOM (if responsible for supervising that activity) or the subcontractor's employee. Designated competent person(s) for this project are shown in Table 4-2:

Table 4-2: Task-Specific Competent Persons

Employee Name	Organization	Area of Competency
		[insert other requirements or delete rows]

Note: The training requirements for competent persons are specified in the indicated SOPs and/or *S3NA-202-PR Competent Person Designation*. By identifying an employee as a "competent person", that person has now been authorized to take prompt corrective measures to eliminate hazards.

4.3 Tailgate Meetings

Prior to the commencement of daily project activities, a tailgate meeting will be conducted by the SSO to review the specific requirements of this SWP, applicable THA. Attendance at the daily tailgate meeting is mandatory for all employees at the site covered by this SWP and must be documented on the attendance form. All safety training documentation is to be maintained in the project file by the SSO.

4.4 Hazard Communication

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this SWP and their properties, hazards, and associated required controls will be communicated to all affected staff and subcontractors.

In addition, any employee or organization (contractor or subcontractor) intending to bring any hazardous material onto this AECOM-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for review and filing (the SSO will maintain copies of all MSDS on site). MSDS may not be available for locally obtained products, in which case some alternate form of product hazard documentation will be acceptable in accordance with the requirements of *S3NA-507-PR Hazardous Materials Communication/WHMIS*.

All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDS.

All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Attachment B provides copies of MSDS for those items planned to be brought on site at the time this SWP is prepared. This information will be updated as required during site operations.

4.5 Confined Space Entry

The SSO/site supervisor shall identify all potential confined spaces in accordance with S3NA-*301-PR Confined Spaces*. In addition; the SSO/site supervisor will inform all employees of the location of onsite confined spaces and their associated security controls and procedures.

4.6 Hazardous, Solid, or Municipal Waste

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable federal, state, provincial, territorial and/or local regulations. Consult the Regional SH&E Manager for further guidance.

4.7 General Safety Rules

All site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to *S3NA-001-PR Safe Work Standards and Rules* and *S3NA-103-PR General Housekeeping*.

4.8 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.9 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any AECOM site. Smoking, eating or drinking must be in an approved area.

4.9.1 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

Heat stress can be a significant field site hazard, particularly for nonacclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in SH&E 616 *Heat Stress Prevention Program*.

4.9.1.1 Responding to Heat-Related Illness

The guidance below will be used in identifying and treating heat-related illness.

Table 4.7.3 Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (*avoid drafts or sudden chilling*). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (*Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing*). • If the victim is conscious, it may be helpful to give him/her sips of water. • Transport victim to a medical facility ASAP.
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	• Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back w/the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

4.10 Personal Protective Equipment

The purpose of personal protective equipment (PPE) is to provide a barrier that which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. *S3NA-208-PR Personal Protective Equipment Program* lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs.

By signing this SWP the employee agree shaving been trained in the use, limitations, care and maintenance of the protective equipment to be used by the employee at this project. If training has not been provided, request same of the PM/SSO for the proper training before signing.

Table: 4-8 Personal Protective Equipment

Type	Material	Additional Information
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides
Boots	Leather	ANSI approved safety toe
Safety Glasses		ANSI Approved; ≥98% UV protection
Hard Hat		ANSI Approved; recommended wide-brim
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE: [list all applicable information or delete not applicable rows]		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas
Leather Gloves		If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Outer:	
Protective Chemical Coveralls	Inner: Outer:	
Protective Chemical Boots		
Face Shield		Safety glasses or goggles must be worn concurrently.
Apron		
Sunscreen	SPF 30 or higher	
Welding Equipment		
Cooling Vest		
Cold Weather Gear	Hard hat liner, hand warmers, insulated gloves	

4.10.1 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

Potable Water - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources.

Nonpotable Water - Nonpotable water may be used for hand washing and cleaning activities. Nonpotable water will not be used for drinking purposes. All containers of nonpotable water will be marked with a label stating:

Nonpotable Water
Not Intended for Drinking Water Consumption

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities (e.g., buckets with water and Alconox) at each work location. The use of water and hand soap (or similar substance) will be required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.11 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for AECOM personnel. Under no circumstances will any employee be present alone in a controlled work area. For areas not in controlled work areas, the procedures outlined in *S3NA-314-PR Working Alone Remote Travel* will be followed at all times.

4.12 Stop Work Authority

All employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions as outlined in *S3NA-002-PRStop Work Authority*. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected AECOM employees and subcontractors.

Upon issuing the stop work order, the SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

4.13 Client Specific Safety Requirements

The client has specified no additional health and safety requirements.

or

Client-specific health and safety guidelines are included in Attachment C of this SWP. All site activities must be performed in accordance with client-specific requirements and procedures.

[Or insert additional client-specific requirements]

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Mobile Phone**
[insert]	Client Contact	[insert]	[insert]
[insert]	Project Manager	[insert]	[insert]
[insert]	Site Supervisor	[insert]	[insert]
[insert]	Site Safety Officer	[insert]	[insert]
	Regional SH&E Manager		
[insert]	SH&E Professional	[insert]	[insert]
Incident Reporting	Incident Reporting Line	1-800-348-5046	
[insert]	Emergency Coordinator (EC)	[insert]	[insert]
	TDG/DOT/IATA Shipper	(303) 804-2312	(303) 588-5829

Organization / Agency	
Name	**Telephone Number**
Police Department:	911
Fire Department:	911
State Police:	911
Ambulance Service ***(EMT will determine appropriate hospital for treatment):***	911
[insert nearest hospital name]	
[insert hospital address, city, state, zip]	
Hospital Route: See Figure 4-1	
Poison Control Center:	(800) 222-1222
Pollution Emergency:	(800) 292-4706
National Response Center:	(800) 424-8802
Chem-Tel:	(800) 255-3924
Title 3 Hotline:	(800) 424-9346

Public Utilities	
Name	**Telephone Number**
National Utility Locate System:	811

Figure 4-1: Hospital Route Map

[Insert a map showing the route from your project location to the nearest emergency treatment hospital]

Attachment A

Task Hazard Analyses

[Insert appropriate THAs]

Attachment B

Standard Operating Procedures

[Insert applicable SOPs]

Attachment C

Client Specific Health and Safety Guidelines

[Insert additional client-specific requirements]

[Contract Name or Client Name]
Contract No. [insert]
Task/Delivery Order No. [insert]

S3NA-209-TP2 HEALTH AND SAFETY PLAN

[PROJECT NAME]
[SITE NAME]
[SITE ADDRESS]
[CITY, STATE] [SITE ZIP]

Prepared for:

[Client Name]
[Client Address]
[Client City, State/Province Zip]

Prepared by:

AECOM
[Office Address]
[Office City, State/Province Zip]

Health and Safety Plan Expiration Date: [insert expiration date which is 1 year from the approval date on the next page– Month, day, year]

Project No: [insert project number]

Project Health and Safety Plan

approval page

This project Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the [site name] site. This HASP has been written for the exclusive use of AECOM, its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Prepared by:

_____ _____

[Preparer name, certs] Date
[Preparer title]
[Preparer phone number]

Concurrence by:

_____ _____

[Safety Prof. name, certs] Date
[Safety Prof. title]
[Safety Prof. phone number]

Approved by:

_____ _____

[Proj. mgr. name, certs] Date
Project Manager
[Proj. mgr. phone number]

Executive Summary

The purpose of this Health and Safety Plan (HASP) is to address health and safety concerns related to AECOM managed activities at the [site name] site, located at [site address] in [city, state]. The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees and the scope of services are discussed herein. The document is intended to identify known potential hazards and facilitate communication and control measures to prevent injury or harm. Additionally, provisions to control the potential for environmental impact from these activities are included where applicable.

[insert brief scope of services and responsible party]

AECOM will be…

Subcontractor X will be…

Subcontractor Y will be…

The primary physical hazards which may be encountered include:

[list PRIMARY physical hazards]

The chemical hazards which may be encountered include:

[list anticipated chemical hazards]

All staff are bound by the provisions of this HASP and are required to participate in a preliminary project safety meeting to familiarize them with the anticipated hazards and respective onsite controls. The discussion will cover the entire HASP subject matter, putting emphasis on critical elements of the plan; such as the emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, daily tailgate safety meetings will be held to discuss: the anticipated scope of work, required controls, identify new hazards and controls, incident reporting, review the results of inspections, any lessons learned or concerns from the previous day.

TABLE OF CONTENTS

ATTACHMENTS

1.0 Introduction

This Health and Safety Plan (HASP) (including Attachments A-[xx]) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the [site name] site, located at [site address] in [city, state/province]. This HASP also identifies chemical and physical hazards known to be associated with the AECOM-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions, which may occur during field operations.

1.1 General

1.1.1 The provisions of this HASP are mandatory for all AECOM personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the AECOM's North America Safety, Health, and Environmental (SH&E) Procedures and Manual shall be accessible on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs). In the event of a conflict between this HASP, the SOPs and federal, provincial, state, and local regulations, workers shall follow the most stringent/protective requirements. Concurrence with the provisions of this HASP is mandatory for all personnel at the site covered by this HASP and must be signed on the acknowledgement page.

1.2 Project Policy Statement

AECOM is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities. We are also committed to protecting and preserving the natural environment in which we operate. The safety of persons and property is of vital importance to the success of this project and accident prevention measures shall be taken toward the avoidance of needless waste and loss. It shall be the policy of this project that all operations be conducted safely. Onsite supervisors are responsible for those they supervise by maintaining a safe and healthy working environment in their areas of responsibility, and by fairly and uniformly enforcing safety and health rules and requirements for all project personnel. Subcontractors shall comply with the requirements of this HASP, provisions contained within the contract document and all applicable rules, requirements and health, safety and environmental regulations. All practical measures shall be taken to promote safety and maintain a safe place to work. Contractors are wholly responsible for the prevention of accidents on work under their direction and shall be responsible for thorough safety and loss control programs and the execution of their own safety plans for the protection of workers.

1.3 References

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

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), Occupational Safety and Health Standards (with special attention to Section 120, Hazardous Waste Operations and Emergency Response).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), Safety and Health Regulations for Construction.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.
- In Canada there is no direct federal or provincial counterpart to HAZWOPER; however, as due diligence and in compliance with applicable provincial duty of care/general duty clauses, staff working in Canada will comply with S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities.
- [Insert state or other requirements]

2.0 Site Information and Scope of Work

AECOM will conduct environmental services at the [site name] site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Project Work Plan developed for project site. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the project site, and the work procedures to be performed. The Project Work Plan prepared by AECOM as a companion document to this HASP provides more detail concerning both site history and planned work operations.

2.1 Site Information

This section provides a general description and historical information associated with the site.

2.1.1 General Description

The [site name] site is located at [site address]. [Insert description. This should include any *significant* physical features of the site (i.e., terrain, buildings, size, location, bodies of water etc.)].

2.1.2 Site Background/History

[Insert site background/history information. This should include all applicable activities and processes that have previously occurred on site, as well as current operations.]

2.1.3 Previous Investigations

[Insert previous highest concentration investigation results in the applicable work area. This should list any known investigations and the results of the investigations. Contaminants with their concentrations (soil in mg/kg and/or groundwater in ug/l) should be listed in tabular format (2-1), if available. This should be the most recent site data available.]

Table 2-1: Previous Investigation Data

Contaminants	Soil (mg/kg)	Groundwater (ug/l)
(insert Highest Contaminants)		
(insert second Highest Contaminants		
(Insert third highest Contaminants		

2.2 Scope of Work

[Provide a verbal description of the overall objective for what is being done for the job and what is supposed to be accomplished. This does not have to actually spell out the steps for the job, as that will be covered in 2.2.1]

(See HASP Description and Assistance document for examples)

2.2.1 Additional Work Operations

The following additional tasks will also be performed as necessary in support of planned site activities:

(Operations at the site may require additional tasks not identified in this section or addressed in Attachment A THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.)

3.0 Hazard Assessment (Safety)

3.1 Physical Hazards

[Discuss the specifics of hazards that will/may be encountered, like haz noise, heavy equip. etc.. Limit the discussion to the scope and magnitude of the hazard on this job, don't discuss hazard control.]

(See HASP Description and Assistance document for examples)

3.2 Wildlife, Plant and Insect Hazards

Below is a series of tasks typically encountered on projects. While the text below may be used to describe your work, it must be elaborated on and sufficient detail included making it site specific.

See HASP Description and Assistance document for examples)

3.3 Radiological Hazards

[Discuss any on-site radioactive materials that are environmental contaminants (ignore RAM in devices, etc. that we bring to site.]

3.4 Ultraviolet Hazards

[The 2009 historical UV Index for the [Insert City here] area showed that worker's UV exposures were in the HIGH category beginning in March and lasting until November with worker's exposures in the EXTREME category from July through August. In 2009, [City Name] had 44 days in the HIGH category, 133 days in the VERY HIGH category, and 0 days in the EXTREME category. Workers performing field work outdoors may be susceptible to sunburn if not properly protected with sunscreen or protective clothing and hats. Skin can burn in minutes when the UV Index is VERY HIGH. Protective measures are advisable.

3.5 Weather Hazards

The Site Safety Officer will be attentive to daily weather forecasts for the project area each morning. Predicted weather conditions of potential field impact are to be included in safety briefings and the Task Hazard Analysis (THA) for that day. Weather changes should initiate a review and updates (THA) as necessary.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events.

3.6 Other Hazards

[Address anything not already covered that might be significant, like UXO. Don't provide control procedures here (that's for Section 5.0), just discuss what's there and what it can do].

3.7 Hazard Analysis

Task Hazard Analyses (THAs) have been completed for all tasks identified in the Scope of Work (Attachment A):

[List all Tasks which have been addressed in THAs]

3.7.1 Unanticipated Work Activities/Conditions

As a result of unanticipated work activities or changing conditions, additional THAs may be required. All additional THAs will be reviewed and approved by the SH&E Professional.

3.8 Task Specific SH&E Procedures

As discussed in Section5.0, personnel may be exposed to a variety of chemical, physical, and radiological hazards resulting from task or equipment-specific activities. The controls for many of these hazards are discussed in SOPs found in the **Series 300 to 500** North America SH&E SOPs.

	SOP#	TITLE		SOP#	TITLE
S3NA 300 Series Field(Common)			**S3NA 500 Series Industrial Hygiene**		
☐	S3NA-301-PR	Confined Spaces	☐	S3NA-501-PR	Asbestos
☐	S3NA-302-PR	Electrical, General	☐	S3NA-502-PR	Benzene
☐	S3NA-303-PR	Excavation and Trenching	☐	S3NA-503-PR	Blood borne Pathogen Program
☐	S3NA-304-PR	Fall Protection	☐	S3NA-504-PR	Cadmium
☐	S3NA-305-PR	Hand and Power Tools	☐	S3NA-505-PR	Cold Stress Prevention
☐	S3NA-306-PR	Highway and Road Work	☐	S3NA-506-PR	Compressed Gases
☐	S3NA-307-PR	Housekeeping, Worksite	☐	S3NA-507-PR	Hazardous Materials Communication / WHMIS
☐	S3NA-308-PR	Manual Lifting, Field		S3NA-508-PR	Hazardous Materials Handling and Shipping
☐	S3NA-309-PR	Mobile or Heavy Equipment	☐	S3NA-509-PR	Hazardous Waste Operations and Emergency Response Activities
☐	S3NA-310-PR	Rigging, Hoisting, Cranes and Lifting Devises	☐	S3NA-510-PR	Hearing Conservation Program
☐	S3NA-311-PR	Scaffolding	☐	S3NA-511-PR	Heat Stress Prevention
☐	S3NA-312-PR	Ladders and Stairways	☐	S3NA-512-PR	Laboratory Safety
☐	S3NA-313-PR	Wildlife, Plants and Insects	☐	S3NA-513-PR	Lead
☐	S3NA-314-PR	Working Alone & Remote Travel	☐	S3NA-514-PR	Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO)
☐	S3NA-315-PR	Water, Working Around	☐	S3NA-515-PR	Nanotechnology
			☐	S3NA-516-PR	Radiation Safety Programs
S3NA 400 Series Field (Uncommon)			☐	S3NA-517-PR	Radiation, Non-Ionizing
☐	S3NA-401-PR	Aircraft Charters	☐	S3NA-518-PR	Radiation, Gauge Source program
☐	S3NA-402-PR	All Terrain Vehicles (ATVs)	☐	S3NA-519-PR	Respiratory Protection Program
☐	S3NA-403-PR	Avalanches	☐	S3NA-520-PR	Spill Response, Incidental
☐	S4NA(US)-404-PR	Commercial Motor Vehicles			
☐	S3NA-405-PR	Drilling and Boring			
☐	S3NA-406-PR	Electrical Lines, Overhead			
☐	S3NA-407-PR	Electro-fishing			
☐	S3NA-408-PR	Elevated Work Platforms and Aerial Lifts			
☐	S3NA-409-PR	Forklifts (operation of)			
☐	S3NA-410-PR	Hazardous Energy Control			
☐	S3NA-411-PR	Machine Guarding			
☐	S3NA-412-PR	Powder-Actuated Tools			
☐	S4NA(US)-413-PR1	Process Safety Management			
☐	S4NA(US)-414-PR	Railway Sites			
☐	S4NA(US)-415-PR	RCRA Regulated Facilities			
☐	S3NA-416-PR	Tunnel and Underground Work			
☐	S3NA-417-PR	Utilities, Underground			
☐	S3NA-418-PR	Welding, Cutting and Other Hot Work			
☐	S3NA-419-PR	Water, Marine Operations, Boating			
☐	S3NA-420-PR	Water, Underwater Diving			

4.0 SH&E Requirements (Safety)

4.1 HAZWOPER Qualifications

Personnel performing work at the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the AECOM's North America SH&E Standard Operating Procedures.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document any symptoms that may be specific to the particular materials present.

4.2 Site-Specific Safety Training

All AECOM personnel performing activities at the site will be trained in accordance with *S3NA-003-PR SH&E Training*. All personnel are required to remain current in all of their required training and evaluate their need for additional training when there is a change in work. In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training developed for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager. Any additional required training that is completed will be documented and tracked in the project files.

4.2.1 Competent Person Training Requirements

In order to complete the planned scope of work, an (OSHA conformance) competent person must be designated to perform the required daily on site inspections of operations and/or equipment. The competent person may be an AECOM (if responsible for supervising that activity) or the subcontractor's employee. Designated competent person(s) for this project are shown in Table 4-2:

Table 4.2.1-2: Task-Specific Competent Persons

Employee Name	Organization	Area of Competency
		[insert other requirements or delete rows]

Note: The training requirements for competent persons are specified in the indicated SOPs and/or *S3NA-202-PR Competent Person Designation*. By identifying an employee as a "competent person", that person has now been authorized to take prompt corrective measures to eliminate hazards.

4.3 Tailgate Meetings

Prior to the commencement of daily project activities, a tailgate meeting will be conducted by the SSO to review the specific requirements of this HASP, applicable THA. Attendance at the daily tailgate meeting is mandatory for all employees at the site covered by this HASP and must be documented on the attendance form. All safety training documentation is to be maintained in the project file by the SSO.

4.4 Hazard Communication

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this HASP and their properties, hazards and associated required controls will be communicated to all affected staff and subcontractors.

In addition, any employee or organization (contractor or subcontractor) intending to bring any hazardous material onto this AECOM-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for review and filing (the SSO will maintain copies of all MSDS on site). MSDS may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable in accordance with the requirements of *S3NA-507-PR Hazardous Materials Communication/WHMIS*.

All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDS.

All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Attachment B provides copies of MSDS for those items planned to be brought on site at the time this HASP is prepared. This information will be updated as required during site operations.

4.5 Confined Space Entry

The SSO/site supervisor shall identify all potential confined spaces in accordance with S3NA-*301-PR Confined Spaces*. In addition; the SSO/site supervisor will inform all employees of the location of onsite confined spaces, and their associated security controls and procedures.

4.6 Hazardous, Solid, or Municipal Waste

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State, Provincial, Territorial and/or local regulations. Consult the Regional SH&E Manager for further guidance.

4.7 General Safety Rules

All site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to *S3NA-001-PR Safe Work Standards and Rules* and *S3NA-103-PR General Housekeeping*.

4.7.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.7.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any AECOM site. Smoking, eating or drinking must be in an approved area.

4.7.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

> *Potable Water* - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
>
> *Non-Potable Water* - Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:
>
> ***Non-Potable Water***
> ***Not Intended for Drinking Water Consumption***

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities (e.g., buckets with water and Alconox) at each work location. The use of water and hand soap (or similar substance) will be required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.7.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for AECOM personnel. Under no circumstances will any employee be present alone in a controlled work area. For areas not in controlled work areas, the procedures outlined in *S3NA-314-PR Working Alone Remote Travel* will be followed at all times.

4.8 Stop Work Authority

All employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions as outlined in *S3NA-002-PR Stop Work Authority.* Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected AECOM employees and subcontractors.

Upon issuing the stop work order, the SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

4.9 Client Specific Safety Requirements

The client has specified no additional health and safety requirements.

or

Client-specific health and safety guidelines are included in Attachment E of this HASP. All site activities must be performed in accordance with client-specific requirements and procedures.

[or insert additional client-specific requirements]

5.0 Exposure Monitoring Procedures (Health)

5.1 Contaminant Exposure Hazards

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical and radiological hazards known, suspected or anticipated to be present on site.

Exposure symptoms and applicable first aid information for each suspected site contaminant identified in the Scope of Work are located in the following subsections.

[insert chemical/chem. group-specific discussions for what is at your site]

-
-
-
-

5.1.1 [insert contaminant]

[insert contaminant information]

5.1.2 [insert contaminant]

[insert contaminant information]

5.1.3 [insert contaminant]

[insert contaminant information]

5.2 Route of Entry Assessment of Exposure Hazards

Inhalation: [Discuss the possible hazards from inhalation based on what's there and what's being done]. [discuss any general things being done to protect, like RPP, monitoring, etc.].

Skin Contact: [Discuss the possible hazards from skin contact (irritation and absorption) based on what's there and what's being done – don't forget the eyes, etc.]. [Discuss any general things being done to protect, like PPE, decon, etc.].

Ingestion: [Discuss the possibility of ingestion exposure based on what's there and what's being done.]. Protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas.

Monitoring procedures will be employed during site characterization activities to assess employee exposure to chemical and physical hazards. Monitoring will consist primarily of onsite determination of various parameters (e.g., airborne contaminant concentrations and heat stress effects), but may be supplemented by more sophisticated monitoring techniques, if necessary.

5.3 Real-Time Exposure Measurement

Monitoring shall be performed within the work area on site in order 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 each THA as work is performed.

Table 5-1 specifies the real-time monitoring equipment, which will be used for this project. [Delete instruments from the table that are not applicable to the project.]

Table 5-1: Monitoring Parameters and Equipment

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED
Photo Ionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNu Model Hnu (min. 10.2 eV bulb)	Petroleum hydrocarbons Organic Solvents
Flame Ionization Detector (FID)	Foxboro	Petroleum hydrocarbons Organic Solvents
Combustible Gas Indicator (CGI) May be combined with individual or multi-gas detectors.		Explosively
Individual Gas Detectors		Oxygen (O_2) Carbon Monoxide (CO) Hydrogen Sulfide (H_2S) Cyanide Gases (CN^-)
Particulate Monitor	MIE Model PDM-3 mini-RAM	Aerosols, mist, dust, and fumes
Colorimetric Detector Tubes	Sensidyne Draeger	Benzene 0.5–10 ppm [list additional]
[insert additional]		

*Or similar unit, as approved by the SH&E Professional

5.4 Health and Safety Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone.

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions to limit, etc.) must be implemented prior to commencing activities at the specific work area.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of SSO or the Safety Professional.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas, vapor, or dust emission.
- Change in work task that will increase the exposure or potential exposure to hazardous materials.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally suspected.
- Change in site conditions that decrease the potential hazard.
- Change in work task that will reduce exposure to hazardous materials.

5.4.1 Monitoring Procedures

[Contact an SH&E Professional for guidance. This section must be approved by the Regional SH&E/District SH&EM prior to the start of field work.]

5.4.1.1 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency or manufacturer for technical guidance for proper calibration. If equipment cannot be pre-calibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be postponed or temporarily ceased until this requirement is completed.

5.4.1.2 Personal Sampling

Should site activities warrant performing personal sampling (breathing zone) to better assess chemical exposures experienced by AECOM employees, the SSO, under the direction of a Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) will be responsible for specifying the monitoring required. Within five working days after the receipt of monitoring results, the CIH or CSP will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the SSO project files.

If the site activities warrant, the subcontractor will ensure its employees' exposures are quantified via the use of appropriate sampling techniques. The subcontractor shall notify the employees sampled in accordance with health and safety regulations, and provide the results to the SSO for use in determining the potential for other employees' exposure.

5.5 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in *S3NA-511-PR Heat Stress Prevention Program*.

5.5.1 Responding to Heat-Related Illness

The guidance below will be used in identifying and treating heat-related illness.

Table 5.5.1: Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (*avoid drafts or sudden chilling*). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (*Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing*). • If the victim is conscious, it may be helpful to give him/her sips of water. • Transport victim to a medical facility ASAP.

Type of Heat-Related Illness	Description	First Aid
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	• Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back w/the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

6.0 Environmental Program (Environment)

6.1 Environmental Compliance and Management

This project and the individual tasks will comply with all federal, state, provincial, and local environmental requirements.

[Give a brief description of the environmental compliance and management requirements for the project site.]

6.1.1 Air Emissions

[Discuss any operations where air emissions may negatively impact the surrounding environment, air emission permits, etc. and discuss associated control of emissions in Section 6.]

6.1.2 Hazardous Waste Management

[Discuss any operations involving the storage, treatment, or disposal of hazardous waste at the project site, RCRA Part B permits or equivalent, 90-day storage procedures, etc. and discuss controls in Section 6.]

6.1.3 Storm Water Pollution Prevention

[Discuss any operations that may generate/discharge stormwater from the project site, NPDES/general construction stormwater discharge permits, etc. and discuss BMPs and other controls in Section 6.]

6.1.4 Wetlands Protection

[Use the FWS online wetlands mapper (http://www.fws.gov/wetlands/Data/mapper.html) to determine if any wetlands exists on your project site, are adjacent to your project, or may be negatively impacted by your project, do you need a regulatory permit, discuss wetlands protection measures/controls in Section 6, etc.] – suggest adding the map as a figure to the HASP or keeping it in the project files as the official risk assessment/determination process.

6.1.5 Critical Habitat Protection

[Use the FWS online critical habitat mapper tool (http://criticalhabitat.fws.gov/) to determine if any plant or animal critical habitats exists on, adjacent to, or may be otherwise impacted by your project, do you need a regulatory permit, discuss critical habitat protection/control measures in Section 6, etc.] – suggest adding the map as a figure to the HASP or keeping it in the project files as the official risk assessment/determination process.

6.1.6 Environmental Protection

[Discuss any environmental protection controls you will implement on your project such as sediment control, stormwater infiltration control, measures to mitigate impacts on wetlands, critical habitat protection, endangered species protection, etc.]

6.1.7 [add here anything else]

[specify if necessary]

7.0 Personal Protective Equipment

7.1 Personal Protective Equipment

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. *S3NA-208-PR Personal Protective Equipment Program* lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs.

By signing this HASP the employee agree shaving been trained in the use, limitations, care and maintenance of the protective equipment to be used by the employee at this project. If training has not been provided, request same of the PM/SSO for the proper training before signing.

Table 7-1: Personal Protective Equipment

TYPE	MATERIAL	ADDITIONAL INFORMATION
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides.
Boots	Leather	ANSI approved safety toe.
Safety Glasses		ANSI Approved; ≥98% UV protection.
Hard Hat		ANSI Approved; recommended wide-brim.
Work Uniform		No shorts/cutoff jeans or sleeveless shirts.
Additional PPE: [list all applicable information or delete not applicable rows]		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas.
Leather Gloves		If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Outer:	
Protective Chemical Coveralls	Inner: Outer:	
Protective Chemical Boots		
Level C Respiratory Protection	MSA (Full Face or equivalent) equipped with GMA/P100	
Level B Respiratory Protection	Self Contained Breathing Apparatus (SCBA), Airline with 5 minute escape pack.	Grade "D" Certified Air (Certificate Required). Obtain certificate of analysis from compressed gas vendor.
Face Shield		Safety glasses or goggles must be worn concurrently.
Apron		
Sunscreen	SPF 30 or higher	
Welding Equipment		
Cooling Vest		
Cold Weather Gear	Hard hat liner, hand warmers, insulated gloves	
Fall Protection		
Insert		
Insert		

7.2 PPE Doffing and Donning (UTILIZATION) Information

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.
- When applying duct tape to PPE interfaces (wrist, lower leg, around respirator, etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.
- Have a “buddy” check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

7.3 Decontamination

7.3.1 General Requirements

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials, etc).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the Exclusion Zone (EZ).

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The applicable Material Safety Data Sheet (MSDS) must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with site-specific requirements determined by site management.

7.3.2 Decontamination Equipment

The equipment required to perform decontamination may vary based on site-specific conditions and the nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and
- Paper or cloth towels for drying protective clothing and equipment.

7.3.3 Personal/Equipment Decontamination

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE, support devices (e.g., hoses, cylinders, etc.), and various handheld tools.

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of PPE required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

[The SH&E Professional will outline the personal decontamination steps here in bullet format.]

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

- Remove majority of visible gross contamination in EZ.
- Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
- Rinse equipment.
- Visually inspect for remaining contamination.
- Follow appropriate personal decontamination steps outlined above.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the Contaminant Reduction Zone (CRZ). Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

[The SH&E Professional, in coordination with the Corporate Radiation Safety Officer, must specify the applicable radiological decontamination procedures along with the applicable removable monitoring limits in CPM, as applicable to the project]

8.0 Project Health and Safety Organization

8.1 **Project Manager** [insert Name, if available]

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The PM will provide the site supervisor with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations.

8.2 **Site Supervisor** [insert Name, if available]

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. The PM may act as the site supervisor while on site.

8.2.1 Responsibilities

The site supervisor is responsible to:

- Discuss deviations from the work plan with the SSO and PM.
- Discuss safety issues with the PM, SSO, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable SOPs.

8.2.2 Authority

The site supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSO, the Safety Professional, and the PM.

8.2.3 Qualifications

In addition to being Hazardous Waste Operations and Emergency Response (HAZWOPER)-qualified (see Section 4.1), the Site Supervisor is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

8.3 **Site Safety Officer** [insert Name, if available]

8.3.1 Responsibilities

The SSO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in AECOM Safety Policy.
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the SOPs using the appropriate audit inspection checklist provided by an AECOM Safety Professional.
- Work with the site supervisor and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.

- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Check that all site personnel and visitors have received the proper training and medical clearance prior to entering the site.
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation).
- Present tailgate safety meetings and maintain attendance logs and records.
- Discuss potential health and safety hazards with the Site Supervisor, the Safety Professional, and the PM.
- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site.

8.3.2 Authority

The SSO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a “Stop Work Order” under the conditions set forth in this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the Safety Professional and the PM.

8.3.3 Qualifications

In addition to being HAZWOPER-qualified, the SSO is required to have completed the 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4).

8.4 **Employees**

8.4.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.
- Notifying the SSO, in writing, of unsafe conditions and acts.

8.4.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SSO or the Safety Professional at any time to discuss potential concerns.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions.

8.5 **Safety Professional [**insert Name, if available]

8.5.1 The Safety Professional is the member of the AECOM Safety, Health and Environmental Department assigned to provide guidance and technical support for the project. Duties include the following:

- Approving this HASP and any required changes.
- Approving the designated Site Safety Officer (SSO).
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

8.6 **Subcontractors**

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in *S3NA-213-PR Subcontractors*. Each AECOM subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE and all required training.

AECOM considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the 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 to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the AECOM PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

8.7 **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 PM 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 personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times.

8.7.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

- A written confirmation must be received by AECOM documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
- Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
- All visitors must be escorted by an AECOM employee.

If the site visitor requires entry to any EZ, but does not comply with the above requirements, all work activities within the EZ must be suspended. Until these requirements have been met, entry will not be permitted.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

9.0 Site Control

9.1 General

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. General examples of zone layouts have been developed for drilling and earth moving activities [(e.g., excavating, trenching, etc.) – post these diagrams as appropriate] and are attached to this section.

9.2 Controlled Work Areas

Each HAZWOPER controlled work area will consist of the following three zones:

- Exclusion Zone: Contaminated work area.
- Contamination Reduction Zone: Decontamination area.
- Support Zone: Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is accessible to the public (e.g., vendors, inspectors).

9.2.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and this HASP will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities.

(See HASP Description and Assistance document for minimum distances examples)

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the EZ and CRZ). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

9.2.2 Contamination Reduction Zone

The Contamination Reduction Zone is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination.

9.2.3 Support Zone

The Support Zone is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels).

Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

9.3 Site Access Documentation

If implemented by the PM, all personnel entering the site shall complete the "Site Entry/Exit Log" located at the site trailer or primary site support vehicle.

9.4 Site Security

9.4.1 Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards.
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
- Prevent theft.
- Avoid interference with safe working procedures.

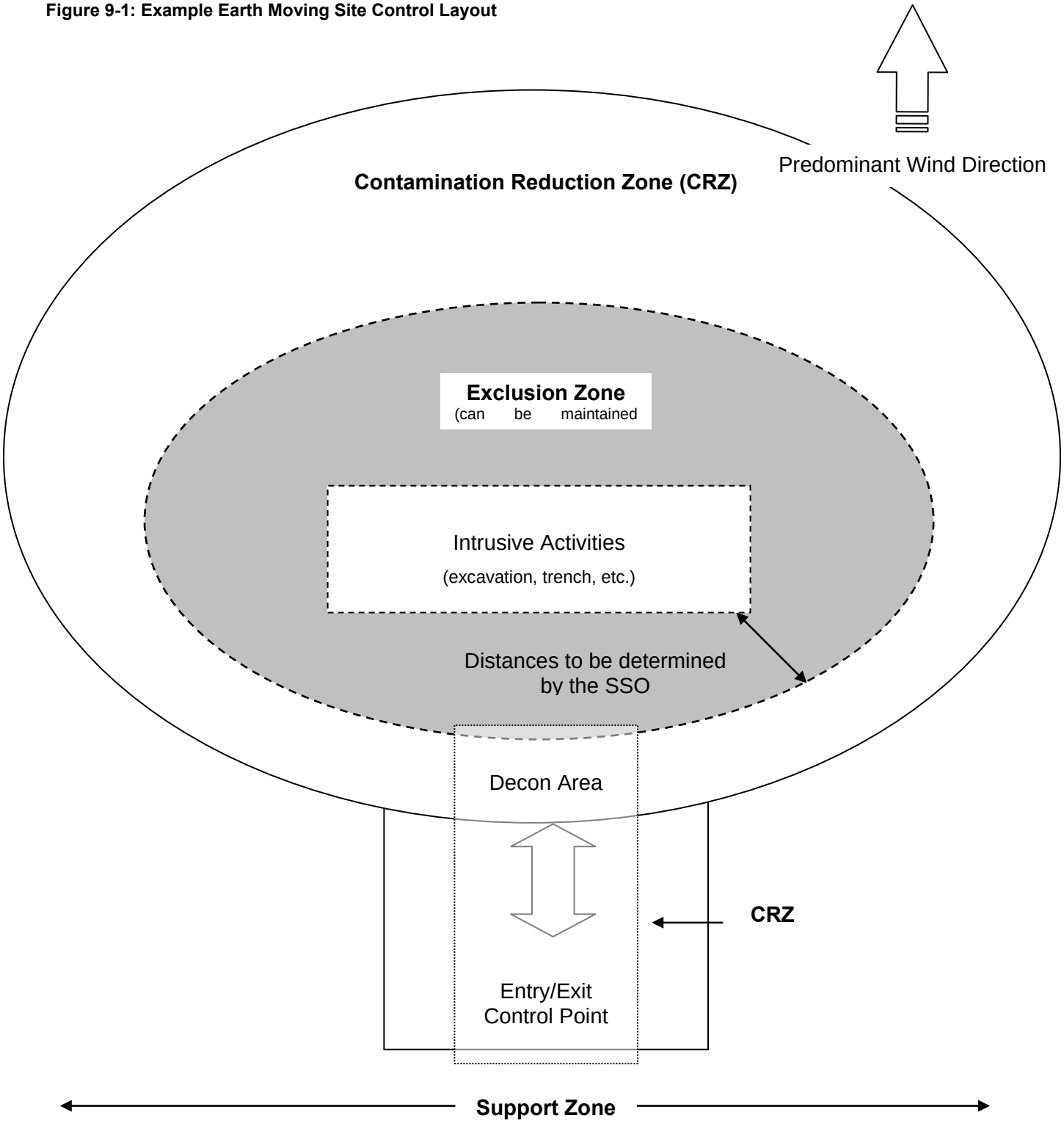
9.4.2 To maintain site security during working hours:

- Maintain security in the Support Zone and at access control points.
- Establish an identification system to identify authorized persons and limitations to their approved activities.
- Assign responsibility for enforcing authority for entry and exit requirements.
- When feasible, install fencing or other physical barrier around the site.
- If the site is not fenced, post signs around the perimeter and whenever possible, use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
- Have the PM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

9.4.3 To maintain site security during off-duty hours:

- If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards, and respiratory protection techniques.
- If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
- Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
- Secure the equipment.

Figure 9-1: Example Earth Moving Site Control Layout



10.0 Emergency Response Planning

10.1 Emergency Action Plan

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the AECOM team. The Emergency Action Plan (EAP) will be reviewed by all personnel prior to the start of field activities. A test of the EAP will be performed within the first three (3) days of the project field operations. This test will be evaluated and documented in the project records.

10.1.1 Three major categories of emergencies could occur during site operations:

- Illnesses and physical injuries (including injury-causing chemical exposure)
- Catastrophic events (fire, explosion, earthquake, or chemical)
- Workplace Violence, Bomb Threat
- Safety equipment problems

10.1.2 Emergency Coordinator

The duties of the Emergency Coordinator (EC) include:

- Implement the EAP based on the identified emergency condition.
- Notify the appropriate project and SH&E Department personnel of the emergency (Table 9-3).
- Verify emergency evacuation routes and muster points are accessible.
- Conduct routine EAP drills and evaluate compliance with the EAP.

10.1.3 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC will complete Table 9-1 with any site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Table 10-1: Emergency Planning

Emergency	Evacuation Route	Muster Location
Chemical Spill	Upwind [insert distance]	[insert location]
Fire/Explosion	[insert directions]	[insert location]
Tornado	[insert directions]	[insert location]
Lightning	[insert directions]	Vehicle
[insert additional]		
Additional Information		
Communication Procedures	[insert communication procedures, means of alerting personnel, etc.]	
CPR/First Aid Trained Personnel	[insert names]	
Site-Specific Spill	[insert spill response procedures for specific chemicals if required]	

Response Procedures	

10.1.4 Spill Containment Procedure

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. Where these activities exist, a site-specific Spill Reporting Card [project team must develop the spill reporting card] will be developed (Attachment D). Procedures outlined below will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri) shall be available at each work site (more as needed).

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- Drums/containers will be secured and handled in a manner which minimizes spillage and reduces the risk of musculoskeletal injuries.

10.1.5 Safety Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSO and the immediate supervisor.

If any AECOM employee is injured and requires medical treatment, the Site Supervisor will report the incident in accordance with AECOM's incident reporting procedures. A copy of the final Supervisor's Report of Incident will be provided to the SH&E Professional before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

All accidents/incidents will be investigated. Copies of all subcontractor accident investigations will be provided to the SSO within five (5) days of the accident/incident.

10.1.6 Environmental Spill/Release Reporting

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be reported according to the sequence identified in the *Site-Specific Spill Reporting Card*. In determining whether a spill or release must be reported to a regulatory agency, the Site Supervisor will assess the quantity of the spill or release and evaluate the reporting criteria against the state-specific reporting requirements, your applicable regulatory permit, and/or client-specific reporting procedures. In order to support the Site Supervisor and expedite the decision to report to a state regulatory agency, a site-specific Spill Reporting Card will be developed (Attachment D). **If reporting to a US state or Federal regulatory agency is required, AECOM has 15 minutes from the time of the spill/release to officially report it.**

Chemical-specific Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Reportable Quantities for the known chemicals onsite are shown in Table 10.1.

Table 10.1: CERCLA Reportable Quantities

Hazardous Substance	Regulatory Synonyms	Final RQ (lbs)
Benzene	N/A	10
Trichloroethylene	Trichloroethene, TCE	100
Tetrachloroethylene	Perchloroethylene, PCE	100
[insert additional rows as required]		

[CERCLA RQs can be found at:
http://www.epa.gov/superfund/programs/er/triggers/haztrigs/302table01.pdf.]

Table 10.1: Emergency Contacts

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Mobile Phone**
[insert]	Client Contact		
[insert]	Account/Client Manager		
[insert]	Project Manager		
[insert]	Site Supervisor		
[insert]	Site Safety Officer		
[insert]	Regional SH&E Manager		
[insert]	District SH&E Manager		
Incident Reporting	**Incident Reporting Line**	**(800) 348-5046**	
[insert]	Emergency Coordinator (EC)		
[insert]	Secondary EC		
Insert	TDG/IATA Shipping Expert		

Organization / Agency	
Name	**Telephone Number**
Police Department (local)	911 [or insert here]
Fire Department (local)	911 [or insert here]
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***	911 [or insert here]
-Emergency Hospital ***(Use by site personnel is only for non-emergency cases)***	
[insert clinic Name]	
[insert clinic address]	
[insert clinic city, state, zip]	
Emergency Hospital Route: See Figure 9-1	
Poison Control Center	(800) 222-1222
Pollution Emergency	(800) 292-4706
National Response Center	(800) 424-8802
INFOTRAC(insert account number)	(800) 355-5053
Title 3 Hotline	(800) 424-9346

Public Utilities	
Name	**Telephone Number**
Call Before You Dig	811

Figure 10.1: Emergency Occupational Hospital Route/Detail Map

[insert map if needed & available]

11.0 Personnel Acknowledgement

By signing below, the undersigned acknowledges that he/she has read and reviewed the AECOM Health and Safety Plan for the [site name] 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.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

Attachment A

Task Hazard Analyses

[attach THAs]

Attachment B

Material Safety Data Sheets

[attach MSDSs]

Attachment C

Client-Specific Health and Safety Guidelines

[attach guidelines]

Attachment D
Applicable SH&E SOPs

[attach SOPs]

Attachment E

Client Specific SH&E Guidelines and Subcontractors SH&E Information

[attach information]

S3NA-209-TP2a HASP Assistance

This document will assist the developer of the HASP in creating information for the HASP templates. Each help section is outlined by the required section.

1.0 Scope of Work

Below is a series of tasks typically encountered on projects. Allthough the text below may be used to describe your work, it must be elaborated on in sufficient detail to make it site specific.

1.1 Mobilization/Demobilization

Mobilization and demobilization represent limited pre- and post-task activities. These activities include driving to and from the site; initial site preparations, such as trailer and toilet facility setup; and post-work activities, such as removing files and office equipment and general housekeeping. Mobilization and demobilization do not represent any intrusive activities. Electrical hook-up and disconnect for office trailers must be performed by a licensed electrical subcontractor. Prior to mobilization, all utility clearance shall be obtained by the authorizing authority for the subject site. If utility locations cannot be verified on site by the public authority, then a private utility location contractor may need to be utilized to confirm/deny the presence of private underground utilities on the site.

1.2 Site Preparation

Site preparation includes construction and maintenance of temporary access roads and construction area entrances, installation of silt fence around the perimeter of disturbance areas, and installation of berms to facilitate the use of existing drainage features and structures. Other pre-work activities, such as the stockpiling of backfill materials, utility mark-out and clearance, and the setup of other work support items are included as well. Other site preparation activities will include the verification of utility mark-outs and presence of the clear dig permits (on site). Typically, the lead time for a clear dig permit is three days, and the permit is generally valid for 10 days. Consult the specific clearance dates associated with the permit obtained for the site.

1.3 Clearing and Grubbing

Clearing and grubbing involves the removal of trees and vegetation and their root systems. The limits of clearing and grubbing will extend approximately 10 feet beyond the perimeter of the areas specified in the work plan. Clearing will involve the cutting of standing timber and the removal of brush-utilizing chainsaws, brush hogs, and chippers. Grubbing will be performed using a dozer and/or hydraulic excavator. All cut and chipped vegetative material will be placed in roll-off boxes for offsite disposal.

1.4 Groundwater Sampling

Groundwater sampling includes the collection of groundwater samples from existing monitoring well networks, temporary Geo-probe points, and new monitoring wells. Groundwater samples will be collected through low-flow sampling techniques using submersible pumps. During groundwater collection, appropriate air monitoring will be conducted and the appropriate chemical-resistant PPE will be worn to protect against exposure. The major activities involved with collecting groundwater samples from the site and surrounding properties include the following:

- Presampling event notifications and approval.
- Setup for sampling activities.
- Groundwater samples from monitoring wells collected using low-flow sampling techniques.
- Sample prep and sample shipping.
- Administrative activities.

1.5 Surface Water Sampling

This activity will include the collection of samples from surface water from[….]. Water samples are collected from effluent collection points accessible from the ground surface. During water collection, the appropriate chemical-resistant PPE will be worn to protect against exposure as well as the PPE prescribed. The major activities involved with collecting samples from the site and surrounding properties include the following:

- Presampling event notifications and approval.
- Setup for sampling activities.

- Samples collection from a body of surface water (Shenandoah River, intermittent stream, pond).
- Sample prep and sample shipping.
- Administrative activities.

1.6 Soil Sampling

Soil samples will be collected from Geo-probe points and during well installation activities. During sampling activities, appropriate air monitoring will be conducted and the appropriate chemical resistant PPE will be worn to protect against exposure. The major activities involved with collecting samples from the site and surrounding properties include the following:

- Presampling event notifications and approval.
- Setup for sampling activities.
- Soil sample collection during well installation activities using HSA drilling techniques or from Geo-probe points.
- Sample prep and sample shipping.
- Administrative activities.

1.7 Sub-slab Vapor Sampling

Two rounds of sub-slab vapor samples, co-located with indoor air samples, will be collected from underneath the slabs of 20 buildings listed in Table 2-1 using 6L Summa® canisters. The sub-slab vapor samples will be sent to a fixed laboratory to obtain definitive data. Definitive data will be produced by using standard methods in a fixed laboratory. The major activities involved with collecting samples from the site include the following:

- Presampling event notifications and approval.
- Setup for sampling activities.
- Air samples will be collected as needed and will consist of ambient air sampling. Summa® canisters are the expected sampling container.
- Sample prep and sample shipping.
- Administrative activities.

1.8 Indoor Air Sampling

Indoor air samples may be collected from buildings on-site or nearby the site. Air samples will be collected as-needed and will consist of ambient air sampling. Suma canisters are the expected sampling container. The major activities involved with collecting samples from the site and surrounding properties include the following:

- Presampling event notifications and approval.
- Setup for sampling activities.
- Air samples will be collected as needed and will consist of ambient air sampling. Suma canisters are the expected sampling container.
- Sample prep and sample shipping.
- Administrative activities.

1.9 Installation and Abandonment of Sub-Slab Vapor Sampling Points

Sub-slab vapor monitoring points will be permanently installed at one location for each of the 20 buildings listed in Table 2-1. Care will be taken to identify locations where the concrete floor is accessible (not covered with tile or carpet). Asbestos tile was identified during the site visit; sampling locations will be adjusted to avoid installation of monitoring points in those locations.

The monitoring points will be installed by drilling a hole in the concrete slab, installing a small amount of filter pack sand, inserting an stainless steel tube fitted with a female threaded swagelok® and sealing the tube into the drill hole with VOC-free modeling clay. The monitoring point will be completed with hydraulic cement and set flush with the surrounding floor surface. A hex-head bolt will be screwed into the fitting to seal the sampling point.

1.10 Temporary Boring and Well Installation Oversight

AECOM personnel will perform oversight for the installation of temporary borings installed using a Geo-probe rig and monitoring wells using hollow-stem auger (HSA) or air rotary drilling methods. A drilling subcontractor (TBD) will be utilized for the installation of monitoring wells (4-inch PVC typical) to a predetermined depth utilizing a HAS drill and/or air rotary drill rig. The major activities involved with the installation of a monitoring well or a temporary boring are as follows:

- Pre-sampling event notifications and approval.

- Set-up for boring/well installation.
- Monitor air quality in the workers breathing zone.
- Log soils and screen with a PID.
- Sample collection using encore or bulk sampling.
- Administrative activities.

1.11 Well Abandonment Oversight

AECOM personnel will be performing the oversight for well abandonment to be performed by a drilling subcontractor (TBD). The major activities involved with abandoning a well are

- Setting up for well abandonment.
- Removinge stick-up or flushmount casing, including concrete pad.
- Pulling the well casing from the ground with drill rig or over-drill.
- Filling the well with grout.

1.12 Operations and Maintenance of GW Treatment System

AECOM personnel will conduct operation and maintenance activities at the ABC Groundwater Treatment facility for the remediation of TCE- and PCE-impacted groundwater. Activities include pump/line repair and replacement, well head checks, acid/caustic deliveries, and periodic groundwater monitoring activities within the established monitoring well network. A minimum of two technicians will be on site during O&M activities.

1.13 Underground Storage Tank Removal

Tank Removal (oversight) activities are anticipated to be conducted on approximately 23 of the 27 individual locations. Tasks included under this SOW item include removal of surface cover (asphalt, concrete), cleaning of the tank interiors, physical tank removal, and backfilling activities. The tanks will be inerted and removed from the ground, tank exteriors will be cleaned, and tanks will be rendered unusable and will be transported off site for further disposition. Confirmation sampling of the tank pits will be performed to determine the need for contaminated soil removal.

1.14 Excavation of Contaminated Soils

AECOM will excavate and dispose impacted soils off site using an excavator and direct loading into roll-off or other approved containers for off-site transportation and disposal. The impacted materials will be placed into lined/covered roll-offs and will be temporarily staged on site prior to transportation to the disposal facility. Equipment operators will be supported by a crew of technicians who will perform spotting activities, provide traffic control, the securing of roll-off containers, and general housekeeping activities on the site. Additional confirmation sampling of the excavation will be performed under this task as well.

1.15 Investigative-Derived Waste (IDW) Management

IDW will be collected and categorized as nonhazardous or hazardous. Potentially hazardous IDW (purge water, decontamination fluids, soil cuttings, if any) will be tested and disposed of within 90 calendar days of completing the field activities. Potentially hazardous IDW waste will be staged onsite, then delivered to an IDW storage facility for processing. Nonhazardous IDW (normal trash) will be disposed of in a timely fashion during fieldwork. Drum handling and drum sampling activities may take place under this task.

1.16 Equipment Decontamination

AECOM and subcontractor personnel will perform decontamination of equipment used to perform work within controlled work areas. Decontamination procedures could range from dry-brush techniques, to wet methods (rinse/wash), to steam cleaning as determined by the type of operation being conducted. Please detail-out the anticipated decon methods for the site.

Before any drilling is begun and at the completion of drilling, the drilling subcontractor shall decontaminate the drill rig, casing, samplers, and all other drilling equipment that will be used on site. The drilling subcontractor shall provide a high-pressure steam cleaner for decontamination of all downhole drilling equipment. The drill rig shall be steam cleaned between drilling at each site. Soil sampling equipment shall be decontaminated between each use, using a phosphate-free detergent and potable water in accordance with ASTM D 5088. The drilling subcontractor shall construct a temporary decontamination pad to contain all decontamination water generated during decontamination of drill rigs and tools.

And/or:

Pre-cleaned and dedicated sampling materials/equipment will be used to collect soil and groundwater samples for laboratory analysis. After the samples are collected, any disposable or one-time use equipment (tubing, bladders)

will placed in a plastic bag for disposal in accordance with the paragraph above. Nondisposable sampling and drilling equipment that has the soil and/or groundwater will be decontaminated between each sampling location. Gross sediments and/or contamination will first be removed from the sampling and drilling equipment. The equipment will then be washed with DI water and Alconox detergent and then rinsed with DI water, methanol, etc.

1.17 Site Restoration

Site restoration will involve the removal of temporary roadways and staging areas, final grading of the site, surface cover installation (asphalt and concrete placement, topsoil, seeding, mulching, tree planting, and other landscaping), removal of temporary fencing and erosion control materials, and the disposal of construction debris.

2.0 Physical Hazards

Below is a series of tasks typically encountered on projects. While the text below may be used to describe your work, it must be elaborated on in sufficient detail to make it site specific.

2.1 Slips, Trips, Falls, and Protruding Objects

A variety of conditions that may exist may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Serious injuries may occur as a result of falls from elevated heights. Always wear fall protection while working at heights of 6 feet or greater above the next lower level. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove the protruding object or label it with an appropriate warning.

2.2 Housekeeping

During site activities, work areas will be continuously policed to identify excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Additional information on the requirements of housekeeping[...].

2.3 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use mechanical assistance to lift or move materials and, at a minimum, use at least two people to lift or roll/lift with your arms as close to the body as possible.

2.4 Utilities

Various forms of underground/overhead utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as is obtaining authorization from all concerned public utility department offices. If insufficient data is available to accurately determine the location of the utility lines, AECOM will hand clear to a depth of at least 5 feet below ground surface in the proposed areas of subsurface investigation. Should intrusive operations cause equipment to come into contact with utility lines, the SSO and an AECOM SH&E Professional will be notified immediately. Work will be suspended until the applicable utility agency is contacted and the appropriate actions for the particular situations can be taken. The phone number for the applicable state agency is provided in the Emergency Contacts list.

Ensure that backhoe operators, truck drivers, etc. and the signal person are aware of overhead power lines when working around overhead power lines. Overhead power and utility lines may be present on, or adjacent to, the site and represent a potential hazard during the mobilization/demobilization of equipment and supplies. Maintain a minimum of 10 feet between overhead power lines and the bucket and/or arm of the backhoe bed/cab of trucks, etc. Any deviation must be approved by the Regional SH&E Manager. Additional information on working adjacent to overhead power and utility lines[...].

2.5 General Electrical Hazards

Electrical and powered equipment may be used during a variety of site activities. Injuries associated with electrical and powered equipment include electric shock, cuts/lacerations, eye damage (from flying debris), and burns. To reduce the potential of injury from the hazards associated with electrical and powered equipment, always comply with the following:

- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Confirm that generators are properly grounded, including the use of a grounding rod driven to a depth of 3 feet.
- Wear ANSI-approved (Z87.1) safety glasses. Face shields may be required to provide additional face protection from flying debris.
- Wear appropriate work gloves. Work gloves may reduce the severity of burns and cuts/lacerations.

All temporary electric installations (site trailer, subpanels) will comply with OSHA (29 CFR 1926, Subpart K, and 29 CFR 1910, Subpart S) guidelines. Only qualified and competent individuals (licensed electrician) will provide electrical service/servicing. Refer to SH&E 712, *Hazardous Energy Control*, for additional requirements and information.

2.6 Hazardous Energy

Use lockout/tagout procedures when performing maintenance or repairs on equipment.

It is the responsibility of AECOM employees to verify that all remediation equipment is locked out before AECOM employees perform any maintenance or repair work on the system. The source must be locked out; it is not enough to push the power switch to off and disconnect the breaker. Anyone can re-engage power under these circumstances. Locking out the power source is the only way to guarantee that the power will not be inadvertently reactivated.

A lock-out/tag-out kit will be located in the treatment shed for the duration of the project. The kit includes standard locks, keys, and lock-out notices.

The site specific lock-out/tag-out information must be completed for both the groundwater containment system and the SSD system. These forms will then be placed within the remediation trailer so all field technicians performing operations and maintenance work on the system are familiar with how to lock out the system when necessary.

2.7 Heavy Equipment and Vehicle Operations

Heavy equipment and site vehicles present serious hazards site personnel. Blind spots, failure to yield, and other situations may cause heavy equipment/vehicles to come into contact with personnel. To reduce the possibility of contact between equipment/traffic and personnel, always adhere to the following:

- Personnel must wear a high-visibility, reflective safety vest at all times when working near heavy equipment and/or other vehicle traffic.
- Personnel must always yield to equipment/vehicle traffic and stay as far as possible from all equipment/vehicle traffic. Always maintain eye contact with operators.
- When feasible, place barriers between work areas and equipment/vehicle traffic.
- Always ensure that reverse warning alarms are working and louder than surrounding noise. Personnel must report inoperative reverse warning alarms.
- Confirm Daily Equipment Safety Inspections are being performed and that documentation is filed at the site.

2.8 Drilling Operations

Drilling operations, including hollow-stem, rotary and/or direct push drilling, present their own set of hazards. Several basic precautions that should be taken include, but are not limited to, confirming locations of underground and overhead utilities, wearing of appropriate PPE and the avoidance of loose clothing or jewelry, staying clear of moving parts, and knowing the locations of emergency shut-off switches. Other operational safety precautions regarding moving the drilling equipment, raising and lowering the derrick(mast), and drilling may be required.

2.9 Excavations and Trenches

Excavations and trenches present workers with a variety of hazards. If not properly sloped, shored, or boxed, trench walls may collapse and trap workers under the weight of the soil. Soil contaminants and other chemical hazards (e.g., carbon monoxide from equipment/vehicles) may result in a hazardous atmosphere. Confined space entry procedures may need to be followed if the potential for a hazardous atmosphere exists. Buried utilities may exist where excavations/trenches will be placed. Always contact the local utility locator service prior to beginning excavations.

2.10 UST Removal

Although AECOM employees do not actually perform underground storage tank removal operations, they may oversee or be present during the removal or closure of underground storage tanks by contractors or subcontractors. It is therefore important that AECOM employees be aware of the hazards associated with and the safe work procedures for performing underground storage tank removal. Safety measures should include confirming locations of underground and overhead utilities, heavy equipment operations awareness, excavation safety awareness, and basic UST removal procedures such as tank cleaning, inerting, physical removal, and load-out procedures.

Only experienced, demonstrably proficient, equipment operators will be used to operate such heavy equipment as backhoes, front-end loaders, cranes, etc. Where certification or licensing requirements exist, such personnel shall possess appropriate certification and/or licensing for operating specified heavy equipment. Because of the potential cave-in and atmospheric hazards, entry into the underground storage tank excavation should be avoided at all costs. Soil samples from the excavation should be collected with a remote sampling device or from the bucket of the backhoe whenever possible. Before initiating work in the tank area or on the tank, air monitoring must be performed to assess flammable vapor concentrations in the tank and the surrounding work area. For the

purposes of this SOP, atmospheres that are measured and found to contain flammable gases or vapors at concentrations greater than 10% of the LEL of flammable gas or vapor shall be considered flammable.

2.11 Elevated Work Platforms and Aerial Lifts

The use of aerial lifts presents a unique set of hazards to employees using and working around the equipment. Proper training on the safe usage of the specific type of lift being utilized is essential to the safe execution of work tasks with the equipment. Besides the daily inspections and safe usage of the equipment, numerous other safety related issues—including fall protection, safe working surfaces, and overhead power lines—need to be assessed.

2.12 Working at Heights

The following are US standards. Fall Protection Fall Protection Systems shall comply with OSHA Regulations (Standards – 29 CFR) Standard # 1926.502 Fall Protection Systems Criteria and Practices and OSHA Standard # 1926.502(d) – 1926 Subpart M App C Personal Fall Arrest Systems.

Specifically, anyone working in an area exposed to a fall greater than 6 feet must use appropriate fall protection. Such protection includes: guardrail systems, safety net systems, or personal fall arrest systems. Other protection methods include hole covers, positioning devices, equipment guards, fences, and barricades. Fall protection shall be provided as required in OSHA Regulations 29CFR1910 and 29CFR1926, reference: standard 1926.501 Duty to Have Fall Protection.

Work above a height of 6 feet requires a fall protection system. This project requires 100 percent tie-off using full-body harness (Class III or IV) with dual shock-absorbing lanyard (shorter than fall distance and a maximum of 6 feet long) equipped with double-locking hooks connected to a proper tie-off attachment point capable of handling potential fall loads of 5,000 pounds.

Fall protection systems classified as “job made” (not purchased, approved fall prevention devices from a fall protection supplier) shall be designed by a Registered Professional Engineer. Fall protection or restraining methods shall be in place when employees are within 6 feet of the leading or exposed edge, where a fall hazard exceeding 6 feet exists, such as during decking activities, inspecting structures, climbing, trenching, etc.

2.13 Working On or Near the Water

The buddy system should be utilized whenever there is the possibility of falling into water. In the buddy system, two persons operate as a single unit in order to monitor and assist each other in performing tasks. Whenever the possibility of falling into water exists, personnel must be attired in a USCG-approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured at all times. A throwable rescue device (Type IV flotation aid), along with other appropriate equipment (i.e., ladders, lifting gear, or rescue boat), shall be immediately available to recover an individual from the water.

Waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the SH&E Manager. Waders may be worn in still waters in water depths up to the waist if bottom conditions are firm and well understood. Waders shall never be worn aboard a watercraft of any kind.

Use a pole to conduct sediment probing to assess water depths, the stability of shoreline terrain, and the bearing capacity of bottom sediments ahead of the chosen path.If workers have the potential to get stuck in mud or fluidized sediment, air injection equipment designed to free workers’ feet/legs may need to be available on site. At a minimum, a safety line should be available to be deployed from safe ground. If a worker does get stuck, he or she should not struggle as this causes further sinking.

Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water’s edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. It is suggested that workers not be permitted to access areas where these slip/fall hazards exists, especially in locations containing tidal water flow.

2.14 Working Near Railroad Hazards

When working on or near “live” tracks, follow these general rules:

Hard hats (preferably orange), high visibility apparel, and safety footwear shall be worn on railroad right-of-way. All other owner/operator safety requirements and procedures shall be followed.

Red markers, flagging, or lights shall not be used on railroad right-of-way. Red means “immediate danger,” and trains that encounter red markers will stop without exception. Red signals shall only be used when injured persons or disabled vehicles are on the tracks or at grade crossings and cannot be moved or when any condition could cause derailment.

Train schedules cannot be relied upon. Passenger trains have published schedules but are often off schedule. Freight trains have no schedules, and move anyplace, anytime.

When tracks must be crossed, look in both directions every time. When crossing more than one set of tracks, stop after the first set and look again each way before crossing the second set. Air build-up can cause a train to "jump" forward; therefore, do not cross directly in front of a standing train. Do not lean on or crawl under stopped cars or cross tracks between cars.

Railroad equipment is not always heard, especially if there is other noise. Coasting, slow-moving trains may give no warning.

Notify the flagger each time it is necessary to "foul" the tracks, and then proceed only after "absolute protection" is received. Efforts to clear tracks must begin immediately anytime the flagger indicates to do so.

For jobs longer than one day, the flagger and project supervisor shall discuss the day's work and any need to foul the tracks at the start of each work day. Discuss job details with each new flagger.

Be alert for buried electrical/utility lines on or near railroad right-of-way. Excavations on the right-of-way shall be filled at the end of each day.

Access roads to and across tracks shall not be blocked or disrupted. Vehicles shall not be parked within 10 feet of the tracks. Materials, tools, or equipment shall not be stored on railroad right-of-way. Track ballast shall not be eroded or contaminated. Work areas shall be inspected after each day's work to ensure that nothing is left on or near the tracks. Appropriate lighting devices shall be used to protect the work area overnight.

It is also important to note that trains and cars in the hump yard area may be under remote operation. Exercise extreme caution when working in these areas as there may be no engineers aboard these trains and cars.

2.15 Dust and Odor Control

Specific controls will be in place to prevent dust generation. If dust is observed reaching or approaching the site boundary, activities causing the dust will be immediately stopped. Dust control measures (water spray, soil covers, slower work pace, or change in work activities) will be deployed prior to resuming work. Corrective measures will be documented in the daily report.

Because of the nature of the contaminant at the site, odors are not likely to be anticipated to be of concern. In the event that an odor complaint is received, the SS and/or SSO will immediately assess site conditions and will determine the probable cause or causes. Appropriate odor mitigation measures will be deployed. These measures may include covering sediment piles, deploying odor suppressing foam, implementing air monitoring, or discontinuing activities that are generating the odor. Corrective measures will be documented in the daily report.

2.16 Spill Prevention

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, including an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (e.g., speedy dri) shall be available at each work site (more as needed).

All hazardous commodities in use (e.g., fuels) shall be properly labeled.

Containers shall only be lifted using equipment specifically manufactured for that purpose.

2.17 Noise Exposure Monitoring

[specify if necessary]

When heavy equipment is in operation, it will be necessary to ensure that each exclusion zone fully encompasses all areas where hazardous noise levels are present (85dBA or greater). Once each work day, the SSO will use a sound level meter to survey the perimeter of each exclusion zone while all onsite heavy equipment within the zone is being operated simultaneously. If the sound pressure level exceeds 85 dBA at any location along the site perimeter, the SSO will exit the exclusion zone and use the meter to determine the 85 dBA limit. The exclusion zone boundary will then be adjusted to fully encompass this region.

2.18 Traffic Control

During certain work tasks, the establishment of traffic control to adequately protect workers and the public may be required on-site. Site-specific requirements will be determined by the site supervisor/SSO on a case-by-case basis. Only approved traffic control devices in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) will be used on public road ways per accordance with the applicable state regulatory guidance.

General traffic control precautions include placing a work vehicle between your worksite and oncoming traffic whenever possible.Not only is it a large, visible warning sign, but also if an oncoming car should fail to yield or deviate, the parked vehicle rather than your body would absorb the first impact of a crash. Turn the vehicle wheels so that if the vehicle were struck it would swing away from the worksite. When using cones or other devices to modify traffic flow, ensure use of the proper taper length and device spacing to provide adequate warning distance to oncoming motor vehicles. In addition, proper PPE, including a hardhat and a high-visibility vest shall be worn during traffic operations.

3.0 Wildlife, Plant, and Insect Hazards

Below is a series of tasks typically encountered on projects. While the text below may be used to describe your work, it must be elaborated on in sufficient detail to make it site specific.

3.1 Bears

An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.

The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criteria, as bears have been encountered within city limits, especially near landfills.

The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.

Preparing staff for any type of encounter is key to managing the risk.

3.2 Small Mammals

Working in the field either directly or indirectly with small mammals has an inherent risk of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) against which all field staff need to protect themselves.

This risk is usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, air-borne diseases (e.g., Hantavirus) also pose a risk.

Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

3.3 Venomous Animals

Some animals have the ability to inject venom. These include rattlesnakes, black widow spiders, and scorpions, all of which have limited distributions and therefore are unlikely to be encountered in most areas. Other spiders possess venom but they are not potentially lethal to humans. Shrews have poisonous saliva, but the chance of being envenomated by them is extremely unlikely unless they are handled.

If bitten by any of these animals, special care should be taken to treat the wound as it may lead to complications due to the toxin.

A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

3.4 Poisonous Plants

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. Staff should be aware that a large number of organisms are capable of causing serious irritations and allergic reactions. Some reactions will only erupt if secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can result in severe scarring, blindness, or even death.

S3NA(US)-209-TP2b HASP Chemical Guidelines

TABLE 4-1

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Aahepta (Heptachlor Epoxide, Heptachlor, 3-chlorochlordene, hepta, heptrachlorane) (76-44-8)	0.5 mg/m^3 (skin) IDLH: 35 mg/m^3	N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	MSA ≥ 0.5 mg/m^3, Level B
						North and 3M[3]
Acenaphthene (1,8,Ethylenenaphthalene, 1,2 dehydroacenaphthalene) (83-32-9)	0.2 mg/m^3[1] (0.03 ppm)	7.5-8.5	1) 306% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.1 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M ≤ 10 mg/m^3, Level C > 10 mg/m^3, Level B
Acenaphthylene (208-96-8)	0.2 mg/m^3[1] (0.03 ppm)	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M ≤ 10 mg/m^3, Level C > 10 mg/m^3, Level B
Acetaldehyde (Ethanal, Acetic aldehyde, ethyl aldehyde) (75-07-0)	100 ppm (180 mg/m^3)	10.21	1) N/A[3] 2) 28% 3) 23% 4) 9.1%	1) N/A[6] 2) 28 ppm 3) 23 ppm 4) 9.1 ppm	SENS Measuring Range: 0.1 - 750 ppm[7] Detection Limit: 0.1 ppm	MSA, North and 3M < 1000 ppm, Level C ≥ 1000 ppm, Level B
					Drager Measuring Range: 100 - 1,000 ppm	3M ≤ 1,250 ppm, Level C > 1,250 ppm, Level B
Acetaldehyde Oxime (Acetaldoxime, Aldoxime, Ethanol Oxime, Ethylidene, Hydroxylamine) (107-29-9)	N/A[2]	N/A[2]	1) 23% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[8]
Acetaldoxime (Acetaldehyde Oxime, Aldoxime, Ethanol Oxime, Ethylidene Hydroxylamine) (107-29-9)	N/A[2]	N/A[2]	1) 23% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[8]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Acetic Acid (Glacial Acetic Acid, Ethanoic acid) (64-19-7)	10 ppm (25 mg/m^3)	10.35	1) 5.0% 2) 32.8% 3a) 38% - slow 3b) 11% - glacial 4) 22.7%	1) 0.50 pp 2) 3.28 ppm 3a) 3.8 ppm 3b) 1.1 ppm 4) 2.3 ppm	SENS Measuring Range: 0.125 – 100 ppm Detection Limit: 0.05 ppm	MSA < 50 ppm, Level C ≥ 50 ppm, Level B
					Drager Measuring Range: 125 - 200 ppm	North < 500 ppm, Level C ≥ 500 ppm, Level B
						3M < 100 ppm, Level C ≥ 100 ppm, Level B
Acetic Acid Anhydride (Acetic Anhydride, Acetic Oxide, Acetyl Oxide) (108-24-7)	5 ppm (20 mg/m^3)	10.14	1) 9.0% 2) N/A[3] 3) 61% 4) 8.2%	1) 0.45 ppm 2) N/A[6] 3) 3.05 ppm 4) 0.41 ppm	SENS Measuring Range: 0.6 – 15 ppm[7] Detection Limit: 0.2 ppm	MSA < 200 ppm, Level C ≥ 200 ppm, Level B
						North and 3M < 250 ppm, Level C ≥ 250 ppm, Level B
Acetic Aldehyde (Acetaldehyde, Ethanal, Ethyl Aldehyde) (75-07-0)	100 ppm (180 mg/m^3)	10.21	1) N/A[3] 2) 28% 3) 23% 4) 9.1%	1) N/A[6] 2) 28 ppm 3) 23 ppm 4) 9.1 ppm	SENS Measuring Range: 0.1 – 750 ppm[7] Detection Limit: 0.1 ppm	MSA and North < 1,000 ppm, Level C ≥ 1,000 ppm, Level B
					Drager Measuring Range: 100-1,000 ppm	3M ≤ 1,250 ppm, Level C > 1,250 ppm, Level B
Acetic Anhydride (Acetic acid anhydride, acetic oxide, acetyl oxide) (108-24-7)	5 ppm (20 mg/m^3) (ceiling)	10.14	1) 9.0% 2) N/A[3] 3) 61% 4) 8.2%	1) 0.45 ppm 2) N/A[6] 3) 3.05 ppm 4) 0.41 ppm	SENS Measuring Range: 0.6 – 15 ppm[7] Detection Limit: 0.2 ppm	MSA, North and 3M < 250 ppm, Level C ≥ 250 ppm, Level B
Acetic Oxide (Acetic acid Anhydride, Acetic Anhydride, Acetyl Oxide) (108-24-7)	5 ppm (20 mg/m^3) (ceiling)	10.00	1) 9.0% 2) N/A[3] 3) 61% 4) 8.2%	1) 0.45 ppm 2) N/A[6] 3) 3.05 ppm 4) 0.41 ppm	SENS Measuring Range: 0.6 – 15 ppm[7] Detection Limit: 0.2 ppm	MSA < 250 ppm, Level C ≥ 250 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Acetone (Dimethyl ketone, ketone propane, 2-propanone) (67-64-1)	750 ppm (1800 mg/m^3)	9.69	1) 42% 2) 38% 3) 82% 4) 45%	1) 315 ppm 2) 285 ppm 3) 615 ppm 4) 337 ppm	SENS Measuring Range: 50-12,000 ppm Detection Limit: 5 ppm	MSA and North ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
					Drager Measuring Range: 100-12,000 ppm	3M ≤ 20,000 ppm, Level C > 20,000 ppm, Level B
Acetonitrile (Ethyl nitrile, methyl cyanide, cyanomethane) (75-05-8)	40 ppm (70 mg/m^3)	12.22	1) N/A(3) 2) 0.8% 3) 70% 4) N/A(3)	1) N/A(6) 2) 0.32 ppm 3) 28 ppm 4) N/A(6)	SENS Measuring Range: 3 – 180 ppm Detection Limit: 0.1	MSA and North Level B
						3M ≤ 400 ppm, Level C > 400 ppm, Level B
Acetophenone (acetyl benzene) (98-86-2)	TLV 10 ppm (49 mg/m^3)	9.27	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA and 3M ≤ 500 ppm, Level C > 500 ppm, Level B
						North(3)
						3M < 100 ppm, Level C ≥ 100 ppm, Level B
Acetyl Oxide (Acetic Anhydride, Acetic acid anhydride, Acetic Oxide) (108-24-7)	5 ppm (20 mg/m^3)	10.14	1) 9.0% 2) N/A(3) 3) 61% 4) 8.2%	1) 0.45 ppm 2) N/A(6) 3) 3.05 ppm 4) 0.41	SENS Measuring Range: 0.6 – 15 ppm(7) Detection Limit: 0.2 ppm	MSA, North and 3M < 250 ppm, Level C ≥ 250 ppm, Level B
Acetylene (74-86-2)	N/A(2)	11.41	1) 0.0(3) 2) N/A(3) 3) 225% 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	SENS Measuring Range: 32.5 – 1,040 ppm Detection Limit: 5 ppm	MSA only Level B
						North and 3M(3)
Acetylenetetrachloride (1,2,4,5-Tetrachlorobenzene, ethane tetrachloride) (95-94-3)	N/A(2)	< 10.2	1) 128% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	N/A(2)

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Acetylene dichloride (1,2-DCE, 1,2-Dichloroethene, 1,2-Dichloroethylene) (540-59-0)	200 ppm (790 mg/m^3)	9.80	1) 75% 2) 85% 3) 40% 4) N/A(3)	1) 150 ppm 2) 170 ppm 3) 80 ppm 4) N/A(6)	SENS Measuring Range: 5 – 800 ppm Detection Limit: 1 ppm	MSA ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
						North(3) 3M ≤ 4,000 ppm, Level C > 4,000 ppm, Level B
Acraldehyde (Acrolein) (107-02-8)	0.1 ppm	10.13	1) 31% 2) 27% 3) 27% 4) 12.8%	1) 0.03 ppm 2) 0.03 ppm 3) 0.03 ppm 4) 0.01 ppm	SENS Measuring Range: 3.3 - 800 ppm(7) Detection Limit: 2 ppm	MSA < 2 ppm, Level C ≥ 2 ppm, Level B
						North and 3M < 5 ppm, Level C ≥ 5 ppm, Level B
Acrolein (Acraldehyde) (107-02-8)	0.1 ppm	10.13	1) 31% 2) 27% 3) 27% 4) 12.8%	1) 0.03 ppm 2) 0.03 ppm 3) 0.03 ppm 4) 0.01 ppm	SENS Measuring Range: 3.3 - 800 ppm(7) Detection Limit: 2 ppm	MSA < 2 ppm, Level C ≥ 2 ppm, Level B
						North and 3M < 5 ppm, Level C ≥ 5 ppm, Level B
Acrylonitrile (Acrylonitrile monomer, propene nitrile, vinyl cyanide) (107-13-1)	2 ppm (skin)	10.91	1) N/A(3) 2) 28.5% 3) 98% 4) N/A(3)	1) N/A(6) 2) 0.77 ppm 3) 1.96 ppm 4) N/A(6)	SENS Measuring Range: 0.125 - 360 ppm(7) Detection Limit: 0.05 ppm	MSA < 85 ppm, Level C ≥ 85 ppm, Level B
					Drager Measuring Range: 0.5 – 20 ppm	North and 3M < 100 ppm, Level C ≥ 100 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Acrylonitrile monomer (Acrylonitrile, propene nitrile, vinyl cyanide) (107-13-1)	2 ppm (skin)	10.91	1) N/A(3) 2) 38.5% 3) 98% 4) N/A(3)	1) N/A(6) 2) 0.77 ppm 3) 1.96 ppm 4) N/A(6)	SENS Measuring Range: 0.125 – 360 ppm(7) Detection Limit: 0.05 ppm Drager Measuring Range: 0.5 - 20 ppm	MSA < 85 ppm, Level C ≥ 85 ppm, Level B North and 3M < 100 ppm, Level C ≥ 100 ppm, Level B
Aldoxime (Acetaldehyde Oxime, Acetaldoxime, Ethanol Oxime, Ethylidene) (107-29-9)	N/A(2)	N/A(2)	1) 23% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	Level B(8)
Aldrin (HHDN, Octalene) (309-00-2)	0.25 mg/m^3 IDLH: 25 mg/m^3	N/A	1) N/A 2) N/A 3) N/A	1) N/A 2) N/A 3) N/A	N/A	MSA > 0.25 mg/m^3, Level B North ≤ 12.5 mg/m^3, Level C > 12.5 mg/m^3, Level B
Allyl Alcohol (allylic alcohol) (107-18-6)	2 ppm (5 mg/m^3)	9.67	1) 25% 2) 47% 3) 30% 4) 21%	1) 0.5 ppm 2) 0.94 ppm 3) 0.6 ppm 4) 0.4 ppm	N/A(3)	MSA < 20 ppm, Level C ≥ 20 ppm, Level B North(3) 3M ≤ 100 ppm, Level C > 100 ppm, Level B
Allyl Chloride (3-chloropropene, 1-chloro-2-propene) (107-05-1)	1 ppm (3 mg/m^3)	10.2	1) 13% 2) 119% 3) 50% 4) 12%	1) 0.13 ppm 2) 1.19 ppm 3) 0.50 ppm 4) 0.12 ppm	SENS Measuring Range: 1 – 20 ppm(7) Detection Limit: 0.02 ppm Drager 5-60 ppm	MSA Level B 3M < 10 ppm, Level C ≥ 10 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Allylic Alcohol (allyl alcohol) (107-18-6)	2 ppm (5 mg/m^3)	9.67	1) 25% 2) 47% 3) 30% 4) 2%	1) 0.5 ppm 2) 0.94 ppm 3) 0.6 ppm 4) 0.4 ppm	N/A[3]	MSA < 20 ppm, Level C ≥ 20 ppm, Level B
						North[3]
						3M ≤ 100 ppm, Level C > 100 ppm, Level B
Alpha Pinene (2-Pinene) (80-56-8)	N/A[2] TLV 10 ppm	8.07	1) 7.0% 2) N/A[3] 3) N/A[3] 4) 167%	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 95 – 1,140 ppm Detection Limit: 0.5 ppm	Level B[8]
Aluminum (7429-90-5)	metal/dust total: 15 mg/m^3 metal/dust respirable: 5 mg/m^3 pyro powders: 5 mg/m^3 welding fumes: 5 mg/m^3	N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	MSA, North and 3M ≤ 250 mg/m^3, Level C > 250 mg/m^3, Level B
Aminobenzene (Aniline, Aniline oil, Benzenamine) (62-53-3)	2 ppm (8 mg/m^3) (skin)	7.70	1) N/A[3] 2) N/A[3] 3) 4% slow 4) 100%	1) 1.3 ppm 2) 1.72 ppm 3) 0.08 ppm 4) 2.0 ppm	SENS Measuring Range: 1.25 - 60 ppm[7] Detection Limit: 0.25 ppm	MSA and North Level B
					Drager Measuring Range: 0.5 - 10 ppm[7]	3M < 100 ppm, Level C ≥ 100 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Ammonia (Anhydrous ammonia) (7664-41-7)	25 ppm (17 mg/m^3)	10.15	1) 6.0% 2) 30% 3) N/A[3] 4) 5.2%	1) 1.5 ppm 2) 7.5 ppm 3) N/A[6] 4) 1.3 ppm	SENS Measuring Range: 0.5 - 1,000 ppm[7] Detection Limit: 0.2 ppm	MSA and North ≤ 500 ppm, Level C > 500 ppm, Level B
					Drager Measuring Range: 0.25 – 1,500 ppm	3M ≤ 1,250 ppm, Level C > 1,250 ppm, Level B
Amyl Hydrine (Pentane) (109-66-0)	600 ppm (1,800 mg/m^3)	10.34	1) N/A[3] 2) 100.8% 3) 65% 4) 6%	1) N/A[6] 2) 605 ppm 3) 390 ppm 4) 36 ppm	SENS Measuring Range: 30 – 1,680 ppm Detection Limit: 5 ppm	MSA Level B
					Drager Measuring Range: 100 – 1,500 ppm	North[3]
						3M < 15,000 ppm, Level C ≥ 15,000 ppm, Level B
Anhydrous Ammonia (Ammonia) (7664-41-7)	25 ppm (17 mg/m^3)	10.15	1) 6.0% 2) 30% 3) N/A[3] 4) 5.2%	1) 1.5 ppm 2) 7.5 ppm 3) N/A[6] 4) 1.3 ppm	SENS Measuring Range: 0.5 - 1,000 ppm[7] Detection Limit: 0.2 ppm	MSA < 300 ppm, Level C ≥ 300 ppm, Level B
					Drager Measuring Range: 0.25 – 1,500 ppm	North and 3M < 500 ppm, Level C ≥ 500 ppm, Level B
Aniline (Aniline oil, Aminobenzene, Benzenamine) (62-53-3)	2 ppm (8 mg/m^3) (skin)	7.70	1) N/A[3] 2) N/A[3] 3) 4% slow 4) 100%	1) 1.3 ppm 2) 1.72 ppm 3) 0.08 ppm 4) 2.0 ppm	SENS Measuring Range: 1.25 - 60 ppm[7] Detection Limit: 0.25 ppm	MSA and North Level B
					Drager Measuring Range: 0.5 – 20 ppm	3M < 100 ppm, Level C ≥ 100 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Aniline oil (Aniline, Aminobenzene, Benzenamine) (62-53-3)	2 ppm (8 mg/m^3) (skin)	7.70	1) N/A[3] 2) N/A[3] 3) 4% slow 4) 100%	1) 1.3 ppm 2) 1.72 ppm 3) 0.08 ppm 4) 2.0 ppm	SENS Measuring Range: 1.25 - 60 ppm[7] Detection Limit: 0.25 ppm	MSA and North Level B
					Drager Measuring Range: 0.5 – 20 ppm[7]	3M < 100 ppm, Level C ≥ 100 ppm, Level B
Anthracene (Paranaphthalene) (120-12-7)	0.2 mg/m^3[1] (0.03 ppm)	7.23	1) 244% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.07 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Antimony (7440-36-0)	0.5 mg/m^3	N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	MSA < 50 mg/m^3, Level C ≥ 50 mg/m^3, Level B
						North[3]
						3M ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B
Aroclor®1254 (PCB-1254, PCB-1260, PCB, chlorobiphenyl, polychlorinated diphenyl, Aroclor®1260) (53469-21-9)	0.5 mg/m^3 (skin) (0.0375 ppm) IDLH: 5 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North > 0.5 mg/m^3, Level B
						3M < 25 ppm, Level C ≥ 25 ppm, Level B
Aroclor®1260 (PCB-1254, PCB-1260, PCB, polychlorinated biphenyl, chlorodiphenyl, Aroclor®1254) (53469-21-9)	0.5 mg/m^3 (skin) (0.0375 ppm) IDLH: 5 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North > 0.5 mg/m^3, Level B
						3M < 25 ppm, Level C ≥ 25 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Arsenic (29 CFR 1910.1018) (7440-38-2)	PEL: 0.01 mg/m^3 Action Level: 0.005 mg/m^3 IDLH: 5 mg/m^3	N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[4]	MSA ≤ 0.5 mg/m^3, Level C > 0.5 mg/m^3, Level B
						North < 1 ppm, Level C ≥ 1 ppm, Level B
						3M < 0.5 ppm, Level C ≥ 0.5 ppm, Level B
Atrazine (2-Chloro-4 (ethylamino)-6-isopropylamino)-s-(trazine) (1912-24-9)	5 mg/m^3	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA ≤ 500 mg/m^3, Level C > 500 mg/m^3, Level B
						North and 3M[3]
BHC (Lindane, HCH, HCCH, ϒ-hexachlorocyclohexane) (58-89-9)	0.5 mg/m^3 (skin) IDLH: 50 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North ≤ 50 mg/m^3, Level C > 50 mg/m^3, Level B
						3M[3]
Barium (Soluble compounds) (7440-39-3)	0.5 mg/m^3	N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	MSA and 3M ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B
						North[3]
Barium Dinitrate (Barium Nitrate) (10022-31-8)	0.5 mg/m^3	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	MSA ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B
						North and 3M[3]
Barium Nitrate (Barium Dinitrate) (10022-31-8)	0.5 mg/m^3	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	MSA ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B
						North and 3M[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Benz(a)anthracene (Benzo(a)anthracene) (56-55-3)	0.2 mg/m^3[1] (0.02 ppm)	7.53	1) 246% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.5 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Benzaldehyde (Benzoic aldehyde) (100-52-7)	AIHA WEEL TWA: 2 ppm	9.53	1) 67% 2) 86% 3) N/A[3] 4) N/A[3]	1) 1.34 ppm 2) 1.72 ppm 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 4 – 92 ppm[7] Detection Limit: 0.05 ppm	MSA < 200 ppm, Level C ≥ 200 ppm, Level B
						North[3]
						3M < 100 ppm, Level C ≥ 100 ppm, Level B
Benzenamine (Aniline, Aminobenzene, Aniline oil) (62-53-3)	2 ppm (8 mg/m^3) (skin)	7.70	1) 67% 2) 86% 3) 4% slow 4) 100%	1) 1.3 ppm 2) 1.72 ppm 3) 0.08 ppm 4) 2.0 ppm	SENS Measuring Range: 1.25 - 60 ppm[7] Detection Limit: 0.25 ppm	MSA and North Level B
					Drager Measuring Range: 0.5-10 ppm[7]	3M < 100 ppm, Level C ≥ 100 ppm, Level B
Benzene Carboxylic Acid (Benzoic Acid, Phenylformic Acid) (65-85-0)	N/A[2]	N/A[2]	1) 50% 2) N/A[2] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 0.01 – 0.8% Detection Limit: 0.003%	Level B[3]
Gamma-Benzene hexachloride (lindane, BHC, HCH, HCCH, ϒ-hexachlorocyclohexane) (58-89-9)	0.5 mg/m^3 (skin) IDLH: 50 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B
						3M[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Benzene Tetrahydride (Cyclohexene, tetrahydrbenzene) (110-83-8)	300 ppm (1,015 mg/m^3)	8.95	1) 34% 2) N/A[3] 3) N/A[3] 4) 62.5%	1) 102 ppm 2) N/A[6] 3) N/A[6] 4) 187 ppm	SENS Measuring Range: 0.01 – 0.8% Detection Limit: 0.003%	MSA < 1,000 ppm, Level C ≥ 1,000 ppm, Level B
						North[2]
						3M ≤ 13,000 ppm, Level C > 13,000 ppm, Level B
Benz(a)anthracene (56-55-3)	0.2 mg/m^3[1] (0.02 ppm)	7.53	1) 246% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.05 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Benzo(a)pyrene Coal Tar Pitch Volatile (50-32-8)	0.2 mg/m^3[1] (0.02 ppm)	7.5-8.5	1) ~300% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.06 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[4]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Benzo(b)fluoranthene Coal Tar Pitch Volatile (205-99-2)	0.2 mg/m^3[1] (0.02 ppm)	7.5-8.5	1) ~290% 2) N/A[2] 3) N/A[2] 4) N/A[3]	1) 0.06 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Benzo(k)fluoranthene Coal Tar Pitch Volatile (207-08-9)	0.2 mg/m^3[1] (0.02 ppm)	7.5-8.5	1) ~290% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.06 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North < 10 mg/m^3, Level C ≥ 10 mg/m^3, Level B
						3M[3]
Benzofuran Coal Tar Pitch Volatile (271-89-6)	N/A[2]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[3]
Benzoic Acid (phenylformic acid, benzene carboxylic acid) (65-85-0)	N/A[2]	N/A[2]	1) 50% 2) N/A[2] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 0.01 – 0.8% Detection Limit: 0.003%	Level B[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Benzoic Aldehyde (Benzaldehyde) (100-52-7)	AIHA WEEL TWA 2 ppm	9.53	1) 67% 2) 86% 3) N/A(3) 4) N/A(3)	1) 1.34 ppm 2) 1.72 ppm 3) N/A(6) 4) N/A(6)	SENS Measuring Range: 4 - 92 ppm Detection Limit: 0.05 ppm	MSA ≤ 200 ppm, Level C > 200 ppm, Level B North(3) 3M < 20 ppm, Level C ≥ 20 ppm, Level B
1,12-Benzoperylene Coal Tar Pitch Volatile (Benzo(g,h,i)perylene) (191-24-2)	0.2 mg/m3(1) (0.02 ppm)	7.5-8.5	1) ≈ 300% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.06 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA, North and 3M ≤ 10 mg/m3, Level C > 10 mg/m3, Level B
Benzo(g,h,l)perylene Coal Tar Pitch Volatile (1,12-benzoperylene) (191-24-2)	0.2 mg/m3(1) (0.02 ppm)	7.5-8.5	1) ~300% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.06 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA, North and 3M ≤ 10 mg/m3, Level C > 10 mg/m3, Level B
Benzo(b)thiopene Coal Tar Pitch Volatile	0.2 mg/m3(1) (0.02 ppm)	N/A(2)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	Level B(8)
3,4-Benzpyrene Coal Tar Pitch Volatile (Benzo(a)pyrene (50-32-8)	0.2 mg/m3(1) (0.02 ppm)	7.5-8.5	1) ≈ 300% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.06 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA, North and 3M ≤ 10 mg/m3, Level C > 10 mg/m3, Level B
Benzylchloride (chlorotoluene) (100-44-7)	1 ppm (5 mg/m3)	10.16	1) 67% 2) 117% 3) 60% 4) 25%	1) 0.66 ppm 2) 1.17 ppm 3) 0.60 ppm 4) 0.25 ppm	SENS Measuring Range: 0.8 – 20 ppm(7) Detection Limit: 0.4 ppm	MSA and 3M ≤ 10 ppm, Level C > 10 ppm, Level B North(3)
Beryllium (7440-41-7)	0.002 mg/m3	N/A(4)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA ≤ 0.05 mg/m3, Level C > 0.05 mg/m3, Level B North and 3M ≤ 0.1 mg/m3, Level C > 0.1 mg/m3, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
BHC (ɣ-hexachlorocyclohexane, HCCH, HCH, lindane) (58-89-9)	0.5 mg/m^3 (skin) IDLH: 50 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North ≤ 50 mg/m^3, Level C > 50 mg/m^3, Level B 3M[3]
Beta Pinene (2-Pinene) (80-56-8)	N/A[2]	8.07	1) 5% 2) N/A[3] 3) N/A[3] 4) 125%	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[3]
Biethylene (1,3-butadiene, Divinyl, Bivinyl, Erythrene, Butadiene) (106-99-0)	1 ppm (2.2 mg/m^3)	9.57	1) 69.9% 2) 76% 3) 33% 4) 50%	1) 0.699 2) 0.76 ppm 3) 0.33 ppm 4) 0.5 ppm	SENS Measuring Range: 2.5-800 ppm[7] Detection Limit: 0.5 ppm	MSA and 3M ≤ 50 ppm, Level C > 50 ppm, Level B North Level B
Biphenyl (diphenyl, phenylbenzene) (92-52-4)	0.2 ppm (1 mg/m^3)	8.27	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA ≤ 10 ppm, Level C > 10 ppm, Level B North[3]
Bivinyl (1,3-butadiene, Divinyl, Biethylene, Erythrene, Butadiene) (106-99-0)	1 ppm (2.2 mg/m^3)	9.57	1) 69.9% 2) 76% 3) 33% 4) 50%	1) 0.699 2) 0.76 ppm 3) 0.33 ppm 4) 0.5 ppm	SENS Measuring Range: 2.5-800 ppm[7] Detection Limit: 0.5 ppm	MSA and 3M ≤ 50 ppm, Level C > 50 ppm, Level B North Level B
Bromo Benzene (Phenyl Bromide, Monobromobenzene) (108-86-1)	N/A[2]	8.98	1) 156% 2) 178% 3) N/A[3] 4) 83%	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M[3]
Bromodichloromethane (Dichlorobromomethane) (75-27-4)	N/A[1]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Bromoform (75-25-2)	0.5 ppm (5 mg/m^3) (skin)	10.48	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) 20%	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) 0.1 ppm	SENS Measuring Range: 1 - 50 ppm Detection Limit: 0.5 ppm	MSA ≤ 25 ppm, Level C > 25 ppm, Level B
						North[1]
						3M < 5 ppm, Level C ≥ 5 ppm, Level B
Bromomethane (Monobromomethane, Methyl Bromide) (74-83-9)	5 ppm (20 mg/m^3) (skin)	10.53	1) 27% 2) N/A[3] 3) 23% 4) 29.4%	1) 1.35 ppm 2) N/A[6] 3) 1.15 ppm 4) 1.47 ppm	SENS Measuring Range: 1-600 ppm[7] Detection Limit: 0.2 ppm	MSA, North and 3M Level B
					Drager Measuring Range: 0.5 – 100 ppm	
Butadiene (1,3-butadiene, Divinyl, Bivinyl, Erythrene, Biethylene) (106-99-0)	1 ppm (2.2 mg/m^3)	9.57	1) 69.9% 2) 76% 3) 33% 4) 50%	1) 0.699 ppm 2) 0.76 ppm 3) 0.33 ppm 4) 0.5 ppm	SENS Measuring Range: 2.5-800 ppm[7] Detection Limit: 0.5 ppm	MSA and North ≤ 50 ppm, Level C > 50 ppm, Level B
						North Level B
						3M < 10 ppm, Level C ≥ 10 ppm, Level B
1,3-Butadiene (Biethylene, Divinyl, Bivinyl, Erythrene, butadiene) (106-99-0)	1 ppm (2.2 mg/m^3)	9.57	1) 70% 2) 76% 3) 33% 4) 50%	1) 0.7 2) 0.76 ppm 3) 0.33 ppm 4) 0.5 ppm	SENS Measuring Range: 2.5-800 ppm[7] Detection Limit: 0.5 ppm	MSA and 3M ≤ 50 ppm, Level C > 50 ppm, Level B
						North > 1 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Butane (106-97-8)	800 ppm	10.63	1) N/A(3) 2) 71% 3) 63% 4) N/A(3)	1) N/A(6) 2) 568 ppm 3) 504 ppm 4) N/A(4)	SENS Measuring Range: 25-1,400 ppm Detection Limit: 5 ppm	MSA and 3M > 800 ppm, Level B
						North(3)
Butanone (Ethyl Methyl Ketone, MEK, Methyl Acetone, 2-butanone, Methyl ethyl ketone) (78-93-3)	200 ppm (590 mg/m^3)	9.53	1) 56% 2) 53% 3) 80% 4) 56%	1) 112 ppm 2) 106 ppm 3) 160 ppm 4) 112 ppm	SENS Measuring Range: 0.125-1,680 ppm Detection Limit: 0.125 ppm	MSA and North ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
						3M ≤ 3,000 ppm, Level C > 3,000 ppm, Level B
2-Butanone (MEK, Butanone, Methyl ethyl ketone, methyl acetone, ethyl methyl ketone) (78-93-3)	200 ppm (590 mg/m^3)	9.53	1) 56% 2) 53% 3) 80% 4) 56%	1) 112 ppm 2) 106 ppm 3) 160 ppm 4) 112 ppm	SENS Measuring Range: 0.125-1,680 ppm Detection Limit: 0.125 ppm	MSA and North ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
						3M ≤ 3,000 ppm, Level C > 3,000 ppm, Level B
2-Butenal (Crotonaldehyde) (4170-30-3)	2 ppm (6 mg/m^3)	9.73	1) 31% 2) 64% 3) N/A(3) 4) 45%	1) 0.62 ppm 2) 1.28 ppm 3) N/A(3) 4) 0.9 ppm	N/A(3)	MSA ≤ 50 ppm, Level C > 50 ppm, Level B
						North(3)
						3M < 15 ppm, Level C ≥ 15 ppm, Level B
Butyl benzyl phthalate (85-68-7)	HSE 5 mg/m^3 (0.39 ppm)	N/A(2)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	Level B(3)

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Butyl methyl ketone (MBK, methyl butyl ketone, methyl n-butyl ketone, 2-Hexanone) (591-78-6)	5 ppm (20 mg/m^3)	9.34	1) N/A[3] 2) N/A[3] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA ≤ 100 ppm, Level C > 100 ppm, Level B North[3] 3M < 250 ppm, Level C ≥ 250 ppm, Level B
tert-Butylbenzene (98-06-6)	N/A[2]	8.68	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[8]
Cadmium (29 CFR 1910.1027) (7440-43-9)	Dust: 0.005 mg/m^3 Action level: 0.0025 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA ≤ 0.25 mg/m^3, Level C (dust) > 0.25 mg/m^3, Level B (dust) North < 0.5 ppm, Level C ≥ 0.5 ppm, Level B 3M < 0.05 mg/m^3, Level C (dust) ≥ 0.05 mg/m^3, Level B (dust)
Cadmium (fume) (1306-19-0)	Fume: 0.005 mg/m^3 (29 CFR 1910.1027)	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North ≤ 0.125 mg/m^3, Level C (fume) > 0.125 mg/m^3, Level B (fume) 3M < 0.05 mg/m^3, Level C ≥ 0.05 mg/m^3, Level B
Calcium (7440-70-2)	N/A[2]	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[4]	N/A[3]	Level B[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Carbazole (86-74-8)	0.2 mg/m^3[1] (0.03 ppm)	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M[3]
Carbolic acid (Phenol, phenyl alcohol, phenol, hydroxybenzene, monohydroxybenzene) (108-95-2)	5 ppm (19 mg/m^3) IDLH: 250 ppm	8.5	1) N/A[3] 2) N/A[3] 3) 54% 4) 50%	1) N/A[3] 2) N/A[6] 3) 2.7 ppm 4) 2.5 ppm	SENS Measuring Range: 0.4-187 ppm Detection Limit: 0.1 ppm	MSA and North < 250 ppm, Level C ≥ 250 ppm, Level B
					Drager Measuring Range: 1-20 ppm	3M < 50 ppm, Level C ≥ 50 ppm, Level B
Carbon Bisulfide (Carbon Disulfide) (75-15-0)	4 ppm (12 mg/m3) (skin)	10.07	1) 49% 2) 277% 3) N/A[4] 4) 41.2%	1) 1.96 ppm 2) 11.08 ppm 3) N/A[6] 4) 1.65 ppm	SENS Measuring Range: 0.63-4,000 ppm Detection Limit: 0.3 ppm	MSA and 3M ≤ 100 ppm, Level C > 100 ppm, Level B
					Drager Measuring Range: 1.25 – 100 ppm	North ≤ 400 ppm, Level C > 400 ppm, Level B
Carbon Chloride (Carbon Tetrachloride, Carbon TET, Freon 10, Halon 104, Tetrachloromethene, perchloromethane) (56-23-5)	2 ppm (12.6 mg/m^3)	11.47	1) N/A[3] 2) 42% 3) 8.0% 4) N/A[3]	1) N/A[6] 2) 0.84 ppm 3) 0.16 ppm 4) N/A[6]	SENS Measuring Range: 0.5 – 60 ppm[7] Detection Limit: 0.2 ppm	MSA and North Level B
					Drager Measuring Range: 0.2 – 70 ppm[7]	3M < 50 ppm, Level C ≥ 50 ppm, Level B
*** Carbon Dichloride (Tetrachloroethene, Tetrachloroethylene, ethylene tetrachloride, PCE, perclane, perchloroethylene) (127-18-41)	25 ppm (170 mg/m^3)	9.32	1) 86% 2) N/A[3] 3) 68% 4) N/A[3]	1) 21.5 ppm 2) N/A[6] 3) 17 ppm 4) N/A[6]	SENS[7] Measuring Range: 0.2 – 900 ppm Detection Limit: 0.3 ppm	MSA and North > 25 ppm, Level B
					Drager Measuring Range: 0.1 – 10,000 ppm	

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Carbon Disulfide (Carbon Bisulfide) (75-15-0)	4 ppm (12 mg/m^3) (skin)	10.07	1) 49% 2) 277% 3) N/A[3] 4) 41.2%	1) 1.96 ppm 2) 11.08 ppm 3) N/A[6] 4) 1.65 ppm	SENS Measuring Range: 0.63-4,000 ppm Detection Limit: 0.3 ppm	MSA ≤ 100 ppm, Level C > 100 ppm, Level B
					Drager Measuring Range: 3 – 95 ppm	North ≤ 200 ppm, Level C > 200 ppm, Level B
						3M < 500 ppm, Level C ≥ 500 ppm, Level B
Carbon Oxychloride (Phosgene, Carbonyl chloride, Chloroformyl chloride) (75-44-5)	0.1 ppm (0.4 mg/m^3)	11.77	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 0.05-16 ppm[7] Detection Limit: 0.02 ppm	MSA, North and 3M < 1,000 ppm, Level B
					Drager Measuring Range: 0.02-1.5 ppm	
Carbon TET (Carbon Tetrachloride, Carbon Chloride, Freon 10, Halon 104, Tetrachloromethene, perchloromethane) (56-23-5)	2 ppm (12.6 mg/m^3)	11.47	1) N/A[3] 2) 42% 3) 8.0% 4) N/A[3]	1) N/A[6] 2) 0.84 ppm 3) 0.16 ppm 4) N/A[6]	SENS Measuring Range: 0.5 - 60 ppm[7] Detection Limit: 0.2 ppm	MSA and North Level B
					Drager Measuring Range: 0.2 - 50 ppm[7]	
Carbon Tetrachloride (Carbon Chloride, Carbon TET, Freon 10, Halon 104, Tetrachloromethane, perchloromethane) (56-23-5)	2 ppm (12.6 mg/m^3)	11.47	1) N/A[3] 2) 42% 3) 8.0% 4) N/A[3]	1) N/A[6] 2) 0.84 ppm 3) 0.16 ppm 4) N/A[6]	SENS Measuring Range: 0.5 - 60 ppm Detection Limit: 0.2 ppm	MSA and North Level B
					Drager Measuring Range: 0.5 - 50 ppm[7]	

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Carbonyl Chloride (Phosgene, carbon oxychloride, chloroformyl chloride) (75-44-5)	0.1 ppm (0.4 mg/m^3)	11.77	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	SENS Measuring Range: 0.05-16 ppm(7) Detection Limit: 0.02 ppm	MSA, North and 3M < 1,000 ppm, Level B
					Drager Measuring Range: 0.02-1.5 ppm	
Cesium - 137	60 pCi/l	N/a	1) N/A(1) 2) N/A(1) 3) N/A(1)	1) N/A(1) 2) N/A(1) 3) N/A(1)	N/A(1)	N/A
Chlorallyl Chloride (cis 1,3-Dichloropropene, 1,3-Dichloropropene, Telone) (542-75-6)	1 ppm (5 mg/m^3) (skin)	N/A(2)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) 38.46	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) 0.38 ppm	N/A(3)	MSA Level B
						North and 3M ≤ 50 ppm, Level C > 50 ppm, Level B
Chlordane (gamma-chlorodon; octachlor-dihydrocyclopentadiene) (57-74-9)	0.5 mg/m^3 (skin) IDLH: 100 mg/m^3	N/A(2)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA Level B
						North ≤ 50 mg/m^3, Level C > 50 mg/m^3, Level B
Chlorine (7782-50-5)	0.5 ppm (1.5 mg/m^3)	11.48	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	SENS Measuring Range: 0.05-100,000 ppm or 10%(7) Detection Limit: 0.02 ppm	MSA and North ≤ 10 ppm, Level C > 10 ppm, Level B
					Drager 0.2-500 ppm	
2-Chloro-4 (ethylamino)-6-isopropylamino)-s-(trazine (atrazine) (1912-24-9)	5 mg/m^3	N/A(4)	1) N/A(3) 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA ≤ 500 mg/m^3, Level C > 500 mg/m^3, Level B
						North and 3M(3)

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
4-Chloroaniline (para-Chloroaniline) (106-47-8)	WEL: 0.1 ppm SL: 0.5 ppm	N/A(1)	1) N/A(3) 2) N/A(3) 3) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6)	N/A(1)	Level B( )
para-Chloroaniline (4-Chloroaniline) (106-47-8)	WEL: 0.1 ppm SL: 0.5 ppm	N/A(1)	1) N/A(3) 2) N/A(3) 3) N/A(3)	1) N/A(6) 2) N/A(6) 3) N/A(6)	N/A(1)	Level B( )
Chlorobenzene (chlorobenzol, MCB, monochlorobenzene, phenyl chloride) (108-90-7)	75 ppm (350 mg/m^3) IDLH: 1,000 ppm	9.07	1) 130% 2) 144% 3) 179% 4) 125%	1) 97.5 ppm 2) 108 ppm 3) 134 ppm 4) 93.8 ppm	SENS Measuring Range: 2-500 ppm Detection Limit: 0.2 ppm	MSA only ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
					Drager Measuring Range: 5-200 ppm	North(3)
Chlorobenzol (chlorobenzene, MCB, monochlorobenzene, phenyl chloride) (108-90-7)	75 ppm (350 mg/m^3)	9.07	1) 130% 2) 144% 3) 179%	1) 97.5 ppm 2) 108 ppm 3) 134 ppm	SENS Measuring Range: 2-500 ppm Detection Limit: 0.2 ppm	MSA only ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
					Drager Measuring Range: 5-200 ppm	North(3)
Chlorinated camphene (Toxaphene, chlorocamphene, octachlorocamphene, polychlorocamphene) (8001-35-32)	0.5 mg/m^3 IDLH: 200 mg/m^3	N/A	1) N/A 2) N/A 3) N/A	1) N/A 2) N/A 3) N/A	N/A(3)	MSA > 0.5 mg/m^3, Level B
						North(3)
Chlorocamphene (Toxaphene, chlorinated camphene, octachlorocamphene, polychlorocamphene) (8001-35-32)	0.5 mg/m^3 IDLH: 200 mg/m^3	N/A	1) N/A 2) N/A 3) N/A	1) N/A 2) N/A 3) N/A	N/A(3)	MSA > 0.5 mg/m^3, Level B
						North(3)
3-chlorochlordene (Heptachlor epoxide, Heptachlor, aahepta, hepta, heptrachlorane) (76-44-8)	0.5 mg/m^3 (skin) IDLH: 35 mg/m^3	N/A(4)	1) N/A(4) 2) N/A(4) 3) N/A(4) 4) N/A(4)	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(2)	MSA ≥ 0.5 mg/m^3, Level B
						North and 3M(3)

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
1-Chlorodecane	N/A[2]	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[3]	N/A[3]
1-Chlordexadecane	N/A[2]	N/A[4]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[3]	N/A[3]
Chlorodibromomethane (Dibromochloromethane) (124-48-1)	N/A[2]	10.59	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[8]
Chlorodiphenyl (PCB-1254, PCB-1260, PCB, polychlorinated biphenyl, Aroclor®1254, Aroclor®1260) (42% - 53469-21-9) (54% - 11097-69-1)	42% - 1 mg/m^3 54% - 0.5 mg/m^3 (skin) (0.375 ppm) IDLH: 5 mg/m^3	N/A[2]	1) Avg. 253% 2) N/A[4] 3) N/A[4] 4) N/A[4]	1) 0.09 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA and North > 0.5 mg/m^3, Level B
Chloroethane (ethyl chloride, monochloroethane) (75-00-3)	1,000 ppm (2,600 mg/m^3)	10.97	1) N/A[3] 2) N/A[3] 3) 58% 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) 580 ppm 4) N/A[6]	SENS Measuring Range: 250-7,000 ppm	MSA > 1,000 ppm, Level B
						North[3]
Chloroethanol (Ethylene Chlorohydrin, Glycol Chlorohydrin) (107-07-3)	1 ppm (3 mg/m^3) (ceiling) (skin)	10.90	1) 2.0% 2) 67% 3) N/A[3] 4) N/A[3]	1) 0.02 ppm 2) 0.67 ppm 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 20-200 ppm	MSA Level B
						North[3]
						3M < 10 ppm, Level C ≥ 10 ppm, Level B
Chloroethene (vinyl chloride, ethylene monochloride, chloroethylene, monochloroethene, monochloroethylene) (75-01-4)	1 ppm (4 mg/m^3)	10.0	1) 32% 2) 78% 3) 35% 4) 25%	1) 0.3 ppm 2) 0.8 ppm 3) 0.3 ppm 4) 0.2 ppm	SENS[7] Measuring Range: 0.1-20,000 ppm Detection Limit: 0.02 ppm	MSA > 1 ppm, Level B
					Drager Measuring Range: 0.5-3,000 ppm	North and 3M Level B
bis(2-chloroethyl)ether (2,2-dichlorodiethylether, 2,2-dichloroethyether) (111-44-4)	5 ppm (30 mg/m^3) (skin)	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[3]	MSA > 5 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Chloroethylene (vinyl chloride, chloroethene, ethylene monochloride, monochloroethene, monochloroethylene) (75-01-4)	1 ppm (4 mg/m^3)	10.0	1) 32% 2) 78% 3) 35% 4) 25%	1) 0.3 ppm 2) 0.8 ppm 3) 0.3 ppm 4) 0.2 ppm	SENS[7] Measuring Range: 0.1-20,000 ppm Detection Limit: 0.02 ppm	MSA > 1 ppm, Level B
					Drager Measuring Range: 0.5-3,000 ppm	North and 3M Level B
Chloroformyl chloride (Phosgene, carbon oxychloride, Carbonyl Chloride) (75-44-5)	0.1 ppm (0.4 mg/m^3)	11.77	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 0.05-16 ppm[7] Detection Limit: 0.02 ppm	MSA, North and 3M < 1,000 ppm, Level B
					Drager Measuring Range: 0.02-1.5 ppm	
bis(2-Chloroisopropyl) (Ether) (108-60-1)	N/A AIHA WEEL TWA: 3 ppm	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[1]	MSA Level B
						North[1]
2-Chloro-1-methylbenzene (2-Monochlorotoluene, chloro-2-methylbenzene, 2-chlorotoluene, tolychloride, o-chlorotoluene) (95-49-8)	50 ppm (250 mg/m^3)	8.83	1) 106% 2) 136% 3) N/A[3] 4) 100%	1) 53 ppm 2) 48.6 ppm 3) N/A[6] 4) 50 ppm	N/A[3]	MSA and 3M ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
						North[3]
4-Chloro-3-Methyl-Phenol (4-Chloro-m-cresol) (59-50-7)	N/A[1]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[1]	N/A[1]
4-Chloro-m-cresol (4-Chloro-3-Methyl-Phenol) (59-50-7)	N/A[1]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[1]	N/A[1]
2-Chlorophenol (95-57-8)	**N/A[2]**	**N/A[2]**	**1) N/A[3] 2) 119% 3) N/A[3] 4) N/A[3]**	**1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]**	**N/A[3]**	**Level B[8]**

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
1-Chloro-2-propene (Allyl chloride, 3-Chloropropene) (107-05-1)	1 ppm (3 mg/m^3)	10.2	1) 13% 2) 119% 3) 50% 4) 12%	1) 0.13 ppm 2) 1.19 ppm 3) 0.50 ppm 4) 0.12 ppm	SENS Measuring Range: 1 – 34,000 ppm[7] Detection Limit: 0.02 ppm	MSA Level B 3M < 10 ppm, Level C ≥ 10 ppm, Level B
3-Chloropropene (Allyl chloride, 1-Chloro-2-propene) (107-05-1)	1 ppm (3 mg/m^3)	10.2	1) 13% 2) 119% 3) 50% 4) 12%	1) 0.13 ppm 2) 1.19 ppm 3) 0.50 ppm 4) 0.12 ppm	SENS Measuring Range: 1 – 34,000 ppm[7] Detection Limit: 0.02 ppm	MSA Level B 3M < 10 ppm, Level C ≥ ppm, Level B
1-Chlorotetradecane	N/A[2]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6]	N/A[3]	N/A[3]
2-Chlorotoluene (2-Monochlorotoluene, 2-chloro-1-methylbenzene, chloro-2-methylbenzene, tolychloride, o-chlorotoluene) (95-49-8)	50 ppm (250 mg/m^3)	8.83	1) 106% 2) 136% 3) N/A[3]	1) 53 ppm 2) 48.6 ppm 3) N/A[6]	N/A[3]	MSA ≤ 1,000 ppm, Level C > 1,000 ppm, Level B North[3]
Chlorotoluene (Benzylchloride) (100-44-7)	1 ppm (5 mg/m^3)	10.16	1) 67% 2) 117% 3) 60% 4) 25%	1) 0.67 ppm 2) 1.17 ppm 3) 0.60 ppm 4) 0.25 ppm	SENS Measuring Range: 0.8 – 20 ppm Detection Limit: 0.4 ppm	MSA ≤ 10 ppm, Level C > 10 ppm, Level B North[3]
o-Chlorotoluene (2-chloro-1-methylbenzene, chloro-2-methylbenzene, 2-chlorotoluene, tolychloride, 2-monochlorotoluene) (95-49-8)	50 ppm (250 mg/m^3)	8.83	1) 106% 2) 136% 3) N/A[3] 4) 100%	1) 53 ppm 2) 48.6 ppm 3) N/A[6] 4) 50 ppm	N/A[3]	MSA and 3M ≤ 1,000 ppm, Level C > 1,000 ppm, Level B North[3]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
p-Chlorotoluene (4-monochlorotoluene, 4-chloro-1-methylbenzene) (	N/A[2]	8.69	1) 108% 2) 150% 3) N/A[3] 4) 100%	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[3] North[2]
Chromium copper arsenate (11125-95-4) Is a mixture comprised of the following: Arsenic acid 19% (7778-39-4) Chromic acid 22.4% (1333-82-0) Copper oxide 8.6% (1317-38-0)	As arsenic: 0.01 mg/m^3 Action level: 0.005 mg/m^3 As chromium VI: 0.5 mg/m^3 As copper: Dust: 1 mg/m^3 Fume: 0.1 mg/m^3	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3]	1) N/A[3] 2) N/A[3] 3) N/A[3]	N/A[3]	As Arsenic: MSA: ≤ 0.5 mg/m^3, Level C > 0.5 mg/m^3, Level B North: ≤ 25 mg/m^3, Level C > 25 mg/m^3, Level B As Chromium VI: MSA: ≤ 0.1 mg/m^3, Level C > 0.1 mg/m^3, Level B North: ≤ 2.5 mg/m^3, Level C > 2.5 mg/m^3, Level B As Copper: MSA/North: ≤ 5 mg/m^3, Level C fume > 5 mg/m^3, Level B fume ≤ 50 mg/m^3, Level C dust > 50 mg/m^3, Level B dust
Chrysene (218-01-9)	0.2 mg/m^3[1] (0.02 ppm)	7.75	1) 296% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.06 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA, North and 3M Level B
Citral	N/A[2]	N/A[2]	1) 5.0% 2) N/A[6] 3) N/A[6] 4) N/A[6]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	Level B[8]

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Coal tar Naptha (Naptha, high solvent naptha) (8030-30-6)	100 ppm (400 mg/m^3)	N/A[2]	1) 50% 2) N/A[3] 3) 0.13% 4) N/A[3]	1) 50 ppm 2) N/A[6] 3) 0.13 ppm 4) N/A[6]	N/A[3]	MSA, North and 3M Level B
Cobalt (7440-48-4)	0.05 mg/m^3	N/A[2]	1) N/A[4] 2) N/A[4] 3) N/A[4] 4) N/A[6]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[3]	MSA ≤ 2.5 mg/m^3, Level C > 2.5 mg/m^3, Level B
						North ≤ 2 mg/m^3, Level C > 2 mg/m^3, Level B
						3M Level B
Colloidal Mercury (Quicksilver, mercury) (7439-97-6)	Alkyl compounds: 0.01 mg/m^3 Others: 0.05 mg/m^3 Aryl and inorganic: ceiling 0.1 mg/m^3 skin	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	SENS Measuring Range: 0.05-13.2 mg/m^3 Detection Limit: 0.01 mg/m^3	MSA Metal ≤ .25 mg/m^3, Level C > .25 mg/m^3, Level B Alkyl Compounds ≤ 0.5 mg/m^3, Level C, contact MSA > 0.5 mg/m^3, Level B Aryl and Inorganic Compounds ≤ 2.5 mg/m^3, Level C, contact MSA > 2.5 mg/m^3, Level B
					Drager (vapor) Measuring Range: 0.05 - 2 mg/m^3	North Alkyl Compounds ≤ 0.5 mg/m^3, Level C, contact North > 0.5 mg/m^3, Level B Aryl and Inorganic Compounds ≤ 2.5 mg/m^3, Level C, contact North > 2.5 mg/m^3, Level B
						3M < 1.25 mg/m^3, Level C ≥ 1.25 mg/m^3, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Copper (7440-50-8)	Dust: 1 mg/m^3 Fume: 0.1 mg/m^3	N/A(4)	1) N/A(4) 2) N/A(4) 3) N/A(4) 4) N/A(4)	1) N/A(4) 2) N/A(4) 3) N/A(4) 4) N/A(4)	N/A(3)	MSA, North and 3M ≤ 5 mg/m^3, Level C (fume) > 5 mg/m^3, Level B (fume) ≤ 50 mg/m^3, Level C (dust) > 50 mg/m^3, Level B (dust)
2-Cresol (2-methylphenol, o-cresol) (95-48-7)	5 ppm (22 mg/m^3) (skin)	8.93	1) ≈ 10% 2) N/A(3) 3) Not feasible	1) ≈ 5.35 ppm 2) N/A(6) 3) N/A(6)	SENS Measuring Range: 0.4 ppm - 62.5 ppm Detection limit: 0.1 ppm	MSA ≤ 230 ppm, Level C > 230 ppm, Level B
						North ≤ 250 ppm, Level C > 250 ppm, Level B
o-Cresol (2-cresol, 2-methylphenol) (95-48-7)	5 ppm (22 mg/m^3) (skin)	8.93	1) ≈ 10% 2) N/A(3) 3) Not feasible	1) ≈ 5.35 ppm 2) N/A(6) 3) N/A(6)	SENS Measuring Range: 0.4 ppm - 62.5 ppm Detection limit: 0.1 ppm	MSA ≤ 230 ppm, Level C > 230 ppm, Level B
						North ≤ 250 ppm, Level C > 250 ppm, Level B
4-Cresol (p-cresol, 4-methylphenol) (106-44-5)	5 ppm (22 mg/m^3) (skin)	8.97	1) 10% 2) N/A(3) 3) Not feasible	1) 5.35 ppm 2) N/A(6) 3) N/A(6)	SENS Measuring Range: 1-25 ppm	MSA ≤ 230 ppm, Level C > 230 ppm, Level B
						North ≤ 250 ppm, Level C > 250 ppm, Level B
p-Cresol (4-methylphenol, 4-cresol) (106-44-5)	5 ppm (22 mg/m^3) (skin)	8.97	1) 10% 2) N/A(3) 3) Not feasible	1) 5.35 ppm 2) N/A(6) 3) N/A(6)	SENS Measuring Range: 1-25 ppm	MSA ≤ 230 ppm, Level C > 230 ppm, Level B
						North ≤ 250 ppm, Level C > 250 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Crotonaldehyde (2-Butenal) (4170-30-3)	2 ppm (6 mg/m^3)	9.73	1) 31% 2) 64% 3) N/A(3) 4) 45.45%	1) 0.62 ppm 2) 1.28 ppm 3) N/A(3) 4) 90.9 ppm	N/A(3)	MSA ≤ 100 ppm, Level C > 100 ppm, Level B North(3) 3M Level B
Cumene (isopropylbenzene) (98-82-8)	50 ppm (245 mg/m^3) (skin)	8.75 eV	1) 122% 2) N/A(3) 3) 18% 4) 100%	1) 61.0 ppm 2) N/A(6) 3) 9.0 ppm 4) 50 ppm	SENS Measuring Range: 1 – 100 ppm	MSA and 3M ≤ 1,000 ppm, Level C > 1,000 ppm, Level B North(3)
Cyanides (sodium, as CN) (151-50-8)	5 mg/m^3	N/A	1) N/A(3) 2) N/A(3) 3) N/A(3)	1) N/A(3) 2) N/A(3) 3) N/A(3)	N/A( )	MSA and North Level B
Cyanomethane (Acetonitrile, Ethyl Nitrile, Methyl Cyanide) (75-05-8)	40 ppm (70 mg/m^3)	12.22	1) N/A(3) 2) 1.0% 3) 70% 4) N/A(3)	1) N/A(6) 2) 0.4 ppm 3) 28 ppm 4) N/A(6)	SENS Measuring Range: 3-180 ppm	MSA and North Level B 3M < 40 ppm, Level C ≥ 40 ppm, Level B
Cyclohexanone (108-94-1)	25 ppm (100 mg/m^3) skin	9.14	1) 51% 2) 73% 3) 43% 4) 55.55%	1) 12.7 ppm 2) 18.2 ppm 3) 10.7 ppm 4) 13.8875 ppm	SENS Measuring Range: 2 – 40 ppm (7) Detection Limit: 0.2 ppm	MSA and 3M ≤ 250 ppm, Level C > 250 ppm, Level B North(3)
Cyclohexene (Benzene Tetrahydride) (110-83-8)	300 ppm (1,015 mg/m^3)	8.95	1) 34% 2) N/A(3) 3) N/A(3) 4) 62.5%	1) 102 ppm 2) N/A(6) 3) N/A(6) 4) 187.5	SENS Measuring Range: 100-1,000 ppm	MSA ≤ 1,000 ppm, Level C > 1,000 ppm, Level B North(3) 3M < 300 ppm, Level C ≥ 300 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
Cyclopentane (Pentamethylene) (287-92-3)	600 ppm (1,720 mg/m^3)	10.52	1) 9.0% 2) 132% 3) N/A(3) 4) N/A(3)	1) 54 ppm 2) 792 ppm 3) N/A(6) 4) N/A(6)	N/A(3)	MSA and 3M Level B
						North(3)
DBP (Di-n-butylphthalate, Dibutyl Phthalate) (84-74-2)	5 mg/m^3 (0.44 ppm)	N/A(2)	1) 106% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.5 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(2)	MSA and North ≤ 250 mg/m^3, Level C > 250 mg/m^3, Level B
						3M < 25 mg/m^3, Level C ≥ 25 mg/m^3, Level B
1,1-DCA (1,1-Dichloroethane, 1,1-ethylidene dichloride, ethylidene chloride) (75-34-3)	100 ppm (400 mg/m^3)	11.06	1) N/A(3) 2) 105% 3) 70% 4) N/A(3)	1) N/A(6) 2) 105 ppm 3) 70 ppm 4) N/A(6)	SENS Measuring Range: 40-200 ppm	MSA and 3M < 100 ppm, Level C ≥ 100 ppm, Level B
						North(8)
1,2-DCA (1,2-Dichloroethane, ethylene dichloride, ethylene chloride, glycol dichloride) (107-06-2)	1 ppm (4 mg/m^3)	11.04	1) N/A(3) 2) 105% 3) 89% 4) N/A(3)	1) N/A(6) 2) 1.05 ppm 3) 0.89 ppm 4) N/A(6)	SENS Measuring Range: 8-80 ppm Detection Limit: 3 ppm	MSA > 1 ppm, Level B
						North(8)
						3M < 10 ppm, Level C ≥ 10 ppm, Level B
1,4-DCB (1,4-dichlorobenzene, para-dichlorobenzene, P-DCB) (106-46-7)	75 ppm (450 mg/m^3)	8.94	1) 119% 2) 155% 3) 113%	1) 89.0 ppm 2) 116 ppm 3) 85.0 ppm	SENS Measuring Range: 2.5-300 ppm Detection Limit: 1 ppm	MSA and North < 150 ppm, Level C ≥ 150 ppm, Level B
					Drager Measuring Range: 2-100 ppm	
P-DCB (1,4-Dichlorobenzene, para-dichlorobenzene, 1,4-DCB) (106-46-7)	75 ppm (450 mg/m^3)	8.94	1) 119% 2) 155% 3) 113%	1) 89.0 ppm 2) 116 ppm 3) 85.0 ppm	SENS Measuring Range: 2.5-300 ppm Detection Limit: 1 ppm	MSA and North < 150 ppm, Level C ≥ 150 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
					Drager Measuring Range: 2-100 ppm	
o-DCB (1,2-Dichlorobenzene, ortho-dichlorobenzene, o-dichlorobenzene, 1,2-DCB) (95-50-1)	50 ppm (300 mg/m^3) ceiling IDLH: 200 ppm	9.07	1) 119% 2) 155% 3) 119%	1) 59.5 ppm 2) 77.5 ppm 3) 59.5 ppm	SENS Measuring Range: 2.5-300 ppm Detection Limit: 1 ppm	MSA and North < 200 ppm, Level C ≥ 200 ppm, Level B
					Drager Measuring Range: 2-100 ppm	
1,2-DCB (1,2-dichlorobenzene (ortho-dichlorobenzene, o-DCB) (95-50-1)	50 ppm (300 mg/m^3) ceiling IDLH: 200 ppm	9.07	1) 119% 2) 155% 3) 119%	1) 59.5 ppm 2) 77.5 ppm 3) 59.5 ppm	SENS Measuring Range: 2.5-300 ppm Detection Limit: 1 ppm	MSA and North < 200 ppm, Level C ≥ 200 ppm, Level B
					Drager Measuring Range: 2-100 ppm	
1,1-DCE (1,1-Dichloroethene, vinylidine chloride) (75-35-4)	1 ppm (4 mg/m^3)	9.6	1) 64% 2) N/A[3] 3) 49% 4) 55.55%	1) 0.64 ppm 2) N/A[6] 3) 0.49 ppm 4) 0.55 ppm	SENS Measuring Range: 0.4-31.5 ppm[7] Detection Limit: 0.1 ppm	MSA > 1 ppm, Level B
						North ≤ 50 ppm, Level C > 50 ppm, Level B
						3M < 5 ppm, Level C ≥ 5 ppm, Level B
1,2-DCE (1,2-Dichloroethene, acetylene dichloride, 1,2-dichloroethylene) (540-59-0)	200 ppm (790 mg/m^3)	9.80	1) 75% 2) 85% 3) 40% 4) N/A[3]	1) 150 ppm 2) 170 ppm 3) 80 ppm 4) N/A[6]	SENS Measuring Range: 5 – 800 ppm Detection Limit: 1 ppm	MSA ≤ 1,000 ppm, Level C > 1,000 ppm, Level B
						North[3]
						3M ≤ 4,000 ppm, Level C > 4,000 ppm, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
2,4-DCP (2,4-dichlorophenol, DCP) (120-83-2)	N/A(2)	N/A(2)	1) 134% 2) N/A(3) 3) N/A(3) 4) 62.5%	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(2)	Level B(3)
DCP (2,4-Dichlorophenol, 2,4-DCP) (120-83-2)	N/A(2)	N/A(2)	1) 134% 2) N/A(3) 3) N/A(3) 4) 62.5%	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(2)	Level B(3)
4,4-DDD	N/A(2)	N/A	1) N/A(2) 2) N/A(2) 3) N/A(2)	1) N/A(2) 2) N/A(2) 3) N/A(2)	N/A(2)	N/A(2)
4,4-DDT (DDT, p,p-DDT, dichlorodiphenyltrichloroethane) (50-29-3)	1 mg/m^3	N/A	1) N/A(4) 2) N/A(4) 3) N/A(4)	1) N/A(4) 2) N/A(4) 3) N/A(4)	N/A(2)	MSA > 1 mg/m^3, Level B
DDT (4,4-DDT, p,p-DDT, dichlorodiphenyltrichloroethane) (50-29-3)	1 mg/m^3	N/A	1) N/A(4) 2) N/A(4) 3) N/A(4)	1) N/A(4) 2) N/A(4) 3) N/A(4)	N/A(2)	MSA > 1 mg/m^3, Level B
Decalin	N/A(2)	N/A(2)	1) 96% 2) N/A(3) 3) N/A(3) 4)	1) N/A(6) 2) N/A(6) 3) N/A(6)	N/A(2)	Level B(8)
Decane	N/A(2)	10.19	1) 33% 2) N/A(3) 3) 53% (slow) 4) 35.7%	1) N/A(6) 2) N/A(6) 3) N/A(6) 4) N/A(6)	SENS Measuring Range: 200-6,000 ppm Detection Limit: 20 ppm	Level B(8)
1,2-Dehydroacenaphthalene (Acenaphthene, 1,8-Ethylenenaphthalene) (83-32-9)	0.2 mg/m^3(1) (0.03 ppm)	7.5-8.5	1) 306% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.1 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(3)	MSA, North and 3M ≤ 10 mg/m^3, Level C > 10 mg/m^3, Level B
Di-n-butylphthalate (DBP, dibutyl phthalate) (84-74-2)	5 mg/m3 (0.44 ppm)	N/A(2)	1) 106% 2) N/A(3) 3) N/A(3) 4) N/A(3)	1) 0.5 ppm 2) N/A(6) 3) N/A(6) 4) N/A(6)	N/A(2)	MSA and North ≤ 250 mg/m^3, Level C > 250 mg/m^3, Level B

Chemical	PEL	I.P. (eV)	Relative Response HNu 1) 10.2 eV 2) 11.7 eV 3) OVA 4) 10.6 MiniRae	Reading to be at PEL 1) 10.2 eV Probe 2) 11.7 eV Probe 3) OVA 4) 10.6 MiniRae	Colorimetric Tubes SENS= Sensidyne	Respiratory Protection Required Above PEL
						3M < 5 mg/m^3, Level C ≥ 5 mg/m^3, Level B
Dibenzo(a,h)anthracene (53-70-3)	0.2 mg/m^3[1] (0.03 ppm)	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	MSA and North Level B
Dibenzofuran (132-64-9)	N/A[2]	N/A[2]	1) 210% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	Level B[8]
Dibenzothiopene	N/A[2]	N/A[2]	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	Level B[8]
Dibromochloropropane (1,2-dibromo-3-chloropropane, Nemagon, Fumazone) (96-12-8)	.001 ppm (0.01 mg/m^3) (29 CFR 1910.1044)	N/A[2]	1) 7.0% 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) 0.0 ppm 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	MSA and 3M < 10 ppm, Level C ≥ 10 ppm, Level B North[3]
Dibromochloromethane (chlorodibromomethane) (124-48-1)	N/A[2]	10.59	1) N/A[3] 2) N/A[3] 3) N/A[3] 4) N/A[3]	1) N/A[6] 2) N/A[6] 3) N/A[6] 4) N/A[6]	N/A[2]	Level B[8]

S3NA-210-PR Project Safety Meetings

1.0 Purpose and Scope

1.1 Establishes the requirements for conducting and documenting meetings on topics that are designed to promote Safety, Health & Environmental (SH&E) awareness and facilitate discussion regarding hazards and risks.

1.2 This procedure applies to all AECOM North America-based employees and operations in the performance of services directed and controlled by AECOM.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 S3NA-210-FM Tailgate Safety Meeting Log

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region SH&E Manager** shall provide assistance to Project Managers (PM) as required to carry out the requirements of this Standard Operating Procedure (SOP), particularly in the area of making training materials available and providing spot-checks of proper documentation.

4.1.2 **Region Manager, District and Office Managers** shall ensure that PMs of projects within their areas of responsibility are conducting and properly documenting safety meetings in accordance with requirements of this SOP.

4.1.3 **Project Managers (field task managers, supervisors)** shall ensure that all employees and personnel under the control of AECOM, e.g. subcontractors, temporary agency employees, etc, assigned to projects within their areas of responsibility participate in project initiation/kick-off meetings, special situation meetings, task hazard analyses, on-site safety inspections, and supplemental training meetings.

4.2 Project Initiation/Kick-off meeting

4.2.1 A project initiation/kick-off safety meeting will be conducted prior to the start of field operations. Discussion points for this meeting will come from the project-specific SH&E documentation (e.g., Health and Safety Plan (HASP), Safe Work Plan (SWP), Task Hazard Analysis (THA), etc.). The meeting will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site. Topics for this meeting will include:

- Communication to all participants regarding on site SH&E responsibilities and authority.
- Establishing safety points of contact for each organization and phase of work.
- Communication of organizational SH&E performance expectations.
- Identification of significant project SH&E issues, risks, and solutions.
- Coordination of organizational SH&E conflicts and interactions.

4.3 Timing of Meetings

4.3.1 Change in Scope/Activity– Conducted for all AECOM staff and site personnel with a direct contractual relationship with AECOM to discuss changes to scope or a new phase of work.

4.3.2 Periodic – Conducted at a regular, recurring frequency of not less than biweekly, but preferably once per week.

4.3.3 Daily – Daily safety discussions as part of daily routine project coordination meetings. Daily meetings are required for HAZWOPER activities and other activities as identified in the safety plan. Daily safety discussions will involve representatives from all organizations with a direct contractual relationship with AECOM on the job site.

4.3.4 Significant Personnel Turn-over – Conducted at the start of any workday where a new organization begins work on site or when more than 25 percent of the day's work force is new to the site.

4.3.5 Post-Incident – Conducted at the start of the work day following the occurrence of a serious incident as defined in *S3NA-004-PR Incident Reporting*. All project initiation/kick-off safety meetings will be documented using the *S3NA-210-FM Tailgate Safety Meeting Log*.

4.3.6 All special situation safety meetings listed above will include review of applicable Task Hazard Analyses for the scope of services to be performed and be documented using the *S3NA-210-FM Tailgate Safety Meeting Log* or equivalent.

4.3.7 Daily safety discussions not otherwise required by HAZWOPER or the project safety plan will be documented.

4.4 **Supplemental Training Meetings**

4.4.1 The **Project Manager (PM), Site Supervisor** or **Site Safety Officer (SSO**) will implement worker training on general safety topics as part of routine on-site training activities. Where such training is conducted it will be documented on the *S3NA-210-FM Tailgate Safety Meeting Log*.

4.5 Safety Orientation

4.5.1 All project employees will attend a project-specific safety orientation and training session prior to the start of any project and/or task.

4.5.2 The **PM**, **Site Supervisor**, or **SSO** will conduct the meeting based on project specifics (e.g., location, unique hazards and risks, client requirements, etc.) and any mandatory topics required by *S3NA-003-PR SH&E Training*. The **Region SH&E Manager** can provide examples of project safety orientation material for reference.

4.5.3 The depth/level of training will be commensurate with the job function(s) to be performed. Site visitors will receive general orientation and task-specific training.

4.5.4 At a minimum, employee orientation and training will consist of the items listed below:

- Identification of hazards associated with the individual's job function and responsibilities.
- Specific safety procedural instruction needed to perform his or her required job function or task.
- Content of the HASP, SWP and any THA in accordance with *S3NA-209-PR Project Hazard Assessment and Planning*.

4.6 Periodic Safety Training Meetings

4.6.1 Sit-down safety training meetings will be scheduled and conducted throughout the duration of the project.

4.6.2 Meetings shall give project personnel an opportunity to maintain a high degree of safety awareness through timely and quality safety education. Meeting time will be used to discuss specific safety topics and obtain employee feedback.

4.6.3 Safety meetings will be conducted by the **PM, Site Supervisor** or **SSO** and supplemented by lead persons of the various crafts represented at the site (e.g., electrician, heavy equipment operator, foreman, inspector, resident engineer, etc.).

4.6.4 Topics for discussion will include SH&E hazards noted during routine and non-routine work situations and an explanation of job safety procedures unique to the project.

4.6.5 The **PM** and **SSO** will monitor safety meetings to ensure that subject matter is properly presented.

4.6.6 All periodic safety meetings will be documented using *S3NA-210-FM Tailgate Safety Meeting Log*. Sign-in of every meeting participant is required to ensure proper accountability and to meet AECOM project recordkeeping requirements.

4.6.7 SH&E considerations will be discussed at every project meeting. Once on-site:

- All on-site personnel must review and acknowledge the form or plan at a “tailgate” or “toolbox” meeting.
- Any new or previously unidentified hazards must be documented on the form or plan as a revision and acknowledged with initials by all on-site staff.
- The HASP or SWP must be reviewed regularly as required and documented on the plan.

4.6.8 All signed copies of the field forms and project plans must be placed in the appropriate project folder.

5.0 Records

5.1.1 All signed copies of the field forms and project plans must be placed in the appropriate project folder.

6.0 References

6.1 S3NA-003-PR SH&E Training

6.2 S3NA-004-PR Incident Reporting Procedure

6.3 S3NA-209-PR Project Hazard Assessment and Planning

S3NA-210-FM Tailgate Safety Meeting Log

This sign-in log documents the topics of the tailgate safety briefing and individual attendance at the briefing. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge their ability to ask questions and receipt of such briefings daily. Please provide a brief narrative of the following topics as applicable to the Project.

Name of Meeting Leader	Signature

PROJECT NAME & LOCATION

PROJECT NO.	DATE/TIME	WEATHER CONDITIONS

TOPIC
Discussion – check one

Today's Scope of Work (All tasks)	☐ yes	☐ n/a	Access / Egress / Slips, Trips, & Falls	☐ yes	☐ n/a
Schedule / New Work / Scope Changes	☐ yes	☐ n/a	Smoking, Eating, & Drinking	☐ yes	☐ n/a
Reviewed Procedures, THA, etc.	☐ yes	☐ n/a	Washroom / Facilities Location	☐ yes	☐ n/a
Emergency Action Plan & Procedures	☐ yes	☐ n/a	Heat/Cold Stress	☐ yes	☐ n/a
Communications Protocol	☐ yes	☐ n/a	Exclusion Areas Barricades / Cones	☐ yes	☐ n/a
Required PPE	☐ yes	☐ n/a	Required Permits, Passes, Keys, etc.	☐ yes	☐ n/a
Required Monitoring / Instruments	☐ yes	☐ n/a	Decon Procedures / IDW Mgmt.	☐ yes	☐ n/a
Site Control / Work Zones / Security	☐ yes	☐ n/a	Eqpmt. Inspections/Safety Checklists	☐ yes	☐ n/a

COMMENTS/OTHER

Tailgate Meeting Attendees

Print Name	Signature

SIX QUESTIONS FOR SUCCESS – As your final preparedness take two minutes to think through and answer these questions**:**

1. What are we about to do?
2. What equipment are we going to use?
3. Have I/we been trained to use this equipment?
4. Have I/we been trained to do this job?
5. How can I/we be hurt?
6. How can I/we prevent this incident?

If you and your team aren't prepared to do the assigned work, STOP WORK, and take time to properly prepare.

END OF DAY SIGN-OFF:

_____

Site Safety Officer Signature

☐ No Incidents Occurred

☐ Number of Near Misses/Observations Reported

☐ All Incidents Reported the Incident Reporting Line

LESSONS LEARNED/COMMENTS/OTHER

S3NA-211-PR Regulatory Inspections

1.0 Purpose and Scope

1.1 The purpose of this procedure is to outline the process for local management to follow in response to any regulatory agency inspection at their location. This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Regulatory Inspection:** Any announced or unannounced inspection of an AECOM office or project site by a regulatory agency involved with SH&E laws and regulations. Periodic visits from service or local agencies to project sites to approve certain activities such as utility hook-up, utility clearance, etc, are not considered regulatory inspections.

2.2 **Regulatory Agency:** Any agency that has the authority to regulate and enforce SH&E laws and regulations. Examples include Ministry of Environment, Ministry of Labour, OSHA, EPA, NRC, DOT, or state and local agencies.

2.3 **Citation:** A written notice of violation identified by a regulatory authority. Examples include notices of violation (NOV), warning letters, complaints, official statements of observations, or other formal actions.

2.4 **Fine:** A written or other monetary penalty paid or anticipated for non-compliance.

3.0 Attachments

3.1 None.

4.0 Procedure

4.1 **General Requirements**

4.1.1 It is the policy of AECOM to have a management representative on-site to interface with a regulatory agency inspector during an inspection for work activities that AECOM controls.

4.1.2 If an inspection involves AECOM, the lead AECOM staff member will notify the regulatory agency employee that it is the policy of AECOM to inform home office management first before the inspection proceeds and provide the time (typically one hour is granted) needed for a management representative to participate in a conference call and/or arrive on-site.

4.1.3 It is not the policy of AECOM to request a search warrant or seek to delay an inspection from any regulatory agency unless specifically so advised by home office management.

4.1.4 Answer all questions succinctly and truthfully; all discussions will be kept on the topic of inquiry.

4.1.5 Never admit responsibility for an apparent violation.

4.1.6 Where AECOM is in an oversight or observation role, we will participate in the opening conference, inspection tour, and closing conference in the capacity of an observer.

4.2 **Before the Inspection Starts**

4.2.1 Verify the inspector's credentials, ask what the reason for the inspection is, and ask for an opening conference between the inspector and management staff.

4.2.2 If the inspection is the result of an employee complaint, insist that the inspection be limited to only the location associated with the complaint.

4.3 **During the Inspection**

4.3.1 Allowing the inspector to view any requested documentation, electronic or printed; however, the inspector must submit a formal request to AECOM before we will turn over any documents.

4.3.2 Contacting Region Counsel prior to any staff interviews by the inspector, so that Region Counsel may have an opportunity to provide guidance and direction.

4.3.3 Upon receipt of an agency's formal request for documentation, immediately notify the Project Manager and Region Counsel; do not provide any documentation to the agency without the approval of the Legal Department.

4.3.4 Any photos taken by an inspector shall be similarly captured from the same vantage point by the AECOM representative.

4.3.5 Document all inspections, interviews, discussions, and actions taken.

4.4 **Post Inspection**

4.4.1 Request and participate with the inspector in the closing conference; take notes of any referenced apparent violations or recommended corrective actions.

4.4.2 For any activity associated with an apparent violation, stop that activity until the appropriate corrective action can be implemented.

4.4.3 Forward all associated paperwork to both the Region Counsel and Region Safety Manager.

4.5 **Roles & Responsibilities**

4.5.1 **Project Managers** will be responsible for the following:

- Notifying, or designating an individual to notify, the Region Safety Manager that a regulatory inspection is in progress; submitting a Supervisor's Report of Incident following the inspection.
- Notifying the Client of an Agency inspection that has occurred on their project site so that the Client may have representation during the inspection, at their discretion.
- Forwarding any correspondence from the inspector, as well as any notes taken by local staff during the inspection to Region Counsel and the Region Safety Manager within 24 hours. Send the information under the cover of "Attorney Privileged Communication."
- Where a citation was issued, direction will be given to the local staff to stop the performance of the cited activity until the appropriate corrective actions are implemented.
- Directing the onsite supervisor to post any regulatory citation in accordance with the directions outlined in the issued citation.
- Submitting a formal response to the citing agency and facilitating payment of any associated monetary fine after approval from the Legal Department.
- Serve, or designate an appropriate individual to serve, as AECOM's informal and formal agency negotiation meeting representative to discuss the citation.

4.5.2 **Supervisor** will be responsible for the following:

- Serve as the initial point of contact for the inspector
- Making all initial notifications that an inspection is in progress at the location.
- Serve as the primary contact for the inspector in the absence of a management representative.
- Confirm that the regulatory visit is fully documented.
- Verify that any cited activity was immediately stopped and not resumed until the appropriate corrective actions are implemented.

4.5.3 **Employees** will be responsible for the following:

- Answer all questions succinctly and truthfully.
- Where an employee is represented by a union, the employee may request his/her representative to be present.

4.5.4 **Region SH&E Manager** will be responsible for the following:

- Assisting project management, as applicable, during the course of the inspection.
- Supporting project management with guidance on appropriate corrective actions to address any cited activity.
- Supporting project management and the Legal Department with responses to any citation, including participation in informal or formal agency negotiation meetings regarding the citation.

4.5.5 **Region Counsel** will be responsible for the following:

- Authorizing the release of AECOM documentation to an inspector or the associated agency.
- Providing guidance to project management regarding the decision to contest the citation, including reviewing and approving any AECOM-issued response to the citation.
- Assisting employees in preparation for inspector interviews by providing guidance and direction.
- Providing, or designating, representation during informal and formal agency negotiation meetings regarding the citation.

- Authorizing payment of any monetary fine associated with a non-compliance citation.

5.0 Records

S3NA-004-FM1, Supervisor's Report of Incident

6.0 References

None.

S3NA-212-PR Site Inspections

1.0 Purpose and Scope

1.1 Establishes the procedure for AECOM employees to perform and document site safety inspections, and to implement appropriate corrective actions designed to minimize risk and enhance operational SH&E performance.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **SH&E Self-Inspection (Walkthrough):** Informal walkthrough by Project Managers and/or designated project SH&E staff of work areas, project offices, storage areas, and other operations. Depending on the scope of work, pace of operations, and types and severity of physical and/or chemical hazards, self-inspections will be conducted on a frequent but not less than weekly basis.

2.1.1 **SH&E Inspection:** A systematic review of operations, procedures, equipment and records in order to identify, evaluate, document, and report actual or potential safety, health and/or environmental risks or hazards. An inspection is normally less formal and less consuming from a time and resources standpoint to conduct than is an audit. This does not apply to government inspections (see *S3NA-211-PR Regulatory Inspections)*.

2.2 **Corrective Action:** Actions assigned to an identified deficiency to remove, resolve or reduce the SH&E risk.

2.3 **SH&E Records:** Information and documentation related to SH&E aspects of the program, project, or other operations unit, including but not limited to Health and Safety Plans (HASP) personnel acknowledgement sheets, Task Hazard Analyses sign-off sheets, Pre-Job or Pre-Entry Briefing sign-off sheets, SH&E training attendance and course completion records, medical surveillance records, exposure monitoring results, and equipment calibration records.

3.0 Attachments

3.1 S3NA-212-FM Site SHE Inspection Report

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 All managers and supervisors have the responsibility to comply with AECOM SH&E procedures, and governmental requirements, and are accountable to prevent or bring any violations to the attention of the appropriate level of Management for corrective actions as per AECOM policies.

4.1.2 **Region, District and Office Managers** shall provide training and technical guidance to operations in support of the requirements of this Standard Operating Procedure (SOP) and to assure a viable SH&E inspection program is effectively implemented within the Region.

Project Managers (field task managers, supervisors) shall schedule and conduct project inspections, and report results in accordance with this procedure; shall actively participate in the SH&E inspection process at their sites and will provide Inspectors access to SH&E records, equipment, and work areas as appropriate.

4.1.3 **Region SH&E Manager** shall provide training and technical guidance to operations in support of the requirements of this SOP and to assure a viable SH&E inspection process is effectively implemented.

4.1.4 **Employees** shall cooperate with SH&E Department personnel, and if requested, participate in site inspections.

4.2 SH&E Inspections

4.2.1 Active, ongoing AECOM project sites will be inspected, e.g. monthly or at a frequency determined by the **Project Manag**er and/or **Region SH&E Manager** to meet the local regulations (*S3NA-212-FM Site SHE Inspection Report).*

4.2.2 On oversight projects where AECOM has or shares the responsibility for project safety, the AECOM supervisor will coordinate with the Contractor's SH&E inspection program and provide observations to the Contractor.

4.2.3 Unscheduled inspections may be requested by the **Region SH&E Manager** in response to project incidents such as a work-related injury, illness or significant near-miss; regulatory agency inquiry or inspection; or SH&E-related employee report of unsafe condition or similar issue.

4.2.4 Self-Inspection (Walkthrough) - Walkthrough self-inspections include identifying and correcting SH&E compliance issues, housekeeping or material storage issues, life and fire safety violations, deficiencies with mobile equipment, or other adverse conditions or unsafe behaviors. Use of a structured checklist is not required for walkthroughs. However, issues will be documented and corrective action will be taken (on the spot, where feasible) when hazards, compliance violations, and/or other deficiencies are observed.

5.0 Records

5.1 SH&E Inspections will be documented to the project file using *S3NA-212-FM Site SHE Inspection Report*. The checklist can be modified locally to reflect specific site operations.

5.2 Completed project review forms will be maintained in the Project Review file with findings provided to the SH&E Department for lessons learned and areas for improvement.

6.0 References

6.1 California Labor Code, Section 10, 6401.7.

6.2 California Code of Regulations, Title 8, Chapter 4, General Industry Safety Orders Section 3203, "Injury and Illness Prevention Program".

S3NA-212-FM Site Inspection Report

Region:	District:	Business Line:
Prepared by (name/title):		Date:
Project:		AECOM Site Supervisor:

Summarize the findings below upon completion of the inspection.

Summary and Recommendations

Section/ Item No.	Acts / Conditions Requiring Attention	Corrective Action(s)	Priority (L/M/H)*	Action By	Completed (date)

** Prioritize the concern or condition identified using a hazard classification of either* **Low** *(not an immediateSH&E hazard),* **Medium** *(must be addressed in the short term), or* **High** *(requires immediate attention).*

General Remarks & Comments:

Acknowledgement – Site Supervisor

Signature: **Date:**

Region:	District:	Business Line:
Prepared by (name/title):		Date:
Project:		AECOM Site Supervisor:

Use this checklist when conducting your regular site safety inspections for projects where AECOM has a site office to identify applicable hazards.

Item	Yes	No	N/A
1. Documentation			
1. Site-specific health and safety plan on-site?	☐	☐	☐
2. OH&S/OSHA regulations available?	☐	☐	☐
3. AECOM safety policy and procedures manual readily available on-site?	☐	☐	☐
4. Tailgate safety briefings performed and documented?	☐	☐	☐
5. Project safety orientations provided to staff and documented?	☐	☐	☐
6. Documentation of site/task specific SH&E personnel training located on-site	☐	☐	☐
7. Personnel medical monitoring information up to date as applicable?	☐	☐	☐
8. All incidents reported to AECOM and the Site Safety Officer?	☐	☐	☐
9. Emergency procedures in place with contact numbers posted?	☐	☐	☐
2. Hazard-specific Documentation			
1. Task Hazard Analysis completed as new hazards are identified?	☐	☐	☐
2. Hazardous substance exposure sampling documented?	☐	☐	☐
3. Hot work permits completed, signed and posted?	☐	☐	☐
4. Lockout/Tagout procedures implemented and documented?	☐	☐	☐
3. Housekeeping			
1. Drinking water containers provided?	☐	☐	☐
2. Adequate waste receptacles provided and routinely replaced?	☐	☐	☐
3. Adequate toilet facilities provided?	☐	☐	☐
4. Walkways, corridors and work areas in general kept clear of trash and debris?	☐	☐	☐
4. Personal Protective and Safety Equipment			
1. Personal protective equipment used as required?	☐	☐	☐
a) Safety boots?	☐	☐	☐
b) Hard hats?	☐	☐	☐
c) Reflective vests?	☐	☐	☐
d) Safety glasses?	☐	☐	☐
e) Respiratory protection?	☐	☐	☐
f) Fall protection?	☐	☐	☐
g) Vehicle beacon?	☐	☐	☐
h) Other	☐	☐	☐
2. Personal protective equipment properly stored, maintained and clean?	☐	☐	☐
3. Personal protective equipment in good condition?	☐	☐	☐
4. Personnel instructed on use and care of personal protective equipment?	☐	☐	☐

Region:	District:	Business Line:
Prepared by (name/title):		Date:
Project:		AECOM Site Supervisor:

Item	Yes	No	N/A
5. Fire Protection			
1. Fire extinguishers provided, marked and placed as required?	☐	☐	☐
2. Fire extinguishers accessible and in proper working order?	☐	☐	☐
3. Fire extinguishers inspected in the last month?	☐	☐	☐
6. Mobile Equipment			
1. Proper warning signs and barricades in place?	☐	☐	☐
2. Where AECOM employees are operating mobile equipment: are they properly trained; is the machinery properly inspected; are safe work practices adhered to?	☐	☐	☐
7. First Aid			
1. First Aid trained personnel on site?	☐	☐	☐
2. Names of First Aid Personnel posted?	☐	☐	☐
3. Appropriate First aid supplies available on site?	☐	☐	☐
8. Hazardous Materials			
1. Materials in storage kept in safe condition?	☐	☐	☐
2. MSDS sheets on site readily available and up to date?	☐	☐	☐
3. Hazard Communications/WHMIS training complete?	☐	☐	☐
The following may or may not be present on the worksite. Please obtain assistance from an experienced individual to complete these sections if necessary.			
9. Confined Spaces **Present on site?**	☐	☐	☐
1. Employees that enter confined spaces have required training?	☐	☐	☐
2. Confined spaces identified and posted?	☐	☐	☐
3. Confined space hazard assessment forms completed?	☐	☐	☐
4. Confined space entry permits completed, signed and filed?	☐	☐	☐
10. Tools **Present on site?**	☐	☐	☐
1. The right tools used for the right job?	☐	☐	☐
2. All guards in place for the tools?	☐	☐	☐
3. Electrical and pneumatic tools in safe conditions?	☐	☐	☐
4. Electrical cables and hoses in good condition and out of the way?	☐	☐	☐
5. Personnel using tools properly trained?	☐	☐	☐
11. Electrical **Present on site?**	☐	☐	☐
1. Electrical installations in a safe condition?	☐	☐	☐
2. Equipment grounded as required?	☐	☐	☐
3. Panels, disconnects or breakers covered and clear access provided?	☐	☐	☐
4. Lock out/tag outs used?	☐	☐	☐
5. Live circuits protected from worker contact?	☐	☐	☐

Region:	District:	Business Line:
Prepared by (name/title):		Date:
Project:		AECOM Site Supervisor:

Item	Yes	No	N/A
12. Scaffolds **Present on site?**	☐	☐	☐
1. Scaffolds erected by a qualified individual?	☐	☐	☐
2. Handrails, mid-rails, and toe-boards in place?	☐	☐	☐
3. Platforms fully planked and secured?	☐	☐	☐
4. Screens installed where personnel are required to work/walk below?	☐	☐	☐
5. Scaffold parts in safe condition, free from damage?	☐	☐	☐
6. Mobile scaffold wheels locked when the scaffold is used?	☐	☐	☐
7. Proper fall protection used when guardrails are not used?	☐	☐	☐
13. Floors, Wall Openings and Stairways **Present on site?**	☐	☐	☐
1. Barricades placed to guard all floor and wall openings that are 4 feet or more above the lower level?	☐	☐	☐
2. All floor openings covered, secured and marked?	☐	☐	☐
3. Handrail provided for stairs having more than 4 risers?	☐	☐	☐
4. No materials stored within 6 feet of floor or wall openings?	☐	☐	☐
5. Stairways kept clear of trash, obstructions and tripping hazards?	☐	☐	☐
14. Ladders **Present on site?**	☐	☐	☐
1. Ladders stored properly?	☐	☐	☐
2. Stepladders used safely?	☐	☐	☐
3. Straight ladders angled properly and tied in or secured?	☐	☐	☐
4. Ladders extend a minimum of 36 inches above level of access?	☐	☐	☐
5. Job made ladders constructed properly?	☐	☐	☐
15. Excavation and Trenching **Present on site?**	☐	☐	☐
1. Underground utilities have been identified, marked, protected AND verified (before digging?	☐	☐	☐
2. All trenches/excavations supervised by a competent person?	☐	☐	☐
3. Equipment or materials stored no closer than 5 feet from edge of excavation/ trench?	☐	☐	☐
4. Spoils no closer than 2 feet from edge of excavation/ trench?	☐	☐	☐
5. Excavations requiring employee entry sloped or benched 1:1 or provided shoring/ boxes?	☐	☐	☐
6. Excavations properly barricaded?	☐	☐	☐
7. Safe access and exit provided?	☐	☐	☐
8. Ladders for egress placed no greater than 25 feet from workers?	☐	☐	☐

S3NA-213-PR Subcontractors

1.0 Purpose and Scope

1.1 Provides a process through which AECOM Subcontractors are evaluated to determine if the use of that Subcontractor will pose an unacceptable risk to AECOM and/or its clients, employees, equipment, or property.

1.2 This policy applies to all AECOM North America based operations.

2.0 Terms and Definitions

2.1 **Subcontractor:** Any contractor or organization procured to provide direct services for, or in support of, an AECOM managed activity or operation. This is inclusive of any AECOM managed activity or operation that requires the physical presence of that contractor at the location to conduct the contracted service. Examples include, but are not limited to:

- Heavy equipment operations
- Surveying
- Construction/renovation/clean-construction operations
- Demolition
- Well abandonment
- Electrical system installation/service
- HAZWOPER Activities

2.2 **AECOM field site:** A site at which AECOM is providing field-related services.

3.0 Attachments

3.1 S3NA-213-FM Subcontractor SH&E Evaluation

3.2 S3NA-213-GL Subcontractor Safety Criteria Questionnaire Scoring Key

4.0 Procedure

4.1 **Roles and Responsibilities**

4.1.1 **Region Business Line Management** is responsible for:

- Providing the resources to implement the subcontractor evaluation process.
- Maintaining all subcontractor SH&E performance data (developing and managing a database recommended).

4.1.2 **Project Managers** are responsible for confirming that all subcontractors have been properly evaluated for SH&E performance and potential risk. This includes:

- Communicating the requirements established in this procedure to the subcontractor and providing them with the Subcontractor SH&E Evaluation form.
- Reviewing the completed subcontractor evaluation and confirming their potential risk prior to the start of work.
- Providing a completed evaluation to the project file and the administrator or database manager in their region.
- Verifying a subcontractor's minimum level of insurance coverage as stipulated by AECOM's Legal and Procurement Departments (Workers' Compensation, Auto Insurance, General Liability, etc.).

4.1.3 **Region SH&E Manager** is responsible for:

- Providing support to the project managers in understanding the subcontractor evaluation process and requirements.

4.2 **Subcontractor Selection Requirements**

4.2.1 For all subcontractors, the selection process will include consideration of the candidate firms' SH&E management and performance indicators.

4.2.2 Subcontractor bids/submittals shall include a completed Subcontractor SH&E Evaluation. Each questionnaire will be evaluated during the subcontractor selection process to identify any organizations whose past SH&E performance may disqualify them from selection.

4.2.3 Prior to the start of their on-site operations, the selected subcontractor firms are required to provide copies of any SH&E documentation (e.g., insurance certificates, safety plan, manual of safety procedures, employee training/medical monitoring certifications) to the Project Manager and/or subcontractor selection manager.

4.2.4 Although the questionnaire is to be used as a guideline to determine whether a bidder's safety and health record is acceptable, there are no simple pass/fail criteria. The guidance outlines the standards AECOM's SH&E Department has established to reflect performance acceptability. Marginal performance (Score is less than 3) will require evaluation for final approval of a subcontractor by the PM in coordination with the SH&E Department. Priority will be given to subcontractors who have obtained certification standards (e.g., OHSAS 18001; Certificate of Recognition).

4.3 **Procurement Phase.** Prior to starting fieldwork, each subcontractor organization shall provide the AECOM **Project Manager** (or AECOM representative) with at least one of the following for review and acceptance:

4.3.1 Site-specific SH&E documentation addressing specific performance requirements for the subcontractor's on-site work activities, site safety coordinator's name and responsible persons; or

4.3.2 A written statement of adoption of the provisions in AECOM's project SH&E documentation as the subcontractor's minimum procedures while working on the job site. This documentation must be in letter format (company letterhead), and must include the following information:

- Site location
- Anticipated scope of work activities to be performed and equipment to be used by the subcontractor
- Name of the subcontractor's Site Safety Officer, with contact phone numbers
- Name of the subcontractor's Health and Safety Manager, with contact phone numbers
- In addition to the subcontractor's own SH&E requirements, a statement adopting the AECOM's project SH&E documentation as the subcontractor's minimum requirements for the project
- Statement requiring that only qualified and trained personnel (to the level of assigned responsibilities) will perform assigned work activities on the site
- Designation of required personal protective equipment anticipated for the subcontractor's assigned work activities
- Copies of supplemental or additional subcontractor-specific provisions, policies, procedures and/or protocols that will be implemented by the subcontractor during site activities

4.4 **On-Site Subcontractor SH&E Requirements**

4.4.1 Subcontractor organizations are responsible for safely performing their assigned work activities in accordance with all applicable federal and state/provincial/territorial occupational safety and health regulations, acts, and codes.

4.4.2 Subcontractors are responsible for providing AECOM with a copy of their project-specific SH&E documentation for the subject work. The specification of minimum acceptable on-site SH&E performance should be included.

4.4.3 Subcontractors are responsible for confirming that their employees are provided the appropriate equipment and training to perform the work safely.

4.4.4 All subcontractors must provide input to, and be orientated to, the hazards associated with the site and activities of the project.

4.4.5 All subcontractors must provide proof of safety training as required for the hazards identified, inclusive of any required medical surveillance documentation.

4.4.6 Subcontractors will be provided with a copy of AECOM's project-specific SH&E documentation for the specification of minimum acceptable on-site SH&E performance.

4.4.7 If at any time the subcontractor obtains the services of another subcontractor, consultant, or lower tier subcontractor for any portion of the work to be performed, a copy of the Statement of Work and the approved project-specific SH&E documentation shall be provided as part of the package submitted to each respective subcontractor, consultant, or lower-tier subcontractor. Prior to the start of work, the subcontractor shall submit in writing to the PM, subcontractor selection manager, or their designee the names of any lower-tier subcontractors that may be used in the project that have yet to be approved. The start of work is conditional upon this approval.

5.0 Records

5.1 Business Line management will maintain subcontractor evaluations and associated documentation either in the project file, or, preferably, in a centralized database for tracking.

6.0 References

6.1 None

S3NA-213-FM Subcontractor SH&E Evaluation

INSTRUCTIONS TO SUBCONTRACTOR/ORGANIZATION
COMPLETING THE AECOM SUBCONTRACTOR SH&E EVALUATION

1. Complete the administrative information related to your organization (*Company name, address, etc.*)
2. List the service(s) to be performed for AECOM by your organization (direct hire or own forces only, not subcontracted). Examples include (*but are not limited to*):
   a. Subsurface drilling
   b. Excavation operations
   c. Surveying
   d. Construction/renovation/clean-construction operations
   e. Demolition
   f. Well abandonment
   g. Electrical system installation
   h. HAZWOPER
3. List the Experience Modification Rate (EMR) for your organization (entire company, not a local office, division, subsidiary, or joint venture) from the past three years. This information can be obtained from your organization's Workers' Compensation Insurance Carrier. If your organization's EMR is greater than **1.0**, an explanation must be provided in the appropriate space provided. NOTE: *EMR is separate from the Experience Modification Factor (EMF) also provided by your Workers' Compensation Insurance Carrier. EMR is a whole number, while EMF is a percentage.*
4. Provide the applicable injury and illness data for your organization from the past three years in the table provided. Using the formulas included in the table, calculate the requested Recordable Case Frequency Rate (e.g., Recordable Incident Rate or RIR). If your company has less than ten employees, you are not required to maintain this information according to Title 29 of the Code of Federal Regulations (CFR) Part 1904, Section 1, Subsection (a)(1) [29 CFR 1904.1(a)(1)]; however, if your organization does have less than 10 employees, AECOM still requires that you provide the information for rows d) *Total Recordable Cases* and e) *Total Corporate Hours Worked*.
5. List any fatalities your organization has incurred during the past three years and for each occurrence please provide the following information (*Supplemental material may be attached to this questionnaire*):
   a. Location where the fatality occurred
   b. Cause of the fatality
   c. What corrective action(s) your organization has taken as a result of the fatality
6. List and describe any SERIOUS, REPEAT, WILLFUL, or CRIMINAL citations issued to your organization by a regulatory authority (e.g., OSHA, OH&S, Environment) (*Supplemental information related to the specific citation(s) may be attached to the questionnaire*).
7. After reading the Compliance Statement on page 3, list the name and phone number of the representative from your organization who completed the questionnaire, sign the questionnaire, and write in the date the questionnaire was completed. By signing the questionnaire, the representative states that they have truthfully answered all questions, that all of the information provided is accurate, and that if selected by AECOM, your organization shall adhere to the requirements identified in the Compliance Statement.
8. Based on the types of services to be provided by the contractor, other qualification criteria is recommended for use including but not limited to:
   a. Identity and qualifications of site safety officer
   b. Training qualification(s) of employees (e.g., certifications, permits, etc.)

Should the subcontractor have any questions regarding this evaluation, please contact the AECOM Project Manager or representative.

Company Name:	**Date:**
Address:	
City:	**State/Province:**
Has company name changed in the last 3 years: **Yes** ☐ **No** ☐ If YES, please provide previous operating name(s):	
List Service(s) to be provided:	

1. Experience Modification Rates

a) List your firm's Experience Modification Rate (EMR) for the three (3) most recent years. (*Information is available from your Workers' Compensation Insurance Carrier*)

Year	Experience Modification Rate

b) If your organization does not have an EMR or your EMR is greater than 1.0, please explain why.

2. **Please consolidate your injury and illness data for the last three (3) years and complete the following:**

	Data	**Year**	**Year**	**Year**
a)	Number of Lost Workday Cases (not days lost)			
b)	Number of Restricted Workday Cases (not restricted days)			
c)	Number of Medical Treatment Cases (not including first aid)			
d)	Total Recordable Cases (a + b + c)			
e)	Total Corporate Hours Worked (hourly and salaried employees)			
f)	Recordable Case Frequency Rate (RCFR) ([d x 200,000] / e)			

a) Does your organization have fewer than 10 employees? Yes ☐ No ☐

Note: If you check Yes, you are required to only complete rows d), e), and f) in the above table.

3. **List any fatalities your firm has had in the last three (3) years.** Include location, cause, and corrective actions. (*Attach supplemental information as required*)

4. **List any SERIOUS, *REPEAT*, *WILLFUL*, or *CRIMINAL* citations your firm has had in the last three (3) years.** Please describe. (*Attach supplemental information as required*)

5. **Do you have a written safety and health manual? Yes ☐ No ☐**
   If yes, provide the Table of Contents.
   If no, please indicate how you confirm that the following are addressed: training, incident reporting and investigation, inspections, hazard assessments, emergency response procedures

6. **Do you have any certificates or awards related to SH&E** (e.g., OHSAS 18001, COR, etc.)**? Yes ☐ No ☐**
   If yes, please list:

Completed by Subcontractor Manager (Print Name):	**Completed by (Signature):**
Phone Number:	**Date Completed:**

Procurement/Safety/Management Use Only

Evaluated by (Print Name):	**Evaluated by (Signature):**	**Region**	**Date:**

EMR Rating	**RCFR Rating**	**# of Citations**	**OVERALL RATING***

**The lowest of the three individual criteria ratings.*

*Evaluator Note: If the organization checked YES to 2.a), they only need to provide the applicable data for rows d) and e) in the table in Section 2, and the evaluator will calculate the RCFRs by applying the formula found in row f). If the organization checked NO, then they must provide **all** requested data to be considered compliant.*

S3NA-213-GL Subcontractor Safety Criteria Questionnaire Scoring Key

EMR[1]	Incident Rate (RCFR)[2]	OSHA Compliance[4]	Scores and Ratings	
< 1.1	< 5.0	No *REPEAT*, *WILLFUL*, or *CRIMINAL* citations	**3**	***Preferred*** - Meets AECOM requirements as acceptable.
1.1 - 1.5	5.0 – 7.5	1 *REPEAT*, *WILLFUL*, or *CRIMINAL* citation	**2**	***Qualified*** - Acceptable with concurrence from the SH&E Dept and provision of a method statement describing avoidance of associated experience.
> 1.5	> 7.5	2 or more *REPEAT*, *WILLFUL*, or *CRIMINAL* citations	**1**	***Not Recommended*** - Not recommended that the company receive subcontracts at this time.
No data	No Data[3]	No Data	**0**	***Non-responsive*** - Cannot receive subcontracts at this time.

[1] – Use the greater of: (a) The most current year, or (b) The 3-year average value.

[2] – If there are any job-related fatalities in the last 3 years then the highest possible score is 2, regardless of reported RCFR.

[3] – If Question 2.a) is checked **YES** then the RCFR must be calculated by the evaluator using the formula found in row f) and the information reported in rows d) and e). If this data is not supplied to AECOM, then the score is 0.

4 – OSHA Compliance experience for the prior 3 years.

S3NA-301-PR Confined Spaces

1.0 Purpose and Scope

1.1 This procedure establishes requirements for AECOM employees to participate in entries into confined space/limited egress (CS/LE) locations.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Asphyxiant**: An airborne substance that can cause suffocation. Simple asphyxiants (e.g., carbon dioxide, nitrogen, argon, etc.) physically displace oxygen from the atmosphere; chemical asphyxiants (e.g., carbon monoxide, hydrogen cyanide, etc.) prevent the body from utilizing oxygen in the atmosphere.

2.2 **Attendant**: An individual who is stationed outside of a permit-required confined space to monitor authorized entrants and to initiate emergency response if necessary.

2.3 **Class 1, Division 1 Approved**: Approval given to equipment that has been approved for use where ignitable concentrations of flammable gases, vapors, or liquids are present within the atmosphere under normal operation conditions.

2.4 **Confined Space**: A space that:

2.4.1 Is large enough and so configured that an employee can physically enter and perform assigned work.

2.4.2 Has limited or restricted means for entry or exit.

2.4.3 Is not designed for continuous human occupancy.

2.5 **Competent Person**: The designated individual who evaluates the hazards in the space and confirms the controls and procedures outlined in the plans and permits.

2.6 **Entrant**: Individual who enters into the CS/LE to perform the task(s) as defined in the entry permit and mitigation/control procedures.

2.7 **Entry**: The action by which a person passes through an opening into a confined space. Entry is considered to have occurred as soon as any part of the body breaks the opening of a confined space.

2.8 **Entry Permit**: A written or printed document that controls entry into a permit-required confined space.

2.9 **Entry Supervisor**: An employee responsible for determining if acceptable entry conditions are present, for authorizing entry into a permit-required confined space, for overseeing entry operations, and for terminating entry.

2.10 **Hazardous Atmosphere**: One or more of the following atmospheres that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness:

2.10.1 Oxygen concentrations below 19.5% or above 23.5%.

2.10.2 Flammable atmospheres (concentrations ≥ 10% of the lower explosive limit).

2.10.3 Toxic environments (concentrations > than the permissible exposure limit).

2.11 **Non-Permit Required Confined Spaces (NPRCS)**: Spaces that do not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. These spaces do not require specific entry procedures.

2.12 **Hot Work**: Any task that may produce a spark or source of ignition (e.g., welding, cutting, etc.).

2.13 **Immediately Dangerous to Life or Health (IDLH)**: The National Institute for Occupational Safety and Health (NIOSH) exposure limit for the airborne concentration of a substance that can cause death, serious or irreversible health consequences, or inability to escape within 30 minutes.

2.14 **Inerting:** Displacement of the atmosphere by a nonreactive gas (i.e., nitrogen) to such an extent that the resulting atmosphere is nonflammable.

2.15 **Lower Explosive Limit (LEL)**: The lowest concentration of a flammable gas/vapor in air which will ignite.

2.16 **Oxygen-deficient**: An atmosphere with an oxygen concentration less than 19.5%.

2.17 **Oxygen-enriched**: An atmosphere with an oxygen concentration greater than 23.5%.

2.18 **Permit-Required Confined Space (PRCS)**: A confined space that exhibits one or more of the following properties:

2.18.1 Contains or has a potential to contain a hazardous atmosphere.

2.18.2 Contains a material that has the potential for engulfing an entrant.

2.18.3 Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.

2.18.4 Contains any other recognized serious safety or health hazard.

2.19 **Physical Hazard**: A nonchemical hazard that may cause cuts, abrasions, suffocation, crushing, trauma, hearing loss, burns, or radiant energy effects (e.g., welding).

2.20 **Upper Explosive Limit (UEL)**: The highest concentration of a flammable gas/vapor in air that will ignite.

3.0 Attachments

3.1 S3NA-301-FM1 Confined Space Identification Log

3.2 S3NA-301-FM2 Hazard Assessment

3.3 S3NA-301-FM3 Entry Permit

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Region and District Operations Managers

- Make available confined space training to employees engaged in projects covered by this procedure.
- Monitor that **project managers** are implementing confined space entry procedures on their projects, where applicable.

4.1.2 **Project Managers** are responsible for administering the procedure, including:

- Determining alternative procedures that eliminate the need for entering confined spaces.
- Consulting with the SH&E Department regarding project-specific requirements for confined space entries.
- Informing the field team about the client’s or facility's requirements for confined space entries.
- Verify that only trained, authorized employees work in or near confined spaces.
- Ensuring that written Confined Space Entry Procedures and permits are prepared for each entry.
- Assigning an **Entry Supervisor** to be in control of all activities associated with the confined space.

4.1.3 **Competent Person** is a designated individual who has confirmed the following requirements for CS/LE program management:

- Meets the minimum CS/LE requirements that are defined by US/Canadian regulations.
- Has been delegated authority to take appropriate actions and to commit resources to identify and mitigate safety and health issues associated with CS/LE entries.
- Has documented CS/LE work experience and practical skills.
- Is capable of identifying workplace hazards relating to CS/LE entries.

4.1.4 **Rescue Organization**

- The individual and/or organization who is properly trained and equipped to carry out a confined space entry rescue operation.

4.1.5 **Entry Supervisor**

- Assess the risks prior to entry and establish the work plan accordingly.
- Notify the SH&E Department prior to entry into a confined space to review the planned activity, circumstances, and Confined Space Permit.
- Verify what conditions exist.
- Verify that all participants (entrants and attendant) are adequately trained for the work that is to be performed.
- Conduct a tailgate training session at the location of the confined space, reviewing all entries in the Permit with all attendants and entrants.
- Confirm that the air within the confined space is tested with an appropriated air monitoring instrument.
- Confirm that all air test results are documented on the Permit form.
- Verify that competence in first aid, use of equipment procedures, etc., is represented in the workers responding to a confined space emergency.
- Verify that a rescue team equipped with retrieval equipment and trained in confined space entry rescue is available. A rescue team may be the local Fire Department or a client's Emergency Rescue Squad or the construction project's emergency response team. Emergency rescue capability must be established in the permit process and must include emergency contact numbers.
- Prior to the entry taking place, notify the emergency rescue service of the time, location, and duration of work in the confined space.
- Confirm that appropriate means of communication are ensured (in place and operable) for the entry team. Communication can be verbal, hand signals, radio, or telephone.
- Confirm that the proper isolation of any process lines, pipes, or electrical systems that can affect the safety or health of entrants in a confined space are isolated and secure—e.g., blanking, blocking, lockout-tagout, and verifying that systems are isolated prior to proceeding with work.
- Verify that fresh air ports, manways, and accessways are opened during the entire operation.
- When forcing air into a confined space to facilitate the proper entry condition, ensure that fresh air is continuously forced into the confined space prior to and during work within a permit-required confined space. Air will not be exhausted from a space. The objective is that the forced air will be sufficient to maintain a space safe for entry.
- Make sure that appropriate safety equipment is selected and used by all entrants based on the physical and health hazards that may exist.
- Cancel the entry permit at any time based on a change in monitored conditions or perceived hazards.
- Serve as an attendant if needed.
- Review the Confined Space Entry Permit after completion of the work to evaluate the process.

4.1.6 **Attendant** must remain outside the confined space at all times. The attendant must not leave the post unattended at any time. If the **attendant** needs to leave his position, **entrants** must be called out of the confined space or another qualified **attendant** must take the position and responsibility.

The **attendant** is responsible for following the Confined Space Entry Permit and will:

- Confirm that correct names of all **entrants** are listed on the permit.
- Confirm that all applicable parts of the permit are completed before allowing any AECOM **employee** to enter the space.
- Confirm that all equipment going into the confined space (e.g., tools and protective equipment) is in safe operating condition. It is prohibited for compressed gas bottles (e.g., burning and welding) to be brought into a confined space. All gas lines brought into accessways shall be protected from sharp edges.
- Confirm that all **entrants** have received any special instructions for the work to be performed before entering into the space.
- Maintain communication with **entrants** either visually, verbally, or through the use of hand signals or radio.
- Interrupt work and evacuate any/all entrants in the event of a newly developed dangerous condition, when signs of entrant stress or fatigue are noticed, or when the **attendant** needs to leave the post and cannot be replaced by another attendant.
- Summon rescue and other services during an emergency.
- Warn any unauthorized persons not to enter a Permit Confined Space.

4.1.7 **Entrants**

- Know the emergency action plan and be able to recognize the potential for real hazards associated with the Confined Space. Refer to the Permit and ask the **Entry Supervisor** or **Region SH&E Manager** if a question arises.
- Know how to use the identified personal protective equipment (PPE) required for entry or rescue.
- Know how to exit the confined space as rapidly as possible without help whenever:
    - The **attendant** orders an evacuation.
    - Any alarm from a continuous monitor/detector sounds.
    - The **entrant(s)** recognizes the warning signs of exposure to hazardous substances that could be found in that confined space, including physical conditions such as fatigue.
- Be aware of the toxic effects or symptoms of the hazardous materials that could be encountered in the confined space.
- Know how to relay an alarm to the outside attendant and to attempt self-rescue immediately upon becoming aware of hazardous conditions.
- Know any modification of normal work practices that are necessary for permit-required confined space work.

4.1.8 **Employees**

- Refrain from making any attempt to enter a confined space without first meeting the requirements of this Procedure and receiving authorization for entry from the entry supervisor.
- Avoid areas where other employees are working in confined spaces.

4.2 Confined Spaces

4.2.1 All confined spaces will be considered permit-required by default in the absence of a previous classification by the owner or AECOM competent person.

4.2.2 All confined spaces under the control of AECOM will be identified, evaluated, and classified on *S3NA-301-FM1 Confined Space Identification Log* (or equivalent). The identification log shall be updated as required, at a minimum annually. An identification log shall be prepared for each project site containing confined spaces to which AECOM employees are exposed.

4.2.3 Labeling/Signage

- All permit-required confined spaces under AECOM control will be labeled so that employees are adequately warned of the potential for hazardous conditions. Labeling is not required under the following circumstance:
    - The spaces are easily recognizable, numerous, and widely spaced (e.g., storm sewer manholes). Employees will be instructed that these constitute confined spaces during required training. However, these locations will be included on the inventory.
    - A complete inventory has been developed, all personnel have been trained in the use of the inventory, and the workers consult the inventory prior to performance of any work that may require entry into a confined space.
- When non-permit-required confined spaces require the implementation of confined space entry procedures because of specific work operations (e.g., painting, welding), all entry points will be labeled or identified by signs to alert all employees of the existence of the hazardous conditions. These labels or signs will be removed only when the hazard no longer exists (e.g., complete curing of the paint).

4.2.4 Classification of Confined Spaces

- For each identified confined space, an evaluation to determine the nature and extent of all possible hazards to entrants must be conducted. Consideration will be given to the following types of hazards:
    - The presence of possible airborne contaminants at concentrations exceeding established occupational exposure limits (PELs).
    - The presence of any physical hazards (e.g., electrical shock, mechanical injury, etc.).
    - The presence of flammable or explosive conditions.
    - The presence of any potential for rapid flooding or engulfment.
    - Configurations/positioning that may cause an entrant to become trapped.
    - Initial classification as either a PRCS or NPRCS.
- The evaluation will be documented using *S3NA-301-FM2 Confined Space Hazard Assessment Form*. A copy of this evaluation will be maintained in the project files.
- Wherever the confined space is controlled by a client or a third party, the controlling entity should be contacted to provide the information necessary to complete the evaluation. However, if AECOM personnel are required to enter a confined space owned or controlled by others, the final evaluation will remain the responsibility of responsible AECOM manager.
- Non-permit-required confined spaces can be designated only by a Certified Industrial Hygienist/Registered Occupational Hygienist, Certified Safety Professional, AECOM Regional SH&E Manager, or Professional Engineer after review of the space(s), historical monitoring data, and other factors (e.g., injuries that have occurred). Therefore, all confined spaces will be considered permit-required unless specifically designated as a non-permit-required space, in writing, on the approved confined space inventory listing.

4.2.5 PRCS-Specific Entry Procedures

- To protect employees during PRCS entries, AECOM-specific PRCS entry procedures will be developed for each PRCS to be entered. Each entry procedure will specify:
    - The identity of the PRCS(s) to which the procedure applies.
    - The potential hazards associated with the entry operation/PRCS.
    - Pre-entry planning:
        - Required air monitoring equipment and procedures;
        - Required ventilation procedures (as applicable);

- Required lockout/tagout procedures (as applicable);
- Required emergency response/extraction equipment;
- Rescue agency notification requirements (as applicable);
- Required pre-entry monitoring procedures and applicable at-entry re-classification criteria;
- Air monitoring procedures during entry;
- PPE requirements during entry.

- Specific entry procedures can be documented by following the procedures in sections 4.2.4 through 4.2.7 of this procedure and by completing a Task Hazard Analysis in combination with a completed Confined Space Hazard Assessment and Confined Space Permit.

4.2.6 **PRCS Pre-Entry Procedure:**

- Prior to the start of the entry operation, the **Entry Supervisor** will assign individuals on the entry team to the following jobs:
  - **Entrant**: The person entering the PRCS
  - **Primary Attendant**: The person dedicated only to assisting the entrant, observing the entry operation, and maintaining communications with the entrant throughout the entry procedure.
  - **Secondary Attendant for Rescue Procedures**: An additional employee who is assigned either to specific support of the entry operation or to working nearby can assist with rescue operations in the event of an accident. This person can perform other duties unrelated to observing the entry.
- The **Entry Supervisor** is responsible for ensuring that the individuals assigned to each job fully understand their duties and responsibilities prior to initiating the entry operation. The **Entry Supervisor** will review the complete entry procedure with all team members prior to the work. The **Entry Supervisor** will also verify the availability of locally accessible rescue services.
- Additional requirements for Pre-Entry Planning include the following:
  - Select the appropriate equipment to measure the potential hazards. Select a multi-gas meter capable of measuring oxygen, combustible gas (%LEL), and other hazardous gases.
  - Determine the acceptable values for the hazardous conditions being measured, based on the equipment in use and the field calibration method. The safe working levels are determined as follows:
    - Oxygen: 19.5% - 23.5%
    - Lower explosion limit: <10%
    - Hydrogen sulfide: ≤10 ppm
    - Carbon monoxide: ≤25 ppm
    - Other toxic chemicals: contact the SH&E Department.
  - Ensure that all the equipment selected is calibrated and that calibration is still valid.
- Personnel trained in accordance with this procedure shall perform field verification of equipment as follows:
  - Calibrate combustible gas meters using appropriate span gas for the detectors to be used. (This span gas calibration shall be performed each time the instrument is turned on).
  - Check detector tube pumps for leakage using the manufacturer's procedures.
  - Calibrate photo ionization detectors (PID) using isobutylene or other material in accordance with the manufacturer's directions.
  - Calibrate any other instrumentation to be used in accordance with manufacturer's directions.
  - Set up barricades and signage around the space being entered as required.
  - Set up required fall arrest, retrieval, or rescue systems.

- Institute required lockout/tagout procedures (i.e. electrical, steam, liquid flow-pipe blanking).
- Ensure that a second person (trained as entry attendant) is available and assists in the set up procedures.
- Agree upon a means of communication between the entrant and the attendant. (The attendant is not authorized to perform rescue involving entry into the space unless he/she is trained for rescue and another entry attendant replaces him/her prior to the attempt to rescue).
- Verify a means to contact emergency rescue services for further assistance.
- Complete the Confined Space Entry Permit.

- The **Entry Supervisor** shall also:
  - Have the attendant verify the completion of the required actions.
  - Sign the Permit upon verification of completed actions.
  - Maintain the Permit at all authorized entry sites until completion of the entry.

4.2.7 **PRCS Entry Permits**

- A PRCS Entry Permit is required to be completed for each individual PRCS entry operation (Exception: Multiple entries of an individual PRCS during a single work shift can be covered by a single Permit). The Permit provides the means for documenting
  - The identities and roles of all individuals involved in the entry operation.
  - Equipment used for performance of the entry (monitoring instruments, extraction equipment, etc.).
  - Pre-entry and operational monitoring results.
  - Communications protocols between Entrants, Attendants, and rescue services.
  - Lockout/Tagout procedures.
  - PPE for specific tasks (refer to the Task Hazard Analysis for the task).
  - Other relevant workplace conditions or events related to the entry operation (e.g., vault isolation procedures).
- The Permit also provides the documented basis for reclassification of any PRCS as non-permit-required (for purposes of the particular entry operation) based upon pre-entry monitoring procedures. Each Permit will be signed and authorized by the **Entry Supervisor**. At the completion of the entry operation, the Permit will be filed as part of the project records.
- A copy of AECOM's Entry Permit is provided in *S3NA-301-FM3 Entry Permit*.

4.2.8 **PRCS Entry Procedure**

- Test the atmosphere around the confined space access door or cover to ensure that no flammable conditions exist prior to the door or cover being removed. Note: Always check for oxygen levels first if the meter does not measure simultaneously. Low oxygen levels can cause LEL readings to be incorrect.
- Don any required PPE.
- Carefully remove any access doors or covers.
- Upon removal of the access cover/door, test the immediate atmosphere using remote testing procedures to ensure that the immediate atmosphere is safe. If any of the parameters being tested are outside the safe working level, do not enter.
- If necessary, use ventilation equipment to either remove the contaminant(s) or to correct the oxygen-deficient atmosphere.
- If the initial test(s) are within allowable safe working levels, slowly enter the space, continually testing the atmosphere in front and to the sides.
- In stratified atmospheres (i.e., vertical entries), test 4 feet in advance of the direction of travel. The entrant's travel speed must allow for adequate instrument response time.

- Test the entire area where work is to be performed prior to performance of any work.
- While performing the work, place the direct read instruments in a location that will not interfere with the work, will allow for continual monitoring, and will enable the entrant to detect alarms that may be activated.
- Upon work completion, pick up all equipment and leave the space.

4.2.9 **PRCS Exit Procedure**

- Replace all access covers.
- Ensure that all signs are visible and legible.
- Remove all lockout/tagout equipment.
- Note on the Permit any problems encountered while in the space.
- Finish the Permit and turn it in to the **Entry Supervisor.**
- The **Entry Supervisor** will inspect the Permit for completion and will investigate any noted problems. Actions taken to correct noted problems will be discussed with all authorized **entrants** and **attendants** for future implementation.
- The completed Permit will be maintained on file as required in this section.

4.3 Non-permit-required Confined Space Entry Procedure

Persons entering this type of space only need to complete a confined space entry permit, to remain vigilant about conditions in the space, to remember that if any condition changes or if hazards are introduced into the space (e.g. welding/cutting operations) the classification and entry procedures in the space may change.

4.3.1 **NPCS Entry Procedure**

- When entrance covers are removed, guard the opening to prevent an accidental fall through the opening and to protect each employee working in the space from foreign objects entering the space.
- Check the atmosphere with the gas detector for Oxygen, LEL, and other hazardous gases (e.g. Methane, H2S, and CO) in the same order prior to entry into the space.
- Record the measured conditions on the permit and do not allow entry if detected levels are above safe working levels.
- Proceed with entry and work with caution.

4.3.2 **NPCS Post Entry Procedures**

The following post-entry procedures must be followed after the completion of a non-permit-required confined space entry:

- Replace all access covers.
- Ensure all signs are visible and legible.
- Remove all lockout/tagout equipment, if applicable
- Note any problems encountered while in the space on the Permit.
- Finish the Permit and submit it to the **Entry Supervisor**.
- The **Entry Supervisor** shall inspect the Permit for completion and investigate any noted problems. Actions taken to correct noted problems shall be discussed with all authorized entrants and attendants for future implementation.

- The completed Permit shall be maintained in record for annual review.

4.4 Alternate Entry Procedures

4.4.1 Under certain conditions, alternative entry procedures may be used. The SH&E Department representative may prescribe alternate procedures if justified.

4.5 Rescue Services

4.5.1 In the event of a change in the confined space environment that may place people at risk, the **Entrant** must exit the confined space and the entry team must evacuate the area immediately.

4.5.2 If the **Entrant** is injured or rendered unconscious and needs assistance to exit the space:

4.5.3 **Attendant** will operate entrant retrieval system to evacuate personnel within the confined space. If this system fails, they will call the Emergency Dispatcher for assistance

4.5.4 Once **Rescuers** arrive at the space, the **Rescuer**(s) will enter the space to untangle, stabilize, package, and extricate the downed entrant. If the space configuration allows—

4.5.5 The **Rescuers** will assume the duties of the **Attendant** during extrication (including maintaining communication lines with all Rescue personnel inside the confined space). The **Attendant** will remain at the confined space and provide assistance to the Rescuers, if requested.

4.5.6 Perform first aid services as required.

4.5.7 Outside Rescue Service (including client services)

- Prior to authorizing entry into any confined space, the **Project Manager** must:
- Evaluate a prospective rescuer's ability to respond to an emergency in a timely manner (within 5 minutes for life threatening situations or 15 minutes for non-life-threatening injuries), considering the hazard(s) identified;
- Select a rescue team or service from those evaluated that:
    - Has the capability to reach the victim(s) within a timeframe that is appropriate for the permit space hazard(s) identified [as defined in 4.5.1 above];
    - Is equipped for and proficient in performing the needed rescue services;
    - Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and
    - Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

4.5.8 Facilitating Non-Entry Rescue

- Retrieval systems or methods shall be used whenever an authorized entrant enters a permit space (unless the retrieval equipment would increase the overall risk of entry).
- Retrieval systems shall meet the following requirements:
    - Each authorized **entrant** shall use a full body harness with a retrieval line attached at the center of the entrant's back near shoulder level or other suitable locations as appropriate.
    - The other end of the retrieval line shall be attached to a mechanical device (mandatory for more than 5 feet deep rescue) or fixed point outside the permit space.

5.0 Records

5.1 **Confined Space Identification Log**: Confined spaces under the control of AECOM or that may be entered by AECOM employees will be identified, evaluated, and classified using this document or an equivalent; this log must be reviewed annually. The log will be maintained in the project files.

5.2 **Hazard Assessment**: Should document the existing and probable conditions/hazards within the confined space to facilitate proper categorization of the space. Once completed, the hazard assessment should be maintained in the project files.

5.3 **Entry Permit**: Will be signed by the entry supervisor and maintained onsite during the confined space entry activity. Once the entry activity is officially closed the entry permit should be maintained in the project files.

6.0 References

6.1 S3NA-208-PR Personal Protective Equipment Program

6.2 S3NA-209-PR Project Hazard Assessment and Planning

6.3 S3NA-312-PR Ladders and Stairways

6.4 S3NA-410-PR Hazardous Energy Control

6.5 S3NA-418-PR Welding, Cutting, and Other Hot Work

S3NA-301-FM1 Confined Space Identification Log

Name of Confined Space and Location	Permit Required Confined Space		Alternate Procedure Confined Space		Non-Permit Required Confined Space	
	Y	Initial Date Inventoried	Y	Date Reclassified	Y	Date Reclassified
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S3NA-301-FM2 Confined Space Hazard Assessment

PART I. CONFINED SPACE IDENTIFICATION

Confined Space Name:

Dimensions:

Description of Space:

Is this space entered on a routine basis? ☐ Yes ☐ No

Described Tasks and Frequency:

PART II. NATURE OF THE HAZARDS—ASSUMPTIONS: Tanks are empty and clean, all energy sources have been identified and isolated, and no other hazards are introduced into the spaces. A more formal hazard assessment must be done at the time of entry.

Potential Atmospheric Hazards

- ☐ O_2 Deficient /Enriched
- ☐ Combustibles/Flammables
- ☐ CO
- ☐ H_2S
- ☐ Other Toxics

Potential Non-Atmospheric Hazards

- ☐ Contains material that could engulf entrant?_____
- ☐ Internal configuration could trap entrant?_____
- ☐ Electrical (live circuits)? _____
- ☐ Mechanical (pipes, linkages)?_____
- ☐ Slick/residue-covered surfaces?_____
- ☐ Equipment preventing safe exit?_____
- ☐ Low/inadequate lighting?_____
- ☐ Hazardous chemicals present? _____
- ☐ Fall potential?_____
- ☐ Potential for dropped objects?_____
- ☐ Multiple work groups/nature of work_____
- ☐ Other _____

Insert photo of space here.

S3NA-301-FM3 Confined Space Entry Permit

1. Permit space to be entered:_ Project Name & No.:
2. Purpose of entry:_
3. Good on this date only: From:__ AM/PM To: AM/PM
4. Designated entry personnel:

Authorized Entrants	Authorized Attendants	Entry Supervisor

5. Hazards within the permit space:_
6. Permit space preparation:

1.	Work area isolated with signs/barriers?	☐ Yes	☐ No	☐ NA
2.	All energy sources locked/tagged out?	☐ Yes	☐ No	☐ NA
3.	All input lines capped/blinded?	☐ Yes	☐ No	☐ NA
4.	Permit space contents drained/flushed/neutralized?	☐ Yes	☐ No	☐ NA
5.	Permit space cleaned/purged?	☐ Yes	☐ No	☐ NA
6.	Ventilation provided before entry?	☐ Yes	☐ No	☐ NA

7. Initial atmospheric testing:

Measured Parameter	Reading	Time	Acceptable Level
Percent Oxygen (%)			19.5% to 23.5%
Explosivity/LEL %			< 10%
Carbon Monoxide			< 25 ppm

8. Multiple depth/location/time testing:

Test(s) To Be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
Percent Oxygen	19.5% to 23.5%				
Explosivity/LEL	<10%				
Carbon Monoxide	< 25 ppm				
Name of Tester					
Test Times					

9. Rescue services : ☐ On Site ☐ Off Site

   Identity and phone # for rescue services or means of summoning:

10. Communication devices and procedures to be used during entry:

11. Safety equipment required for entry:

    PPE: ☐ NA ☐ No ☐ Yes

    Specify:

    Testing Equip: ☐ NA ☐ No ☐ Yes

    Specify:

    Alarm System: ☐ NA ☐ No ☐ Yes

    Specify:

    Rescue Equip: ☐ NA ☐ No ☐ Yes

    Specify:

    Other: ☐ NA ☐ No ☐ Yes

    Specify:

12. Additional permits required:

    Hot work: ☐ Yes ☐ No

Other: ☐ Yes ☐ No

Specify:

13. Permit authorization:

I certify that I have inspected the work area for safety and have reviewed all safety precautions recorded on this permit.

Permit Authorization by Entry Supervisor

(Signature): Date/Time

14. Permit conditions verification:

Physical conditions at confined space checked and verified to be in accordance with the permit ☐ Yes ☐ No

If no, please record the deviation observed and the corrective action taken:

Verified by: _____ _____ _____

(Entry Supervisor) Date Time

15. Review & closeout:

Please list any problems encountered during the entry:

Corrective/preventive action(s) taken:

Additional precautions/recommendation for future entry:

Based on this review, this confined space will be considered:

Permit-required Confined Space	☐ Yes	☐ No
Non-permit-required Confined Space	☐ Yes	☐ No
Alternate Procedure Confined Space	☐ Yes	☐ No

Reviewed by: _____ _____ _____

(Entry Supervisor) Date Time

S3NA-302-PR Electrical, General

1.0 Purpose and Scope

1.1 To minimize and control electrical hazards in the workplace.

1.2 This procedure applies to all AECOM North America-based employees and operations.

1.3 As a general rule, AECOM employees should not work on exposed, energized systems with a potential greater than 50 volts. This work should be subcontracted to a qualified electrician. Should it be necessary for an AECOM employee to perform work on exposed, energized systems with a potential greater than 50 volts, the requirements of this procedure will be followed.

2.0 Terms and Definitions

2.1 **Arc Rating:** The maximum incident energy resistance demonstrated by a material prior to breakdown or at the onset of a second-degree skin burn (expressed in cal/cm^2).

2.2 **Arc Flash:** A dangerous condition associated with the release of energy during an electrical arc.

2.3 **Arc Flash Analysis:** A mathematical determination of the energy released by an electric arc and the distance from the source that a flash hazard exists. The process for an Arc Flash Analysis is defined in NFPA 70E of the National Electric Code.

2.4 **Circuit Protective Device:** A load-rated switch, circuit breaker, or other device specifically designed as a disconnecting means for opening, reversing, or closing of live circuits.

2.5 **Energized Electrical Equipment:** Electrically connected to or having a source of voltage.

2.6 **Flash Hazard:** A dangerous situation associated with the release of energy caused by an electric arc.

2.7 **Ground Fault Circuit Interrupter (GFCI):** An electrical device that protects the users of all devices connected to it from electrical shock. The GFCI is part of the circuit or device in use and continuously measures the current in that circuit. If a leakage of current is detected, as in the case of an electrical short circuit, the circuit is opened at the GFCI and current cannot flow beyond the GFCI.

2.8 **Hazardous Atmospheres:** Areas that contain or may contain explosive or flammable atmospheres require specific electrical precautions. OSHA regulates the use of electrical devices in explosive atmospheres according to National Electrical Code criteria and classifications for hazardous atmospheres.

2.9 **Portable Electric Equipment:** Cord- and plug-connected equipment and extension cords.

2.10 **Qualified Persons:** Individuals who have specific and documented training to avoid the hazards of working on or near energized electrical equipment and have been specifically permitted to work on or near exposed energized and parts.

2.11 **Shock Hazard:** A dangerous situation associated with the possible release of energy caused by contact or approach to live parts**.**

2.12 **Unqualified Persons:** Individuals with little or no training to avoid the hazards of energized electrical parts or equipment.

3.0 Attachments

3.1 S3NA-302-FM Energized Electrical Work Permit

3.2 S3NA-302-ST Electrical Regulations

3.3 S3NA-302-WI1 Electrical Safe Work Practices

3.4 S3NA-302-WI2 Ground Fault Protection Safe Work Practices

3.5 S3NA-302-WI3 Generator Safety Card

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager (Field Task Manager, Supervisor)

- The **Manager** of any **employee** performing work on exposed, energized systems above a potential of 50 volts will trained to the same level as a Qualified Person (1910.332).
- The AECOM **Project Manager, Field Task Manager,** or **Supervisor** is responsible for determining if AECOM employees are exposed to electrical hazards.
- The **Manager** or **Supervisor** will determine the appropriate safe guards to be put in place to protect employees.
- The **Manager** or **Supervisor** will confirm that only Qualified Persons are assigned duties that expose them or others to live electrical current above 50 volts.

4.1.2 **Region\District SH&E Manager** is responsible for the following:

- Approving all Energized Electrical Work Permits.
- Providing technical guidance in support of this procedure.

4.1.3 **Site Safety Coordinator** shall assist the site **manager/supervisor** in compliance with the requirements of this procedure.

4.1.4 **Employees**

- All AECOM **employees** engaged in project field activities shall follow these procedures.
- AECOM **employees** will stop work if workers, other than Qualified Persons, are exposed to live electrical systems at unknown voltages or potentials greater than 50 volts
- No staff shall open electrical panels unless they are a Qualified Person.

4.2 Training

4.2.1 **Employees** who have potential exposures to electrical hazards, Qualified Persons, shall be trained in and be familiar with the electrical safety-related work practices required by the applicable regulations.

4.2.2 All other on-site personnel, Unqualified Persons, will be advised of the electrical hazards and the procedures to mitigate their risk.

4.3 General Requirements for Use of Electricity

4.3.1 AECOM personnel who meet the requirements of a Qualified Person and have been specifically designated as such in the project health and safety plan may set up temporary circuits up to 240 volts. Maintenance or installation of circuits over 240 volts will require professionally trained personnel (i.e. professional electricians).

4.3.2 All electrical panels, lines, equipment, and facilities are to be considered energized unless confirmation that they are de-energized can be obtained from a Qualified Person or electrician.

4.3.3 All work on de-energized systems will be performed using established Hazardous Energy Control procedures. Lockout devices will be used to prevent the operation/energizing of equipment or circuits during maintenance or other work. Tagout devices will be used only where it is not feasible to use a lockout device.

4.3.4 Insulated tools and electrical handling equipment shall be inspected prior to use to confirm that their protective properties are not damaged. Damaged equipment will be tagged “DAMAGED” and removed from service.

4.3.5 *S3NA-302-WI1 Electrical Work Safe Work Practices* outlines additional requirements for working on live electrical systems located on AECOM job sites. All work on exposed, energized electrical systems at potentials above 50 volts will be approved by the **Region** or **District Safety Manager**

4.4 General Requirements for Field/Worksite Use of Electricity

4.4.1 Electrical outlets utilized to supply power for electrical equipment during field operations shall be of the three-wire grounding type. Whenever possible, they should be tested for correct polarity and adequacy of the ground with a circuit analyzer. If it is determined that the outlet is incorrectly wired or inadequately grounded, it should not be used.

4.4.2 Ground Fault Circuit Interrupter (GFCI) devices will be in place between the equipment and power source for all temporary circuits unless protected by an assured equipment grounding program as defined in this procedure and *S3NA-302-WI2 Ground Fault Protection Safe Work Practices* (i.e., circuits that are not part of a permanently installed facility electrical system, such as on a construction site or temporary field installation).

4.5 Distribution System Setup

4.5.1 Only qualified personnel shall perform electrical wiring or connections.

4.5.2 Under no circumstances shall electrical lines be routed through doorways, hatches, windows, or other openings where lines could be crimped, bent, or cut.

4.5.3 Electric lines crossing work areas, personnel, or vehicular traffic areas shall be either fastened securely overhead (at a height that provides safe clearance for work operations), or protected by a cover capable of withstanding the imposed loads without creating a trip hazard.

4.5.4 Circuit breakers shall be labeled to indicate their use.

4.5.5 All circuit breaker panels shall be kept covered when not in use.

4.5.6 A fuse puller shall be used to remove cartridge fuses where one or more energized circuits are present.

4.5.7 All live parts of electrical equipment operating at 50 volts or more shall be properly guarded against accidental contact, which includes:

- Limit access to the equipment to qualified employees only.
- Unqualified Persons shall remain at least one meter (three feet) from exposed, energized systems managed by AECOM Qualified Persons. This distance shall be nine meters (10 feet) for systems with a potential greater than 240 volts.
- Label using the proper accident prevention sign, stating DANGER as well as the voltage of the equipment.
- Provide a conductor of the ampacity of not less than the rating of the circuit breaker or fuses protecting that circuit.
- Confirm that a bare conductor or earth return is not used for any temporary circuit.
- Confirm that all electrical wiring is protected from physical damage by covering and by not placing it in a location where it can be crimped or cut, etc.

4.5.8 **Extension Cord Use**

- Extension cords and electrical connections on handheld and other power tools will be inspected prior to use for cuts, kinks, frayed wires, etc. If any deficiency is noted, the equipment will be tagged “DAMAGED” and removed from service. Manufacturer-installed insulated electrical cords will not be repaired or spliced.
- Extension cords are to be kept clean, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or create a tripping hazard. Extension cords will be appropriate for the specific task and environment.
- Extension cord sets for use in field operations should be of the three-wire grounding type and should be designed for hard or extra-hard use. This type of cord will typically utilize insulated wires within an outer insulated sleeve. Examples of such cord include the type marked S, ST, SO, STO, SJ, SJO, or SJTO. Molded wire (flat) cord sets should not be used in field situations. The cord will minimally be rated for the intended current (e.g., heavy duty extension cords are often available in both 15 and 20 amp versions).
- Use of extension cords is allowed only for temporary installations not to exceed 90 days (e.g., decorations).
- Extension cords shall be provided with a plug cap that is either molded to the cord or equipped with a cord clamp to prevent strain on the terminal screws.
- Extension cords shall not be fastened with staples or otherwise hung in a manner that could damage the outer jacket or insulation.

- Extension cords shall be inspected prior to each use to confirm that there is no damage or defects. Defective cords shall not be used.
- Extension cords used with grounding-type equipment (e.g., three-prong plug) shall contain a grounding-type conductor (have three plugs to accept the ground plug).
- Ground fault circuit interrupters shall be used for all nonpermanent wiring needed for construction purposes or when working in wet or moist areas or onboard ships.
- Extension cords used in highly conductive work locations (e.g., wet areas) shall be of the type approved for such locations.
- Grounding-type equipment (e.g., three-prong plugs) shall not be modified to mate to incompatible outlets (e.g., cut off grounding prong to fit two prong outlets).

4.5.9 **Temporary Lights/Task Lights**

- A temporary light shall not be suspended by the cord unless the cord and light are designed for suspension.
- Temporary lights shall be equipped with bulb protectors unless they are installed at least 7 or more feet overhead.

4.6 Working on or Near Energized Parts

4.6.1 Working on Energized Circuits

Working on or near energized parts covers either potential direct physical contact or contact by means of tools or equipment and working close enough to the energized part to draw an arc. Any AECOM **employee** (Qualified Person) assigned to work on exposed, live electrical systems above 50 volts shall have a person knowledgeable about the task to be performed and emergency response procedures assigned to observe the Qualified Person during the task with the potential exposure. This observer shall have no other assignments during the potential exposure.

- Prior to performing any work near exposed, energized systems, the Qualified Person shall:
  - Perform a Shock Hazard Analysis.
  - Perform an Arc Flash Analysis.
  - Establish emergency contacts.
  - Complete and have approved the Energized Electrical Work Permit.
  - Have all required personal protective equipment (PPE), insulated tools, and test equipment tested and ready to use.
  - Know and understand the procedures to be followed.
  - Ensure that adequate lighting and clearance space is available.
  - Remove all conductive clothing and jewelry.

4.6.2 Working Near Overhead Power Lines

- Personnel working in the vicinity of overhead power lines, either on the ground or elevated, shall comply with *S3NA-406-PR Electrical Lines, Overhead.*
- All workers and equipment including cranes and drill rigs shall maintain a clearance distance of at least 50 feet from overhead power lines unless a detailed assessment demonstrating that a smaller clearance distance provides protection has been completed.

4.7 Grounding

4.7.1 The path to ground from circuits, equipment, and enclosures will be permanent and continuous.

4.7.2 Electrical installations at project sites will be protected by either an equipment grounding conductor program or GFCIs. The two options are:

- All 120-volt, single-phase, 15- and 20-amp receptacles that are not part of permanent wiring will be protected by GFCIs.
- The equipment grounding conductor program will cover extension cords, receptacles, and cord- and plug-connected equipment. The program will include the following elements:

- A written description of the program.
- At least one competent person to implement the program.
- Daily visual inspections of extension cords and cord- and plug-connected equipment for defects. Equipment found damaged or defective shall be removed from use and not used until repaired.
- Continuity tests of the equipment grounding conductors or receptacles, extension cords, and cord- and plug-connected equipment every three months.
- Compliance with the requirements for grounding of systems, circuits, and equipment (see 1926.404 in the US).

4.7.3 If the equipment grounding conductor program option is chosen, the designated competent person at the site shall maintain inspection records.

4.8 Assured Grounding

4.8.1 Where AECOM Operations is responsible, projects will have in place a program for the testing and inspection of all temporary electrical supply systems.

4.8.2 Assured grounding is applicable to all cord sets, receptacles that are not a part of the permanent wiring of a building or structure, and all equipment and tools connected by cord or plug.

4.8.3 All cord sets and receptacles will be visually inspected for damage before use.

4.8.4 All items covered by this procedure shall have their grounding conductor tested for continuity and all cord attachments and receptacles shall be tested for polarity to be sure the ground conductor is connected to the proper terminal.

4.8.5 Testing will be done on the following intervals:

- Before first use of any item.
- After repairs and before placing back into service.
- After every incident that might reasonably be suspected of causing damage.
- At intervals not to exceed 3 months.\
  - Any tool, cord, or service that does not pass the required tests may not be made available to employees. Such equipment shall be tagged out of service and delivered to the supervisor or competent person for repair or replacement.
  - Only a qualified employee (electrician) designated as the competent person may test electrical devices and will:
    - Prior to testing any item, remove any and all of the old color-coding tape or zip strips.
    - Perform the required ground conductor testing and polarity verifications.
    - After passing the necessary tests, the items will be marked by putting a wrap of the color coding tape or zip strip (of the appropriate color) around the cord close to the male and female ends of the electrical cord or by the male end on tools. Receptacle outlets will be marked in the most practical manner.

4.9 Personal Protective Equipment/Work Practices

4.9.1 PPE requirements shall be determined based on the results of each of the following: Task Hazard Analysis, Shock Hazard Analysis, and Arc Flash Analysis.

4.9.2 Nonconductive hardhats shall be worn when there is danger of head injury from electric shock or burns due to exposure to energized parts.

4.9.3 Jewelry shall not be worn when working around or with energized parts.

4.9.4 Insulated tools shall be used to work with energized parts. Tools that have insulation that might be damaged (e.g., rubber handles) shall be inspected prior to each use to confirm the insulation is not damaged.

4.9.5 Eye protection with side shields shall be worn when working with energized parts.

4.9.6 Rubber mats, non-conductive shields, or protective barriers shall be used as needed to protect employees from electrical hazards.

4.9.7 Appropriate insulating gloves shall be worn to pick up or unplug connections that are in highly conductive areas, such as in water.

4.9.8 Do not plug in or unplug electric equipment with wet hands.

4.10 **Portable Electrical Equipment**

4.10.1 Double-insulated, portable, industrial-type electrical tools meeting the requirements of the National Electrical Code (NEC) are authorized for use (ground wire not required). Where this type of tool is used, the equipment will be distinctly marked.

4.10.2 Portable electrical tools not provided with special insulating or grounding protection are not for use in damp, wet, or conductive locations (e.g., by persons standing on the ground or on metal floors).

4.10.3 All portable electrical appliances and equipment with non-current-carrying metal parts to which personnel may be exposed shall be grounded by a continuous conductor of adequate capacity from the device to a grounded receptacle. The Site Safety Officer shall resolve any question of whether or not a particular appliance should be grounded.

4.10.4 Manufacturer-installed guards shall not be tampered with, modified, or removed. These guards will be in place and utilized during operation of equipment.

4.10.5 The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment that requires examination, adjustment, servicing, or maintenance while energized shall not be less than 36 inches deep and 30 inches wide or the width of the equipment, whichever is greater.

4.10.6 Portable electrical equipment shall be handled in a manner that will not cause physical damage to the equipment.

4.10.7 Portable electrical equipment shall not be carried by the cord.

4.10.8 Cords shall not be used to raise or lower equipment.

4.10.9 Extension cords shall not be fastened with staples, nails, wire, or otherwise hung in such a fashion that could damage the outer jacket or insulation.

4.10.10 Electrical cords shall not be removed from a receptacle by pulling on the cord line.

4.10.11 Employees' hands shall not be wet when plugging and unplugging cord and plug connected equipment and extension cords.

4.10.12 Disconnect portable electric equipment when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.

4.10.13 Portable electric equipment and extension cords used in potentially wet locations shall be approved for use in those locations by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation (e.g., F.M., UL, etc.).

4.10.14 Portable electric equipment and extension cords used in areas exposed to gases, fumes, vapors, liquids, or other agents having a deteriorating effect shall be approved for use in those locations.

4.10.15 Portable electric equipment and extension cords used in areas in which hazardous concentrations of flammable gases or vapors exist shall be approved for use in those locations.

4.10.16 If an adapter is used to accommodate a three-wire cord to a two-hole receptacle, the adapter wire will be attached to a known ground. The third prong shall never be removed from the plug.

4.10.17 After a circuit is de-energized by a circuit protective device, the circuit may not be manually reenergized until it has been determined that the equipment and circuit can be safely energized.

4.10.18 The outlet box for portable extension cords for outdoor use shall be weatherproof and shall be maintained in good condition.

5.0 Records

5.1 The Shock Hazard Analysis and the Arc Flash Analysis forms shall be retained in the project file.

5.2 The completed *S3NA-302-FM Energized Electrical Work Permit* shall be retained in the project file.

6.0 References

6.1 S3NA-406-PR Electrical Lines, Overhead

6.2 S3NA-410-PR Hazardous Energy Control

S3NA-302-FM Energized Electrical Work Permit

PART 1: To be completed by the requester

Job Work Number

(1) Description of circuit/equipment/job location:

(2) Description of work to be done:

(3) Justification of why the circuit/equipment cannot be de-energized or the work cannot be deferred until the next scheduled outage:

Requester/Title Date Time

PART II: To be completed by the electrically qualified persons *doing* the work:

	Check When Complete
(1) Detailed job description procedure to be used in performing the above detailed work:	☐
(2) Description of the Safe Work Practices to be employed:	☐
(3) Results of the Shock Hazard Analysis:	☐
(4) Determination of Shock Protection Boundaries:	☐
(5) Results of Flash Hazard Analysis:	☐
(6) Determination of the Flash Protection Boundary:	☐
(7) Necessary personal protective equipment to safely perform the job:	☐
(8) Means employed to restrict the access of unqualified persons from the work area:	☐
(9) Evidence of completion of a Job Briefing including discussion of any job-related hazards:	☐

(10) Do you agree that the above described work can be done safely? ☐ Yes ☐ No
(If *no*, return to requester)

Electrically Qualified Person(s) Date/Time Electrically Qualified Person(s) Date/Time

Electrically Qualified Person(s) Date/Time Electrically Qualified Person(s) Date/Time

Authorized by:

Authorized Supervisor Date/Time

Notes:

S3NA-302-ST Electrical Regulations

1.0 Regulations

Jurisdiction	Regulation
United States	
OSHA	National Fire Protection Association (NFPA) Publication 70, National Electrical Code Occupational Health and Safety Administration 29 CFR 1910, Subpart S Electrical Occupational Health and Safety Administration 29 CFR 1926, Subpart K Electrical
Canada	
Alberta	OHS Code (2009) Sect 225 – 227, Schedule 4 Alberta Electrical and Communication Utility Code (2002)
British Columbia	OHS Regulation (1997) Sect 19.1 – 19.40 Electrical Safety Act
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 25.0 – 25.8, 26.45, 38.1 – 38.17
New Brunswick	OHS Regulation (91-191) Sect 286 – 298
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 84 – 87
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 120 – 128
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 96
Ontario	Reg. 213/91 Sect 181 – 195.3 Reg. 851 Sect 41, 60
Prince Edward Island	OHS Regulations (EC180/87) Sect 36.1 – 36.44
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 331 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.11.1 – 2.11.6, 5.1.1 – 5.3.1, Schedule 7
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 450 – 466, Schedule Table 22
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 9.18 – 9.20

2.0 Standards

Canadian Standards Association	C22.1-98, Canadian Electrical Code - Part I

S3NA-302-WI1 Electrical Safe Work Practices

1.0 Purpose

The purpose of this guideline is to confirm that all live electrical work conducted under the control of AECOM personnel is carried out in accordance with recognized best practices in order to provide adequate protection to workers from the hazards of potential arc flash and/or electrical shock.

2.0 Associated AECOM Policies

In addition to this guideline, AECOM will also follow all Federal and State/Provincial Regulations, in particular NFPA-70E and 29CFR part 1910 as well as relevant AECOM SH&E procedures, including *S3NA-302-PR Electrical, General* and *S3NA-410-PR Hazardous Energy Control*.

3.0 Responsibilities

3.1 AECOM's Project Manager

3.1.1 Be familiar with all precautions and Federal and State/Provincial regulations and Best Practices, including NFPA-70E.

3.1.2 Provide training on this Best Management Practice to authorized employees covering:

- Nature and control of known shock and arc flash hazards.
- Means of eliminating and controlling shock and arc flash hazards.
- Special electrical personal protective equipment (PPE) requirements (task-specific).
- Procedure for reporting any deviations to this Best Practice.

3.1.3 Control access to energized electrical equipment with potential of shock or arc flash to authorized personnel only.

3.1.4 Confirm availability of proper tools for the operation and maintenance of electrical equipment.

3.1.5 Proper identification and guarding of potentially hazardous electrical equipment.

3.1.6 Providing available electrical one-line diagrams.

3.1.7 Confirm proper housekeeping around energized electrical equipment at all times.

3.1.8 Provide proper working conditions, including adequate lighting, to facilitate work in a safe environment.

3.1.9 Proper supervision of employees.

3.1.10 Maintaining a list of authorized electrical supervisor, authorized electrical worker, and attendant.

3.1.11 Implementation and ongoing evaluation of this Best Management Practice.

3.1.12 Terminate the work and cancel the permit when live work has been completed or any new electrical hazard arises.

3.1.13 Verify that communication modes are available and have been tested.

3.1.14 Remove unauthorized individuals who enter or who attempt to enter the approach boundaries during live work.

3.1.15 Confirm that live work remains consistent with terms of the live work permit and that acceptable working conditions are maintained.

3.1.16 Withdraw the live work permit and stop all work if unsafe conditions are reported during any live work (e.g. sparking, smoldering etc.). Do not permit work on that equipment until the cause of any unsafe condition is thoroughly investigated and the live work procedure has been reviewed to prevent reoccurrence.

3.2 Authorized Electrical Attendant

3.2.1 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.

3.2.2 Understand the hazards that may be faced during live work, including the potential for arc flash, shock hazard, and other related hazards.

3.2.3 Be aware of the potential of arc flash or shock possible to the authorized worker.

3.2.4 Maintain an accurate count of authorized workers working near the live equipment or inside approach boundaries.

3.2.5 Remain near the approach boundary until relieved by another authorized electrical attendant.

3.2.6 Communicate with authorized workers as necessary to confirm maintenance of safe conditions at all times.

3.2.7 Monitor activities inside and outside the approach zone to determine if it is safe for the worker to continue to remain in the approach zone. Order the authorized worker to stop live work under any of the following conditions:

- The attendant detects a problem;
- The attendant detects the signs of short-circuiting, such as electrical sparking, smoldering, or any other abnormality;
- The attendant detects a situation outside the approach zone that could endanger the worker; and
- If the attendant cannot effectively and safely perform all assigned duties.

3.2.8 Perform no other duties that might interfere with the attendant's primary duty to monitor and protect the authorized worker.

3.3 Authorized Electrical Worker

3.3.1 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.

3.3.2 Be continuously alert, focused, and aware of the hazards of performing the task.

3.3.3 Understand AECOM Safety, Health and Environmental policies and standards as well as site-specific electrical safe work practices.

3.3.4 Examine and understand all the documents provided by AECOM and manufacturers, including all specific hazards, advisories, cautions, etc.

3.3.5 Perform all work in accordance with applicable federal and state/provincial regulations, AECOM policies, safe work practices, and this Best Management Practice.

3.3.6 Be knowledgeable of the use and selection of the proper tools to safely perform the electrical task safely.

3.3.7 Complete a Safe Work Plan prior to the start of a task and during work, if conditions change.

3.3.8 Maintain good housekeeping around work areas. Remove all debris, materials, etc., at the completion of tasks.

3.3.9 Report any hazardous (uncontrolled) conditions to AECOM's authorized supervisor.

3.3.10 Understand the hazards that may be faced during live work, including arc flash, shock, or other electrical hazards.

3.3.11 Properly use required PPE and electrical tools as specified in this best practice.

3.3.12 Communicate with the attendant as necessary.

3.3.13 Alert the attendant whenever any abnormality occurs (e.g., sparking, minor shock, burning smell, etc.) or symptoms of unsafe conditions are observed.

3.3.14 Stop all work and exit from the approach zone whenever:

- An order to evacuate is given by the authorized attendant or the authorized supervisor; or
- When the worker observes any warning sign or symptom of short circuiting or a dangerous situation; or
- When the supervisor gives an order to stop work.

4.0 Multi-employer Live Electrical Work Coordination

4.1 **AECOM's Requirements:** When using another employer to perform work involving live electrical work, AECOM will:

4.1.1 Inform the contractor that the workplace contains shock and/or arc flash potential and that live work is allowed only through compliance with a live work permit program meeting the requirements of NFPA-70E.

4.1.2 Appraise the contractor of the elements of the work, including the hazards identified and all past experiences with the live work that make the live work hazardous.

4.1.3 Appraise the contractor of any precautions or procedures that have been implemented for the protection of employees in the approach zone where contractor personnel will be working.

4.1.4 Coordinate live work operations with the contractor when both AECOM employees and contractor employees will be working in or near approach zone, so that employees of AECOM and the contractor do not endanger each other.

4.1.5 Debrief the contractor at the conclusion of the live work operations.

4.2 **Contractor Requirements:** In addition to complying with the live work permit requirements, each contractor who is retained to perform live electrical work will:

4.2.1 Obtain any available information regarding live work from the project manager.

4.2.2 Coordinate live work operations with the project manager when both AECOM personnel and contractor personnel will be jointly working in or near the approach zone.

4.2.3 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.

4.2.4 Inform AECOM's project manager of the live work permit that the contractor will be using and of any hazards confronted or created during live work, either through debriefing or during live work.

5.0 Review and Update

This Best Management Practice will be reviewed and updated annually.

6.0 Definitions

6.1 **Arc Rating:** The maximum incident energy resistance demonstrated by a material prior to breakdown or at the onset of a second-degree skin burn (expressed in cal/cm2).

6.2 **Flash Hazard:** A dangerous situation associated with the release of energy caused by an electric arc.

6.3 **Energized Electrical Equipment:** Electrically connected to or having a source of voltage.

6.4 **Shock Hazard:** A dangerous situation associated with the possible release of energy caused by contact or approach to live parts.

7.0 Required Minimum Qualifications

7.1 All electrical work including instrumentation, installations, maintenance, troubleshooting, calibration, and operation of breakers will only be conducted by qualified, trained, and skilled personnel (this includes AECOM personnel and contractors/subcontractors). These personnel will meet all qualification requirements mandated by the federal/state regulations as well as applicable electrical associations and trade bodies.

7.2 The Project Manager, in consultation with SH&E Department, will determine the minimum qualifications requirements for any work with the potential for arc flash.

8.0 Working on or Near Electrical Conductors of Circuit Parts

8.1 Safe work practices shall be used to safeguard employees from injury when working on or near exposed electric conductors or circuit parts that can be energized.

8.1.1 Live Parts – Safe Work Conditions: Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them.

8.1.2 Live Parts – Unsafe Work Conditions: Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into electrically safe conditions.

8.2 Working on or near exposed electrical conductors OR circuit parts that are, or might become, energized – Prior to working on or near exposed electrical conductors and circuit parts operating at 50 volts or more, lockout/tagout devices shall be applied in accordance with AECOM and site-specific policies.

8.3 Electrical Hazard Analysis – If the live parts operating at 50 volts or more are not placed in electrically safe condition, other safety-related work practices shall be used to protect employees who might be exposed to electrical hazards. Safe work practices mentioned below shall be established before any person approaches exposed live parts within limited approach boundary:

8.3.1 Shock Hazard Analysis – A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the PPE necessary in order to minimize the possibility of electrical shock.

8.3.2 Flash Hazard Analysis – A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the flash protection boundary and the PPE that people within the flash protection boundary shall use.

9.0 Shock Hazard Analysis and Approach Boundaries

9.1 The National Fire Protection Association (NFPA) has determined that a comprehensive Shock Hazard Analysis Survey is the best method to:

9.1.1 Systematically analyze shock hazards,

9.1.2 Identify approach boundaries, and

9.1.3 Identify appropriate PPE.

9.2 Before permitting live work on electrical equipment, each project site having electrical equipment operating at more than 50 volts is required to conduct Shock Hazard Analysis Survey. Upon completion of the survey, the applicable electrical areas/spaces will be labeled in accordance with survey results.

9.3 Shock hazard analysis for individual equipment is not required if a facility-wide shock hazard analysis has been conducted and if conditions (including labels and signage) are maintained at all times.

NOTE: Only authorized personnel are allowed to work within the approach boundaries.

9.4 No qualified person shall approach or take any conductive object closer to exposed live parts operating at 50 volts or more than the restricted approach boundary set forth in Appendix A-1 [Table 130.2 (C) of NFPA 70-E].

9.5 In the absence of facility-wide survey, a shock hazard analysis (including the identification of approach boundaries) shall be conducted in accordance with NFPA 70E Section 130.2 and Table 130.2 (C) (see Appendix A-1 of this Practice) for all electrical equipment operating at over 50 volts.

9.6 Results of both facility-wide as well as individual shock hazard survey shall be made available to all authorized employees. Additionally, any recommendations given by the survey generated from the survey shall be reviewed by the project manager and shall be addressed in a timely manner.

10.0 Arc Flash Hazard Analysis and Approach Boundaries

10.1 Arc flash safety requirements apply to all electrical equipment operating at 50 volts or more.

10.2 Similar to the shock hazard analysis, the NFPA has determined that a comprehensive Arc Flash Hazard Analysis Survey is the best method to:

10.2.1 Systematically analyze the potential for arc flash,

10.2.2 Identify the limits of the approach, and

10.2.3 Identify appropriate PPE.

10.3 Once a comprehensive facility arc flash survey has been conducted and electrical work areas/spaces are labeled in accordance with survey results, an individual arc flash hazard analysis is not required, provided that qualified personnel confirm that the conditions, as indicated on the labels and signs, are maintained.

NOTE: Only authorized personnel are allowed to work within the limits of approach.

10.4 Please refer to Appendix A-1 for details.

10.5 Prior to performing any work on energized electrical systems, an arc flash hazard analysis [including the identification of approach boundaries) will be conducted in accordance Appendix F of this practice (taken from NFPA 70E Section 130.3)].

11.0 Required PPE Categorized by Exposure

The following specialized PPE requirements will be used while working on energized electrical systems:

11.1 PPE as prescribed by the shock hazard analysis and arc flash analysis; or

11.2 PPE requirements identified in Appendix A-2 of this practice (taken from NFPA 70E Sections 130.2 and 130.7).

12.0 Required Tools and Equipment

12.1 Only tools and testing or protective equipment approved by ANSI/ASTM for the relevant voltage rating [see Table130.7(C)(8) or Canadian Standards Association for appropriate voltage rating] will be used when working on energized electrical systems. All tools and testing or protective equipment will be visually inspected prior to use to confirm that the protection systems associated with the tool or equipment are not damaged or impaired and that diagnostic meters and tools are configured properly. Any tool or testing or protective equipment suspected of being compromised will be immediately taken out of service and will be tagged for disposal.

13.0 Work on Energized Electrical Systems

13.1 It is the policy of AECOM that all electrical maintenance or troubleshooting will be done on de-energized circuits, to the extent practical. Work on energized circuits can only be done under special circumstances using a “Live Work Permit” issued by authorized electrical supervisor. This permit takes into consideration the voltage levels, known electrical hazards, communication requirements, and need for watch persons, etc. The following procedure will be observed for a live work permit:

13.1.1 The person requesting the work (authorized worker) will complete the permit and will retain the original with him or her during the work. Copy of the permit will be displayed at a prominent location in the control room as a notice that live work has been authorized in certain part of the plant/project.

13.1.2 Permit will be reviewed for correctness, proper safety precautions, and adequacy of controls by the authorized electrical supervisor. After satisfying all safety requirements, an authorized electrical supervisor will sign the permit and will give the original copy to the authorized electrical worker.

13.1.3 Upon work completion, the authorized worker will note any observation on the permit and will return the original to the authorized supervisor.

13.1.4 Authorized supervisor will keep both copies of the permit as a controlled record for a period of 12 months.

13.2 The following conditions will be met for live electrical work:

13.2.1 If any equipment or instrumentation is to be disabled while other related components or systems are still functioning, the Live Work Permit should record how process safety of the remaining systems will be maintained.

13.2.2 All electrical and instrumentation work conducted will be recorded in the applicable MCC log. The documentation will include a reference to the permit number where appropriate.

13.2.3 The worker will inform the operations supervisor that he or she intends to de-energize a circuit. He or she will also inform the operations supervisor when the work is complete and that the system can be returned to service.

13.3 See *S3NA-302-FM Energized Electrical Work Permit* for a suggested template for a “Live Work Permit.”

14.0 Lockout/Tagout Policy and Procedures

14.1 All equipment will be locked out prior to any work commencing in accordance with AECOM’s policy *S3NA-410-PR Hazardous Energy Control* and applicable site specific lockout/tagout program.

15.0 Troubleshooting Procedure

15.1 The troubleshooting of electrical equipment often requires working with live circuits. Where possible, work will be done on de-energized circuits following the relevant AECOM and site-specific lockout/tagout policy. However, troubleshooting may require limited work on live circuits; if such work is required it will be done using the “Live Work Permit” and site-specific Troubleshooting Guidelines.

16.0 Housekeeping

16.1 All areas containing electrical equipment will:

16.1.1 Be maintained and kept clean.

16.1.2 Be well illuminated.

16.1.3 Not be used for storage of supplies.

16.1.4 Not be used for the storage of any flammable materials.

16.1.5 Be assessed for safety hazards.

16.1.6 Be suitably ventilated to control dust, temperature, and humidity.

17.0 Communication

17.1 Personnel working in or around equipment with electrical hazards will employ a suitable means of communication to confirm their safety.

17.2 The means of communication may include:

17.2.1 Authorized attendant (required for ALL live work conducted on 600 volts and above) (CFR 29 1910.335(b)(3) in the United States).

17.2.2 Permits.

17.2.3 Two-way radios.

18.0 Signage and Labels

18.1 MCCs, ECRs, battery rooms, and electrical panels are required to have the following labeling to identify arc flash and shock hazards. The information on the label will include:

18.1.1 Flash Hazard Boundary (Arc Flash Current).

18.1.2 Flash Hazard at 18 inches in cal/cm^2 or joules.

18.1.3 Hazard Risk Categories (PPE requirements).

18.1.4 Shock Hazards.

18.1.5 Limited Approach Boundaries.

18.1.6 Restricted Approach.

18.1.7 Prohibited Approach.

18.1.8 Log book to record all electrically related activities.

18.2 All doorways to buildings and enclosures containing energized electrical equipment will be signed to indicate that:

18.2.1 Access is restricted to authorized personnel only.

18.2.2 Electrical hazards exist beyond this (boundary, door, etc.).

19.0 Management of Change

19.1 Any changes to electrical and/or project instrumentation will be conducted following the prescribed management of change policy.

APPENDIX A-1

Table 130.2(C) Approach Boundaries to Live Parts for Shock Protection

(All dimensions are distance from live part to employee.)

Nominal Voltage Range (Phase to Phase)	Limited Approach Boundary Exposed Moveable Conductor	Exposed Fixed Circuit Parts	Restricted Approach Boundary; includes inadvertent movement adder	Prohibited Approach Boundary
Up to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
50-300	10 ft	3.5 ft	Avoid Contact	Avoid Contact
300-750	10 ft	3.5 ft	1 ft	1 inch
More than 750 volts	Consult NACO's Master Electrician or other authorized electrician.			

APPENDIX A-2

Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE) Matrix

Table 130.7(C)(11) Protective Clothing Characteristics

Hazard/Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm2 (cal/cm2)]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd^2 (1)	N/A
1	FR shirt and FR pants or FR coverall (1)	16.74 (4)
2	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)
3	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)
4	Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)

NOTE:

Arc rating: Arc rating is defined in Article 100 and can be either ATPV or E_{BT}.

ATPV: ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve.

E_{BT}: E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.

APPENDIX B

Protective Clothing and Equipment	Protective Systems for Hazard/Risk Category					
Hazard/Risk Category Number	-1 (Note 3)	0	1	2	3	4
Non-melting (according to ASTM F 1506-00) or Untreated Natural Fiber						
a. T-shirt (short-sleeve)	X			X	X	X
b. Shirt (long-sleeve)		X				
c. Pants (long)	X	X	X (Note 4)	X (Note 6)	X	X
FR Clothing (Note 1)						
a. Long-sleeve shirt			X	X	X (Note 9)	X
b. Pants			X (Note 4)	X (Note 6)	X (Note 9)	X
c. Coverall			(Note 5)	(Note 7)	X (Note 9)	(Note 5)
d. Jacket, parka, or rainwear			AN	AN	AN	AN
FR Protective Equipment						
a. Flash suit jacket (multilayer)						X
b. Flash suit pants (multilayer)						X
c. Head protection						
1. Hard hat			X	X	X	X
2. FR hard hat liner					AR	AR
d. Eye protection		—	—	—	—	—
1. Safety glasses	X	X	X	AL	AL	AL
2. Safety goggles				AL	AL	AL
e. Face and head area protection		—	—	—	—	—
1. Arc-rated face shield, or flash suit hood				X (Note 8)		
2. Flash suit hood					X	X
3. Hearing protection (ear canal inserts)				X (Note 8)	X	X
f. Hand protection			—	—	—	—
Leather gloves (Note 2)			AN	X	X	X
g. Foot protection						
Leather work shoes			AN	X	X	X

AN = As needed AL = Select one in group AR = As required X = Minimum required

NOTES:

1. See Table 2. Arc rating for a garment is expressed in cal/cm^2.
2. If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.
3. Hazard/Risk Category Number "-1" is only defined if determined by Notes 3 or 6 of Table 130.7(C)(9)(a).
4. Regular weight (minimum 12 oz/yd^2 fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 4.
5. Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.
6. If the FR pants have a minimum arc rating of 8, long pants of non-melting or untreated natural fiber are not required beneath the FR pants.
7. Alternate is to use FR coveralls (minimum arc rating of 4) over non-melting or untreated natural fiber pants and T-shirt.
8. A face shield with a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternately, a flash suit hood), is required.
9. Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4 and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over non-melting or untreated natural fiber clothing.

Table 2: Protective Clothing Characteristics

Hazard/Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm2 (cal/cm2)]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd^2 (1)	N/A
1	FR shirt and FR pants or FR coverall (1)	16.74 (4)
2	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)
3	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)
4	Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)

NOTE:

Arc rating is defined in Article 100 and can be either ATPV or E_{BT}. ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve. E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.

APPENDIX C

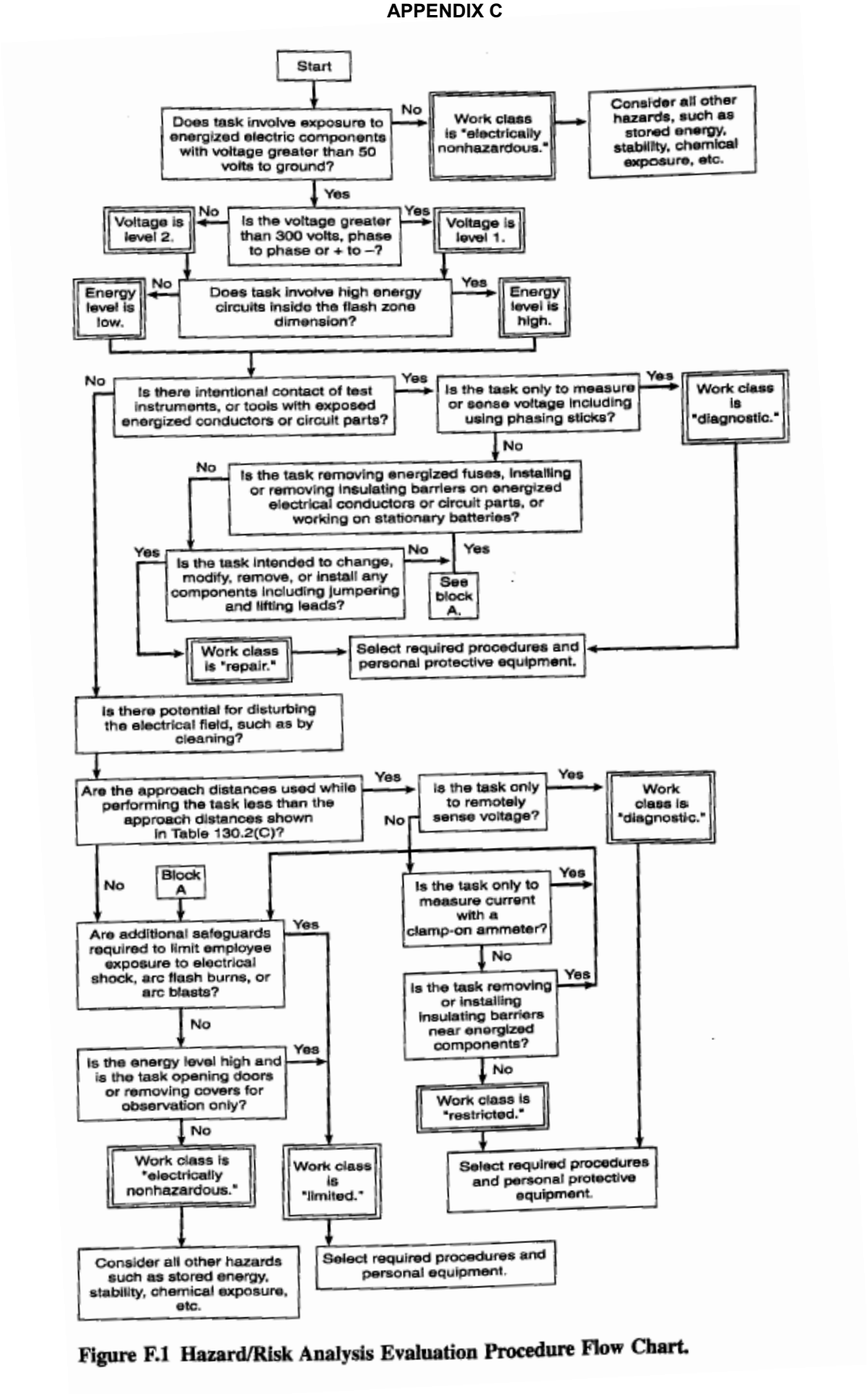


Figure F.1 Hazard/Risk Analysis Evaluation Procedure Flow Chart.

APPENDIX E

Flash Protection Boundary

For system that are above 600 volts or less, the Flash Protection Boundary shall be 4.0 ft., based on the product of clearing time of 6 cycles (0.1 second) and the available bolted fault current of 50 kA, or any combination not exceeding 300 kA cycles (5,000 ampere seconds).

For clearing times and bolted fault currents other than 300kA cycles, or under engineering supervision, the Flash Protection Boundary shall alternatively permitted to be calculated in accordance with the following general formula:

$D_c = [2.65 \times MVA_{bf} \times t\ ]^{1/2}$

or

$D_c = [53 \times MVA \times t\ ]^{1/2}$

where:

D_c = distance in feet from an arc source for a second-degree burn

MVA_{bf} = bolted fault capacity available at point involved (in mega volt-amps)

MVA = capacity rating of transformer (mega volt-amp). For transformer with an MVA rating below 0.75 MVA, multiply the transformer MVA rating by 1.25

t = time of arc exposure (in seconds)

At voltage levels above 600 volts, the Flash Protection Boundary is the distance at which the incident energy equals 5 J/cm2 (1.2 cal/cm^2). For situations in which fault-clearing time is 0.1 second (or faster), the Flash Protection Boundary is the distance at which the incident energy equals 6.24 J/cm^2 (1.5 cal/cm^2).

S3NA-302-WI2 Ground Fault Protection Safe Work Practices

1.0 Background

1.1 OSHA standard 1926.404(b)(1) requires “ground fault protection” on construction sites. The standard allows two different approaches to providing the required protection for employees from electrical ground faults. Either “ground fault circuit interrupters” (GFCI) are to be used with temporary receptacles, or an “assured equipment grounding conductor program” is to be established in which plug-connected electrical equipment, extension cords, and temporary receptacles are tested on a periodic basis.

2.0 Ground Fault Circuit Interrupters

2.1 A GFCI is an electrical device that is designed to prevent electrocution from electrical leakage. It is designed to measure the difference in amperage between the “hot” wire and the “neutral” wire in a circuit. Under ideal conditions, the amperage should be the same in both wires. If there is electrical leakage (a ground-fault), the amperages will be different. If the difference is more than a predetermined amount, the GFCI “trips” and stops the flow of electricity.

2.2 GFCIs may trip from many causes:

2.2.1 Electrical leakage in the tool from internal defects.

- Electrical leakage in the extension cord from damaged insulation or from normal leakage in long runs of cords.

2.2.2 Moisture in the air or cords lying in water or on moist dirt.

2.2.3 Too many tools on one GFCI circuit.

- Electromagnetic interference from two-way radios or from power transmission lines.

2.2.4 Faulty wiring of the GFCI into the circuit.

2.2.5 Defective GFCI.

2.2.6 Any such tripping will require the problem to be corrected before the protected circuit can be re-set.

2.3 All 120-volt, single phase, 15 and 20 ampere temporary receptacles shall be protected with “approved” GFCIs. “Approved” means listed by Underwriters Laboratories.

2.4 There are several types of GFCIs.

2.4.1 A combination circuit breaker and GFCI that is installed in place of the ordinary circuit breaker.

2.4.2 A receptacle containing a built-in GFCI.

2.4.3 A portable GFCI that plugs into a receptacle and allows the extension cord or tool to be plugged into the GFCI.

2.4.4 A portable unit containing several GFCI protected receptacles.

2.5 GFCIs contain a test button and a reset button. Each GFCI needs to be tested prior to use and on a periodic basis depending upon the manufacturer's recommendations (at a minimum monthly).

3.0 Assured Equipment Grounding Conductor Program

3.1 If an assured equipment grounding conductor program is to be used instead of GFCIs to provide ground fault protection, the program shall be governed by the following requirements.

3.1.1 Temporary receptacles shall be electrically grounded in accordance with the temporary wiring requirements of the National Electrical Code.

3.1.2 Extension cords shall be three-wire cords containing an equipment grounding conductor (ground wire).

3.1.3 Electrical equipment that is plugged into a receptacle or extension cord (portable electrical tools, bench grinders, electric heaters, etc.) shall have a ground wire properly attached to the non-current-carrying metal parts of the equipment. (Double-insulated tools have no ground wire and are therefore exempt from these testing and recording requirements but still need to be inspected for defects.)

3.1.4 The Worksite Manager and/or Supervisor are required to designate one or more competent persons to administer this testing and recording program.

3.1.5 Periodic testing of all plug-connected equipment, all extension cords, and all temporary receptacles is to be conducted at the following times:

- Before a new item (equipment, cord, or receptacle) is put into use.
- After any repairs to the item.
- After any incident in which the item may have been damaged.
- Within 3 months of the last test. (An exception is allowed in the Standard in which extension cords, and temporary receptacles, which are fixed in place and are not exposed to damage, may be tested every 6 months.)

3.1.6 The purpose of the test is to determine the following:

- Temporary receptacles—to be sure that the receptacle is grounded.
- Extension Cords—to be sure that the ground wire is connected to the proper terminal at each end and that the ground wire is continuous throughout the length of the cord.
- Plug Connected Equipment—to be sure that the ground wire is connected to the proper terminal and to the non-current carrying metal parts of the equipment and that the ground wire is continuous from the equipment to the plug.

3.1.7 The tests may be conducted using the following instruments:

- A receptacle tester may be used to test receptacles and to test extension cords when plugged into a receptacle.
- A continuity tester, or a volt-ohm meter, may be used to test equipment and to test extension cords when not plugged into a receptacle.

3.1.8 Records must be kept to show which items have passed the test and when the test was conducted. These records may be either written inspection logs, a color coding system using colored tape attached to the item, or some other effective means.

3.1.9 Color coding shall be used in the following manner:

- After a plug-connected piece of equipment or an extension cord has passed the test, colored tape is to be placed around the cord near the plug. After a temporary receptacle has passed the test, colored tape is to be placed on the cover plate.
- Any set of colors may be used, with the exception of white, black, or silver.
- If there has been no overall site requirements established by the general contractor, use the following colors for the test periods.

January, February, March	Red
April, May, June	Blue
July, August, September	Orange
October, November, December	Green

3.1.10 The tests administered every three months are to begin on the first working day of each quarter. Testing and color coding are to be continued until all items covered by this program have been tested. The test administered every six months, for those receptacles and extension cords needing only semi-annual testing, are to be color coded using the quarterly color current at the time of the semi-annual test.

3.1.11 A visual inspection of plug-connected equipment, extension cords, and temporary receptacles is to be made by the user before each use. The purpose of the visual inspection is to look for damage or defects that could affect the safe use of the item. (Exception: extension cords and temporary receptacles that are fixed in place and not exposed to damage are not required to be give a daily visual inspection, but it is a good idea to do the daily visual inspection anyway.)

3.1.12 Equipment, cords, or receptacles showing damage or defects that could affect its safe operation are not to be used. This applies not only to the visual inspection before each use but also applies to any evidence of damage observed any time during use. Damaged items are to be taken out of service and are not to be used until properly repaired and retested.

3.1.13 Equipment covered by this program is not to be used until the equipment has been tested and color coded according to the requirements of this program.

3.1.14 A copy of this program is to be kept at the worksite.

S3NA-302-WI3 Generator Safety Card

1.0 Objective/Overview

1.1 Portable generators should be used with extreme caution in order to prevent personal injury. When using a portable generator it is important to follow the manufacturer's instructions to avoid injuring someone or damaging your generator or appliances. Allow only trained, authorized personnel to operate the generator. Along with training, other safety measures include proper maintenance of equipment and personal protective equipment (PPE). Remember muscle strains are the most common injury associated with portable generators.

2.0 Safe Operating Guidelines:

2.1 Follow manufacturer's recommended operating instructions; every generator is not the same. Maintain adequate ventilation. Generators emit carbon monoxide (CO). Never operate a generator in an enclosed building without proper ventilation. Turn the generator off to refuel. Gasoline and its vapors may ignite if they come into contact with hot components or an electrical spark, so store fuel in a properly designed container in a secure location. To avoid a shock, make sure that your hands are dry and that you are standing in a dry place whenever you operate the generator. Turn off equipment and lights supplied by the generator until it is running. Use the right extension cord. Use only UL-listed, three-prong extension cords. Be sure the extension cord is the proper size (wire-gauge) to handle the electric load that will be plugged into it. Make sure the generator is properly grounded prior to each use. Using a portable generator to tie into the wiring of an existing structure shall be done only by a licensed electrician.

2.1.1 Potential Hazards:

- Lifting, carrying, and pulling starter cords.
- Burns from contact with the hot muffler or engine.
- Shocks/electrocution.
- Noise exposure.
- Inhaling exhaust gases, CO.

2.1.2 Training Requirements:

- Review of Applicable SOPs.
- Back Injury Prevention.
- Demonstrated knowledge on the use of a generator.
- Review of manufacturers operating guidelines.

2.1.3 Personal Protective Equipment (Level D PPE):

- Leather Gloves.
- Hearing Protection.
- Long Sleeve Shirt (i.e., to shield from burns, etc.).

2.1.4 Other Safety Tips:

- Have a Class A:B:C fire extinguisher readily available at all times.

S3NA-303-PR Excavation and Trenching

1.0 Purpose and Scope

1.1 To evaluate all excavation operations to provide for proper protective systems for employee protection from associated hazards.

1.2 This SOP applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Benching (Benching system)**: A series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels to protect employee from cave-ins.

2.2 **Cave-in (collapse)**: The separation of a mass of soil or rock material from the side of an excavation or the loss of soil from under a trench shield or support system and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

2.3 **Competent person**: Person, who, by way of training, knowledge, and/or experience, is capable of classifying soils and is also capable of identifying existing and predictable hazards in excavation/trenching work area and who has the authority to take prompt corrective measures to eliminate them. The person must also be familiar with the requirements in the regulation.

2.4 **Excavation**: A manmade cut, cavity, trench, or depression in an earth surface formed by earth removal. Examples include trenches, tunnels, shafts, caissons and open cut holes.

2.5 **Faces (or sides)**: The vertical or inclined earth surfaces formed as a result of excavation work.

2.6 **Failure:** A structural member's integrity and supportive capabilities is compromised, causing a breakage, displacement, or permanent deformation.

2.7 **Hazardous Atmosphere**: An atmosphere that by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic, or otherwise harmful may cause death, illness, or injury.

2.8 **Protective Systems**: Devices or methods in protecting employees in an excavation from cave-ins, a collapse or falling material. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

2.9 **Ramp**: An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

2.10 **Registered Professional Engineer**: An engineer who can authorize any state of work by his professional designation. However, a professional engineer registered in the state, province, or territory is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

2.11 **Shield (Shield system)**: A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

2.12 **Shoring (Shoring system)**: A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and that is designed to prevent cave-ins.

2.13 **Sloping (Sloping system)**: An alternative to shoring is trench sloping. This means that the trench walls are cut back to decrease the possibility of cave-ins. The angle of incline required to prevent a cave-in varies with such factors as soil type, environmental conditions of exposure, and application of surcharge loads.

2.14 **Stable rock:** A natural solid mineral material that can be excavated with vertical side wall; unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against cave-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

2.15 **Support system**: A structure such as underpinning, bracing, or shoring that provides support to an adjacent structure, underground installation, or the sides of an excavation.

2.16 **Trench:** An open narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width (measured at the bottom) is often not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered a trench.

2.17 **Trench Box:** A trench box is a unit of shoring that is an engineered shoring system capable of protecting workers in case of cave-in of trench walls. The space between the trench wall and the trench box must be backfilled.

3.0 Attachments

3.1 S3NA-303-FM Daily Excavation Checklist

3.2 S3NA-303-WI1 Selection of Protective Systems

3.3 S3NA-303-WI2 Sloping Options

3.4 S3NA-303-WI3 Shoring or Shielding Options

3.5 S3NA-303-WI4 Factors Affecting Shoring Methods

4.0 Procedure

4.1 Restrictions

4.1.1 Because of their inherent dangers, entry into trenches and excavations shall not be performed if there are means other than entry to perform the work. Where entry into trenches and excavations is necessary, strict adherence to the procedures specified below is extremely important. Whenever there are questions regarding the safety of trench or excavation entry, contact shall be made with the Competent Person or the **Region SH&E Manager**.

4.1.2 No one shall enter any trench or excavation until the walls have been adequately cut back or temporary protective structures have been installed unless the trench or excavation is shallower than the legal minimums and the soil is stable.

4.1.3 Excavation work must be completed and inspected in accordance with the written instructions of a qualified professional and in accordance to the provincial, territorial, state, or federal regulations.

4.2 Competent Person

4.2.1 A competent person must be present during all work that involves entry by AECOM personnel into trenches or excavations greater than 5 feet/1.5m in depth (as above).

4.2.2 The competent person does not have to be an AECOM employee; however, an AECOM competent person must be qualified per *S3NA-202-PR Competent Person Designation*.

4.2.3 For the purpose of this SOP, a competent person is defined as an individual, who by education or experience, is capable of evaluating the hazards associated with trench or excavation collapse and is capable of classifying soils. The competent person for the project will be indicated in the Task Hazard Analysis for the project.

4.2.4 The competent person:

- Will determine the maximum allowable slope for the walls of the trench or excavation.
- Will classify the soil in the trench or excavation in accordance with the requirements specified in the legislation (e.g., CFR 1926 subpart P, Appendix A Soil Classification) prior to determining that a maximum allowable slope, other than 34° with the horizontal is selected.
- Will inspect the excavation or trench on a daily basis when the potential for employee exposure to the hazards of the trench or excavation exists (*S3NA-303-FM Daily Excavation Checklist*).

4.3 Project Managers

4.3.1 All projects under their direct control or authority and involve excavations or trenching are conducted in a safe and efficient manner and in accordance with the requirements of this SOP.

4.3.2 All projects under their direct control or authority have a written HASP prepared for the activity.

4.4 Underground and Overhead Utilities

4.4.1 Prior to beginning any excavation work at a site, the location of all underground and overhead utilities shall be identified and work locations will be carefully planned to avoid any potential for inadvertent contact with them.

4.4.2 Locate underground utilities and expose prior to excavating.

4.4.3 Identify any overhead power lines and de-energize or protect by other appropriate means.

4.5 Excavation Requirements

4.5.1 Soil conditions, wall slope, or shoring must be identified and designed by a professional engineer or qualified professional to meet the federal, state, provincial, territorial regulations.

4.5.2 Excavated (spoil) material shall be kept at least 1.0 metre (3.2 feet) from the edge of the excavation, or further if local regulations are more stringent.

4.5.3 If the walls of an excavation or trench are not sloped or cutback, barriers must be placed around the perimeter. The barrier must be at least 1.1 metres (3.6 feet) in height.

4.5.4 Workers must be protected whenever shoring is being installed or removed.

4.5.5 If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored regularly to ensure proper operation.

4.5.6 If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require regular inspections.

4.5.7 All excavations must be secured at the end of the day with a protective covering or appropriate barriers to prevent the public from falling into the open excavation.

4.5.8 Backfill trenches as soon as reasonably possible after work is complete.

4.6 Sloping or Shoring Protection Requirements

4.6.1 A Professional Engineer or Qualified Soils professional can properly assess the need for and the type of shoring required for specific applications. Shoring may not be needed in all cases, but failure to recognize the need for shoring can be catastrophic.

4.6.2 **Exceptions.** Each individual in an excavation shall be protected from cave-ins and trench collapse by an adequate protective system except when

- Excavations are made entirely in stable rock.
- Excavations are less than 5 feet (and as above) in depth and an examination of the excavation by a competent person reveals no indication of a potential cave-in.

4.6.3 The depth of the excavation is to be measured at its greatest vertical dimension. Be aware that crouching or kneeling in a trench that is greater than 3 feet in depth may still pose significant hazard for the employee involved. The three means for supporting trench walls are sloping, shoring, and trench boxes.

4.6.4 The protective system may include sloping the excavation walls, shoring the excavation walls, or installing a shielding system. The protective system chosen must have the capacity to resist, without failure, all loads to be applied to the system.

4.6.5 Any excavation deeper than 20 feet (6.0 m); a professional engineer must approve and sign on all protective systems.

4.6.6 Trenches must be protected from cave-ins or loss of ground prior to workers entering the trench when the following conditions apply:

- The trench is greater than 3'11" (1.2 m) in depth (however, even if the trench is less than 1.2 meters deep the potential for a cave-in exists, and appropriate controls must be implemented prior to entry to ensure the trench is safe);
- A worker is required to enter the trench;
- A worker is required to be closer to a trench wall than the height of the trench wall; and,
- If an excavation may affect the stability of an adjacent building or structure, precautions must be taken to prevent damage to the structure. The precautions shall be specified in writing by a professional engineer.

4.7 Use of Sloping as a Means of Protection

4.7.1 Sloping the walls of the trench or excavation is the preferred, and typically simplest, means of protecting employees who must enter trenches or excavations which are greater than 5 feet (1.5 m) in depth or where there is danger of collapse.

4.7.2 The trench or excavation walls may be sloped back so that the ratio of the horizontal distance to the vertical rise (H:V ratio) of the sloped wall is at least 1½:1 (i.e., equivalent to an angle with the horizontal of 34° or less) or,

4.7.3 In many cases, determining the maximum allowable slope may allow the use of a steeper slope, which will result in a narrower excavation. However, determination of soil classification is complicated and requires that the competent person be familiar with the manual and visual tests. Since incorrect soil classification may result in the use of a steeper, and potentially unsafe, slope, it is recommended that an angle of 34° (or less) with the horizontal typically be selected.

4.8 Use of Shoring or Shielding as a Means of Protection

4.8.1 Where sloping the walls of the trench or excavation is unfeasible (e.g., when there are dimensional constraints or adjacent structures), the use of shoring or shield systems (e.g., trench boxes) may be necessary.

4.9 Work Around the Trench/Excavation

4.9.1 While workers are in a trench, an aboveground observer must be present to warn of earth movements and to advise equipment operators of the presence and location of those in the trench so as to avoid vibrating equipment near trenches or excavations.

4.9.2 If there is a danger of a worker or equipment falling into an excavation, or whenever the edge is not clearly visible, you must identify the trench or excavation perimeter with visual markers (e.g., barricade tape, wooden railings, stop logs, etc). If the trench or excavation is 4 ft (1.2 m) or greater in depth, the visual barrier must be a minimum of 6 ft (1.8 m) from the edge.

4.9.3 Personnel must notify workers of the excavation through flagging, marking, safeguards, or other appropriate and effective means.

4.9.4 Where employees or equipment are required or permitted to cross over excavations, walkways, or bridges, walkways or bridges over excavations must have a minimum clear width of 20 inches (0.6 meters), be fitted with standard guard rails and extend a minimum of 24 inches (0.6 meters) past the surface edge of the trench. If vehicle crossings over excavations are required, they must be designed by and installed under the direction of a registered professional engineer.

4.9.5 Precautions must be taken to isolate loose rocks or other materials that may slide, roll, or fall into the trench and onto workers are stripped prior to entry by workers into an excavation.

4.9.6 While operating heavy equipment in the work area, the equipment operator shall maintain communication with a designated signal person through either direct voice contact or approved standard hand signals.

4.9.7 When mobile equipment is operated adjacent to an excavation or when such equipment is required to approach the edge of an excavation and the operator does not have a clear and direct view of the edge of the excavation, a warning system such as barricades, hand or mechanical signals, or stop logs shall be used. If possible, the grade should be away from the excavation.

4.9.8 All site personnel should maintain a safe distance and remain clear of the swing of operating excavation equipment.

4.9.9 Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

4.9.10 All site personnel that operate or work in the vicinity of heavy equipment shall wear all AECOM-required safety equipment.

4.9.11 All materials such as pipe, rebar, etc., shall be kept out of traffic lanes and access ways. Materials and equipment shall be stored in a designated area so as not to endanger personnel at any time.

4.9.12 A flagman with roadwork, signs, cones, and high-level warning signs shall be provided when it is necessary to control normal vehicular traffic due to vehicles, such as end-dumps, entering, or leaving the site.

4.10 Work Within the Trench/Excavation

4.10.1 Employees shall not work in excavations in which there is accumulated water or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

4.10.2 A stairway, ladder, ramp, or other safe means of egress shall be located in excavations or trenches that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees. Ladders should extend at least 3 feet (0.75m) above the trench top.

4.10.3 Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design and shall be constructed in accordance with the design.

4.10.4 Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement. Structural members used for ramps and runways shall be of uniform thickness. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

4.11 Hazardous Atmospheres

4.11.1 Confined spaces may exist in excavations where there is limited access or egress and in which a hazardous gas, vapor, dust, or fume or an oxygen-deficient atmosphere may occur.

4.11.2 To prevent exposure to harmful levels of atmospheric contaminants, entry into trenches and excavations greater than 5 feet/1.5m in depth in which a hazardous atmosphere exists, or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, entry must be performed in accordance with the requirements specified in *S3NA-301-PR Confined Spaces.*

4.11.3 Adequate precautions, such as mechanical ventilation or appropriate respiratory protection, shall be taken prior to entry into trenches and excavations in which the oxygen concentration is less than 19.5 percent or the concentration of flammable gases or vapors is in excess of 10 percent of the lower explosive limit (LEL).

4.11.4 When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to confirm that the atmosphere remains safe. Atmospheric testing will be conducted in the anticipated breathing zone of the work area to determine oxygen content, combustible gas, and toxic gases and vapors, if applicable.

4.11.5 Appropriate respiratory protection shall be donned prior to entry into any trench or excavation in which airborne levels of toxic substances are present at concentrations in excess of their Threshold Limit Value (TLV) or Permissible Exposure Limit (PEL).

4.11.6 If a confined space is identified, emergency rescue procedures will be in place in accordance with *S3NA-301-PR Confined Spaces.*

4.12 Stability of Adjacent Structures

4.12.1 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

4.12.2 Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when

- A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- The excavation is in stable rock; or
- A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
- A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

4.12.3 In addition, sidewalks, pavements, and appurtenant structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

4.13 Inspections

4.13.1 Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.

4.13.2 An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

4.13.3 Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

4.14 Personal Protective Equipment

4.14.1 Hard hats

4.14.2 Steel-toed boots

4.14.3 Reflective vest

4.14.4 Respiratory equipment, as required

4.14.5 Safety glasses with side shields

4.15 Special Excavation Entry Permit Required for California

4.15.1 In California, for the construction of trenches or excavations that are 5 feet/1.5 m or deeper and into which a person is required to descend, an additional permit must be obtained from Cal/OSHA.

5.0 Records

5.1 Completed Daily Excavation Checklist—must be retained for +1 year

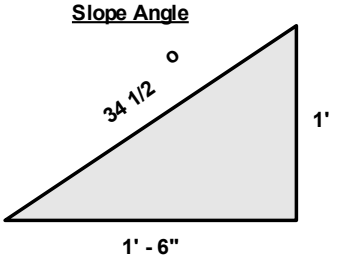
6.0 References

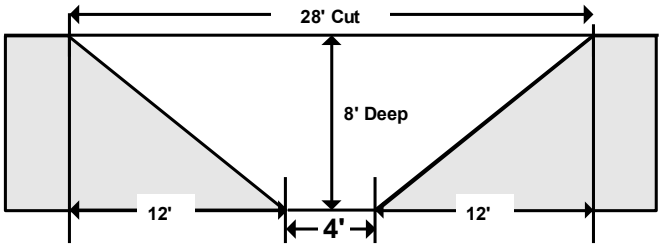
6.1 None

S3NA-303-FM Daily Excavation Checklist

Daily Excavation Checklist			
Competent Person:	Date:		
Site Location:	Job Number:		
Soil Type: Excavation Depth:	Excavation Width:		
Type of Protective System Used:			
Indicate for each item: Yes – No – or N/A for not applicable:			
1. General Information:	**Yes**	**No**	**N/A**
A. Is excavation less than five feet in depth?			
B. Is there a potential for a cave-in? ***IF YES, excavation must be sloped, shored, or shielded.**			
C. Is excavation deeper than 5 feet? *** IF YES, excavation must be sloped, shored, or shielded.**			
D. Is sloping used as your protective system?			

Slope information to keep in mind:





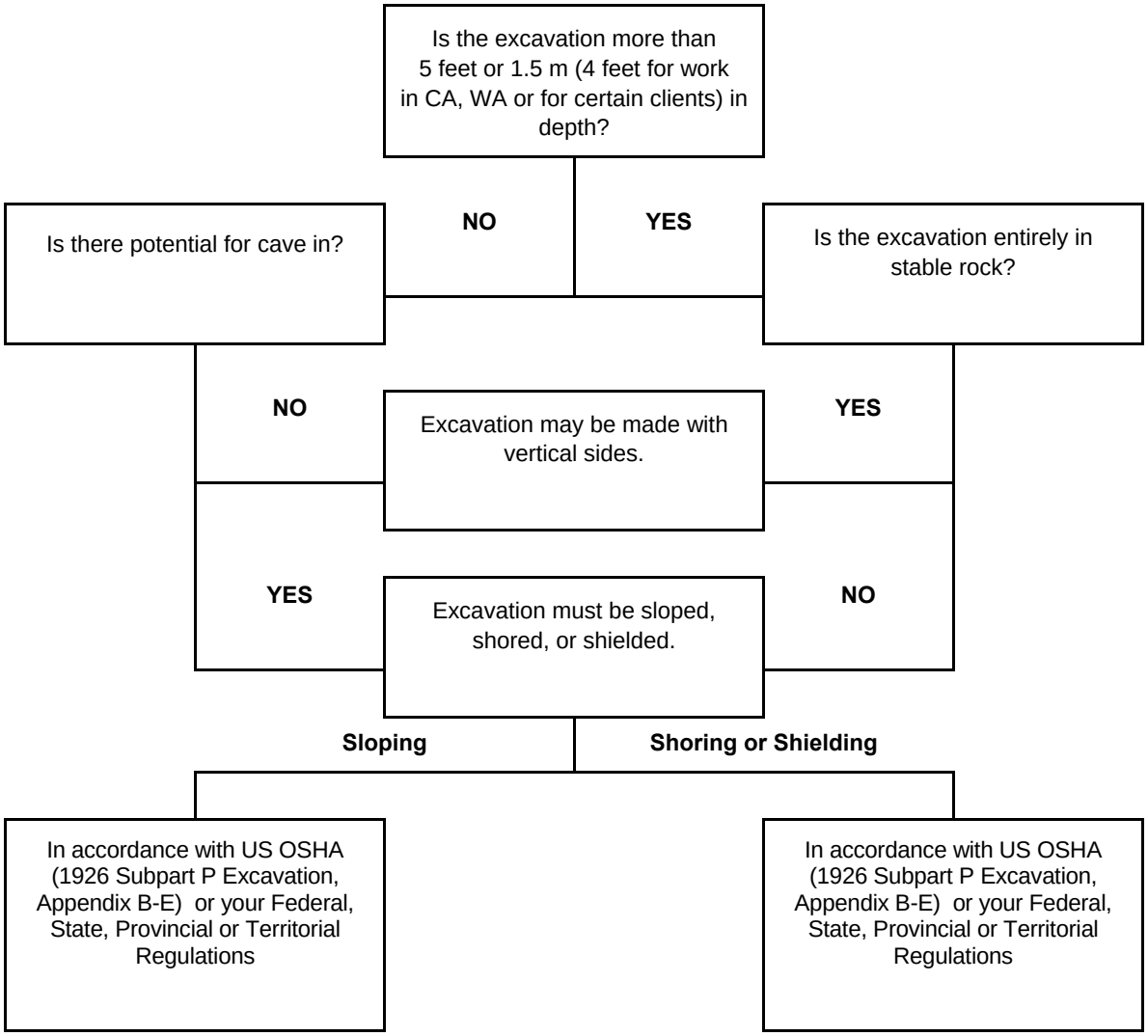
Example of a Simple 34-degree Slope commonly used around the site for cav e-in protection.

E. 1- Manual and 1- Visual Method utilized to determine Soil Classification as A-B-C.			
2. Inspection of Job Site	**Yes**	**No**	**N/A**
A. Excavations, adjacent areas, and protective systems inspected by a competent person daily before the start of work.			
B. Competent person has the authority to remove all individuals from the excavation immediately.			
C. Surface encumbrances removed or supported.			
D. All individuals protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.			
E. Hard hats, safety-toed boots, and safety glasses worn by all individuals.			

F. Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation.			
G. Adequate barriers provided at all excavations, wells, pits, shafts, etc.			
H. Warning vests or other highly visible clothing provided and worn by all individuals. Wearing a vest at all times around heavy equipment is required.			
I. All individuals are required to stand away from vehicles being loaded or unloaded.			
J. Warning system established and utilized when mobile equipment is operating near the edge of the excavation (e.g., barricade tape, signalpersons, stop logs, etc).			
K. All individuals prohibited from going under suspended loads.			
3. Utilities	**Yes**	**No**	**N/A**
A. Location of utilities marked.			
B. Prior to the use of equipment, underground utilities have been located by hand digging.			
C. Underground utilities are protected, supported, or removed when excavation is open.			
4. Means of Access and Egress:	**Yes**	**No**	**N/A**
A. Travel distance to means of egress no greater than 25 feet in excavations 4 feet or more in depth.			
B. Straight ladders used in excavations extend at least 3 feet above the edge of the trench.			
C. Ramps being used for employee access have been designed by the competent person.			
D. All individuals are protected from cave-ins when entering or exiting the excavation.			
5. Wet Conditions:	**Yes**	**No**	**N/A**
A. Precautions have been taken to protect all individuals from the accumulation of water.			
B. Water removal equipment monitored by a competent person.			
C. Surface water or runoff is diverted or controlled to prevent accumulation in the excavation.			
D. Inspections have been made after every rainstorm or other hazard-increasing occurrence (freeze/thaw, local demolition, rerouting of traffic, etc).			
6. Hazardous Atmosphere: The atmosphere within the excavation must be tested where there is a reasonable possibility of an oxygen deficiency or a combustible or other harmful contaminant exposing any individual to a hazard.	**Yes**	**No**	**N/A**
A. Are there exposed sewer or natural gas lines in excavation?			
B. Is excavation near a landfill area, or are hazardous substances being stored close to the excavation?			
If you answered YES to A or B, then treat the excavation as a confined space. **See *S3NA-301-PR Confined Spaces***			
C. All individuals will contact the Fire/Rescue Group at prior to entry and in case of emergencies.			
7. Support Systems:	**Yes**	**No**	**N/A**
A. Materials and/or equipment for support systems are selected based on soil analysis, trench depth, and expected loads.			

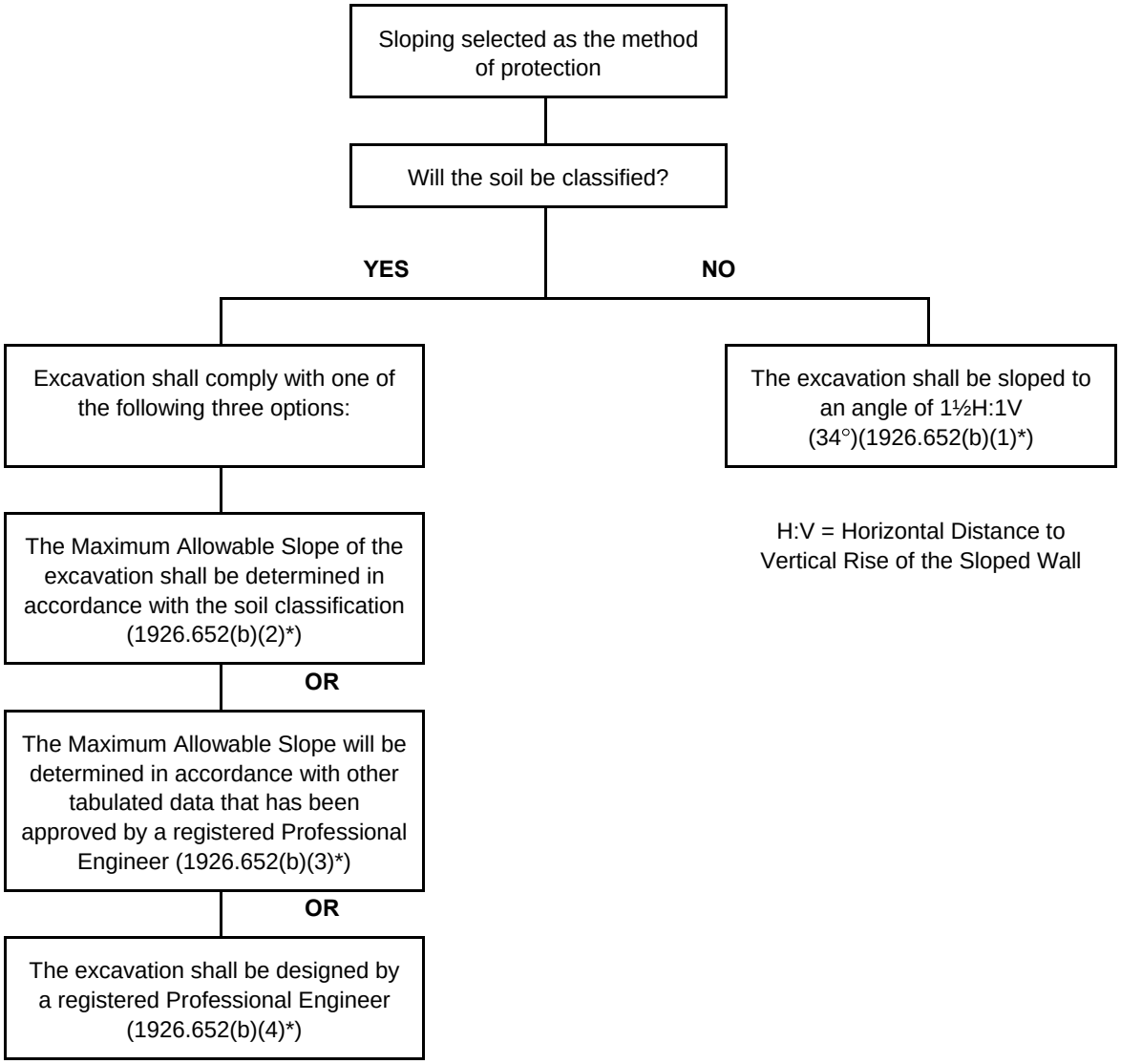
B. Materials and equipment used for protective systems have been inspected and are in good condition.			
C. Materials and equipment not in good condition have been removed from service.			
D. Protective systems installed without exposing all individuals to the hazards of cave-ins, collapses, or the threat of being struck by materials or equipment.			
E. Members of support system are securely fastened to prevent failure.			
F. Support systems are provided to ensure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.			
G. Excavations below the level of the base of a footing have been approved by a registered Professional Engineer.			
H. Removal of support systems progresses from the bottom, and members are released slowly so that you can note any indication of possible failure.			
I. Backfilling progresses with the removal of the support system.			
J. Material is excavated to a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.			
K. A shield system has been placed to prevent lateral movement.			
M. All individuals are prohibited from remaining in the shield system during vertical movement.			
8. Training:	**Yes**	**No**	**N/A**
A. All individuals have had Excavation Safety Awareness Training.			

S3NA-303-WI1 Selection of Protective Systems



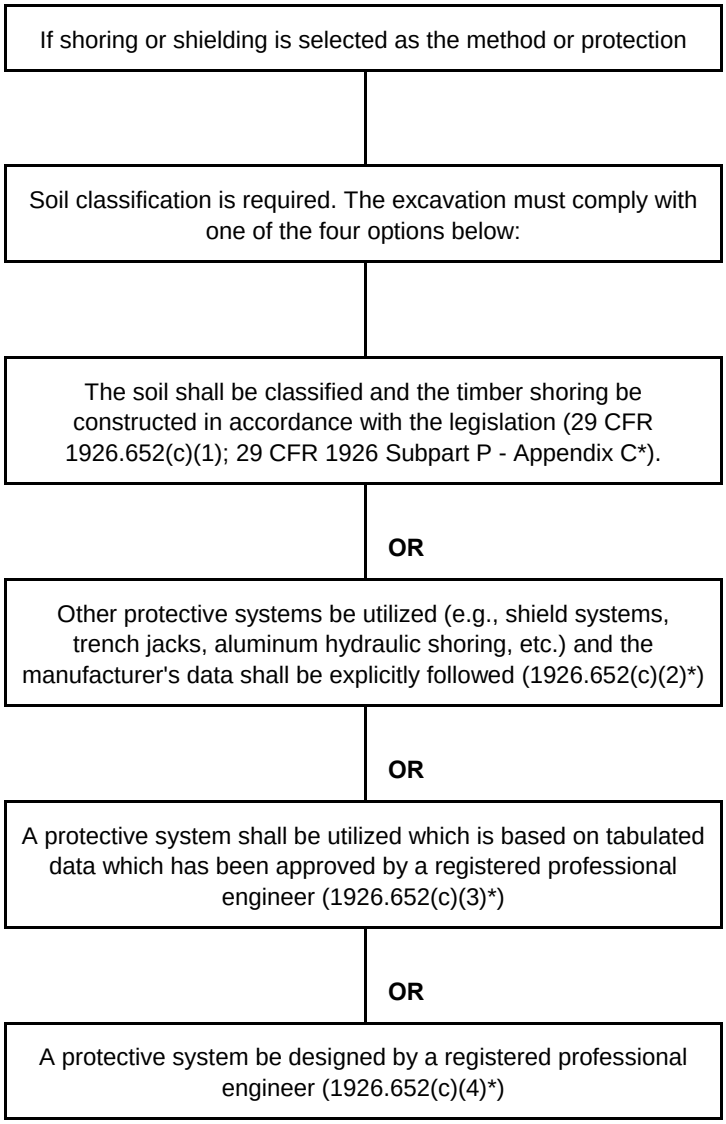
(1) Protective systems for excavations greater than 20 feet in depth must be designed by a registered professional engineer in accordance with 1926.652 (b) and (c) in the United States.

S3NA-303-WI2 Sloping Options



**Please refer to your provincial, territorial, for local requirements.*

S3NA-303-WI3 Shoring or Shielding Options



**Please refer to your provincial, territorial, for local requirements.*

S3NA-303-WI4 Factors Affecting Shoring Methods

Factor	Description
Soil Structure and Strength	Trench walls, at first glance, may appear to have strength, particularly if rock is encountered. Fractures in the rock can develop because of construction and soil strength may fail when subjected to undercutting or high-energy impacts. Irregular slopes on stratified soils that appear stable can fail if lower materials do not have adequate strength.
Soil Moisture Content	Soil may be moist even though the weather has been dry. Care must be taken and shoring provided if the soil appears to be moist.
Weather and Humidity	These can have a significant impact on shoring requirements. Frozen stable soil may collapse if warm mild weather persists. Percolation of water into the soil can increase the load on the shoring due to the increased weight and mobility of saturated soils. Frozen ground does not preclude the need to install shoring unless the freezing process is designed and approved by a Professional Engineer.
Soil Stress	Stress can originate from many sources. Heavy machinery passing close to the shoring creates vibrations that decrease the soil strength and can result in shoring failure. Stationary equipment at the edges of the excavation can transmit loads and additional stresses to the shoring.
Trench Depth and Width	These directly influence the choice of materials and the spacing of support bracing. The shoring requirements of a wide and deep trench differ substantially from those of a narrower trench.
Erosion Time	If excavations are to be left for extended periods, shoring materials may have to be increased.

S3NA-304-PR Fall Protection/Working at Heights

1.0 Purpose and Scope

1.1 Provides the AECOM requirements for employees who perform work at heights of 6 feet (1.8 m) or more above grade or other work surfaces for fall prevention and protection.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Anchor Point**: A secure point of attachment for lifelines or lanyards, usually a building structural component, crane, or other support capable of holding a 5,400 pound static load.

2.2 **Base Surface**: The area immediately beneath an elevated structure or surface (ground, walking surface, floor, etc.). Used synonymously here with “grade.”

2.3 **Body Harness (Class III)**: A tight fitting harness designed to fit the torso and spread the shock associated with arresting a fall over the entire torso area. Harnesses typically have connecting D rings at chest level in the front and the back for attaching a lanyard.

2.4 **Climbing Protection System**: A type of fall protection used on long ladders, poles, and towers that incorporates a permanently installed rail or cable that runs the length of the ladder. The climber's harness is attached to the rail or cable by a sliding device or sleeve that allows climbing freedom but locks the instant a fall is sensed.

2.5 **Deceleration Device**: A mechanism, such as a rope grab, rip-stitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., that serves to dissipate a substantial amount of energy during a fall arrest or to otherwise limit the energy imposed on an employee during fall arrest.

2.6 **Fall Prevention**: Any structure (e.g., a ladder cage or guardrail), fence, or barrier that will prevent falls during work at heights. A safety belt and short lanyard is also considered fall prevention.

2.7 **Fall Protection**: A personal lifeline system (e.g., harness and lanyard), deceleration device, and fixed anchor points or climbing protection system (e.g., permanent ladder rails) that limit falls to less than 6 feet (1.8m) .

2.8 **Free Climbing**: Climbing on a structure such as a ladder, tower, or chimney that is not equipped with guardrails, walls, a cage, or other type of structural fall prevention. Free climbing generally requires the use of a fall protection system.

2.9 **Grade**: (see Base Surface).

2.10 **Lanyard**: A line connecting a safety harness or safety belt to a safety line or structure. When used with a safety belt, the lanyard must be short enough to prevent the employee from approaching the fall hazard.

2.11 **Personal Lifeline System**: A type of fall protection comprised of a body support (i.e., a safety belt or body harness) and lanyard that is attached to an anchorage point or a safety line.

2.12 **Personal fall arrest system**: A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, and full-body harness and may include a lanyard, deceleration device, or static line**.**

2.13 **Safety Belt (Class I)**: A belt worn around the waist that when attached to an anchor point with a lanyard prevents a worker from approaching a fall hazard. Safety belts should not be used on AECOM projects other than within the cage of a man or scissor lift without the prior approval of the Project Manager and the Regional SH&E Manager.

2.14 **Safety Line**: A rope or cable secured to one or more an anchor points to which lanyards may be attached to limit fall distance.

2.15 **Standard Railing**: Railing provided to enclose open-sided work platforms and consisting of a top rail, intermediate rail, and posts. The top rail has a vertical height of 42 inches above the platform surface and the intermediate rail is approximately halfway between the top rail and the platform surface.

Work at Heights: Any work/job/task to be performed above the normal walking/working surface that necessitates the use of some form of fall protection as determined by the applicable governing rules and regulations. In the absence of applicable rules and/or regulations governing this type of work in a particular jurisdiction, the default requirement shall be 1.8 meters (6 feet).

3.0 Attachments

3.1 S3NA-304-FM1 Fall Arrest Harness Inspection

3.2 S3NA-304-FM2 Fall Arrest Lanyard Inspection

3.3 S3NA-304-FM3 Fall Arrest Life Line Inspection

3.4 S3NA-304-FM4 Fall Arrest Rope Grap Inspection

3.5 S3NA-304-FM5 Fall Arrest Cable Sling Inspection

3.6 S3NA-304-FM6 Fall Arrest Carabiner Inspection

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager (including field task manager, supervisor)

The **Manager** and **Supervisor** have primary responsibility for ensuring that work done at elevations is done safely. He/she is responsible for implementation of the requirements of this procedure. Some of the **field manager's** responsibilities include

- Assuring that all personnel who perform work at heights are familiar with this procedure.
- Designating a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements.
- Assuring that all personnel are apprised of any site specific hazards prior to performing work more than 6 feet (1.8 m) above grade.
- Assuring that required personal protective equipment (PPE) and/or personal lifeline systems are available on site as necessary.
- Maintaining a high level of health and safety consciousness among employees.
- Maintaining regular communications with field staff and the **Region SH&E Manager**, as necessary.

4.1.2 Competent Person

A competent person *(see S3NA-202-PR Competent Person)* will be designated to:

- Recognize fall hazards.
- Warn employees if they are unaware of a fall hazard or are acting in an unsafe manner.
- Be on same working surface and in visual sight.
- Stay close enough for verbal communication.
- Not have other assignments that would take monitors attention from the monitoring function.

4.1.3 Region SH&E Manager

The **Region SH&E Manager** is the individual responsible for the interpretation and, with the concurrence or the **Corporate Health and Safety Manager,** the modification of this procedure. Modifications to this procedure that may result in less stringent precautions cannot be undertaken by the **Project Manager** or on-site personnel without the approval of the **Region SH&E Manager**. Specific duties of the **Region SH&E Manager** include

- Advising **Field Task Managers** and site personnel on matters relating to climbing safety or other work to be performed more than 6 feet (1.8m) above ground or base surface level.
- Recommending appropriate PPE and climbing safety equipment to protect personnel.
- Working with the Manager to ensure that sufficient PPE and equipment are available.

- Performing field audits to monitor the effectiveness of this procedure and to ensure compliance with it.
- Maintaining contact with **Project Manager** to regularly evaluate site conditions and new information that might require modifications to this procedure.
- Conducting training or briefings, when necessary, to apprise personnel of the contents of this procedure and site hazards.
- Investigating all incidents that resulted or could have resulted in an injury.

4.1.4 **Employees**

This procedure will not be effective unless field **employees** and contractors make a conscientious effort to comply with it and to exercise good judgment in all tasks. The following specific responsibilities are incumbent on field personnel:

- Obtaining a copy of this procedure and reading it prior to the start of on-site work.
- Using personal lifeline systems where appropriate and required.
- Bringing forth any questions or concerns regarding fall protection or this procedure to the **Manager**, **Supervisor**, or **Region SH&E Manager**.
- Complying with this procedure and good practice.

4.2 Restrictions

4.2.1 All applicable Fall Protection regulations must be reviewed prior to work commencing.

4.2.2 All fall arrest equipment must bear a CSA label and confirmation of annual inspection.

4.2.3 All workers must visually inspect fall arrest equipment prior to each use.

4.2.4 A written Rescue Procedure must be available on all Project Sites and shall be provided to staff prior to commencing any work at elevation.

4.2.5 Use all PPE in accordance with manufacturers' specifications.

4.2.6 Do not attempt to repair or modify equipment yourself.

If there is a question of unacceptable risk in working at any elevated work station, the work shall not be done until such questions are dealt with. Alternatives to climbing (elevators, aerial lifts, etc.) shall be used when practical.

4.3 Working at Heights

4.3.1 A hazard assessment is required for all work at height tasks.

4.3.2 Additionally, those tasks that require personnel to work above rotating machinery, hazardous chemicals, vehicular traffic or other recognized hazards shall be included in the assessment. The assessment shall include the potential for persons falling as a result of working at height as well as the hazards of objects, machinery, and tools that may fall from a height, potentially striking a person working below.

4.3.3 Each recognized work at height hazard shall be mitigated to comply with applicable governing regulations. Mitigation control methods shall adhere to the hierarchy of controls described below:

- The preferred form of work at height hazard mitigation is to implement engineering controls to eliminate the need for work to be performed at heights entirely.
- An example of an engineering control is a design modification to facilities and/or equipment to eradicate the working at height hazard.
- In lieu of an engineering control, administrative controls shall be employed, such as but not limited to a modification to procedures, work practices, work schedules, utilization of Work at Height compliant work stands or scaffolding, etc., to reduce and/or remove exposure to the recognized work at height hazard.
- The final mitigation control method is the use of personal fall arrest system.

4.3.4 Training required for **employees** working at height is identified below. At a minimum, the program must detail (or reference if detailed elsewhere) the training required to perform the following functions:

- Work on scaffolds erected by others.

- Wear and use personal fall arrest systems (refer to PPE procedure).
- Work on and/or operate Aerial Lift devices.
- Work on and/or utilize fixed and portable ladders.
- Work on roofs (where applicable).
- Work around unprotected walking/working surfaces such unfinished mezzanines, etc.

4.3.5 People Requirements: Only properly trained personnel shall be permitted to perform Work at Height tasks.

4.3.6 Fall arrest systems shall limit the shock force on the employee to 408 kg (900 pounds) or less. The fall arrest system shall be capable of supporting a total weight that conforms to the applicable regulations of the jurisdiction, or 2268 kg (5,000 pounds) if not specifically identified.

4.3.7 Procedural Requirements: Where personal fall arrest systems are required, site-specific procedures shall be developed to ensure that all workers exposed to work at heights are protected from falls for 100 percent of the duration of their task, including the time it takes them to locate to their task. Examples would include while climbing a ladder, transferring materials, descending a pit or vault, and working within a cage arrangement.

4.4 Fall Protection Plan

4.4.1 Where the risk of a fall exists, a fall protection plan must be developed for the project or site by a qualified and competent person.

4.4.2 The plan must:

- Identify specific fall protection needs and systems prior to the start of the project.
- Confirm that the worker is trained appropriately for the fall protection plan.
- Identify fall hazards on an ongoing basis and review fall protection equipment needs.
- Hold a pre-job meeting to address and discuss the fall protection system requirements. This includes any training or review of equipment usage.
- Consider the procedures and tracking for assembly, maintenance, inspection, and disassembly of equipment.
- Confirm that there will be adequate anchor points available at each location where fall protection systems are used.
- Control or restrict access below or around the personnel working at elevation.
- Confirm the use of barricades, caution tape, and signs identify restricted areas.

4.5 Fall protection systems can be either:

4.5.1 A fall RESTRAINT system (physically stops a worker from getting too close to a fall hazard), or

4.5.2 A fall ARREST system (stops a fall already occurring and limits arresting forces to 800 kilonewtons or less)

4.5.3 Guardrails are the preferred fall RESTRAINT system; however, if guardrails are not feasible, staff shall be adequately protected by at least one of the following methods:

- Personal Fall Protection Equipment
  - a travel restraint system,
  - a fall restricting system,
  - or a fall arrest system.
- A safety net.
- A control zone (bump lines—portable weighted posts supporting a taught chain, cable or rope—can be used to indicate a control zone 2 m from an elevated work area edge).
- A control zone with a safety monitor.

4.6 Personal Fall Protection Equipment

4.6.1 Personal Fall Protection Equipment is composed of a full body harness, and shock absorbing lanyard, a lifeline, or any other connecting equipment that is used to secure the worker to an individual anchor or to a horizontal lifeline system.

4.6.2 Personal Fall Protection Equipment must also be worn and tied off when you are

- On a scaffold without adequate guardrails; or

- Getting on, working from, or getting off a suspended platform, or suspended scaffold.

4.7 Towers

AECOM **employees** shall not climb a tower unless the tower has a fixed ladder that is equipped with fall protection or unless the employee is equipped with and utilizes a personal lifeline system.

4.8 Other Elevated Working Surfaces

All other work at heights (i.e., work at elevation greater than 6 feet (1.8m) above the base surface), including activities conducted on:

• Tank Tops • Roof Tops	• Temporary Staging • Bridges	• Catwalks • Other Work Platforms

Must either be performed on working surfaces that are surrounded on all open sides by standard railings or their equivalent or by **employees** who are protected by a personal lifeline system as described below.

4.9 Guardrails

- Where possible, guardrails must be installed:
  - along the open edges of roofs, platforms, and floors;
  - on formwork, scaffolds, and other work surfaces;
  - openings in floors and roofs; and
  - wherever workers are exposed to the risk of falling.
- All guardrails—especially wooden guardrails—must be inspected regularly.
- Guardrails are the best method of protecting workers around openings in floors and roofs, but sometimes they are not practical. You may have to use securely fastened protective coverings made of planks, plywood, or a steel plate. Covers must be strong enough to support any weight to be reasonably expected and must be marked clearly (e.g., DO NOT REMOVE. DANGER! HOLE IN FLOOR).
- Toe plates, covers, and guard rails must be constructed in the manner as described in the regulations and must not be removed without adjusting the fall protection plan in order to mitigate the hazard.
- Any work area under the control of AECOM that exposes an employee to a wall opening, open-sided floor, or platform greater than 1.8 meters (6 feet) above the adjacent floor or ground level shall be equipped with a guardrail system. Unless otherwise governed by a more stringent local regulation, the guardrail system shall consist of a top rail, intermediate rail, and posts, and have a vertical height of 1 meter (42 inches). The guardrail system shall be of sufficient strength to withstand a load of at least 90 kg (200 pounds) applied in any direction at any point on the top rail. Where AECOM employees may be exposed to a wall opening, open-sided floor, or platform greater than 1.8 meters above the adjacent floor or ground level that is not protected as specified above, the use of a fall arrest system (or other control method approved, in writing, by the **NA SH&E Director**) shall be utilized.

4.10 Personal Lifeline Systems

If fall protection normally provided by walls, floors, guardrails, scaffolds, and cages is absent during work at height, personal lifeline systems must be used. Personal lifeline systems typically consist of a body support (i.e., a safety belt or harness), an attached lanyard, and an anchorage point. Any equipment used for fall protection systems must meet the applicable ANSI and ASTM requirements for that equipment.

- Full body harness, and lanyard, lifeline, and any other connecting equipment for fall protection.
- Hardhat, steel-toed boots, and a reflective vest may be required, depending on the site.
- Personal Flotation Device, if working above water or other liquid hazard.

4.10.1 Training

- Prior to using personal fall protection equipment, staff must be trained in Fall Protection and must be provided detailed instructions on the inspection and use of the equipment and all on-site work procedures.
- Proof of training must be carried while in the field and presented upon request.

4.11 Personal Fall Protection Equipment

4.11.1 A travel restraint system keeps you from getting too close to an unprotected edge. Lifeline and lanyard are adjusted to let you travel only so far. When you get close to the open edge of a floor or roof, the system holds you back.

4.11.2 A fall-arrest system consists of a full body harness, a lanyard, and a shock absorber.

4.11.3 You can connect the lanyard directly to adequate support or to a rope grab mounted on a vertical lifeline.

4.11.4 Horizontal life lines must be installed according to an engineered design.

4.11.5 Lifelines must be adequately anchored. For fall arrest, that means able to support the weight of a small car (about 3,600 pounds). Fall-arrest loads can be high, depending on the height of the fall and the weight of the person.

4.11.6 Do not wrap the lanyards and/or rope around beams, girders, pipes, etc. The safety lines and lanyards must be protected from cuts, wear, and abrasion.

4.11.7 Use the buddy system and continually check each other's harness and D ring to confirm that the harness is not too loose and or the D ring has not slipped down the back.

4.11.8 Visually inspect all restraint components before each use for wear, damage, or deterioration. Defective components are removed from use and tagged out to prevent others from using them.

4.11.9 Tie restraint lines independently of other lines and to an approved anchor point only.

4.11.10 Check the restraint line length to confirm the limits of approach.

4.11.11 Setup equipment to limit the free fall distance to the shortest distance possible and not exceeding that prescribed in the federal/state/provincial/territorial regulations.

4.11.12 Confirm that only one employee is attached to any one vertical safety line. The attachment involves the use of locking snap hooks to "D" rings only.

4.11.13 Maintain manufacturer's specifications of total dynamic load capability of lifelines on site.

4.11.14 Any fall arrest components which have been involved in a fall must be tagged out and removed from service.

4.11.15 All Fall Arrest Equipment must be formally inspected and certified annually according to the manufacturer's specifications.

4.11.16 The Full Body Harness must meet the requirements of CAN/CSA Z259.10, Class A, suitably sized for the body mass and shape of the worker. Comfort harnesses made from stretch webbing, including the Miller Duraflex, may not be used with these procedures.

4.11.17 The shock-absorbing lanyard must meet the requirements of CAN/CSA Z259.11 Class E4 or E6. Workers weighing up to 80kg (175 lbs) must use a Class E4 lanyard and workers weighing 80–175 kg (175–300 lbs) must use a Class E6 lanyard. Workers weighing above 300 lbs must consult a qualified fall protection engineer who can review the circumstances and establish procedures to control the free fall and/or provide additional equipment that will confirm that the energy absorber will not bottom out.

4.11.18 Thorough, annual inspections of fall protection equipment must be performed, documented, and initialled on the equipment tags.

4.11.19 Any damaged equipment or any equipment used in a fall, must be removed from service, repaired, and recertified prior to future use.

4.11.20 Most lanyard shock-absorbing devices are intended for one-time use only and may not be returned to service.

4.11.21 All equipment must be inspected prior to use, daily as required.

- Inspect the entire surface of webbing for damage. Beginning at one end, bend the webbing in an inverted "U." Holding the body side of the belt toward you, grasp the belt with your hands 6 to 8 inches apart.
- Watch for frayed edges, broken fibers, pulled stitches, cuts, or chemical damage. Broken webbing strands generally appear as tufts on the webbing surface.
- Replace according to manufacturers' guidelines.

4.11.22 Inspecting the buckle:

- Inspect the buckle for loose, distorted, or broken grommets. Do not cut or punch additional holes in waist strap or strength members.
- Check belt without grommets for torn or elongated holes that could cause the buckle tongue to slip.
- Inspect the buckle for distortion and sharp edges. The outer and center bars must be straight. Carefully check corners and attachment points of the center bar. They should overlap the buckle frame and move freely back and forth in their sockets. The roller should turn freely on the frame.
- Check that rivets are tight and cannot be moved. The body side of the rivet base and outside rivet burr should be flat against the material. Make sure the rivets are not bent.
- Inspect for pitted or cracked rivets that show signs of chemical corrosion.

4.11.23 Inspecting the rope:

- Rotate the rope lanyard and inspect from end to end for fuzzy, worn, broken, or cut fibers. Weakened areas have noticeable changes in the original rope diameter.
- Replace when the rope diameter is not uniform throughout, following a short break-in period.
- The older a rope is and the more use it gets, the more important testing and inspection become.

4.11.24 Inspecting the hardware (forged steel snaps, "D" rings):

- Inspect hardware for cracks or other defects. Replace the belt if the "D" ring is not at a 90° angle and does not move vertically independent of the body pad or "D" saddle.
- Inspect tool loops and belt sewing for broken or stretched loops.
- Check bag rings and knife snaps to see that they are secure and working properly. Check tool loop rivets. Check for thread separation or rotting, both inside and outside the body pad belt.
- Inspect snaps for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should be seated into the snap nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to close the keeper firmly.

4.11.25 Inspecting the safety strap:

- Inspect for cut fibers or damaged stitches inch by inch by flexing the strap in an inverted "U." Note cuts, frayed areas, or corrosion damage.
- Check friction buckle for slippage and sharp buckle edges.
- Replace when tongue buckle holes are excessively worn or elongated.

4.11.26 Cleaning the equipment.

- Basic care prolongs the life of the unit and contributes to its performance.
- Wipe off all surface dirt with a sponge dampened in plain water. Rinse the sponge and squeeze it dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion.
- Rinse the webbing in clean water.
- Wipe the belt dry with a clean cloth. Hang freely to dry.
- Dry the belt and other equipment away from direct heat and out of long periods of sunlight.
- Store in a clean, dry area, free of fumes, sunlight, or corrosive materials and in such a way that it does not warp or distort the belt.

4.11.27 Safety Belts and Harnesses

- A Class I safety belt, often referred to as a body belt, is a device worn around the waist to which a lanyard is attached. It must only be used as a positioning device (form work) to restrict the **employees'** movement and prevent an approach to a fall hazard.
- Safety belts are no longer approved for personal fall arrest systems (PFAS). Only a full body harness may be used for this purpose.
- A Class III safety harness, often referred to as a body harness or parachute harness, is a belt system designed to spread shock load over the torso (shoulders, thighs, and seat area). It must be used during free climbing or working above 6 feet (1.8 m).

4.11.28 Lanyards

- A lanyard is a short, flexible rope or strap webbing that connects a worker's safety belt or harness to an anchorage point. Lanyards cannot exceed 6 feet (1.8 m) in length. Length should be selected to allow appropriate freedom of movement while limiting the fall to as short a distance as possible.
- A shock-absorbing lanyard is designed to absorb a portion of the shock as the lanyard becomes taut during a fall. They should be used for fall protection.
- Lanyards should be replaced at the first sign of wear and after they have been subjected to a fall.

4.11.29 Retractable Lifelines

- Retractable lifelines contain a cable wound around a drum with a spring that removes slack from the line and an inertial latching device that stops a sudden decent. The device is attached to an anchor point. This system allows a freedom of motion for the worker but stops a fall very rapidly.

4.11.30 Anchorage Points

- The anchorage point is the position on an independent structure to which the lanyard is attached. It should be capable of supporting a minimum 5,000-pound static load.
- A typical anchorage point on a fixed ladder would be a ladder rung or support.
- To limit the fall distance, lanyards should be attached to an anchorage point at or over the head.

4.11.31 Use of Personal Lifeline Systems for Free Climbing

- The object of personal lifeline systems is that the wearer be attached, and thereby protected, at all times while performing work at heights. During tower and ladder climbing, where a ladder cage is not provided, a Class III safety harness and a two lanyard system must be utilized to ensure continuous fall protection.
- Using this method, the worker attaches the first lanyard to an anchorage point (e.g., ladder rung or tower brace) above his/her head and climbs until the anchorage point is at slightly below waist height. At that point, the worker attaches the second lanyard to an anchorage point over his/her head, detaches the first lanyard, and repeats the process. By using this method, the worker is always attached during the climb.

4.11.32 Climbing Protection Systems

- An alternative to the above method involves the use of a climbing protection system. A climbing protection system is a fall protection mechanism often installed on long ladders, chimneys, and towers. It incorporates a permanently attached rail or cable that runs the length of the ladder or tower. The climber's harness and lanyard is attached to the rail or cable by a sliding device or sleeve that allows climbing freedom but locks the instant a fall is sensed.
- Obviously, the use of such systems will typically be limited to client facilities where climbing protection systems have been installed.
- On new towers constructed by AECOM, climbing protection systems shall be installed at the time of construction, if technically and economically feasible.

4.11.33 Approvals, Inspection and Maintenance

- Body harnesses, lifelines, and lanyards must be approved by the manufacturer for the planned application.
- Such equipment will be in good condition and inspected prior to each day's work.
- Lanyards and safety lines that have been subjected to shock-loading as a result of a fall shall be replaced as a precaution to prevent potential failure.
- Modifications to personal lifeline systems that void the systems' certification will not be made.

4.12 Fall Protection Plan

- A documented fall protection system and recovery procedure must be implemented if staff will be exposed to any of the following hazards:
  - Falling more than 9.8 feet (3 metres);
  - Falling more than (3.9 feet (1.2 metres), if the work area is used as a path for a wheelbarrow or similar equipment;
  - Falling into operating machinery;

- Falling into water or another liquid (Personal Flotation Devices should also be used in these cases);
- Falling into or onto a hazardous substance or object; or
- Falling through an opening on a work surface.

- All projects with unprotected fall hazards greater than 6 feet (1.8 m) must have a Fall Protection Plan written and provided to the workers exposed to the fall hazard. This plan may be attached to or included in a Health and Safety Plan for the project. The plan and any changes to the plan shall be approved by a qualified person.
- A copy of the fall protection plan with all approved changes shall be maintained at the job site.
- The implementation of the fall protection plan shall be under the supervision of a competent person.
- The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) is infeasible or why their use would create a greater hazard.
- The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle-mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.
- The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones.
- Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system.
- The fall protection plan must include a statement that provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

4.13 Fall Rescue Plan

4.13.1 A rescue plan must be developed for each specific project where AECOM **employees** use Personal Lifeline Systems. The plan must incorporate procedures that will ensure prompt rescue in the event that an employee falls into a Personal Lifeline System. As a minimum, the rescue plan should address:

4.13.2 Effective rescue procedures shall be established in advance of an event requiring the use of personal fall arrest systems. Rescue measures must be capable of being initiated within 5 minutes of a fall and the worker must be able to be relieved of strap pressure within 20 minutes unless the harness is equipped with leg/foot straps to relieve the hanging pressure while in the device.

4.13.3 Specific equipment and procedures to facilitate self-rescue, if applicable and appropriate;

- Procedures for utilizing outside rescue services (e.g., client facility emergency services, local fire department rescue services, etc.);
- Contact information for the proposed emergency services; and,
- Procedures for familiarizing the proposed rescues services with the potential rescue conditions.

4.13.4 **Personnel Qualifications**

- All **employees** working on tasks that require the use of fall protection must have attended training on the selection, use, care, and limitations of fall protection equipment. Retraining will occur when the following conditions occur: 1) Deficiencies in training; 2) Work place changes; 3) Fall protection systems or equipment changes that render previous training obsolete.
- No **employee** shall attempt to perform work that he/she has not been trained to safely perform or that he/she considers unsafe, including specific activities involving work at heights.
- **Employees** who regularly climb towers or stacks to heights in excess of 20 feet (6.09 m) shall be active participants in the AECOM Medical Surveillance Program.
- Records of training and medical surveillance exams will be maintained by the AECOM North America SH&E office.
- In addition, **employees** will not undertake climbing under personal conditions of fatigue, sickness, or injury, nor will they expose themselves to unusual or unacceptable risks. **Employees** using medications that may interfere with alertness or physical strength will not

perform work at elevations. Project managers will not allow employees known to be experiencing personal or psychological stress to undertake work at elevations.

4.14 Working Alone

4.14.1 All climbing or work at heights shall be carried out only in the presence of a coworker or client **employee** who will be in visual and auditory range at all times during the critical phases of the work. This standby observer shall be able to make immediate contact with emergency services.

4.15 Environmental Conditions

4.15.1 Climbing or other work at heights will not be undertaken if adverse conditions such as high winds, storms (particularly lightning), inadequate illumination, any type of precipitation, or severe icing exist unless deemed safe by the competent person. Extreme caution should be exercised after any type of rain or snowstorm.

4.16 Other Protective Equipment

4.16.1 Other required PPE, suitable for the task, shall be available and worn by personnel who perform work at heights. In addition to safety belts or harnesses and lanyards, other PPE, such as safety helmets (hard hats with chin straps) shall be worn; clothing shall be adequate to protect against inclement weather; rugged safety shoes with heels should be worn to provide protection as well as adequate support; and gloves should be worn as needed.

4.17 Tools

4.17.1 All tools, equipment, and supplies provided or used by AECOM personnel shall be appropriate and in good condition; unsafe tools or equipment will not be used; tools and equipment will not be misused. Tools will be raised to the point of work via a tool lift, leaving the hands free for climbing. Electric tools will be battery operated or will have electrical power supplied through ground fault circuit interrupters (GFCI).

4.18 Visual Inspection

4.18.1 Prior to ascending a tower or structure, a visual inspection of its general conditions (guys, rungs, anchors, etc.) shall be made. If for any reason an **employee** believes the tower is unsafe to climb, he/she should not climb until corrections are made; he/she should contact the supervisor if the work cannot be performed safely.

4.19 Emergency References

4.19.1 Prior to commencement of work to be conducted more than 6 feet (1.8 m) above grade, the on-site personnel shall identify the nearest clinic or hospital. The phone number and directions to this facility shall be recorded and kept available on site.

4.19.2 No AECOM **employee** shall climb alone. A standby person who can immediately contact emergency services must be in visual and voice contact with the climber.

5.0 Records

5.1 All records from this procedure that must be retained should be kept by each project and/or office location are

5.1.1 Training Records

5.1.2 Group/Region Work at Height Program

5.1.3 Hazard Assessments

6.0 References

6.1 S3NA-001-PR Safe Work Standards and Rules

6.2 S3NA-202-PR Competent Person Designation

6.3 S3NA-205-PR Equipment Inspections and Maintenance

6.4 S3NA-208-PR Personal Protective Equipment Program

6.5 S3NA-311- PR Scaffolding

6.6 S3NA-312-PR Stairways and Ladders

6.7 S3NA-408-PR Elevated Work Platforms and Aerial Lifts

6.8 S3NA-209 -PR Project Hazard Assessment and Planning

6.9 S3NA- 314-PR Working Alone and Remote Travel

6.10 29 CFR 1926 Subpart M

6.11 29 CFR 1910 Subpart F

6.12 The following standards apply to personal fall protection equipment:

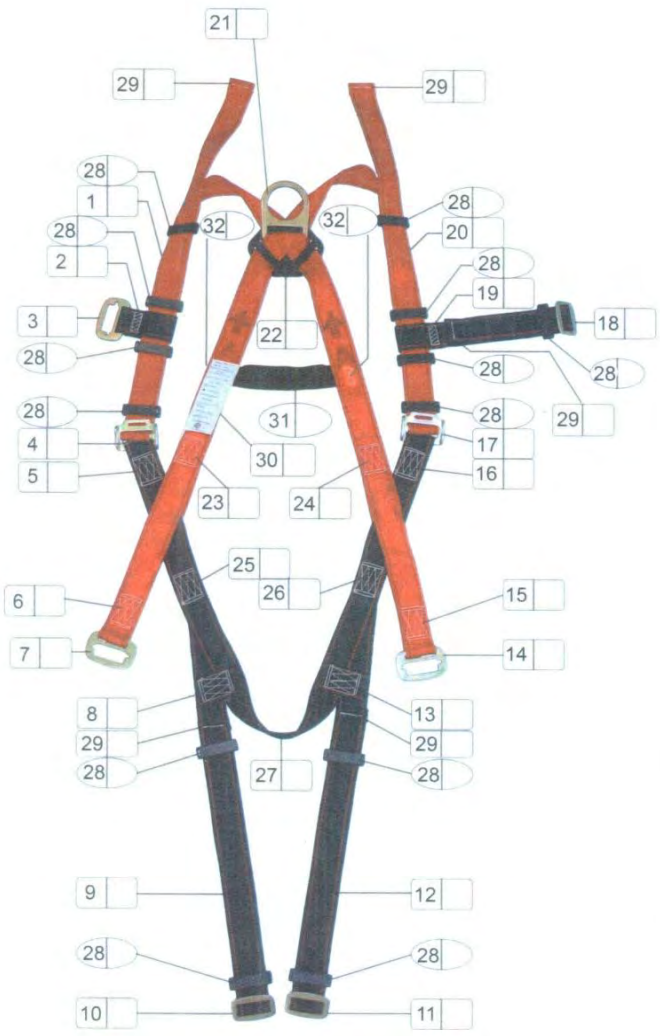
Association	Standard
CEN Standards	EN 341: 1997, Personal protective equipment against falls from height - Descender devices EN 353-2: 2002, Personal protective equipment against falls from a height - Part 2: Guided type fall arresters including a flexible anchor line EN 354: 2002, Personal protective equipment against falls from a height - Lanyards EN 361: 2002, Personal protective equipment against falls from a height - Full body harnesses EN 362: 2004, Personal protective equipment against falls from height - Connectors EN 813: 1997, Personal protective equipment for prevention of falls from a height - Sit harnesses EN 1891: 1998, Personal protective equipment for the prevention of falls from a height - Low stretch kernmantel ropes
Canadian Standards Association (CSA)	Z259.1-1976, Fall Arresting Safety Belts and Lanyards for the Construction and Mining Industries Z259.1-05, Body Belts and Saddles for Work Positioning and Travel Restraint Z259.1-95 (R1999), Safety Belts and Lanyards Z259.2.1-98, Fall Arresters, Vertical Lifelines, and Rails Z259.2.2-98, Self-Retracting Devices for Personal Fall-Arrest Systems Z259.2.3-99, Descent Control Devices Z259.3-M1978 (R2001), Lineman's Body Belt and Lineman's Safety Strap Z259.10-M90 (R1998), Full Body Harnesses Z259.11-M92 (R1998), Shock Absorbers for Personal Fall Arrest Systems Z259.11-05, Energy Absorbers and Lanyards Z259.12-01, Connecting Components for Personal Fall Arrest Systems (PFAS) Z259.13-04, Flexible Horizontal Lifeline Systems Z259.16-04, Design of Active Fall Protection Systems

S3NA-304-FM1 Fall Arrest Harness Inspection

Inspection Requirements

INSTRUCTIONS:
1. A qualified person must perform a documented inspection of safety harness upon initial use, after a fall arrest, and annually.
2. All documentation must be maintained in the Office Safety files.
3. Visual inspection of assigned harnesses and lanyards are to be performed prior to each use.
4. Any harness or lanyard failing the criteria below is to be **removed from service, and given to the SH&E representative with its checklist.**

Harness Manufacturer:		**Inspector's Name:**	
Harness Serial Number:		**Inspector's Signature:**	
Harness Class:		**Date of Inspection:**	
Date of Manufacture:			
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



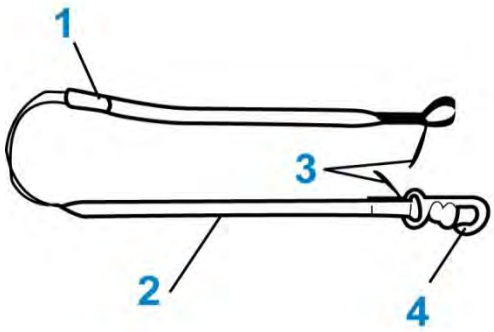
	Description	Pass	Fail
1	Left Shoulder Webbing	☐	☐
2	Stitching	☐	☐
3	Mating Buckle	☐	☐
4	Adjusting Buckle	☐	☐
5	Stitching	☐	☐
6	Stitching	☐	☐
7	Mating Buckle	☐	☐
8	Stitching	☐	☐
9	Left Leg Webbing	☐	☐
10	Mating Buckle	☐	☐
11	Mating Buckle	☐	☐
12	Right Leg Webbing	☐	☐
13	Stitching	☐	☐
14	Mating Buckle	☐	☐
15	Stitching	☐	☐
16	Stitching	☐	☐
17	Adjusting Buckle	☐	☐
18	Mating Buckle	☐	☐
19	Stitching	☐	☐
20	Right Shoulder Webbing	☐	☐
21	Dorsal D-Ring	☐	☐
22	D-Ring Back Pad	☐	☐
23	Stitching	☐	☐
24	Stitching	☐	☐
25	Stitching	☐	☐
26	Stitching	☐	☐
27	Sub-pelvic Strap	☐	☐
28	Belt Keepers	☐	☐
29	Stitching - end pattern	☐	☐
30	Product Label	☐	☐
31	Back Strap	☐	☐
32	Stitching – back strap	☐	☐
	Load Indicators	☐	☐

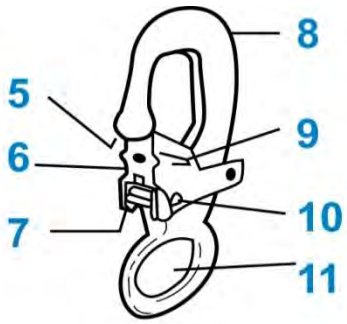
Comments:

AECOM

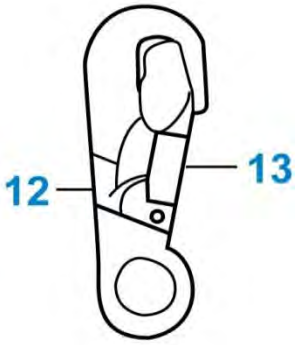
S3NA-304-FM2 Fall Arrest Lanyard Inspection

Inspection			
Lanyard Manufacturer:		**Inspector's Name:**	
Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐





Snaphook, Self-locking
Style A



Snaphook, Self-locking
Style B

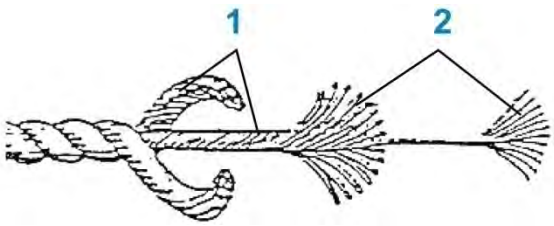
Item #	Description - Lanyard	Fail	Pass	Comments
1	Flag indicator	☐	☐	
2	Outside Core Webbing	☐	☐	
	Core	☐	☐	
3	Wear Pads	☐	☐	
	Labelling (tags)	☐	☐	
	Stitching	☐	☐	
4	Snaphooks (Self-locking)	☐	☐	
5	Hook Nose	☐	☐	
6	Gate (keeper)	☐	☐	
7	Lock	☐	☐	
8	Hook Body	☐	☐	
9	Spring (inside gate)	☐	☐	
10	Hinge	☐	☐	
11	Eye	☐	☐	
12	Lock	☐	☐	
13	Gate	☐	☐	

Comments:

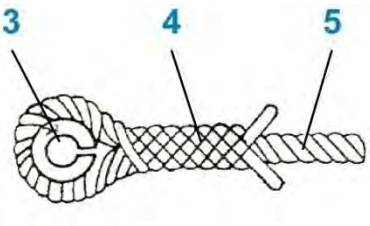
AECOM

S3NA-304-FM3 Fall Arrest Life Line Inspection

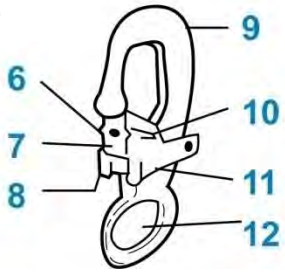
Inspection			
Life Line Manufacturer:		**Inspector's Name:**	
Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



Synthetic Rope Composition (Three-Strand Laid Rope)



Spliced Eye



Snaphook, Self-locking

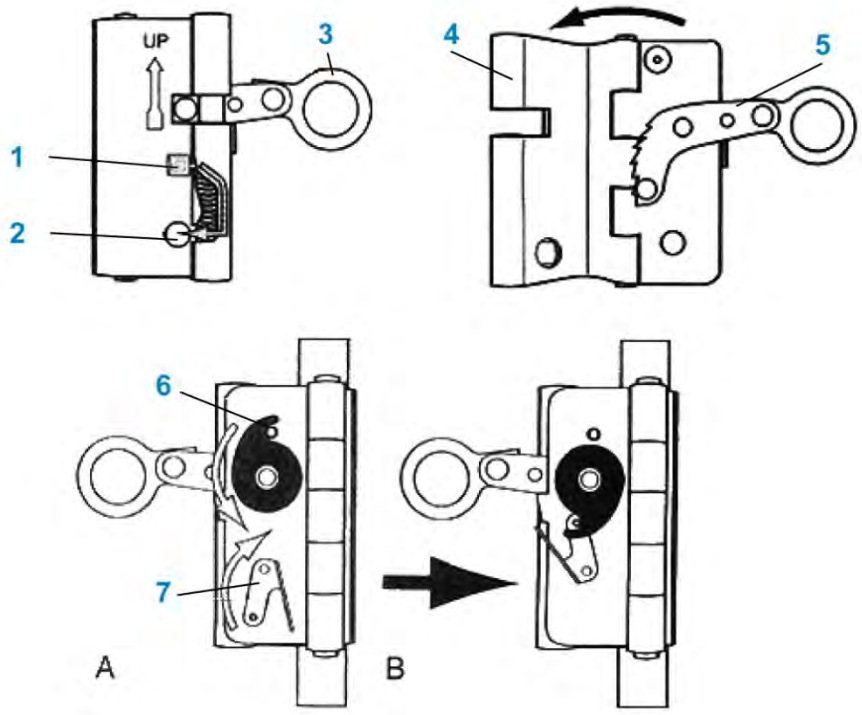
Item #	Description - Lanyard	Fail	Pass	Comments
1	Rope Strand	☐	☐	
2	Rope Fibers	☐	☐	
3	Thimbles & Eyes	☐	☐	
4	Rope Splice	☐	☐	
5	Synthetic Rope	☐	☐	
	Rope Diameter (entire length)	☐	☐	
	Rope Hockling	☐	☐	
	Labelling (tags)	☐	☐	
	Snaphook	☐	☐	
6	Hook Nose	☐	☐	
7	Gate (keeper)	☐	☐	
8	Lock	☐	☐	
9	Hook Body	☐	☐	
10	Spring (inside gate)	☐	☐	
11	Hinge	☐	☐	
12	Eye	☐	☐	

Comments:

AECOM

S3NA-304-FM4 Fall Arrest Rope Grap Inspection

Inspection			
Lifeline Manufacturer:		**Inspector's Name:**	
Model/Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



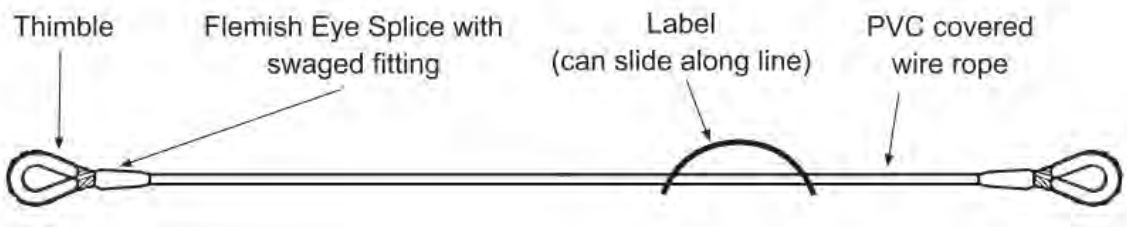
Item #	Description – Rope Grab	Fail	Pass	Comments
	Hinge	☐	☐	
1	Thumbscrew	☐	☐	
2	Metal Button	☐	☐	
3	Attachment Eye	☐	☐	
4	Body	☐	☐	
5	Cam Lever	☐	☐	
6	Black Cam	☐	☐	
7	Locking Mechanism/Lever	☐	☐	
	Labeling (Tags)	☐	☐	
	Springs	☐	☐	
		☐	☐	

Comments:

AECOM

S3NA-304-FM5 Fall Arrest Cable Sling Inspection

Inspection			
Manufacturer:		**Inspector's Name:**	
Model/Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



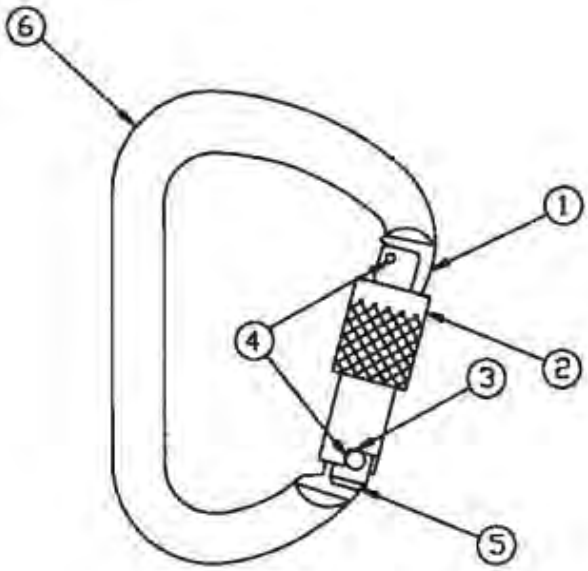
Item #	Description – Rope Grab	Fail	Pass	Comments
1	Thimble	☐	☐	
2	Eye Splice	☐	☐	
3	Label	☐	☐	
4	Cable Casing	☐	☐	
5	Cable	☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

Comments:

AECOM

S3NA-304-FM6 Fall Arrest Carabiner Inspection

Inspection			
Manufacturer:		**Inspector's Name:**	
Model/Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



Item #	Description – Rope Grab	Fail	Pass	Comments
1	Nose	☐	☐	
2	Gate	☐	☐	
3	Hinge	☐	☐	
4	Dowel Pins	☐	☐	
5	Inner Sleeve	☐	☐	
6	Carabiner Body	☐	☐	
7	Pin	☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

Comments:

S3NA-305-PR Hand and Power Tools

1.0 Purpose and Scope

1.1 Provides the AECOM requirements for all manually-operated hand and power tools and equipment use, handling and storage.

1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 S3NA-305-GL Hand and Power Tools Guide

3.2 S3NA-305-WI1 Chainsaw Safety Card

3.3 S3NA-305-WI2 Circular Saw Safety Card

3.4 S3NA-305-WI3 Cut Off Saw Safety Card

3.5 S3NA-305-WI4 Hand-held Grinder Safety Card

3.6 S3NA-305-WI5 Impact Wrench Safety Card

3.7 S3NA-305-WI6 Nail Gun Safety Card

3.8 S3NA-305-WI7 Pentak Vacuum Safety Card

3.9 S3NA-305-WI8 Power Drill Safety Card

3.10 S3NA-305-WI9 Pressure Washer Safety Card

3.11 S3NA-305-WI10 Reciprocating Saw Safety Card

3.12 S3NA-305-WI11 Sander Safety Card

3.13 S3NA-305-WI12 Utility Knife Safety Card

3.14 S3NA-305-WI13 Wood Chipper Safety Card

3.15 S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card

3.16 S3NA-305-WI15 Pneumatic Tools Safety Card

3.17 S3NA-305-WI16 Manual Hand Tools Safety Card

3.18 S3NA-305-WI17 Small Engines Safety Card

3.19 S3NA-305-WI18 Electric and Battery Powered Hand Tools Safety Card

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers/Field Task Managers/Supervisors**. Each **Manager/Supervisor** must 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 this work instruction section of this SOP, appropriate guidelines shall be established prior to work associated with that equipment, including following manufacturer's recommendations.

4.1.2 **Region SH&E Manager** provides technical guidance and support as to this procedure.

4.1.3 **Employees. Employees** shall not work with any tool that they are not familiar with without first obtaining training associated with that equipment. In addition, **employees** must following manufacturer's recommendations for its use and must not modify the equipment without first obtaining authorization from the manufacturer.

4.2 **Restrictions**

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

4.2.2 All tools will be used in accordance with manufacturer's specifications.

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.

4.4 **Personal Protective Equipment**

4.4.1 Lockout devices (padlocks, multiple lock hasps, tags), gloves appropriate to the task, safety-toed boots, as required, hard hats and eye & face protection, as required.

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 or identified as such. Tagged tools will be returned to your supervisor for repair or replacement. Tagged tools will be immediately removed from service.

4.5.2 All tools must be inspected to manufacture's specifications according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly.

5.0 Records

5.1 None

6.0 References

6.1 S3NA-208-PR Personal Protective Equipment Program

6.2 S3NA-302-PR Electrical, General

6.3 S3NA-305-GL1 Hand and Power Tools

6.4 S3NA-410-PR Hazardous Energy Control

6.5 S3NA-510-PR Hearing Conservation Program

S3NA-305-GL Hand and Power Tools

1.0 Exposure

1.1 Employees who use hand and power tools and are exposed to the hazards of falling, flying, abrasive, and splashing objects, or to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate personal protective equipment.

2.0 Basic Safety rules

2.1 Keep all tools in good condition with regular maintenance.

2.2 Use the right tool for the job.

2.3 Examine each tool for damage before use and do not use damaged tools.

2.4 Operate tools according to the manufacturers' instructions.

2.5 Provide and use properly the right personal protective equipment.

2.6 All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable vapors).

2.7 When a temporary power source is used for construction a ground-fault circuit interrupter should be used

2.8 Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools.

2.9 Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

2.10 Compressed air guns should never be pointed toward anyone.

2.11 Workers should never "dead-end" them against themselves or anyone else.

2.12 A chip guard must be used when compressed air is used for cleaning.

2.13 Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold.

2.14 Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield also should be used.

2.15 Noise hazard associated with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

3.0 Hazard Prevention Sharp Objects

3.1 Employees, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity.

3.2 Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones.

3.3 Cracked saw blades must be removed from service.

3.4 Wrenches must not be used when jaws are sprung to the point that slippage occurs.

3.5 Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads.

3.6 The wooden handles of tools must not be splintered.

3.7 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 should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

4.0 Hazard Prevention of Power tools

4.1 Precautions

4.1.1 Never carry a tool by the cord or hose.

4.1.2 Never yank the cord or the hose to disconnect it from the receptacle.

4.1.3 Keep cords and hoses away from heat, oil, and sharp edges.

4.1.4 Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.

4.1.5 Keep all people not involved with the work at a safe distance from the work area.

4.1.6 Secure work with clamps or a vise, freeing both hands to operate the tool.

4.1.7 Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.

4.1.8 Maintain tools with care; keep them sharp and clean for best performance.

4.1.9 Follow instructions in the user's manual for lubricating and changing accessories.

4.1.10 Be sure to keep good footing and maintain good balance when operating power tools.

4.1.11 Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.

4.1.12 Remove all damaged portable electric tools from use and tag them: "Do Not Use."

4.2 Guards

4.2.1 The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.

4.2.2 Machine guards, as appropriate, must be provided to protect the operator and others from the following:

- Point of operation.
- In-running nip points.
- Rotating parts.
- Flying chips and sparks.

4.2.3 Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards.

4.2.4 An upper guard must cover the entire blade of the saw.

4.2.5 A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work position.

5.0 Operating Controls and Switches

5.1 The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released: drills; tappers; fastener drivers; horizontal, vertical, and angle grinders with wheels more than 2 inches (5.08 centimeters) in diameter; disc sanders with discs greater than inches (5.08 centimeters); belt sanders; reciprocating saws; saber saws, scroll saws, and jigsaws with blade shanks greater than 1/4-inch (0.63 centimeters) wide; and other similar tools.

5.2 These tools also may be equipped with a "lock-on" control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers.

5.3 The following hand-held power tools must be equipped with either a positive "on-off" control switch, a constant pressure switch, or a "lock-on" control:

5.3.1 Disc sanders with discs 2 inches (5.08 centimeters) or less in diameter.

5.3.2 Grinders with wheels 2 inches (5.08 centimeters) or less in diameter.

5.3.3 Platen sanders, routers, planers, laminate trimmers, nibblers, shears, and scroll saws; and jigsaws, saber and scroll saws with blade shanks a nominal 1/4-inch (6.35 millimeters) or less in diameter.

5.3.4 It is recommended that the constant-pressure control switch be regarded as the preferred device.

5.3.5 Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches (5.08 centimeters), chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

6.0 Electrical Shock Caution

6.1 Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electricpowered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death.

6.2 An electric shock also can cause the user to fall off a ladder or other elevated work surface and be injured due to the fall.

6.3 To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a lowvoltage isolation transformer.

6.4 Three-wire cords contain two currentcarrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground.

6.5 The third prong must never be removed from the plug.

6.6 Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On doubleinsulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

7.0 Electric Tools General Practice

7.1 Operate electric tools within their design limitations.

7.2 Use gloves and appropriate safety footwear when using electric tools.

7.3 Store electric tools in a dry place when not in use.

7.4 Do not use electric tools in damp or wet locations unless they are approved for that purpose.

7.5 Keep work areas well lighted when operating electric tools. Ensure that cords from electric tools do not present a tripping hazard.

7.6 In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program.

8.0 Pneumatic Tools (powered by compressed air)

8.1 There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

8.2 Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected.

8.3 A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.

8.4 If an air hose is more than 1/2-inch (12.7 millimeters) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.

8.5 In general, the same precautions should be taken with an air hose that are recommended for electric cords, because the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards.

8.6 When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.

8.7 Pneumatic tools that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.

8.8 Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

9.0 Liquid Fuel Tools (operated with gasoline)

9.1 The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids.

9.2 Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors.

9.3 When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.

9.4 Noise hazards associated with gasoline engines must be mitigated by proper hearing protection utilization. Ear Plugs, ear muffs or a combination of the two must be used to protect workers from excessive noise levels.

9.5 Fire extinguishers must also be available in the area.

10.0 Hydraulic Power Tools (fluid run)

10.1 The fluid used in hydraulic power tools must be an approved fireresistant 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.

10.2 The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

10.3 All jacks—including lever and ratchet jacks, screw jacks, and hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.

10.4 A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.

10.5 To set up a jack, make certain of the following:

10.5.1 The base of the jack rests on a firm, level surface;

10.5.2 The jack is correctly centered;

10.5.3 The jack head bears against a level surface; and

10.5.4 The lift force is applied evenly.

10.6 Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule:

10.6.1 For jacks used continuously or intermittently at one site—inspected at least once every 6 months;

10.6.2 For jacks sent out of the shop for special work—inspected when sent out and inspected when returned; and

10.6.3 For jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.

S3NA-305-WI1 Chainsaw Safety Card

1.0 Objective / Overview

1.1 Available in a variety of types and capacities, chainsaws are one of the most powerful, yet dangerous cutting tools available.

1.2 Working safely with a chain saw begins with training.

1.3 Additional safety measures include proper training, good body mechanics and felling technique, well-maintained equipment, and protective clothing.

2.0 Safe Operating Guidelines

2.1 A sharp chainsaw is safer than a dull one. Keep the saw clean, lubricated, and adjusted. Before starting work inspect and test the chain brake, chain catch, throttle lock, handles and guards, all nuts and bolts, spark arrestor, and muffler and air filter. The chain tension should be properly adjusted and the carburetor tuned. Never “drop start” the saw.

2.2 A chainsaw is not only dangerous to the operator but to those around him. Keep the saw close to the body. Bend from the knees, not the waist. Improper lifting techniques and poor posture contribute to injuries.

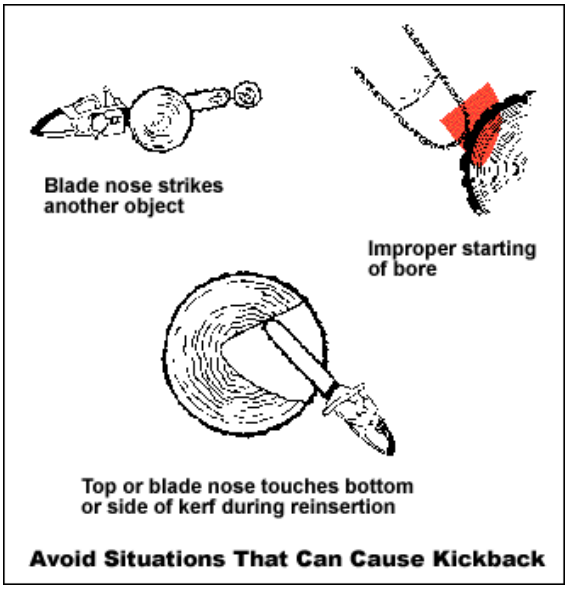
3.0 Potential Hazards

3.1 Kickback – Sudden and violent reverse movement of the saw

3.2 Hand / arm vibration syndrome

3.3 Flying / falling debris

3.4 Severe cuts



4.0 Training Requirements

4.1 Review of Applicable SOPs

4.2 Demonstrated knowledge on the use of a chainsaw

4.3 Review of manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

5.1 Debris Shield

5.2 Chainsaw Chaps

5.3 Leather Gloves

5.4 Hearing Protection

6.0 Other Safety Tips

6.1 Always avoid standing on the log and making cuts with the saw between your legs; always cut with the saw to the outside of your legs.

6.2 Determine where the tree/limb will fall prior to cutting. Always ensure that personnel and equipment are not in the path the falling tree/log, and that you have time to move away. If necessary, flag/or fence off the area to prevent entry.

6.3 Always stand to one side of the limb you are to cut, never straddle it.

6.4 Always keep in mind where the chain will go if it breaks, never position yourself or other people in line with the chain.

6.5 Keep the chain out of the dirt, debris will fly, the teeth will be dulled and the chain life shortened.

S3NA-305-WI2 Circular Saw Safety Card

1.0 Objective / Overview

1.1 Among professionals, the circular saw is probably the most commonly used powered saw and perhaps the most commonly abused. Familiarity should not breed carelessness.

1.2 Safe measures include proper training, good body mechanics and felling technique, well-maintained equipment, and protective equipment.

1.3 The circular saw is used in cutting wood products (i.e., plywood, construction lumber, etc.).

2.0 Safe Operating Guidelines

2.1 Use sharp blades. Dull blades cause binding, stalling and possible kickback.

2.2 Use the correct blade for the application and check for proper operation before each cut.

2.3 Check often to ensure that guards return to their normal position quickly. Never defeat the guard to expose the blade.

2.4 Before starting a circular saw, be sure the power cord and extension cords are out of the blade path and are long enough to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.

2.5 For maximum control, hold the saw firmly with both hands after securing the work piece.

2.6 Check frequently to be sure clamps remain secure.

2.7 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest.

2.8 When you start the saw, allow the blade to reach full speed before contacting the work piece.

3.0 Potential Hazards

3.1 Kickback – Sudden and violent reverse movement of the saw

3.2 Hearing loss

3.3 Flying debris

3.4 Severe cuts

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of a circular saw.

4.3 Review and follow manufacturer’s operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather Gloves

5.2 Hearing Protection

6.0 Other Safety Tips

6.1 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.

6.2 Disconnect power supply before adjusting or changing the blade.

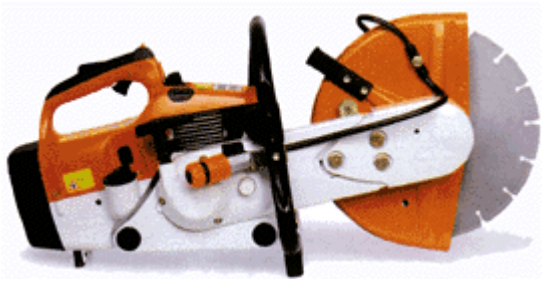
6.3 Do not place hand under or in front of the shoe or guard of the saw when operating.

6.4 Cut at the proper depth (¼ in.) below work surface (see picture).

6.5 Circular saw must be double-insulated or protected by a GFCI.

S3NA-305-WI3 Cut Off Saw Safety Card

1.0 Objective / Overview



1.1 Cut-off saws are high-speed cutting tools and very dangerous to operate. Therefore, it is very important to review the general safety rules, training, PPE and procedures for working with portable cut off saws.

1.2 Cut off saws are used in a variety of activities (i.e. concrete, piping, metal, etc.).

2.0 Safe Operating Guidelines

2.1 **Starting -** Start the saw on firm ground or other solid surface in an open area. Never attempt to drop-start the engine. Clear the working area. Avoid operating the saw if the terrain is wet and/or frozen.

2.2 **Handling -** Hold the saw firmly with two hands when the engine is running, *and whenever the blade is rotating until it comes to a complete stop*. Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.

2.3 **Cutting -** Begin cutting at full throttle and continue at full throttle until the cut is finished. Avoid standing in a direct line with the cutting wheel. Use only downward pressure on the saw, as lateral pressure may cause the blade to break and shatter. Do not change the direction of the cut once started, as this can also cause the blade to break and shatter. Do not use abrasive-type wheels for rough grinding. Do not cut above shoulder height.

2.4 **Maintenance -** Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

2.5 Hearing loss

2.6 Flying debris

2.7 Severe cuts

2.8 Burns from engine

2.9 Fire Hazard from sparks and gasoline

2.10 Hand / arm vibration syndrome

002BA058 KN

Never drop-start saw

3.0 Potential Hazards

3.1 Kickback – Sudden and violent reverse movement of the saw

4.0 Training Requirements

4.1 Review of Applicable SOPs

4.2 Demonstrated knowledge on the use of a cut off saw

4.3 Review and follow manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

5.1 Face shield

5.2 Chainsaw Chaps

5.3 Leather gloves

5.4 Hearing protection: earplugs and/or earmuffs

5.5 Respirator if required (concrete operations)

6.0 Other Safety Tips

6.1 Keep flammable and combustible materials away from saw while cutting metal.

6.2 Make sure the fuel cap is properly secured.

6.3 Inspect the abrasive wheel for cracks and chips. If cracked or chip replace wheel before use.

6.4 Ensure guard is positioned properly prior to start-up (*S3NA-411-PR Machine Guarding*).

6.5 Never try to drop-start the engine (see picture).

S3NA-305-WI4 Hand-Held Grinder Safety Card

1.0 Objective / Overview

1.1 Hand held grinders are high-speed electric- or pneumatic-powered grinding tools used to shape or cut metal, and can be dangerous to operate.

1.2 Grinders are used in a variety of activities (i.e., piping installation/repair, metal, restoring, polishing, sharpening, etc.).

2.0 Potential Hazards

2.1 Kickback – Sudden and violent reverse movement of the grinder.

2.2 Flying debris.

2.3 Severe cuts.

2.4 Fire Hazard from sparks igniting nearby debris or objects.

2.5 Hand / arm vibration syndrome.

3.0 Safe Operating Guidelines

3.1 Basic safety rules can help prevent hazards associated with the use of hand-held grinders:

3.1.1 Never carry the tool by the cord (or the hose for pneumatic tools).

3.1.2 Never yank the cord or the hose to disconnect the tool from the receptacle.

3.1.3 Keep cords and hoses away from heat, oil, and sharp edges.

3.1.4 Denergize tools when not in use, before servicing, and when changing accessories such as blades/bits/cutters.

3.1.5 All observers should be kept at a safe distance from the work area.

3.1.6 Always secure work with clamps or a vise, freeing both hands to operate the tool.

3.1.7 Avoid accidental starting; do not hold a finger on the trigger/switch while carrying a powered tool.

3.1.8 Tools should be maintained with care. They should be kept clean and sharp for the best performance. Follow instructions in the user's manual for lubricating and care instructions.

3.1.9 Be sure to keep your footing and maintain proper balance.

3.1.10 The proper apparel should be worn. Loose clothing or jewelry can become caught in moving parts.

3.1.11 Inspect the tool before every use. Damaged tools must be removed from use and tagged "DO NOT USE".

4.0 Training Requirements

4.1 Review applicable SOPs.

4.2 Demonstrated knowledge on the use of a hand-held grinder.

4.3 Follow manufacturers operating guidelines, especially for proper grinding wheel attachment.

5.0 Personal Protective Equipment

5.1 Leather gloves

5.2 Safety glasses with sideshields

5.3 Hearing protection: earplugs and/or earmuffs

5.4 Other PPE as necessary for the worksite/activity

6.0 Other Safety Tips

6.1 Keep flammable and combustible materials away from the grinder.

6.2 Have a fire extinguisher on hand while using grinder.

6.3 Inspect the abrasive wheel for cracks and chips. If cracked or chipped replace wheel before use.

6.4 Ensure safety guard(s) is positioned properly prior to start-up.

6.5 Never clamp a hand held grinder in a vice.

S3NA-305-WI5 Impact Wrench Safety Card

1.0 Objective / Overview

1.1 Impact wrenches are mainly used for tire changing but that does not limit their use. They can be used in all applications when a certain amount of torque is needed to loosen or tighten nuts and bolts.

1.2 The danger comes in to play when employees try to use the wrong sockets with an air wrench. Employees using air wrenches must have a general understanding of how to use them.

2.0 Safe Operating Guidelines

2.1 Drain water from air compressor tank and condensation from air lines.

2.2 Disconnect the tool from the air supply before lubricating or changing sockets. Impact wrench sockets and accessories must be used with this tool.

2.3 Do not use hand sockets and accessories. Select the required impact socket.

2.4 Connect tool to air hose of recommended size. The use of a quick connect set makes connecting easier.

2.5 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.

2.6 If the proper retaining device on the tool is broken, the tool should be repaired.

2.7 On applications where a low or critical level of torque is required, it is recommended that you impact each fastener lightly, and then perform the final tightening with a hand torque wrench.

3.0 Potential Hazards

3.1 Flying debris

3.2 Hearing loss

3.3 Cuts

3.4 Hand / arm vibration syndrome

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of a electric drill.

4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather gloves/anti-vibration gloves

5.2 Hearing protection

6.0 Other Safety Tips

6.1 Be sure no one is below when using the tool in high locations.

6.2 The proper fastening torque may differ depending upon the kind or size of the bolt.

6.3 Check the torque with a torque wrench.

S3NA-305-WI6 Nail Gun Safety Card

1.0 Objective / Overview

1.1 Nail guns are useful tools, but must be handled with care, and have been shown to be the cause of unnecessary injuries when the design of the gun places emphasis on speed, rather than safety.

2.0 Safe Operating Guidelines

2.1 Watch out for other crewmembers working near you.

2.2 Never let an inexperienced crewmember use a nail gun without supervised training.

2.3 Never use bottled gas as a power source for pneumatic tools.

2.4 Disconnect a nail gun before you service it.

2.5 Hold your hand a good 12 inches back from the ends of studs or joists when you are nailing.

2.6 Keep the gun properly aligned with your work both vertically and horizontally.

2.7 Never nail with the gun pointed toward you or anyone else on the job.

2.8 Never try to nail beyond your reach.

3.0 Potential Hazards

3.1 Flying debris/nails

3.2 Imbedded object

3.3 Puncture wounds

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of a coring machine.

4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather gloves

5.2 Hearing protection

6.0 Other Safety Tips

6.1 When you are moving about the work area - keep your finger off the trigger until you are ready to fire. Make sure you have only placed the nose guard against the material you are going to nail together.

6.2 Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.

6.3 Be aware of what is located behind the nailing surface. Never place hands or other body parts directly behind the nailing surface.

6.4 Use only for intended work.

6.5 Avoid nailing into knots as nail can splinter wood.

6.6 Never disable safety tip on gun.

S3NA-305-WI7 Pentak Vacuum Safety Card

1.0 Objective / Overview

Worker is using the roto-peen (scabbler) attachment; VAC-PAC collection system shown with 55 gal drum.

1.1 Pentek's dustless decontamination system removes and packages surface contamination from concrete and steel structures.

1.2 The Pentek integrated suite of manually operated equipment (e.g., squirrel III, corner cutter, roto-peen, and crack chaser) is designed for the safe removal of radioactive materials, lead-based paints, PCBs, pesticides, chemical residues, and other contaminated coatings.

1.3 The Pentek system incorporates a high-performance vacuum and waste packaging unit, the VAC-PAC, in conjunction with pneumatically operated equipment to remove contaminated material. Dust and debris are captured at the cutting tool surface. Supporting equipment required to operate the unit includes a 60 kW generator and an air compressor (minimum 350 ft^3 capacity), as well as a drum grappler for drum handling activities.

2.0 Safe Operating Guidelines

2.1 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.

2.2 The vacuum unit should be placed a minimum of 50 feet away from the work area.

2.3 Once in position to begin work, apply the brake to stabilize the unit. When raising the VAC-PAC to insert/remove a drum, do not place your body or any extremity under the VAC-PAC while it is in the raised position.

2.4 Two workers should be used to maneuver the unit into place.

2.5 A minimum 10 ft clearance will be established around the unit while in operation.

2.6 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.

2.7 A competent person will train each worker in the operation of the unit.

2.8 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY.

3.0 Potential Hazards

3.1 Hazardous noise

3.2 Vibration

3.3 Tripping hazard from cables and hoses

3.4 Hot surfaces (vacuum unit)

3.5 Electrical (high voltage)

3.6 Pinch hazard

3.7 Back strain

3.8 High pressure air

4.0 Personal Protective Equipment (Level D ensemble)

4.1 Leather gloves (maintenance)

4.2 Tyvek suit (with hood)

4.3 Vibration gloves (operation)

4.4 Hearing protection (plugs or muffs)

5.0 Other Safety Tips

5.1 Always know where the emergency stop is located.

5.2 Operators of a motorized drum grappler must be trained IAW the powered industrial truck standard.

5.3 Review *S3NA-302-PR Electrical, General* prior to refueling the electrical generator and/or compressor.

S3NA-305-WI8 Power Drill Safety Card

1.0 Objective / Overview

1.1 Available in a variety of types and capacities, portable power drills are undoubtedly the most used power tools.

1.2 Because of their handiness and application to a wide range of jobs, drills often receive heavy use. For this reason, you'll need to carefully check your drill's capacity limitations and accessory recommendations.

2.0 Safe Operating Guidelines

2.1 Check carefully for loose power cord connections and frays or damage to the cord.

2.2 Replace damaged tool and extension cords immediately.

2.3 Be sure the chuck is tightly secured to the spindle. This is especially important on reversible type drills. Tighten the bit securely as described by the owner / operators manual.

2.4 The chuck key must be removed from the chuck before starting the drill.

2.5 A flying key can be an injury-inflicting missile.

2.6 Check auxiliary handles, if part of the tool. Be sure they are securely installed.

2.7 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.

2.8 Grasp the drill firmly by insulated surfaces.

2.9 Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise -- forward -- direction, brace the drill to prevent a counter-clockwise reaction.

2.10 Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure. Forcing the drill can cause the motor to overheat, damage the bit and reduce operator control.

3.0 Potential Hazards

3.1 Electrical shock

3.2 Leaving chuck wrench in tool

3.3 Puncture wounds

3.4 Flying debris

3.5 Severe cuts

3.6 Fire

3.7 Burns (hot bits)

3.8 Sprains/strains (wrist)

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of a power drill.

4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather Gloves

6.0 Other Safety Tips

6.1 Electric drills must be double-insulated or plugged into a GFCI outlet.

6.2 Never carry tool by cord or yank it to disconnect from receptacle.

6.3 Keep cord away from sharp edges.

S3NA-305-WI9 Pressure Washer Safety Card

1.0 Objective / Overview

1.1 High pressure washers can operate up to pressures of 5,000 psi and come in a variety of types ranging from gas operated to electrical. If not used correctly and safely, pressure washers can be dangerous piece of work equipment.

1.2 AECOM only allows trained, authorized personnel to operate the high pressure washers. Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Safe Operating Guidelines

2.1 The gun valve must always be pointed at the work area, NEVER point the gun valve at yourself or another person.

2.2 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.

2.3 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.

2.4 Always set the tripper safety lock when the gun valve is not in use.

3.0 Training Requirements

3.1 Review of Applicable SOPs

3.2 Demonstrated knowledge on the use of a pressure washer

3.3 Review of manufacturers operating guidelines

4.0 Potential Hazards

4.1 Kickback – Sudden and violent reverse movement of the gun

4.2 Flying debris

4.3 Slips and trips on wet surfaces and hoses

4.4 Exhaust fumes/carbon monoxide (CO) in enclosed spaces

4.5 Severe cuts

5.0 Personal Protective Equipment (Level D PPE)

5.1 Hard hat with faceshield

5.2 Heavy gloves

5.3 Hearing protection

5.4 PVC (or equivalent) rain suit

6.0 Other Safety Tips

6.1 Never fill a pressure washer fuel tank with fuel while the engine is running or if the engine is still hot.

6.2 Non-operators must remain a minimum of 25 feet from the operator.

6.3 High pressure washing equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.

6.4 Always set the trigger safety lock when the gun valve is not in use.

6.5 Relieve the pressure in the system before coupling and uncoupling hoses.

6.6 Visually inspect the full length of high pressure discharge hose and inspect other high pressure fluid-handling components for abrasions or cuts, damage caused by exposure to chemicals and for damage caused by kinks in the hose.

S3NA-305-WI10 Reciprocating Saw Safety Card

1.0 Objective / Overview

1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.

1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Safe Operating Guidelines

2.1 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.

2.2 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.

2.3 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.

2.4 The work piece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.

2.5 Maintain firm contact between the saw's shoe and the material being cut.

2.6 When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.

2.7 If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire.

2.8 Water pipes must be drained and capped.

2.9 Always hold the tool by the insulated grouping surfaces. When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work piece. This prevents breakage of the blade, and possible loss of tool control.

2.10 Different work surfaces demand different blades.

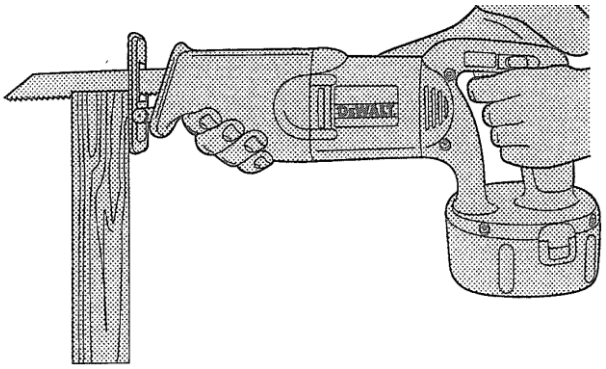
3.0 Potential Hazards

3.1 Flying debris

3.2 Hearing loss

3.3 Cuts

3.4 Hand / arm vibration syndrome



The correct way to hold the reciprocating saw while operating.

4.0 Training Requirements

4.1 Review of Applicable SOPs

4.2 Demonstrated knowledge on the use of a reciprocating saw

4.3 Review and follow manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather Gloves/anti-vibration gloves

5.2 Hearing protection

6.0 Other Safety Tips

6.1 Do not operate reciprocating saw in explosive atmospheres.

6.2 Do not overreach. Keep proper footing and balance at all times.

6.3 Do not use tool if switch is not operating correctly.

6.4 Check for misalignment or binding of moving parts, breakage or parts and any other condition that may affect the tool's operation.

6.5 Always use two hands to operate saw (see picture).

S3NA-305-WI11 Sander Safety Card

1.0 Objective / Overview

1.1 Sanders are commonly used at project sites for a variety of tasks.

1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and PPE selection.

2.0 Safe Operating Guidelines

2.1 Make sure the sander is switched "OFF" before connecting the power supply. Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector. Inspect sanding belts before using them.

2.2 Replace those belts that are worn or frayed. Install sanding belts that are the same widths as the pulley drum.

2.3 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.

2.4 Secure the sanding belt in the direction shown on the belt and the machine. Keep hands away from the sanding belt.

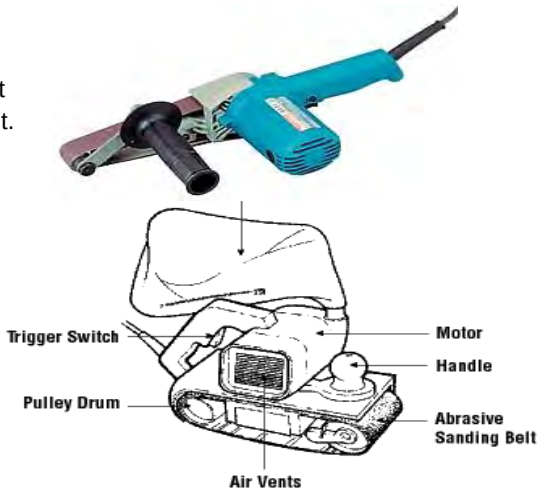
2.5 Use two hands to operate sanders – one on the trigger and the other on the front handle knob.

2.6 Clean dust from the motor and vents on a regular basis.

2.7 Do not use a sander without an exhaust system or dust collector present that is in good working order.

2.8 Empty the collector when ¼ full.

2.9 Do not exert excessive pressure on a moving sander. The weight of the sander provides adequate pressure for the job.



2.10 Do not work on unsecured stock unless it is heavy enough to stay in place.

2.11 Do not overreach. Always keep proper footing and balance.

2.12 Do not cover air vents of the sander.

2.13 Check often to ensure that guards are in their normal position.

2.14 Before starting a sander, be sure the power cord and extension cords are out of the belt path and are long enough to freely complete the task. The sander must be either double insulated or connected to a GFCI.

3.0 Potential Hazards

3.1 Kickback – Sudden and violent reverse of the sander

3.2 Hearing loss

3.3 Flying debris

3.4 Severe abrasive cuts

3.5 Electrocution

3.6 Explosion/fire hazard from the dust

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Hearing protection

5.2 Leather gloves

S3NA-305-WI12 Utility Knife Safety Card

1.0 Objective / Overview

1.1 Utility knives serve a variety of purposes at worksites, and can be a useful tool, when used safely and correctly.

1.2 Learning proper positioning and correctly using a utility knife will drastically reduce the potential of cut related injuries.

2.0 Safe Operating Guidelines

2.1 Always be sure that knives are sharp and not dull. A dull blade will require more force to cut, increasing the likelihood of slipping.

2.2 Be sure to blade is seated in the frame of the knife correctly, closed, and fastened together properly.

2.3 Always keep body parts away from the cut line, (e.g., fingers), and ensure that the material being cut is on firm ground and not against a body part (e.g. cutting rope against your leg).

2.4 Always pull the knife, never push the knife (the blade may break, and momentum could cause the body to come into contact with broken blade).

2.5 Always retract the blade when not in use.

3.0 Potential Hazards

3.1 Lacerations from direct contact with the blade

3.2 Lacerations from blade breaking or shattering

3.3 Ergonomics

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Review of client specific requirements.

4.3 Demonstrated knowledge on the safe use of a utility knives.

4.4 Review and follow manufacturers operating guidelines for specialized or unusual knives.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Cut resistant gloves (Kevlar, thick leather, etc.).

6.0 Other Safety Tips

6.1 Purchase safety equipped utility knives with guarding or automatically retracting blades.

6.2 Replace dull blades – When knife begins to tear rather than cut, it is a good indicator the blade is dull.

6.3 Always wear a cut resistant glove on your free hand.

6.4 Always use the right tool for the job – NEVER use the blade as a screwdriver or prying tool.

6.5 When using a knife to cut thicker materials, use several passes. Increased force on the blade can cause it to stray from the intended cut path, or break the blade.

6.6 When changing blades, always handle from the non-sharp side. Cover blade with duct tape and dispose.

6.7 Use an alternate tool when possible (scissors, wire cutters, etc.).

Utility Knives with Gaurding

S3NA-305-WI13 Wood Chipper Safety Card

1.0 Objective / Overview

1.1 Wood chippers should be used with extreme caution in order to prevent personal injury, as the wood chipper is open to receive tree branches and other wooden material.

1.2 AECOM only allows trained, authorized personnel to operate the wood chipper.

1.3 Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Safe Operating Guidelines

2.1 The operator must be completely familiar with the controls and proper use of the equipment.

2.2 Workers feeding material into self-feeding wood chippers are at risk of being fed through the chipper if they reach or fall into the infeed hopper or become entangled in braches feeding into the machine.

2.3 Prior to use, make sure all safety devices and controls, such as emergency shut-off devices, are tested and verified to be functioning properly.

2.4 Make sure two workers (buddy system) are in close contact with each other when operating the chipper.

3.0 Potential Hazards

3.1 Burns from contact with the hot muffler or engine

3.2 Flying debris

3.3 Noise exposure

3.4 Inhaling exhaust fumes

3.5 Entanglement in limbs and contact with chipper blades

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of a wood chipper.

4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather gloves

5.2 Hearing protection

5.3 Debris shield

5.4 Long sleeve shirt (e.g. working near poison ivy, poison oak, etc.)

6.0 Other Safety Tips

6.1 Stand to the side of the chipper while inserting limbs into chipper, never stand directly in front.

6.2 Insert trunk portion of tree/limb first. This will prevent the branches from getting entangled with clothing, etc. and pulling you in with the tree/limb.

6.3 Bystanders should be kept at least 25 feet away when in operation.

6.4 Keep the area around the wood chipper free of tripping hazards.

6.5 Never wear loose clothing that may get caught on feed material or moving parts.

6.6 Always set the trigger safety lock when the gun valve is not in use.

6.7 Never fill the fuel tank while the engine is running or if the engine is still hot.

S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card

In accordance with 29 CFR 1910.266, the following safety precautions will be followed during site clearing and tree felling:

1.0 Hand Tools

1.1 All hand tools shall be in safe condition. Tools shall be inspected by the user daily.

1.2 Handles shall be sound, straight and tight-fitting.

1.3 Driven tools shall be dressed to remove any mushrooming.

1.4 Cutting tools shall be kept sharp and properly shaped.

1.5 All clearing activities shall terminate during electrical storms and periods of high winds.

1.6 Dead, broken or rotted limbs or trees (widow makers) shall be felled first.

1.7 Always wear the appropriate Personal Protective Equipment (PPE) when using hand tools, particularly eye and hand protection.

1.8 Use the right tool that is being used for the job to reduce chance of unexpected occurrences. Do not submit or use makeshift tools.

1.9 Defective tools shall not be used. They shall be taken out of service until repaired or replaced.

1.10 Check tools for damage or wear prior to each use to reduce chance of unexpected occurrences.

1.11 Replace cracked or broken handles on files, hammers, screwdrivers, or sledges.

1.12 Replace worn jaws on wrenches, pipe tools, and pliers

1.13 Redress burred or mushroomed heads on striking tools.

1.14 Sharpen cutting tools frequently to reduce chance of unexpected occurrences.

1.15 Store hand tools properly after each use.

1.16 Tools shall be clean and dry to avoid slippage when in use.

1.17 Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use (a high number of injuries occur from objects/tools falling from overhead work areas in construction).

1.18 Always keep tools being used in overhead work areas in containers that will prevent them from falling.

1.19 Carry tools using a heavy belt or apron and hang tools at your sides.

1.20 Never carry tools in your pockets or hanging behind your back.

1.21 Avoid muscle strain and fatigue by doing the following:

- Avoid using hand tools with your wrist bent.
- Choose tools that allow you to keep your wrist straight when using them.
- Always PULL on wrenches and pliers. Never push unless you hold the tool with your palm open.
- Always cut away from yourself when using cutting tools.

1.22 Establish balance and stable footing when using a bar for prying. Pry bars can slip or break without warning.

1.23 Be aware of the presence of other personnel when using any tool, especially picks or axes.

2.0 Machete Use

2.1 A machete will only be used for its designated purpose; do not carelessly swing the machete when it is not needed.

2.2 To prevent lacerations, employees will wear Kevlar gloves and Kevlar chain saw chaps.

2.3 Machetes shall not be used when other employees are in the immediate work area.

3.0 Use of Weed Whips

3.1 Weed whips may be used to clear vegetation such as grass, light brush, briars and tree seedlings. The L-shaped weed whip cuts grass and weeds but is unstable for use on larger growth; the triangular-frame weed whip cuts briars and woody stems up to a half-inch in diameter. A “Suwannee” sling is a heavy duty weed whip that also has an axe blade. It does the same work as a weed whip, but can also cut through large materials. The heavier weight of this tool allows it to more easily cut off larger material than a weed whip.

3.2 When using weed whips, employees should follow these safety procedures:

3.2.1 Select the correct tool for the types and size of vegetation present across the landfill.

3.2.2 Employees will wear leather gloves when using weed whips.

3.2.3 Weed whips are meant to be swung back and forth with both hands. Avoid using a golf swing. The tool should be swung no higher than an employee’s side.

3.2.4 Strong swings should be made to prevent the blade from bouncing or glancing off springy growth.

3.2.5 Screws hold the serrated double-edge blade in place. These screws can work loose so check them before each use.

3.2.6 At the end of the day, inspect the whips for damage. Clean, sharpen, and oil as necessary and store with a sheath in place.

4.0 Chain Saws

4.1 Hand Protection (leather gloves)

4.2 Eye Protection

4.3 Hearing Protection

4.4 Long sleeves and pants; no loose clothing

4.5 Chaps (full protection) or pants with full front protection as well as all around protection below the knee

4.6 As per manufacturer’s instructions

4.7 The chainsaw shall:

4.7.1 Be in safe operating condition;

4.7.2 Have a chain that minimizes the possibility of a kickback; and

4.7.3 Have a device which will effectively stop the chain in the event of a kickback or when the engine is at idle.

4.8 Operate the chainsaw in accordance with manufacturer’s instructions.

4.9 Hold the chainsaw firmly with two hands during operation.

4.10 Hold the chainsaw firmly when starting.

4.11 Have the chain stopped when not actually cutting.

4.12 Be sure that the chain brake is functioning properly and adequately stops the chain.

4.13 Check that the chain is sharp, has the correct tension and is adequately lubricated.

4.14 Start, hold, carry or store and use of the saw as directed by the manufacturer.

4.15 Do not use the chain saw for cutting above shoulder height.

4.16 Add fuel in a well-ventilated area and not while the saw is running or hot.

4.17 Use an approved safety container to contain the fuel used along with a proper spout or funnel for pouring.

4.18 Carry and transport the chain saw with the bar guard in place, the chain bar toward the back and the motor shut off.

4.19 Chain saws shall be inspected daily to assure that all handles and guards are in place and tight, that all controls function properly and that the muffler is operative.

4.20 Start the saw only on the ground or when otherwise firmly supported.

4.21 Clear brush which might interfere with clear footing before starting to cut.

4.22 Shut off the saw when carrying it for a distance greater than from tree to tree or when surface is slippery or heavy with underbrush. The saw shall be at idle speed when carried short distances.

4.23 Do not use the saw to cut directly overhead or a distance at which the operator no longer has a safe grip on the saw. Always use two hands to operate the saw.

4.24 Safety glasses with permanently attached side shields will be worn underneath a steel mesh face shield which will attach to standard hard hats. The brush shield is designed to protect the head and face from debris created by using a chain saw. Employees will wear Kevlar gloves and Kevlar chain saw chaps. Appropriate ear protection shall also be worn.

5.0 Felling Trees Manually

5.1 Before cutting begins, survey the work area for dead limbs, the lean of the tree to be cut, wind conditions and the location of other trees.

5.2 Remove lodged trees (tree has not fallen to the ground after being separated from its stump) as soon as possible. Never work under a lodged tree.

5.3 The distance between workers should be maintained at twice the height of the trees being felled.

6.0 Chipping Operations

6.1 Access covers and doors shall not be opened until the drum or disk is at a complete stop.

6.2 Infeed and discharge ports shall be designed to prevent employee contact with disc, knives and blower blades.

7.0 Cutting Tools

7.1 Wear safety glasses and protective gloves when using cutters.

7.2 Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.

7.3 Inspect the tool for proper working condition.

7.4 If tool is designed to have a guard, make sure guards are in place.

7.5 Cut materials straight across - keep the material being cut at right angles to the cutting edges of jaws.

7.6 Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.

7.7 Keep cutting tools in good repair.

7.8 Adjust and lubricate cutter and moving parts daily if heavily used.

7.9 Sharpen jaws according to manufacturer’s instructions.

7.10 Do not use a cutting tool until you are trained in its proper and safe use.

7.11 Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.

7.12 Do not use cutters which are cracked, broken or loose.

7.13 Do not exceed the recommended capacity of a tool.

7.14 Do not cut diagonally.

7.15 Do not rock cutters from side to side when cutting wire.

7.16 Do not pry or twist with tool when cutting.

7.17 Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.

7.18 Do not expose cutters to excessive heat.

8.0 Selection and Use

8.1 Select tools that can be used without bending the wrist. Hand tools should allow the operator to grasp, hold, and use the tool with the wrist held straight.

8.2 Select the tool with the workplace layout and job design in mind. Sometimes a tool is correct for one operation and incorrect for another.

8.3 Use the right tool for the job. Confirm it is the right size and has sufficient power to do the job safely. When there is a choice, select a tool of a low weight.

8.4 Select low-vibrating tools, or choose tools with vibration-absorbing handles, like those covered with cork, rubber, plastic or plastic bonded to steel, to reduce hand-arm vibration.

8.5 Choose hand tools that have the center of gravity within or close to the handle.

8.6 Select tools with rounded and smooth handles that you can grip easily.

8.7 If they are available, choose hand tools with double handles to permit easier holding and better manipulation of the tool.

8.8 Select tools with a trigger strip, rather than a trigger button. This strip will allow you to exert more force over a greater area of the hand that, in turn, will reduce muscle fatigue.

8.9 Confirm that the trigger works easily to reduce the effort needed to operate it.

8.10 Confirm that your tool is well maintained and in good repair.

8.11 Frequently used tools that weigh more than 1 pound should be counter-balanced.

8.12 Hold the tool close to the body. Do not overreach.

8.13 Keep good balance and proper footing at all times. This will help operators to control the tool better, especially in response to unexpected situations.

8.14 Rest your hands by putting the tool down when you are not using it.

8.15 Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.

8.16 Confirm that cutting tools, drill bits, etc., are kept sharp, clean, and well maintained.

8.17 Do not wear gloves, loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection to prevent hair from getting caught in moving parts of equipment (manufacturer's operating manual for recommended PPE and/or safety issues/concerns).

8.18 Do not use a tool unless you have been trained to use it safely and know its limitations and hazards.

9.0 Storage and Handling

9.1 All tools shall be stored in a manner to prevent damage and injury. Store tools in a dry, secure location when they are not being used.

9.2 Tools shall be properly put away after each use.

9.3 Sharp or pointed tools shall be handled only if the sharp/pointed edge is covered, carried in a tool box or other device designed for that purpose, or the sharp/pointed edge is pointed downward, away from the body.

S3NA-305-WI15 Pneumatic Tools Safety Card

1.0 General Requirements

1.1 Wear safety glasses.

1.2 Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.

1.3 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.

1.4 Use only the attachments that the manufacturer recommends for the tools you are using.

1.5 Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.

1.6 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.

1.7 Use the proper hose and fittings of the correct diameter.

1.8 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.

1.9 Choose air-supply hoses that have a minimum working pressure rating of 150 psig or 150% of the maximum pressure produced in the system, whichever is higher.

1.10 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.

1.11 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.

1.12 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).

1.13 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.

1.14 Do not operate the tool at a pressure above the manufacturer's rating.

1.15 Turn off the air pressure to the hose when not in use or when changing power tools.

1.16 Do not carry a pneumatic tool by its hose.

1.17 Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.

1.18 Do not use compressed air to blow debris or to clean dirt from clothes.

2.0 Pneumatic Nailing and Stapling Tools

2.1 Permit only experienced and trained persons to operate pneumatic nailing and stapling tools.

2.2 Wear safety glasses or face a shield and, where necessary, use hearing protection.

2.3 Inspect a tool before connecting it to air supply:

2.3.1 Check tool safety mechanisms if applicable.

2.3.2 Tighten securely all screws and cylinder caps.

2.4 Check correct air supply and pressure before connecting a tool.

2.5 Check that the tool is correctly and securely connected to the air supply hose and that it is in good working order, with the safety mechanism operative, before using.

2.6 Always handle a tool as if it loaded with fasteners (nails, staples, etc.).

2.7 Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.

2.8 Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.

2.9 Disconnect a tool from the air supply when the tool is unattended and during cleaning or adjustment. Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool.

2.10 Use only fasteners recommended by the manufacturer.

2.11 Permit only properly trained people to carry out tool maintenance.

2.12 Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface.

2.13 Do not carry a tool with the trigger depressed.

2.14 Do not load a tool with fasteners while the trigger is depressed.

2.15 Do not overreach. Keep proper footing and balance.

S3NA-305-WI16 Manual Hand Tools Safety Card

1.0 Hammers

1.1 Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.

1.2 Choose a hammer with a striking face diameter approximately ½ inch larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).

1.3 Ensure that the head of the hammer is firmly attached to the handle.

1.4 Replace loose, cracked or splintered handles.

1.5 Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.

1.6 Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with beveled faces are less likely to chip or spall).

1.7 Look behind and above you before swinging the hammer.

1.8 Watch the object you are hitting.

1.9 Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.

1.10 Do not use a hammer with a loose or damaged handle.

1.11 Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.

1.12 Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.

1.13 Do not use a hammer for any purpose for which it was not designed or intended.

1.14 Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.

1.15 Do not redress, grind, weld or reheat-treat a hammer head.

1.16 Do not strike with the side or cheek of the hammer.

1.17 Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).

1.18 Keep pipe wrench teeth clean and sharp.

1.19 Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.

1.20 Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.

1.21 Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.

1.22 Do not use pipe wrenches on nuts and bolts.

1.23 Do not use a pipe extender for extra leverage. Get a larger pipe wrench.

1.24 Replace pipe cutter wheels which are nicked or otherwise damaged.

1.25 Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.

1.26 Choose a cutting wheel suitable for cutting the type of pipe material required:

1.26.1 Thin wheel for cutting ordinary steel pipe.

1.26.2 Stout wheel for cutting cast iron.

1.26.3 Other wheels for cutting stainless steel, plastic and other materials.

1.27 Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.

1.28 Use a proper tap wrench (with a “T” handle) for turning a tap.

1.29 Use lubricant or machine cutting fluid with metals other than cast iron.

1.30 Do not permit chips to clog flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning – this may result in the tap breaking if you continue to apply pressure.

1.31 Do not use a conventional adjustable wrench for turning a tap – it will cause uneven pressure on the tap that may cause it to break.

1.32 Do not attempt to thread hardened steel. This can chip or damage the die.

1.33 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.

1.34 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

2.0 Pliers and Wire Cutters

2.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.

2.2 Choose pliers or wire cutters that have a grip span of 2½ – 3½ inches to prevent your palm or fingers from being pinched when the tools are closed.

2.3 Use adjustable pliers that allow you to grip the work piece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).

2.4 Use tools only if they are in good condition.

2.5 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.

2.6 Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the work piece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.

2.7 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.

2.8 Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.

2.9 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.

2.10 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.

2.11 Do not expose pliers or wire cutters to excessive heat.

2.12 Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.

2.13 Do not use pliers as a hammer.

2.14 Do not hammer on pliers or wire cutters to cut wires or bolts.

2.15 Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.

2.16 Do not use cushion grip handles for jobs requiring tools with electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.

2.17 Do not use pliers on nuts and bolts; use a wrench.

3.0 Screwdrivers

3.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.

3.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.

3.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.

3.4 For cross-head screws, use the correct size and type of screwdriver; a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozi-driv screwdriver.

3.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.

3.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.

3.7 If work must be carried out on “live” electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.

3.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).

3.9 Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.

3.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.

3.11 Use a screwdriver that incorporates the following features when continuous work is needed:

3.11.1 A pistol grip to provide for a straighter wrist and better leverage.

3.11.2 A "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.

3.11.3 A ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.

3.12 File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.

3.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.

3.14 Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.

3.15 Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.

3.16 Do not hammer screws that cannot be turned.

3.17 Do not grind the tip to fit another size screw head.

3.18 Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-flutted spline screw heads).

3.19 Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).

3.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.

3.21 Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.

3.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.

3.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.

3.24 Do not carry screwdrivers in your pockets.

4.0 Snips

4.1 Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.

4.2 Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.

4.3 Universal snips can cut in both straight and wide curves.

4.4 Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.

4.5 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.

4.6 Aviation snips have compound leverage that reduces the effort required for cutting.

4.7 Offset snips have jaws that are set at an angle from the handle.

4.8 Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).

4.9 Use only snips that are sharp and in good condition.

4.10 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.

4.11 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.

4.12 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.

4.13 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.

4.14 Keep the nut and the pivot bolt properly adjusted at all times.

4.15 Oil the pivot bolt on the snips occasionally.

4.16 Do not try to cut sharp curves with straight cut snips.

4.17 Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.

4.18 Do not hammer or use your foot to exert extra pressure on the cutting edges.

4.19 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.

4.20 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

5.0 Wood Chisels

5.1 Wear safety glasses.

5.2 Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.

5.3 Use the right size of chisel for the job.

5.4 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.

5.5 Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.

5.6 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.

5.7 Clamp stock so it cannot move.

5.8 Adjust your stance so that you do not lose your balance if the tool slips.

5.9 Chip or cut away from yourself.

5.10 Keep your hands and body behind the cutting edge.

5.11 Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.

5.12 Make finishing or paring cuts with hand pressure alone.

5.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.

5.14 Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.

5.15 Store chisels in a “storage roll,” a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.

5.16 Replace broken or splintered handles.

5.17 Sharpen cutting edges as often as necessary.

5.18 Do not use a wood chisel as a pry or a wedge.

5.19 Do not use a wood chisel on metal.

5.20 Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.

5.21 Do not use a grinder to redress heat-treated tools. Use a whetstone.

5.22 Do not use a dull chisel.

6.0 Wrenches

6.1 Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.

6.2 Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).

6.3 Select the correct jaw size to avoid slippage.

6.4 Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.

6.5 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.

6.6 Ensure that the jaw of an open-ended wrench is in full contact (fully seated, “flat,” not tilted) with the nut or bolt before applying pressure.

6.7 Face an adjustable wrench “forward,” adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw.

6.8 Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.

6.9 Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.

6.10 Support the head of the ratchet wrench when socket extensions are used.

6.11 Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.

6.12 Stand aside when work is done with wrenches overhead.

6.13 Make sure adjustable wrenches do not "slide" open during use.

6.14 Keep tools well maintained (cleaned and oiled).

6.15 Clean and place tools and wrenches in a tool box, rack or tool belt after use.

6.16 Do not push on a wrench - losing your balance is more likely if the wrench slips.

6.17 Do not use a wrench that is bent or damaged.

6.18 Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.

6.19 Do not pull on an adjustable wrench that is loosely adjusted.

6.20 Do not use pipe wrenches on nuts or bolts.

6.21 Do not use pipe wrenches for lifting or bending pipes.

6.22 Do not use a wrench on moving machinery.

6.23 Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.

6.24 Do not use a makeshift wrench.

6.25 Do not insert a shim in a wrench for better fit.

6.26 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.

6.27 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.

6.28 Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

7.0 Files/Rasps

7.1 Personnel will not use a file as a pry bar, hammer, screwdriver, or chisel.

7.2 When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.

7.3 Personnel will not hammer on a file.

8.0 Chisels

8.1 Personnel will not use a chisel that has a dull cutting edge.

8.2 Personnel will not use chisels that have "mushroomed" striking heads.

8.3 Hold a chisel by using a tool holder if possible.

8.4 Clamp small work pieces in the vise and chip towards the stationary jaw when working with a chisel.

9.0 Vises

9.1 When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand, saw horse or box.

9.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.

9.3 Personnel will not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.

9.4 Personnel will not slip a pipe over the handle of a vise to gain extra leverage.

10.0 Clamps

10.1 Personnel will not use the C-clamp for hoisting materials.

10.2 Personnel will not use the C-clamp as a permanent fastening device.

11.0 Jacks

11.1 Personnel will not exceed the jack’s rated lifting capacity as noted on the label of the jack.

11.2 Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

S3NA-305-WI17 Small Engine Safety Card

1.0 Objective / Overview

1.1 Operate small-engine machines, such as push mowers, weed trimmers, and leaf blowers, in a safe manner.

1.2 You should know how to operate and maintain them in a safe manner.

1.3 If possible, read the operator's manual. It will contain detailed information on the safe operation and maintenance of the machine. If you do not have a manual, ask if one can be ordered from the manufacturer.

2.0 Safe Operating Guidelines

2.1 Do not wear loose or baggy clothing around tools with rotating parts.

2.2 Never run the engine indoors, in poorly ventilated areas, or in a location where the exhaust could be drawn into a building through an opening.

2.3 Never store engine with fuel in fuel tank inside a building with potential sources of ignition such as hot water and space heaters, clothes dryers, electric motors, etc.

2.4 Never remove fuel cap or add fuel when engine is running.

2.5 Never start or operate the engine with the fuel fill cap removed.

2.6 Refuelling: allow engine to cool; fill in well-ventilated area; and do not smoke while re-fuelling.

2.7 Use only properly labelled, CSA approved red gasoline containers to store and dispense fuel.

2.8 Do not pour fuel from engine or siphon fuel by mouth.

2.9 Never leave the engine unattended while it is running.

2.10 Never operate the engine with an unguarded engine shaft.

2.11 Do not modify the engine or tamper with the factory setting of the engine governor.

2.12 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.

2.13 Keep all flammable materials away from the muffler and the rest of the engine; do not idle or park the engine in dry grass or ground cover.

2.14 When working on the equipment, avoid accidentelstarts by removing the ignition key, turn off all engine switches, disconnect the battery and disconnect the spark plug, keeping it away from metal part.

2.15 Always wear hearing protection when operating an engine.

3.0 Training Requirements

3.1 Review of Applicable SOPs.

3.2 Demonstrated knowledge on the use of small engine equipment.

3.3 Review and follow manufacturers operating guidelines.

4.0 Personal Protective Equipment (Level D PPE)

4.1 Always wear safety goggles with shields

4.2 Leather or cotton gloves

4.3 Long pants and long sleeve shirt

4.4 Safety toe work boots

4.5 Hearing protection (earmuffs or earplugs)

5.0 Potential Hazards

5.1 Flying debris

5.2 Hearing loss

5.3 Cuts

5.4 Burns

S3NA-305-WI18 Electric and Battery Hand Tools Safety Card

All electrical tools and equipment must be operated in accordance with the requirements of *S3NA-302-PR Electrical, General.*

1.0 Safe Work Practices

1.1 Maintain all electrical tools and cords in good condition and not overloaded.

1.2 Do not wear loose or baggy clothing around tools with rotating parts.

1.3 The switch on the tool must be in the OFF position before connecting it to a power source.

1.4 Verify that the power source is the same voltage and current as indicated on the nameplate of the tool. Using a higher voltage can cause serious injury to the operator as well as burn out the tool.

1.5 The tool must have an approved three-wire cord with a three-prong plug so that it can be used only in a properly grounded three-hole receptacle, unless the tool is double insulated to protect the operator from electrical shock.

1.6 All outdoor receptacles must be protected by means of a ground fault circuit interrupter* (GFCI or GFI) available in portable or fixed models. Do not use any electric power tools outdoors in a receptacle that is not properly protected.

1.7 Report all shocks and/or sparks from electrical tools, no matter how minor. The tool in question should be tagged out and not be used until it has been checked for ground fault.

1.8 Maintain electrical cords and appliances in good working order.

1.8.1 Cords and appliances must be CSA approved.

1.8.2 Never carry an electric tool by the cord or disconnect the plug by pulling or jerking on the cord (can damage, loosen, or separate connections).

1.8.3 Check cords frequently for such damage such as kinks, cuts, and cracked or broken outer jackets (any cord that feels more than comfortably warm to the touch should be checked by an electrician for overloading).

1.9 Store electrical cords in a clean, dry area off the ground to prevent damage to cord.

1.10 Equipment must have proper guards or shields and they must remain in place. If, due to damage or deterioration, the original guard provided on a piece of equipment cannot be put in place, the tool must be removed from service.

1.11 Do not modify, remove, or disable any machine guards.

1.12 Stand to one side when engaging or disengaging an electrical circuit breaker to avoid electrical flash backs.

1.13 It's strongly advisable to use GFCI with all portable electric tools at any time.

1.14 A cord should not be pulled or dragged over nails, hooks, or other sharp objects that may cause cuts in the insulation. In addition, cords should never be placed on radiators, steam pipes, walls, and windows. Particular attention should be placed on connections behind furniture, since files and bookcases may be pushed tightly against electrical outlets, severely bending the cord at the plug.

1.15 Disconnect electrical equipment before cleaning, adjusting, or applying flammable solutions. If a guard is removed to clean or repair parts, replace it before testing the equipment and returning the machine to service.

1.16 Only authorized persons are permitted to activate, de-activate or lockout electrical equipment.

1.17 Where there is or may be a danger to a worker, from the inadvertent operation of electrical equipment, then that equipment must be locked out and tagged prior to commencing work.

1.17.1 Switch off all appropriate devices (MCC, Distribution Panel, Disconnect).

1.17.2 Lock and tag Electrical Supply devices in the “OFF” position.

1.17.3 Test to be sure the equipment cannot be operated at the STOP-START switch.

1.17.4 Test to be sure electrical equipment is de-energized.

1.17.5 After completion of task, remove padlocks and destroy tags.

2.0 Inspection

2.1 Inspect tools for any damage prior to each use.

2.2 Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.

2.3 Ensure that the tools are properly grounded using a 3-prong plug, are double-insulated (and are labeled as such), or are powered by a low-voltage isolation transformer; this will protect users from an electrical shock.

2.4 Check electric tools to ensure that a tool with a 3-prong plug has an approved 3-wire cord and is grounded. The 3-prong plug should be plugged in a properly grounded 3-pole outlet. If an adapter must be used to accommodate a 2-hole receptacle, the adapter wire must be attached to a known, functioning ground. Never remove the third, grounding prong from a plug.

2.5 Check the handle and body casing of the tool for cracks or other damage.

2.6 If the tool has auxiliary or double handles, check to see that they installed securely.

2.7 Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.

2.8 Any tool with a spring-operated trigger switch shall be fully functional.

2.9 Check for damaged switches and ones with faulty trigger locks.

2.10 Inspect the plug for cracks and for missing, loose or faulty prongs.

2.11 If a tool is defective, remove it from service, and tag it clearly “Out of service for repair.” Replace damaged equipment immediately – do not use defective tools “temporarily.” DO NOT ATTEMPT FIELD REPAIRS.

3.0 Battery Powered Tools

3.1 Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.

3.2 Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.

3.3 Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.

3.4 Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting out the battery and possibly cause sparks, fires or burns.

4.0 Using Electric Tools

4.1 Switch off the tools before connecting them to a power supply.

4.2 If a power cord feels more than comfortably warm or if a tool is sparking excessively, have it checked by an electrician or other qualified person.

4.3 Disconnect the power supply before making adjustments or changing accessories.

4.4 Remove any wrenches and adjusting tools before turning on a tool.

4.5 Inspect the cord for fraying or damage before each use. Tag defective tools clearly with an “Out of Service” tag and replace immediately with a tool in good running order.

4.6 During use, keep power cords clear of tools and the path that the tool will take.

4.7 Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.

4.8 Use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.

4.9 For outdoor work, use outdoor extension cords marked “W-A” or “W.”

4.10 Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.

4.11 Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.

4.12 Pull the plug not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug - an electrical shock to the operator may result.

4.13 Keep power cords away from heat, water, oil, sharp edges and moving parts. They can damage the insulation and cause a shock.

4.14 Avoid accidental starting by ensuring the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.

4.15 Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.

4.16 Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.

4.17 Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.

4.18 Do not use electric tools in wet conditions or damp locations unless tool is connected to a ground fault circuit interrupter (GFCI).

4.19 Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood for getting an electric shock.

4.20 Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.

4.21 Do not plug several power cords into one outlet by using single-to-multiple outlet adapters or converters (“cube taps”).

4.22 Do not use light duty power cords.

4.23 Do not connect or splice extension cords together to make a longer connection: the resulting extension cord may not be able to provide sufficient current or power safely.

4.24 Do not carry electrical tools by the power cord.

4.25 Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.

4.26 Never break off the third prong on a plug: replace broken 3-prong plugs and make sure the third prong is properly grounded.

4.27 Never use extension cords as permanent wiring; use extension cords only as a temporary power supply to an area that does not have a power outlet.

4.28 Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.

4.29 Do not brush away sawdust, shavings or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.

4.30 Do not operate tools in an area containing explosive vapors or gases.

4.31 Do not clean tools with flammable or toxic solvents.

4.32 Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.

5.0 Belt Sanders

5.1 Wear safety glasses.

5.2 Make sure the sander is switched “OFF” before connecting the power supply.

5.3 Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.

5.4 Inspect sanding belts before using them. Replace those belts that are worn or frayed.

5.5 Install sanding belts that are the same widths as the pulley drum.

5.6 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.

5.7 Secure the sanding belt in the direction shown on the belt and the machine.

5.8 Keep hands away from a sanding belt.

5.9 Use two hands to operate sanders – one on a trigger switch and the other on a front handle knob.

5.10 Keep all cords clear of sanding area during use.

5.11 Clean dust from a motor and vents at regular intervals.

5.12 Do not use a sander without an exhaust system or a dust collector present that is in good working order. Empty the collector when 1/4 full. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.

5.13 Do not exert excessive pressure on a moving sander. The weight of the sander supplies adequate pressure for the job.

5.14 Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stock into place or use a “stop block” to prevent movement.

5.15 Do not overreach. Always keep proper footing and balance.

5.16 Do not cover the air vents of the sander.

6.0 Drills

6.1 Wear safety glasses.

6.2 Keep drill air vents clear to maintain adequate ventilation.

6.3 Always keep drill bits sharp.

6.4 Keep all cords clear of the cutting area during use. Inspect for frays or damage before each use.

6.5 Disconnect power supply before changing or adjusting bit or attachments.

6.6 Tighten the chuck securely. Remove chuck key before starting drill.

6.7 Secure workpiece being drilled to prevent movement.

6.8 Slow the rate of feed just before breaking through the surface.

6.9 Drill a small “pilot” hole before drilling large holes.

6.10 For small pieces, clamp stock so work will not twist or spin. Do not drill with one hand while holding the material with the other.

6.11 Do not use a bent drill bit.

6.12 Do not exceed the manufacturer’s recommended maximum drilling capacities.

6.13 Do not use a hole saw cutter without the pilot drill.

6.14 Do not use high speed steel (HSS) bits without cooling or using lubrication.

6.15 Do not attempt to free a jammed bit by starting and stopping the drill. Unplug the drill and then remove the bit from the work piece.

6.16 Do not reach under or around stock being drilled.

6.17 Do not overreach. Always keep proper footing and balance.

6.18 Do not raise or lower the drill by its power cord.

7.0 Planers

7.1 Wear safety glasses.

7.2 Disconnect the planer from the power supply before making any adjustments to the cutter head or blades.

7.3 Use blades of the same weight and set at the same height.

7.4 Ensure that the blade-locking screws are tight.

7.5 Remove adjusting keys and wrenches before turning on power.

7.6 Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.

7.7 Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.

7.8 Start a cut with the infeed table (front shoe) resting firmly on the stock and with the cutter head slightly behind the edge of the stock.

7.9 Use two hands to operate a planer - one hand on the trigger switch and the other on a front handle.

7.10 Do not put your finger or any object in a deflector to clean out chips while a planer is running.

7.11 Disconnect the power supply when stopping to dump out chips.

7.12 Do not set a planer down until blades have stopped turning.

7.13 Keep all cords clear of cutting area.

8.0 Routers

8.1 Wear safety glasses.

8.2 Disconnect the power supply before making any adjustments or changing bits.

8.3 Ensure that the bit is securely mounted in the chuck and the base is tight.

8.4 Put the base of the router on the work, template or guide. Make sure that the bit can rotate freely before switching on the motor.

8.5 Secure stock. Never rely on yourself or a second person to support or hold the material. Sudden torque or kickback from the router can cause damage and injury.

8.6 Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.

8.7 Keep all cords clear of cutting area.

8.8 Always hold both hands on router handles, until a motor has stopped. Do not set the router down until the exposed router bit has stopped turning.

8.9 Do not overreach. Keep proper footing and balance.

8.10 When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower the bit to two times the required depth.

8.11 When routing outside edges, guide the router counter clockwise around the work.

8.12 When routing bevels, moldings and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.

8.13 Feed the router bit into the material at a firm, controlled speed.

8.14 With softwood, you can sometimes move the router as fast as it can go. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.

8.15 The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise.

8.16 When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.

8.17 To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

9.0 Circular Saws

9.1 Wear safety glasses and hearing protection.

9.2 Check the retracting lower blade guard to make certain it works freely.

9.3 Ensure that the blade that you have selected is sharp enough to do the job. Sharp blades work better and are safer.

9.4 Check the saw for proper blade rotation.

9.5 Set the depth of the blade, while the saw is unplugged, and lock it at a depth so that the lowest tooth does not extend more than about 1/8 inch beneath the wood.

9.6 Keep all cords clear of cutting area.

9.7 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.

9.8 Check the retracting lower blade guard frequently to make certain it works freely. It should enclose the teeth as completely as possible, and cover the unused portion of the blade when cutting.

9.9 Check that the retracting lower blade guard has returned to its starting position before laying down the saw.

9.10 Keep upper and retracting lower blade guard clean and free of sawdust.

9.11 Disconnect power supply before adjusting or changing the blade.

9.12 Allow the saw to reach full power before starting to cut.

9.13 Use two hands to operate saws - one on a trigger switch and the other on a front knob handle.

9.14 Keep the motor free from accumulation of dust and chips.

9.15 Select the correct blade for stock being cut and allow it to cut steadily. Do not force it.

9.16 Secure work being cut to avoid movement.

9.17 Do not hold or force the retracting lower guard in the open position.

9.18 Do not place your hand under the shoe or guard of the saw.

9.19 Do not over tighten the blade-locking nut.

9.20 Do not twist the saw to change, cut or check alignment.

9.21 Do not use a saw that vibrates or appears unsafe in any way.

9.22 Do not force the saw during cutting.

9.23 Do not cut materials without first checking for obstructions or other objects such as nails and screws.

9.24 Do not carry the saw with a finger on the trigger switch.

9.25 Do not overreach. Keep proper footing and balance.

9.26 Do not rip stock without using a wedge or guide clamped or nailed to the stock.

10.0 Other Saws

10.1 Wear safety glasses.

10.2 Disconnect power supply before changing or adjusting blades.

10.3 Use lubricants when cutting metals.

10.4 Keep all cords clear of cutting area.

10.5 Position the saw beside the material before cutting and avoid entering the cut with a moving blade.

10.6 Make sure guards, if present, are installed and are working properly.

10.7 Remember sabre saws cut on the upstroke.

10.8 Secure and support stock as close as possible to the cutting line to avoid vibration.

10.9 Keeps the base or shoe of the saw in firm contact with the stock being cut.

10.10 Select the correct blade for the material being cut and allow it to cut steadily. Do not force it. Clean and sharp blades operate best.

10.11 Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.

10.12 Do not start cutting until the saw reaches its full power.

10.13 Do not force a saw along or around a curve. Allow the machine to turn with ease.

10.14 Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.

10.15 Do not put down a saw until the motor has stopped.

10.16 Do not reach under or around the stock being cut.

10.17 Maintain control of the saw always. Avoid cutting above shoulder height.

10.18 **External Cuts**

10.18.1 Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.

10.18.2 Hold the saw firmly down against the material and switch the saw on.

10.18.3 Feed the blade slowly into the stock, maintaining an even forward pressure.

10.19 **Internal Cuts**

10.19.1 Drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade in the hole until the shoe rests firmly on the stock.

10.19.2 Do not let the blade touch the stock until the saw has been switched on.

S3NA-306-PR Highway and Road Work

1.0 Purpose and Scope

1.1 To address potential hazards that may occur during highway construction and during work within the right of way of a public or private roadway.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Personal Protective Equipment (PPE)**: Safety clothing and equipment worn by workers in traffic areas to provide protection and heightened visibility from physical hazards including moving vehicles and construction equipment.

2.2 **Traffic areas**: Any work area where workers are located within 20 feet of moving traffic, existing or anticipated.

2.3 **Traffic Control Plan**: A written document containing drawings and text that describes the physical controls to be established to isolate workers from moving vehicles.

2.4 **WOF:** Workers on foot.

3.0 Attachments

3.1 S3NA-306-FM Equipment Checklist

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project/Lead Manager or Resident Engineer** is responsible for administering the procedure and for determining the measures and configuration of the temporary traffic control zone in accordance with specifications for workers, motorists, and pedestrians and the protection of AECOM employees within the contract. The Lead Manager will also see that employees assigned to work in traffic areas are trained in the use of traffic control systems and PPE.

4.1.2 **Site Safety Coordinator** is responsible to the lead manager for the implementation of safety and the internal traffic control plan within a highway construction/demolition worksite. The Site Safety Coordinator will

- Be responsible for traffic safety coordination on office projects.
- Be appointed by each office that has any field work involving AECOM staff working in or near traffic. This is not a dedicated role and may be a committee member.
- Receive training in the requirements of the governing transportation authority and the applicable OH&S legislation through training sanctioned by the respective authorities.
- Be involved in conducting hazard assessments, developing the mitigating strategies and Safe Job Procedures, and reviewing their implementation for any project where traffic is identified as a hazard to our team members.

4.2 Personal Protective Equipment

4.2.1 High visibility safety vest /apparel

4.2.2 Retro-reflective stripes (for night work)

4.2.3 Protective headwear (hard hat)

4.2.4 Two-way radio or other means of effective communication

4.2.5 Traffic Accommodation equipment, as required by the traffic protection plan:

- A rooftop beacon light for the vehicle, where required
- Pylons, Glo-posts, flags, barricades and/or flagging tape, warning lights, flashing light boards
- Signage
- Flagging equipment, as required:
  - Daytime:
    - Flag person's "Stop and Slow" paddle
    - A blaze orange flag person's vest over white coveralls
    - Safety head protection (hard hat)
    - Drinking water
    - Bug repellent and/or sun screen as conditions warrant
    - Optional radio communication (if required)
  - Night time (additional requirements):
    - A retro-reflective "Stop and Slow" paddle
    - A flashlight fitted with a red signaling baton
    - Flashing yellow beacons set up in advance of the flag person

4.3 Restrictions

4.3.1 Applicable legislated requirements governing all aspects of traffic safety, including directing traffic, signage, PPE, traffic control devices in temporary construction, maintenance and utility work zones, will be reviewed in preparation for the site-specific traffic accommodation.

4.3.2 No personnel will be allowed onto the site without first reviewing the project-specific traffic protection plan.

4.4 Training

4.4.1 All staff will receive on-site orientation to the hazards and controls.

4.4.2 Only staff with appropriate flag person training will act as a flag person.

4.5 Traffic Control Plan

4.5.1 Transportation incidents and workers struck by vehicles or mobile equipment account for many fatal construction work injuries. Workers in highway construction activities including flagging, demolition, surveying, utility, clean-up, emergency responders, and others in areas where traffic exists are exposed to being struck by moving vehicles. Work zones are used to move traffic in an approved direction and are typically identified by signs, cones, barrels, and barriers.

4.5.2 The procedures appropriate for work in traffic areas will vary depending on the work environment. Very simple procedures are needed in an inactive parking lot, and more complex procedures are needed when working in a construction zone on a highway. Each AECOM project team shall prepare a project HASP or SWP addressing traffic controls and worker protection appropriate for the team's project and exposures. Plans shall address the following if applicable:

- Attenuator vehicles
- Closures within a closure
- Communications
- Driving: seatbelts and rollover protection should be used on equipment and vehicles as stated by the manufacturer
- Night operations and work within traffic controls
- PPE
- Sanitation

- Traffic control plans and permits
- Training
- Work zone protections: various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck mounted attenuators are available to limit motorist intrusions into the construction work zone
- Worker: heavy equipment interface

4.5.3 A Traffic Control Plan will be completed for the movement of vehicles in areas where workers are conducting other tasks.

4.5.4 Drivers, workers on foot (WOF), and pedestrians will be able to see and understand the routes they are to follow.

4.5.5 Where there are several projects, coordinated vehicle routes and communication between contractors will reduce vehicular struck-by incidents.

4.5.6 Hazard identification and plan development shall be performed in accordance with this procedure. The plans shall include the identification of the responsibility for personnel and implementation of the safety program under highway construction activities.

4.5.7 Other requirements for supporting activities such as excavations, heavy equipment usage, personal protective equipment, etc. shall be applicable and addressed in accordance with other Standard Operating Procedures.

- A traffic protection plan will be an integral part of the Health and Safety Plan (HASP) or Safe Work Plan (SWP) whenever staff will be exposed to the hazards of vehicular traffic during project work (this may include surveys, drilling and soils inspections, bridge or overpass inspections, inspection of roadway construction projects).
- Work duration, road width, and traffic volume are some of the key considerations to be contemplated when designing a traffic protection plan. The traffic protection plan will address the specific vehicular hazards and describe the measures that will be implemented to protect employees.
- Traffic accommodation plans will be developed in consultation with a qualified supervisor or manager experienced in traffic control. In addition, a supervisor will be designated to oversee the implementation of the protection plan until work is completed.
- OH&S regulations and associated standards or guidebooks provide instruction on the use of traffic control devices in temporary construction, maintenance, and utility work zones for worker and motorist safety and to minimize the disruption of traffic flow.
- Schedule work to avoid periods of heavy traffic.
- Alert traffic of work ahead, by placing signs or cones well ahead of the work area.
- If the work area is being managed under a Traffic Control Plan or Traffic Accommodation Plan, obtain copies of these plans before commencing work.
- Traffic accommodation that is adequate in good weather conditions and daylight may not be adequate under adverse weather conditions and/or hours of darkness. Reassess the accommodation based on conditions.
- Traffic accommodation will be planned to provide safe conditions for the protection and safe passage of motorists, pedestrians, and employees at all work sites. It will include all areas located within the traveled portion of a roadway including shoulders, ditches, and boulevards.

4.6 Short-Term Traffic Protection

4.6.1 Always wear the appropriate PPE to maintain your visibility to vehicular traffic. Wear a tear-away fluorescent reflective vest (and retro-reflective stripes on the arms and legs for night work or during periods of limited visibility) at all times.

4.6.2 Pull your vehicles off as far to the right of the traveled portion of the road as possible. Confirm that the shoulder of the highway or street where you will park your vehicle is wide enough to allow for safe access to and egress from the vehicle.

4.6.3 Always park your vehicle at least 30 metres from the flag person station. The vehicle should be positioned between the flag person and the work crew.

4.6.4 Activate the four-way flashers for your vehicle prior to exiting the vehicle.

4.6.5 Plan an escape route prior to exiting the vehicle.

4.6.6 Load and unload materials or equipment from the passenger side of the vehicle.

4.6.7 Avoid turning your back to oncoming traffic.

4.6.8 Be aware of mobile equipment that may be operating in the work area.

4.6.9 Do not enter onto the traveled portion of the road except to cross the road. Road crossings should be made at a 90 degree angle to the direction of the road.

4.7 Long-Term Traffic Protection

4.7.1 Traffic accommodation will be provided BEFORE the work starts and will be maintained until the work is completed. This may mean 24 hours a day, 7 days a week.

4.7.2 Generally, for long-term duration work activities that are performed at construction projects, the Constructor for the project is required to develop a traffic protection plan.

4.7.3 If AECOM has assumed the role of Constructor for the project, the traffic protection plan will be developed and implemented prior to the commencement of work activities at the project.

4.7.4 If AECOM is not the Constructor for the project, the traffic protection plan for the project will be developed by our Client or a Constructor designated by the Client.

4.7.5 The traffic protection plan should be reviewed with AECOM employees during orientation to the Project. If the traffic protection plan is not discussed at the project-specific orientation, employees should discuss the issue with the Site Supervisor or Client contact for the Project.

4.8 Signage

4.8.1 Standard highway signs for information, speed limits, and work zones will assist drivers in identifying designated traffic paths.

4.8.2 Provide appropriate instructional signage such as: EVACUATION ROUTE; DO NOT ENTER; REDUCED SPEED AHEAD; ROAD CLOSED; and NO OUTLET.

4.8.3 Using standard highway signs for internal construction worksite traffic control will assist workers in recognizing the route they are to use at the construction site.

4.8.4 Traffic Signs

- Signage will be of acceptable standards, in good condition, clean, legible, and suited to the purpose.
- Signage will be secured or weighted.
- Routinely inspect signage for placement, cleanliness, and physical damage.
- Cover road traffic control signage when no activity is present.

4.9 Traffic Control Devices

4.9.1 Standard traffic control devices, signals, and message boards will instruct drivers to follow a path away from where work is being done.

4.9.2 The authority in charge will determine the approved traffic control devices such as cones, barrels, barricades, and delineator posts that will be used as part of the traffic control plan.

4.9.3 These standard devices should also be used inside the work zone.

4.10 Work Zone Protections

4.10.1 Various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck-mounted attenuators shall be used to limit motorist intrusions into the construction work zone, as appropriate.

4.10.2 All AECOM staff shall be made aware of controls established by the Contractor.

4.10.3 AECOM staff shall wear the required safety equipment at all times including a hard hat, work boots, eye protection, and a high-visibility safety vest as a minimum and shall observe all project rules and requirements.

4.10.4 In the absence of a contractor, when AECOM staff are in the field alone—e.g., investigations, surveys—all appropriate DOT traffic control standards and devices shall be observed and placed in position.

4.10.5 The work zone shall be made safe by its separation from traffic.

4.11 Flagging

4.11.1 Flaggers and others providing temporary traffic control will wear high visibility clothing with a background of fluorescent yellow-green or orange-red and white, silver, yellow-green, orange, or yellow retro-reflective material.

4.11.2 In areas of traffic movement, PPE will make the worker visible for at least 1,000 feet so that the worker can be seen from any direction and will make the worker stand out from the background. Check the label or packaging to confirm that the garments are performance Class 2 or 3 (class requirement may be project-specific).

4.11.3 Drivers should be warned in advance with signs that there will be a flagger ahead.

4.11.4 Flaggers should use STOP/SLOW paddles, paddles with lights, or flags (flags should be used only in emergencies.). The STOP sign should be octagonal with a red background and white letters and border. The SLOW sign should be octagonal with an orange background and black letters and a border.

4.11.5 Flag Persons

- A traffic control person (flag person) will stand in a safe position, preferably on the driver's side of the lane under control, be clearly visible, have an unobstructed view of approaching traffic, and be positioned at least 25 m (80 ft) away from the work area unless circumstances or space requirements, such as working at or near an intersection, dictate otherwise.
- Flag persons will be trained and competent and will use appropriate PPE.
- Flag persons will be instructed in traffic control and flagging procedures, will be provided with sufficient breaks, and will not be permitted to work alone for extended periods as per local regulations.
- Flag persons will not get involved in needless conversation and will stay alert at their points of duty until relieved.
- Except for brief flagging operations, or in an emergency, "Flag Person Ahead" signs will be posted in advance of each flag person's station. Such signs will be removed promptly when the flagging operation terminates.

4.12 Lighting

4.12.1 Flagger stations should be illuminated. Lighting for workers on foot and equipment operators is to be at least 5 foot-candles or greater.

4.12.2 Where available lighting is not sufficient, flares or chemical lighting should be used.

4.12.3 Glare affecting workers and motorists should be controlled or eliminated.

4.13 Training

4.13.1 Flaggers should be trained/certified and will use the signaling methods required by the authority in charge.

4.13.2 WOF, equipment operators, and drivers in internal work zones need to know the routes that construction vehicles will use.

4.13.3 Equipment operators and signal persons need to know the hand signals used on the worksite.

4.13.4 Operators and WOF need to know the visibility limits and the "blind spots" for each vehicle on site.

4.13.5 WOF should wear high visibility safety garments designated as Class 1, 2 or 3.

4.13.6 Workers should be made aware of the ways in which shift work and night work may affect their performance.

4.14 Driving

4.14.1 Seatbelts and rollover protection will be used on equipment and vehicles as stated by the manufacturer.

4.14.2 When pulling off to the side of the road, AECOM personnel will park their vehicles at minimum of 20 feet or the width of two traffic lanes from moving traffic.

4.15 Night Operations and Work Within Traffic Controls

4.15.1 Night work on roadways should not be done unless absolutely necessary and unless the work area is adequately lit.

4.15.2 Operations with night activities will have a written plan that addresses the safety issues of working at night. The plan will address, but is not limited to:

- Reflectivity
  - All equipment used in the work zone shall have DOT-approved reflective material placed to increase the visibility of the equipment.
  - All reflective surfaces shall be cleaned as required so that the reflectivity of the material is not degraded. Any areas of reflective surface that is damaged or obscured will be replaced.
  - Personnel working at night will have reflective tape on their hardhats and will wear retro-reflective vests at a minimum. The reflective bands on vests will be vertical and horizontal around the entire upper body.
  - Additional measures such as white disposable coveralls, reflective bands, and personal battery-operated strobe lights may be used when practical.
- Illumination
  - Whenever feasible and practical, light plants will be used to illuminate the work area.
  - On mobile operations, additional lighting on equipment may be used to illuminate the work area.
  - All equipment shall, at a minimum, have working strobe or warning beacon lights.
  - All equipment shall have working lights confirmed through daily visuals.
  - All flag persons will be placed in illuminated areas only.
  - All lighting is to be checked after setup to confirm that it is not blinding approaching traffic or other equipment in the work zone.
- Hazard Analysis and Communication
  - Prior to the start of any night operation, a detailed Hazard Analysis will be made addressing the possible hazards of night work. The Hazard Analysis will be reviewed with the crews and updated as needed. At the start of each shift, the Daily Safety Reminder will be used to reaffirm the provisions of the night work requirements as found in the hazard analysis and this policy.
  - The hazard analysis should also provide for:
    - The selection of a competent person responsible for maintaining surveillance on the work area to alert other workers of vehicles encroaching on the work zone.
    - A method to signal workers when vehicles encroach on the work zone.
    - A system to account for workers at all times, which may include a buddy system.
    - Emergency communication or warning signals used by a worker such as a radio, signal horn, or whistle, which will be used to call for help.

4.16 Attenuator Vehicles

4.16.1 Although not required, it is good construction practice to place an attenuator truck or pick-up truck (minimum) immediately ahead of workers in a work zone.

4.16.2 The vehicle of choice should be placed to provide the best protection for workers.

4.16.3 The tires should be placed so that when struck the vehicle will turn away from workers.

4.17 **Closures within a Closure**

4.17.1 On occasion, satellite operations may be performed under full freeway traffic closures. For this type of work, special precautions referred to as a "closure within a closure" is to be implemented in accordance with the following:

- Posted speed limits within closures should be set at 15 miles per hour.
- Signs are to be installed approximately 250 feet in advance of and behind the work zone to alert drivers who may approach from either direction of the upcoming work zone.
- The work area is to be completely delineated with Type 1 barricades (candlesticks).
- Any vehicle used for AECOM field work shall be equipped with a functioning rotating beacon placed on the roof of the vehicle.

5.0 Records

5.1 Traffic Protection Plans and completed Equipment Checklists will be maintained in project files.

6.0 References

6.1 The following standards apply to traffic accommodation equipment.

Association	Standard
Transportation Association of Canada	Manual of Uniform Traffic Control Devices for Canada (1998)

S3NA-306-FM Equipment Checklist

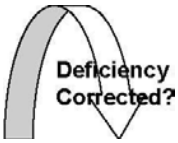
Name of Contractor:

Location: Project #:

Date: Time: Weather:

Person Conducting Inspection: Title:

*Note: As you conduct your inspection you should be able to answer each question with a **YES**. If the answer to any question is **NO,** this deficiency should be corrected as soon as possible.*



	YES	NO	OK	N/A
Are accident prevention signs, tags clearly visible?	☐	☐	☐	☐
Are danger signs used where immediate hazards exist?	☐	☐	☐	☐
Are caution signs used to warn against potential hazards or to caution against unsafe practices?	☐	☐	☐	☐
Are exit signs posted at all exit locations?	☐	☐	☐	☐
Are proper visual warning signs posted prior to (in advance of) the work area?	☐	☐	☐	☐
Are flaggers provided with signs, signals, and barricades to provide the necessary protection?	☐	☐	☐	☐
Are flaggers using red lights when signaling during periods of darkness?	☐	☐	☐	☐
Are flaggers wearing highly visible warning garments?	☐	☐	☐	☐
Are the flaggers trained in proper flagging procedures?	☐	☐	☐	☐
Are warning garments worn at night reflectorized?	☐	☐	☐	☐
Are highly visible flags used by the flaggers at least 18 inches square?	☐	☐	☐	☐
Are barricades used to totally obstruct the passage of people and vehicles to protect the work area?	☐	☐	☐	☐
Do barricades meet the requirements set forth in the Manual of Uniform Traffic Control Devices? (MUTCD)	☐	☐	☐	☐

COMMENTS:

S3NA-307-PR Housekeeping, Worksite

1.0 Purpose and Scope

1.1 This procedure provides AECOM's work practices as well as personal hygiene and work site sanitation standards for housekeeping.

1.2 Applies to all AECOM North America-based staff and field worksites.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager (Field Task Manager, Supervisor)** is responsible for the procedure's implementation and the details of addressing housekeeping policy within the construction/demolition worksite.

4.1.2 **SH&E Department** personnel will monitor, assess, and report on project housekeeping when visiting locations.

4.1.3 **Employees** are responsible for reporting any areas of concern to the Site Supervisor for prompt resolution as well as for maintaining worksites that are free from debris, clutter, and slipping or tripping hazards.

4.2 Smoking, Eating, and Drinking

4.2.1 Eating and drinking will be permitted in designated areas at AECOM project sites and as specified on client sites. Smoking will be permitted only in areas designated in compliance with applicable local laws, regulations, legislation, and ordinances, by the Field Supervisior and situated in locations that are not in the immediate vicinity of activities associated with work site activities. Additionally, Field Supervisior will designate each smoking area giving primary consideration to those personnel who do not smoke.

4.2.2 Personnel 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).

4.2.3 Site personnel will first wash hands and face after completing work activities and prior to eating or drinking.

4.3 Water Supply

4.3.1 Water supplies will be available for use on site and will comply with the following requirements:

4.3.2 Potable Water: An adequate supply of drinking water will be available for site personnel consumption. Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources.

4.3.3 Nonpotable Water: Nonpotable water will not be used for drinking purposes. Nonpotable 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 nonpotable water used will be properly identified and labeled as such.

4.4 Toilet Facilities

4.4.1 Toilet facilities will be available for site personnel and visitors. Should subcontractor personnel be located on-site for extended periods, it may become necessary to obtain temporary toilet facilities.

Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

4.4.2 A minimum of one toilet will be provided for every 20 site personnel, with separate toilets maintained for each sex, except where there are less than five total personnel on site. For mobile crews where work activities and locations permit use of nearby toilet facilities (e.g., gas station, or rest stop), on-site facilities are not required.

4.4.3 Washing Facilities

4.4.4 Hand and Face: Site personnel will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

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

4.5 Clothing and Personal Protective Equipment (PPE)

4.5.1 All PPE will be kept clean at all times and maintained in accordance with the manufacturer's, AECOM's. and applicable regulatory, legislative, or provincial requirements.

4.5.2 General Work Areas

4.5.3 At all times work areas will be kept free of dirt and debris that may impact the safety of site personnel and visitors. All trash receptacles will be emptied regularly.

4.5.4 Break Areas and Lunchrooms

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

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

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

4.5.7 Perishable foods will be refrigerated whenever possible.

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

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

4.5.10 Refrigerators used to store food items will be maintained at 45 degrees Fahrenheit and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labeled as such so that only food and drinks are stored within the refrigerator.

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

4.6 Vermin Control

4.6.1 Every enclosed workplace shall be constructed, equipped, and maintained, so far as reasonably practicable, to prevent the entrance or harborage of rodents, insects, and other vermin.

4.6.2 A continuing and effective extermination program shall be instituted where the presence of rodents, insects, or other vermin is detected.

4.7 General Housekeeping

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

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 present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip, and fall hazards to a minimum.

4.7.4 Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal.

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

4.7.6 Material and equipment must be placed, stacked, or stored in a stable and secure manner. Stacked material or containers must be stabilized as necessary by interlocking, strapping, or other effective means of restraint to protect the safety of workers.

4.7.7 An area in which material may be dropped, dumped, or spilled must be guarded to prevent inadvertent entry by workers or protected by adequate covers and guarding.

4.7.8 Floors, platforms, ramps, stairs, and walkways available for use by workers must be maintained in a state of good repair and kept free of slipping and tripping hazards. If such areas are taken out of service, the employer must take reasonable means for preventing entry or use.

4.7.9 Hazardous areas not intended to be accessible to workers must be secured by locked doors or equivalent means of security and must not be entered unless safe work procedures are developed and followed.

4.8 **Worksite Offices and Trailers**

Worksite offices and trailers will be maintained in accordance with *S3NA-103-PR Housekeeping, Office.*

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-308-PR Manual Lifting, Field

1.0 Purpose and Scope

1.1 This procedure provides the requirements for use when performing manual materials handling activities (e.g., lifting/handling of items or materials).

1.2 This procedure applies to all field staff for AECOM North America-based operations.

2.0 Terms and Definitions

2.1 **Manual Materials Handling:** Moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

2.2 **Team Handling:** Team handling occurs when more than one person is involved during the lift.

3.0 Attachments

3.1 S3NA-308-WI Manual Lifting Safe Work Practices

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 The **Project Manager** will effectively implement the procedure, providing resources as required, and providing direction on proper lifting/handling techniques.

4.1.2 The **Region SH&E Manager** will assist in identifying activities with a high potential for lifting/handling strains/injuries as well as the associated mitigation strategies and training on proper lifting/manual materials handling techniques.

4.1.3 **Employees** are responsible for reviewing and following *S3NA-308-WI Manual Lifting Safe Work Practices*.

4.2 Mechanical Controls

4.2.1 Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are preferable to be used whenever possible rather than the employee physically moving materials.

4.2.2 Mechanical assistance will be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists.

4.2.3 Objects to be moved will be secured to prevent falling and properly balanced to prevent tipping.

4.3 Administrative Controls

4.4 When significant, sustained lifting work is required, it is desirable to rotate employees to spread the work load among several people and thereby avoid fatigue.

4.5 Rotation is not simply performing a different job but instead is performing a job that utilizes a completely different muscle group from the ones that have been overexerted.

5.0 Records

5.1 None

6.0 References

6.1 OSHA Technical Manual: http://www.osha.gov/dts/osta/otm/otm_vii/otm_vii_1.html

6.2 National Safety Council: www.nsc.org

S3NA-308-WI Manual Lifting Safe Work Practices

1.0 General

1.1 Before Performing a Lift:

1.1.1 Check to see if mechanical aids such as hoists, lift trucks/dollies, or wheelbarrows are available.

1.1.2 Do not lift if you are not sure that you can handle the load safely.

1.1.3 Confirm that, based on your own physical capabilities and medical limitations, you can lift the load without overexertion. Get help with heavy or awkward loads.

1.1.4 Confirm that the load is “free” to move.

1.1.5 Check that the planned destination of the load is free of obstacles and debris.

1.1.6 Confirm that the path to the planned destination of the load is clear. Grease, oil, water, litter, and debris can cause slips and falls.

1.1.7 Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, and sheet materials like metal or glass). See Section 2.0 for additional guidance.

1.2 General Tips for Lifting

1.2.1 Prepare for the lift by warming up the muscles.

1.2.2 Make certain that your balance is good. Feet should be shoulder width apart, with one foot beside and the other foot behind the object that is to be lifted.

1.2.3 Bend the knees; do not stoop. Keep the back straight, but not vertical. There is a difference. Tucking in the chin straightens the back.

1.2.4 Grip the load with the palms of your hands and your fingers. The palm grip is much more secure. Tuck in the chin again to make certain your back is straight before starting to lift.

1.2.5 Use your body weight to start the load moving, then lift by pushing up with the legs. This makes full use of the strongest set of muscles.

1.2.6 Keep the arms and elbows close to the body while lifting.

1.2.7 Carry the load close to the body. Do not twist your body while carrying the load. To change direction, shift your foot position and turn your whole body.

1.2.8 Watch where you are going!

1.2.9 To lower the object, bend the knees. Do not stoop. To deposit the load on a bench or shelf, place it on the edge and push it into position. Confirm that your hands and feet are clear when placing the load.

1.3 Engineering Controls:

1.3.1 Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.

1.3.2 Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body—such as adjusting the height of a pallet or shelf.

1.3.3 Work methods and stations should be designed to minimize the distance between the person and the object being handled.

1.3.4 High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.

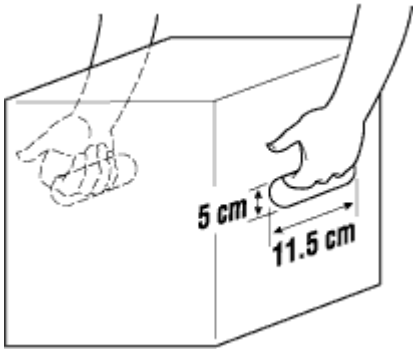
1.3.5 Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported seated posture. Bending the upper body and spine to reach into a bin or container is highly

undesirable. The bins should be elevated, tilted, or equipped with collapsible sides to improve access.

1.3.6 Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors.

1.3.7 Store heavy objects at waist level.

1.4 Whenever possible, utilize hand holds or other lifting attachments on objects being handled:



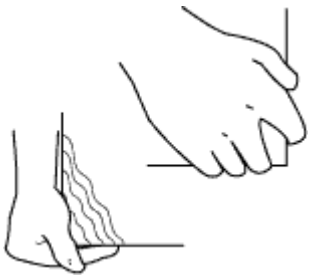
1.4.1 Use the “hook grip” on loads with cut-out handholds.

1.4.2 Curl your fingers around the edge.

1.4.3 Do not hold the load with your fingertips.

1.4.4 Use containers with handles located more than halfway up the side of the container.

1.4.5 Use the “ledge grip” to handle regularly shaped objects without handles.



1.4.6 Use vacuum lifters to handle sheet materials or plates.

1.4.7 Hold the object with hands placed diagonally.

1.4.8 Wear gloves where practical.

2.0 Specific Handling Techniques

The following guidance will be used when performing manual materials handling for various types of materials.

2.1 Square or Rectangular Objects

2.1.1 Place one foot slightly in front of the other.

2.1.2 Squat as close to the object as possible.

2.1.3 Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.

2.1.4 Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight, and tuck in the chin.

2.1.5 Test to confirm that the object is loose from floor and will lift without snagging.

2.1.6 Straighten the legs, keeping the backbone straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.

2.1.7 If turning or change of direction is required, turn with feet without twisting the torso and step in the direction of travel.

2.1.8 To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

2.2 Cylindrical Objects

2.2.1 When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible. Rolling must be controlled by chute, tagline, or other means of limiting acceleration. Workers must not be positioned downhill from rolled objects. Use of the legs for pushing and tagline control of rolled objects must be stressed.

2.2.2 Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus maintaining balance and a steady, controlled, forward motion. Motion must be controlled so that ceasing to walk and moving the hands will stop forward motion.

2.2.3 Use carts or tracks to transport cylinders. Make sure that two people transport a cylinder if carts cannot be used, use lifting straps to improve grip.

- Technique for one person lifting a cylinder onto a platform:
  - Roll the cylinder to within 3 feet of the platform.
  - Position the forward foot around the cylinder, the back foot about 1 foot behind the cylinder.
  - Bend knees slightly.
  - Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot from the ground.
  - Tilt the cylinder onto the thigh of the back leg.
  - Balance the cylinder on the thigh by pressing down with the back hand while lifting the cylinder with the forward hand.
  - Extend both knees to initiate forward movement of the cylinder and continue by pushing up and forward with the arms until the cylinder is located on the platform.
  - Climb on the platform.
  - Straddle the cylinder at the valve end.
  - Grasp the valve protective cap of the cylinder with both hands between the thighs.
  - Lean forward and straighten the knees to set the cylinder upright.

2.3 Bags and Sacks

2.3.1 The best way to handle a bag depends on its size, weight, and how far it is to be carried. When lifting, remember to

- Straddle the end of the bag.
- Bend the hips and knees.
- Keep the back straight.
- Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.
- Lean forward, straightening the knees to set the bag upright.
- Readjust the straddle position moving feet closer to the bag.
- Readjust the grasp, with one hand clasping the bag against the body and the other under it.
- Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
- Thrust the bag up with the knee while straightening the body.
- Put the bag on the shoulder opposite the knee used to thrust the bag up.
- Stabilize the bag on the shoulder.

- Move off without bending sideways.

2.3.2 Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a coworker.

- Stand close to the platform.
- Place one foot in front of the platform.
- Bend hips and knees.
- Keep the back straight.
- Ease the bag off the shoulder and put it upright on the platform.
- Pull the bag slightly over the edge of the platform.
- Stand close to the platform with the bag touching the chest.
- Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
- Step back.
- Bend hips and knees, keeping back straight.
- Ease the bag onto the floor.

2.3.3 Bulkier sacks are easier to carry on your back. Lift the sack onto your back from a platform:

- Move the sack to the edge of the platform.
- Put your back against the sack.
- Grasp with both hands on the upper corners of the sack.
- Ease the sack onto the back, bending hips and knees before taking the weight.
- Keep the back straight.
- Stand up and straighten the hips and knees.
- Stabilize the sack.
- Move away without bending sideways.

2.3.4 Two-person handling of a sack:

- Position one person on either side of the sack.
- Squat with one foot balancing behind the sack.
- Keep back straight.
- Grasp with the outer hand on the upper corner, the other hand holding the bottom of the sack.
- On one person's command:
  - Stand up and straighten the hips and knees.
  - Move toward the stack.
  - Put the sack on the stack.

2.4 Sheet Materials

2.4.1 When lifting sheet materials:

- Stand close to the pile of sheets in a walking stance.
- Grasp sheet firmly at the midpoint of its long side with the closer hand.
- Pull sheet up and toward the body.
- Change grip using your other hand and put your fingers on top of the sheet.
- Pull sheet up to the vertical position and to the side until one half is off the pile.
- Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
- Stand up without bending or twisting body.

- Whenever moving sheet materials, be cognizant of wind conditions.

2.4.2 To carry sheets:

- Use drywall carts to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.

2.4.3 Use team lifting and carrying where other solutions are inappropriate.

- Remember that the combined strength of the team is less than the sum of individual strength.
- Select team members of similar height and strength.
- Assign a leader to the team.
- Determine a set of commands to be used such as "lift," "walk," "stop," and "down." Make sure that everyone knows what to do when they hear the command.
- Follow the commands given by the team leader.
- Practice team lifting and carrying together before attempting the task.

2.5 Material Storage

2.5.1 When storing materials on site:

- Store materials at a convenient height.
- Leave the lowest shelf unused if necessary.
- Use vertically mobile shelves to avoid bending and overhead reaching.
- Use bin racks for storing small items.
- Store heavy and frequently used materials at waist height.
- Do not store materials at floor level.
- Use hand trucks with elevating devices in storage and loading areas.
- Use trucks with a tilting device to avoid bending.
- Use elevating platforms to avoid overhead reaching.

S3NA-309-PR Mobile or Heavy Equipment

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near mobile equipment and heavy equipment operation.

1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 **Heavy equipment:** All excavating equipment include scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.

2.2 **Operator:** Any person who operates the controls while the heavy equipment in is 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 Attachments

3.1 S3NA-309-FM1 Certification of Machinery and Mechanized Equipment

3.2 S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist

3.3 S3NA-309-WI Brokk180 Safety Card

4.0 Procedure

4.1 For work under AECOM's control, Project Managers are responsible for ensuring all equipment is in good working order and all equipment operators are qualified on the piece of machinery they are assigned.

4.2 Staff will confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.

4.3 The operator of mobile equipment is the only worker permitted to ride the equipment unless the equipment is a worker transportation vehicle.

4.4 A person will not operate mobile equipment unless the person has received adequate instruction and training in the safe use of the equipment, has demonstrated to a qualified supervisor or instructor competency in operating the equipment.

4.5 The operator of mobile equipment will operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment

4.6 **Communication**

4.6.1 Communication between site supervisors/managers, heavy equipment operators, and other site personnel is a key method of preventing serious injury or death during heavy equipment operations.

4.6.2 The following outline the communication requirements during heavy equipment operations:

- Site supervisors/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 onsite 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.
- 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 (i.e., 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 guide shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.7 Ground Personnel

4.7.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.7.2 The following 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 job-specific hazard analysis that identifies any special precautions shall be completed and communicated to all AECOM personnel.
- 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 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.
- 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 heavy equipment or other objects (i.e., steel support beams, trees, buildings, etc.).
- Ground personnel shall never stand directly below heavy equipment located on higher ground.
- If working near heavy equipment, ground personnel shall stay out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
- Ground personnel shall never work near heavy equipment.
- Personnel shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- Personnel shall not talk on a cell phone while standing or walking on a roadway or other mobile equipment path.

4.7.3 At a minimum, all ground personnel and operators outside of heavy equipment shall wear the following:

- High visibility, reflective (Class 2) safety vest that is visible from all angles and made of fluorescent material and orange, white, or yellow reflective material (confirm that vest is not faded or covered with outer garments, dirt, etc.).
- Retro-reflective striping for arms and legs (night work)
- ANSI-CSA approved hard hat
- ANSI-CSA approved safety glasses with side shields
- ANSI-CSA approved work boots (unless project requirements are more stringent)
- ANSI-CSA approved hearing protection as needed
- Appropriate work clothes (i.e., full length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).

4.8 Prior to work commencing

4.8.1 All mobile equipment will be regularly inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.

4.8.2 The operator will report defects and conditions affecting the safe operation of the equipment to the supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.

4.8.3 Exposed moving parts on mobile equipment which are a hazard to the operator or to other workers will be guarded and 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.

4.8.4 An approved Underwriter's Laboratories (UL) 4A40BC fire extinguisher should be present on all mobile equipment.

4.8.5 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, mobile equipment has the 'right of way'.

4.8.6 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.

4.8.7 Mobile equipment in which the operator cannot directly or by mirror or other effective device see immediately behind the machine will have an automatic audible warning device which activates whenever the equipment controls are positioned to move the equipment in reverse, and if practicable, is audible above the ambient noise level.

4.9 Operation

4.9.1 The operator of mobile equipment will operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment.

4.9.2 A supervisor will not knowingly operate or permit a worker to operate mobile equipment which is, or could create, an undue hazard to the health or safety of any person.

4.9.3 The operator of mobile equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement such as by setting the parking brake, placing the transmission in the manufacturer's specified park position, and by chocking wheels where necessary.

4.9.4 The operator will maintain the cab, floor and deck of mobile 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.

4.9.5 If mobile 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.

4.9.6 When approaching or crossing the intended path of travel of mobile equipment, establish eye contact with the operator of the mobile equipment and confirm that it is safe to proceed.

4.9.7 Have vehicle headlights on at all times when driving in the area.

4.9.8 Park motor vehicles off the haul roads, or away from the work areas.

4.9.9 Do not wear loose clothing where there is a danger of entanglement in rotating equipment.

4.9.10 Do not enter the swing area of machines such as cranes, mobile drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so.

4.9.11 Stay out of the blind areas around mobile equipment and never assume that the equipment operators have seen them or are aware of their presence.

4.9.12 Maintain a distance of 60 cm (2 ft.) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, the area will be barricaded or guarded to prevent access.

4.9.13 Vibration from moving traffic or mobile equipment can cause excavations or spoil piles to become unstable. Be aware of the risk and keep clear.

4.9.14 All heavy equipment shall be operated in a safe manner that will not endanger persons or property.

4.9.15 All heavy equipment shall be operated at safe speeds.

4.9.16 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.

4.9.17 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.

4.9.18 When feasible, operators shall travel with the “load trailing”, if the load obstructs the forward view of the operator.

4.9.19 Slow down and sound horn when approaching a blind curve or intersection. Flagmen equipped with 2-way radio communications may be required to adequately control traffic.

4.9.20 Operators shall remain in cab while heavy equipment is being loaded.

4.9.21 Equipment shall be shut down prior to and during fueling. Do not smoke or use electrical devices while fueling. Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.

4.9.22 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. Heavy equipment parked on slopes shall have the wheels chocked.

4.9.23 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.

4.9.24 Never exit heavy equipment while it is in motion.

4.9.25 Passengers shall only ride in heavy equipment designed for occupancy of passengers.

4.9.26 Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).

4.9.27 Site vehicles will be parked in a designated parking location away from heavy equipment.

4.9.28 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.

4.9.29 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.

4.9.30 Equipment left unattended at night adjacent to traveled 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 (or the regulatory requirement for the work location) to the active roadway.

4.9.31 Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.

4.9.32 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not exceeded.

4.9.33 Steering or spinner knobs shall not be attached to steering wheels.

4.9.34 High lift rider industrial trucks shall be equipped with overhead guards.

4.9.35 When ascending or descending grades in excess of 5%, loaded trucks shall be driven with the load upgrade.

4.9.36 All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.

4.9.37 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.

4.9.38 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.

4.9.39 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.

4.9.40 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.10 Utilities

4.10.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc.

4.10.2 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 (i.e., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath of 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.

4.11 Training

4.11.1 The operator or other qualified supervisor will provide all on-site personnel with an orientation to the mobile equipment and its associated hazards and controls.

4.11.2 Only designated, qualified personnel shall operate heavy equipment.

4.11.3 Operators shall have all appropriate local, state, or federal licenses or training to operate a designated piece of heavy equipment.

4.11.4 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 needed. Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.12 Inspection and Maintenance

4.12.1 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 during work hours.

4.12.2 Maintenance records will be maintained on the site or project for mobile equipment.

4.12.3 Servicing, maintenance and repair of mobile equipment will not be done when the equipment is operating, unless continued operation is essential to the process and a safe means is provided.

4.12.4 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 certified to be in safe operating condition (certification form attached) by a competent individual seven days prior to on-site operation, and is valid for one year.

4.12.5 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 site supervisor/manager immediately. Inspection records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use the Heavy Equipment Pre-Operation Inspection Checklist (attached).

4.12.6 Defective heavy equipment shall be immediately taken out of service until repaired.

4.13 Fueling and batteries

4.13.1 A well-ventilated area shall be used for refueling.

4.13.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.

4.13.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.

4.13.4 No one shall spill fuel on hot surfaces. Any spillage should be cleaned before starting an engine.

4.13.5 Spilled fuel shall be cleaned with cotton rags or cloths; do not use wool or metallic cloth.

4.13.6 Open flames, lighted smoking materials, or sparking equipment shall remain well away from the fueling area.

4.13.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.

4.13.8 Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.

4.13.9 The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.

4.13.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

4.13.11 Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent buildup of a static charge.

4.13.12 Batteries shall be serviced in a ventilated area while wearing appropriate PPE.

4.13.13 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first.

4.13.14 When installing a battery, the battery shall be connected ground post last.

4.13.15 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.

4.13.16 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.

4.13.17 Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water.

4.13.18 Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention sought immediately.

4.13.19 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 battery by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least 25 feet away from battery-charging stations.

5.0 Records

5.1 Inspection records shall be maintained with the equipment.

6.0 References

6.1 S3NA-205-PR Equipment Inspections & Maintenance

S3NA-309-FM1 Certification of Machinery and Mechanized Equipment

1.0 General Guidelines

1.1 Subcontractor equipment shall comply with all applicable requirements for motor vehicles and material handling heavy equipment contained in 29 CFR 1926 Subpart O. Heavy equipment includes, but is not limited to, drill rigs, front end loaders, backhoes, trackhoes, bulldozers, forklifts, and similar equipment used for the implementation of the project Statement of Work.

2.0 Equipment Safety Inspections

2.1 The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all-inclusive.

2.1.1 All machinery and mechanized equipment will be certified to be in safe operating condition (using the attached form) by a competent individual seven days prior to onsite operation. This certification is valid for one year.

2.1.2 Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.

2.1.3 Inspections shall include, but are not limited to, all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.

2.1.4 Drill rigs and related support equipment and vehicles shall be inspected by the driller in charge on a daily basis. These inspections shall be recorded on the Daily Drill Rig Checklist or on equivalent subcontractor forms.

2.1.5 Exhaustive preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or the subcontractor's internal policies, schedules, and equipment SOPs.

2.1.6 Only designated qualified persons shall operate machinery and mechanized equipment.

2.1.7 The contractor shall maintain records of tests and inspections at the site and shall make the records available upon request of the designated authority; the records shall become part of the official project file.

2.1.8 Equipment found to not be in safe operating condition or to have a deficiency that affects the safe operation of the equipment shall immediately be taken out of service and its use shall be prohibited until safe conditions have been corrected.

2.1.9 All equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.

2.1.10 Equipment with an obstructed rear view must have an audible alarm that sounds when equipment is moving in reverse.

TO: AECOM

DATE:

FROM:

Project Name:

Project Location:

1. This form provides certification of machinery and mechanized equipment to be used on the referenced project for the following work:

Description of equipment work:	
Project site:	
Subcontractor providing equipment: Address:	
Dates (duration) of equipment work:	

2. Inspection and certification of machinery and mechanized equipment, as required by AECOM, has been made prior to but within seven calendar days in advance of use on the project site. Recertification will be required for equipment that is used on the project site for more than one year.

Identification of equipment (make, model, serial no.)		Date of Certification
1		
2		
3		

3. The above listed equipment has been inspected and tested as indicated above, and is CERTIFIED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Name		Title	
Company			
Signature		Date	

4. If there are any questions regarding this certification, please contact the following AECOM representative:

S3NA-309- FM2 Heavy Equipment Pre-Operation Checklist

Project Name/Location:															
Number/Name:							**Make/Model:**								
Hour meter reading:															
Check the following as appropriate	**Operator Name/Date**			**Operator Name/Date**			**Operator Name/Date**			**Operator Name/Date**			**Operator Name/Date**		
	SAT	**UNSAT**	**N/A**	**SAT**	**UNSAT**	**N/A**	**SAT**	**UNSAT**	**N/A**	**SAT**	**UNSAT**	**N/A**	**SAT**	**UNSAT**	**N/A**
1. Operator qualified															
2. Overhead guard (ROPS)															
3. Horn															
4. Lights															
5. Parking brake															
6. Service brakes															
7. Steering															
8. Oil level															
9. Hydraulic oil level															
10. Radiator fluid level															
11. Major fluid leaks															
12. Windows															
13. Backup alarm															
14. Tires (visual)															

15. Seat belts															
16. Fuel leaks															
17. Fire extinguisher															
18. Fuel lines secure															
19. Electrical lines															
20. Exhaust components															
Comments/Remarks:															

S3NA-309-WI Brokk180 Safety Card

1.0 Objective/Overview

The Brokk 180 is an electric-powered hydraulic device used for demolishing concrete structures and refractory linings as well as excavating. This machine includes attachments designed exclusively for demolishing work (e.g., grapple, bucket, hydraulic hammer, etc.). By using the remote control unit, an operator can move the machine and attachments in different directions and speeds from afar.

2.0 Safe Operating Guidelines

2.1 Prior to use, complete a pre-operation inspection to determine if the unit is in safe working condition.

2.2 Position the unit to safely perform the intended task, then deploy the outriggers to stabilize the unit.

2.3 Confirm that the operator knows what the lifting capacity is; do not exceed the lifting capacity.

2.4 Complete a subsurface utility clearance prior to excavating.

2.5 Establish a minimum 15-foot clearance around the unit.

2.6 Do not allow debris to build-up around the unit. Maintain good housekeeping practices.

2.7 Prior to removing debris from under the boom, stop, disengage the unit, and position the boom so that the attachment is at rest on the ground.

2.8 Personnel operating the unit with the remote control device will be properly trained and certified by a competent person.

2.9 The operator will be able to maintain line of sight visual contact with the unit at all times to assess hazards and site security.

2.10 Maintenance in excess of preventive maintenance activities (e.g., lubrication, replenishing fluids, etc.) will be performed by manufacturer personnel ONLY.

2.11 All operations will comply with the manufacturer's recommended policies.

3.0 Potential Hazards

3.1 Flying debris.

3.2 Crush/impact/pinch from extendable boom, tracks, and tipping over.

3.3 Electrocution from subsurface utilities (when excavating).

3.4 Hearing loss.

4.0 Training Requirements

4.1 Review of applicable SOPs.

4.2 Complete knowledge and understanding of remote control functions.

4.3 Review and follow manufacturers' recommended policies and practices.

5.0 Personal Protective Equipment (Level D ensemble)

5.1 Reflective traffic safety vest.

5.2 Hearing protection (ear plugs and/or ear muffs).

5.3 Leather gloves.

6.0 Other Safety Tips

6.1 Never stand under a raised boom.

6.2 Maintain a clearance of 15 feet around the unit while operating.

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

6.4 Maintain line of sight visual contact with unit at al times (especially when operating from a distance).

S3NA-310-PR Rigging, Hoisting, Cranes, and Lifting Devices

1.0 Purpose and Scope

1.1 Establishes the minimum requirements for rigging, hoisting, and crane operations.

1.2 This procedure applies to all AECOM North America- based employees and operations.

2.0 Terms and Definitions

2.1 **ASME**: American Society of Mechanical Engineers

2.2 **Assembly/Disassembly Director(A/D Director):** An individual who meets this subpart's requirements for an A/D director, irrespective of the person's formal job title or whether the person is nonmanagement or management personnel. Assembly/disassembly will be directed by a person who meets the criteria for both a competent person and a qualified person or by a competent person who is assisted by one or more qualified persons. If the assembly/disassembly is being performed by only one person, that person will meet the criteria for both a competent person and a qualified person. For purposes of this standard, that person is considered the A/D director.

2.3 **Crane**: Any power-operated equipment that can hoist, lower, and horizontally move a suspended load.

2.4 **Critical lifts**: Hoisting operations in which a critical item or load is hoisted or moved, or in which a noncritical item is hoisted or moved in an area where critical systems or equipment could be affected. Critical lifts are lifting operations that exceed 75 percent of the crane's rated capacity or any activity involving a part, component, assembly, or piece of equipment ("item") whose dropping, upset, or collision could cause or result in the following:

- Damage that would result in serious economic consequences.
- Damage that would result in an unacceptable delay to schedule or other significant deleterious programmatic impact (such as the loss of vital data).
- Undetectable damage that would jeopardize the future operations or safety of a facility.
- A significant release of hazardous material to the environment or the creation of an undesirable condition.
- Personnel injury or significant adverse health impact, either onsite or offsite.

2.5 **Controlling Entity**: An employer that is a prime contractor, general contractor, construction manager or any other legal entity that has the overall responsibility for the construction of the project, including planning, quality, and completion.

3.0 Attachments

3.1 S3NA-310-FM1 Crane Pre-Operation Inspection

3.2 S3NA-310-FM2 Critical Lift Checklist

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers (includes Supervisors)** are responsible for confirming that all aspects of this procedure are followed and adhered to on all AECOM sites and locations for critical lifts for which AECOM is the controlling entity.

4.2 General Requirements

4.2.1 AECOM personnel will not operate powered cranes and/or tuggers without approval from the **Project Manager**, **Region SH&E Manager**, and legal.

4.2.2 Some AECOM project sites may require the setup and use of tower cranes, hydraulic cranes, boom trucks, or helicopters to facilitate movement of equipment or materials on the site or project. The hazards and controls associated with these activities will be documented on the Project Safety Plan and communicated to all site personnel before work commences.

4.2.3 Prior to mobilization, **PMs** will confirm that cranes and crane operators, signal persons, and riggers are certified/qualified and that a Crane Pre-Operational Inspection Checklist (see *S3NA-310-FM1 Crane Pre-Operation Inspection* or its equivalent) is completed and reviewed prior to each use/shift.

4.3 Assembly/Disassembly

4.3.1 Prior to assembly of any cranes, all crews will confirm:

- Their tasks.
- The hazard associated with their tasks.
- Hazardous locations they need to avoid.

4.3.2 Should a crew member change a task then that crew member will be instructed that the above requirement will be met.

4.3.3 No assembly/disassembly of cranes shall be performed underneath power lines.

4.4 Addressing Specific Hazards

4.4.1 The assembly/disassembly director supervising the operation will address the following hazards associated with the operation:

- Site and ground bearing conditions will be adequate for safe operation and to support the equipment.
- Blocking material will be sufficient in size, amount, condition, and method of stacking to sustain loads and maintain stability.
- Proper location of blocking. When used to support lattice booms or components, blocking will be appropriately placed to protect the structural integrity of the equipment and prevent dangerous movement and collapse.
- Verifying assist crane loads. Loads that will be imposed on the assist crane at each phase will be verified before operations begin.
- Boom and jib pack points. The attachment points of rigging to a boom/ boom sections, or to jib/jib sections, will be suitable for preventing structural damage and for facilitating safe handling of the components.
- The center of gravity will be identified, if necessary, for the method used for maintaining stability.
- Measures designed to prevent unintended dangerous movement will be used where there is insufficient information.
- Stability upon pin removal. Boom sections, boom suspension systems, and components will be rigged or supported to maintain stability upon the removal of the pins.
- Snagging. Suspension ropes and pendants will not be able to catch on the boom or jib connection pins or cotter pins (including keepers and locking pins).
- Struck by counterweights. The potential for unintended movement from inadequately supported counterweights and from hoisting counterweights.
- Boom hoist brake failure. The brake will be tested prior to each time reliance is to be placed on the boom hoist brake to prevent boom movement.
- If found to be insufficient, a boom hoist pawl, other locking/back-up braking device, or another method of preventing dangerous boom movement (such as blocking or using an assist crane) from a boom hoist failure will be used.
- Loss of backward stability. Backward stability before swinging upward, during travel, and when attaching or removing equipment components.
- Wind speed and weather. The effect of wind speed and weather on the equipment.

4.5 Prerequisites and Physical Qualifications

4.5.1 Operators, riggers, and inspectors shall meet the minimum requirements established by this procedure as it relates to their work.

4.5.2 As part of this procedure, all site-specific training shall be in accordance with procedure *S3NA-209-PR Project Hazard Assessment and Planning* and 29 CFR Part 1926.1400 Cranes and Derricks in Construction.

- All sling and hoist systems used on AECOM sites will be operated, inspected, and maintained in compliance with regulations.
- AECOM will only employ qualified/certified licensed equipment operators, signal persons, and riggers (for cranes, helicopters, etc.).

4.6 Personal Protective Equipment

4.6.1 All AECOM personnel operating lifting or hoisting equipment and/or functioning as riggers or signal persons shall wear a reflective equipment.

- Hard hats
- Steel-toed boots
- Reflective vest

4.6.2 Class II high visibility vest in addition to their normal personal protective Power Line Safety gear.

4.6.3 All cranes shall maintain the following minimal clearance distance from power lines**.**

Voltage (nominal, kV, alternating current)	**Minimum clearance distance (feet)**
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1000	45
Over 1000	As established by the utility owner/operator.

4.7 Training Programs

4.7.1 Power Line Safety Training

- Each operator and crew member assigned to work with the equipment will be trained on Power Line Safety.
- Spotter: Workers as dedicated spotters will be trained to enable them to effectively perform their task under section 29 CFR 1926. 1430(g) as applicable in the US.
- Fall Protection: Any AECOM employee will be trained who may be exposed to fall hazards while on or hoisted when exposed to a fall greater than 6 feet.
- Crush/Pinch points: All AECOM employees who work with the equipment shall be trained to keep clear of holes and crush/pinch points (i.e., work area controls).

4.8 Basic Operator Training

4.8.1 Topics to be included in the basic certification criteria operator training programs shall include as a minimum the requirements listed below:

- The individual knows the information necessary for safe operation of the specific type of equipment the individual will operate, including the following:

- The controls and operating/performance characteristics.
- Use of and the ability to calculate (manually or with a calculator) load/capacity information on a variety of configuration of the equipment.
- Procedure for preventing and responding to power line contact.
- Technical knowledge:
  - Wire rope.
  - Rigging devices and their use.
  - Technical limitations of protective measure against electrical hazards.
  - The effects of load share and load transfer in multi-crane lifts.
  - Basic crane terms.
  - The basics of machine power flow systems.
  - The significance of the instruments and gauge reading.
  - The effects of thermal expansion and contraction in hydraulic cylinders.
  - Background information necessary to understand preoperation and inspection requirements.
  - How to us the safety devices and operation aids required under 29 CFR 1926.1415 and 1416.
  - How to calculate net capacity for every possible configuration of the equipment using the manufacturer's load chart.
  - How to use manufacturer-approved attachments and their effect on the equipment.
  - How to obtain dimensions, weight, and center of gravity of the load.
  - The effect of dynamic loading from wind, stopping and starting, impact loading, and moving with the load.
  - The effects of side loading.
  - The principles of backward stability.
  - Site information.
  - How to identify the suitability of the supporting ground.
  - Proper use of mats, blocking/cribbing, outriggers, stabilizers, or crawlers.
  - Identification of site hazards.
  - How to review operation plans with supervisors and other workers.
  - How to determine if there is adequate room for extension of cralers or outriggers/stabilizers and counterweights.
  - How to pick up, carry, swing, and place the load smoothly and safety on rubber tires and on outriggers/stabilizer or crawlers.
  - Proper procedure and methods of reeving wire ropes.
  - How to react to change in conditions.
  - How to shut down and secure the equipment properly while leaving it unattended.
  - Know how to apply the manufacturers' specification for operating in various weather conditions and understand how environmental conditions affect the safe operation of the equipment.
  - How to properly lever the equipment.
  - How to verify the weight of the load and rigging prior to initiating the lift.
  - How to determine where the load is to be picked up and placed and how to verity the radii.
  - Know basic rigging procedures.

- How to carry out the shift inspection.
- Know that the following operations require specific procedures and skill levels:
  - Multi crane lifts.
  - Hoisting personnel.
  - Clamshell/dragline operations.
  - Pile driving and extracting.
  - Demolition operations.
  - Operations on water.
  - Multi drum operation.
- Know the proper procedure for load control and the use of handheld tag lines.
- Know the emergency response site procedures.

- Any necessary repairs or adjustments needed for the equipment will be communicated to all affected employees at the beginning of the shift.
- Other topics identified by the training or operating organizations.

4.9 Basic Training for Signal Person

4.9.1 Topics to be included in the basic certification criteria signal person training programs shall include as a minimum the requirements listed below:

- Know and understand the type of signal used.
- Know and understand the standard method of hand signaling.
- Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and bood deflection from hoisting load.
- Demonstrate that the signal person meets the requirements of 29 CFR 1926, 1400 through an oral or written test and through a practical test.

4.10 Basic Training for Special Equipment Operators

4.10.1 Operators of special equipment will first complete training requirements for the most applicable equipment category, such as overhead, gantry, and polar cranes; hoists; or mobile cranes. The operator of special equipment will then complete any additional classroom instruction required specific to that equipment, and will complete an on-the-job (OJT) training program for the special equipment.

4.11 Rigger Training Programs

4.11.1 It is recommended that training for riggers be divided into two categories:

- Training for personnel who do rigging as a major part of their job assignment.
- Training for personnel who do simple rigging jobs as an incidental part of their job assignment.

4.11.2 Topics in both categories shall include the same basics but the depth of detail shall match the job assignment.

4.11.3 Topics shall include the requirements listed below:

- Equipment operating characteristics, capabilities, and limitations.
- Use and inspection of slings, wire rope, chain, and synthetic fiber.
- Effect of sling angles on resultant sling loads.
- Restriction on use of come-alongs.
- Determination of load weights, load-weight calculations, and individual sling loads.
- Use of load-indicating devices.
- Safe work practices.
- Hand signals and communications between the signal person and operator.

- Use and inspection of all major rigging accessories or assemblies.
- Critical lift classifications and requirements.
- Use of spreader bars and other below-the-hook lifting devices.

4.12 Crane Inspection Training

4.12.1 Inspector training shall be established to train personnel in the inspection categories listed below.

- Overhead, gantry, and polar cranes.
- Monorail, jib, and other hoists.
- Mobile cranes.
- Wire rope.
- Rigging and rigging hardware.
- Special equipment.

4.13 Inspector Training Subcategories

4.13.1 To meet the needs of the discipline, the training may divide these categories into subcategories. For example, an inspector may be trained to inspect only mechanical portions of monorail hoists.

4.14 Scope of Inspector Training

4.14.1 Inspector training shall include basic inspection techniques and the application of manufacturer-supplied information, OSHA, ASME, and acceptance/rejection criteria.

4.15 Testing and Examination

4.15.1 Testing Phases

- Testing for operator, rigger, and inspector classifications shall include, as a minimum, a written examination comprised of questions covering training topics and a practical examination to demonstrate knowledge of equipment operating characteristics and practical application. A qualified instructor shall grade the practical examination. Documentation of training shall be maintained on site.

4.15.2 Examination Scores

- Scope standards shall be set for each examination by the training organization. The minimum passing score shall depend on the subject, testing technique, and test difficulty. A candidate may be given additional opportunities to take and pass the examination if the materials have been reviewed and the employee tests satisfactorily.

4.16 Qualification, Requalification, or Disqualification

4.16.1 Training Certificate

- After the training, testing, and OJT (if required) is successfully completed, a certificate shall be issued to the operator, rigger, or inspector. The operator's certificate shall list the equipment the operator is qualified to operate.

4.16.2 Qualification Period

- Operator, signal person, rigger, and inspector qualifications may be dependent on state or local regulations.

4.16.3 Refresher Training

- AECOM will provide refresher training on relevant topics for each employee based on the employee's conduct or an evaluation of the employee's knowledge or another indication that retraining is warranted. If for any reason the employee's manager determines that the employee should be disqualified, the manager shall write a letter of disqualification. This written statement of disqualification shall state the reason for disqualification and when, or if, the employee will be eligible to requalify.

4.17 Critical Lift Procedure

4.17.1 Critical Lift Plan

- Prior to commencing any critical lift activity, the PM will confirm that a Crane Pre-Operational Inspection Checklist and a Critical Lift Checklist (see attachments) are prepared for all critical lifts.

4.17.2 Critical Lift Plan Approval

- The Crane Operator and the Rigging Site Supervisor will review and approve the Critical Lift Plan (procedure); on projects that AECOM controls, the SH&E Department will also review and approve the Critical Lift Plan.
- Revisions to the procedure will be reviewed and approved in the same manner as the original procedure.

4.17.3 Pre-Lift Meeting

- Before the Critical Lift is performed, a safety meeting with participating personnel will be held. During this meeting, the relevant portions of the applicable Task Hazard Analysis (THA) will be covered, the Critical Lift procedure will be reviewed, and questions/concerns related to personnel involved in the lift and operation of equipment will be resolved. The safety meeting will be documented on a Tailgate Safety Briefing Form as required by *S3NA-210- PR Project Safety Meetings*.

4.17.4 Critical Lift Plan Documentation

- Once completed, the SH&E Department will maintain copies of the Critical Lift Plan. Documentation of a critical lift will include the following:
  - The Critical Lift Checklist, recording job completion with approval signatures.
  - Documentation of the safety meeting including, at a minimum, the meeting date and list of attendees.
  - Any additional documentation deemed appropriate by the SH&E Department or other responsible personnel (e.g., lessons learned).

4.17.5 Preparing for Rigging & Hoisting

- The passing of loads over client facility equipment, trailers, public roads, and sidewalks shall only be done if the necessary precautions have been taken for the safety of all workers and other persons.
- When operating conditions are such that the boom of the crane swings over property lines or operating transportation systems for the site or project, the owners of adjacent properties or systems shall be consulted. A diagram should be prepared detailing the proposed swing paths for the crane.
- All rigging equipment, fittings, and devices will be of adequate strength for the application. All components will be capable of supporting at least five times the maximum load to which they may be subjected. If the load exceeds 85 percent of the equipment capacity or involves multi-lifts, hoisting and rigging operations will be approved by a professional engineer.
- At no time is the operator of the equipment to perform lifts that exceed the load rated capacity of the equipment.
- Only loads that have been properly rigged or have been placed in containers designed for hoisting may be lifted.
- Loads should only be rigged for hoisting by qualified persons.
- Inspect all slings before each use and maintain them in good condition. All ropes, hardware, and other fittings will be inspected regularly for wear, cracks, severe corrosion, kinks, bird caging, broken strands, burn marks, chemical damage, deformation, or other signs of obvious damage.
- Use slings of proper reach. Never shorten a line by twisting or knotting or with chain slings. Never use bolts and nuts.
- Estimate the center of gravity or point of balance. The lifting device should be positioned immediately above the estimated center of gravity.
- Select shackle and sling sizes that exceed the minimum working load limits.
- The signaller will be properly identified and will understand proper signaling techniques.

- Hoisting areas will be secured with a barrier in areas where public access is a concern. Appropriate warning signage will be posted to indicate that overhead work is being performed in the area.
- Wire ropes will be lubricated to reduce friction between wires and strands.
- Tag lines will be used to control loads.
- When two or more slings are to be connected to a hook, a shackle should be used.

4.18 **During Transport of the Load**

- When being assisted by a signal person ("spotter"), the equipment operator will maintain continuous communication with the signal person. If communication with the signal person is lost, the operator will not continue until communication has been restored.
- All personnel will be clear of the load being lifted and the load will be double-checked to ensure that it is secure before it is lifted.
- No one shall be permitted to ride the lifting hook, ball, or load.
- At no time are loads to be passed over any workers or other persons.
- No one shall pass under any part of a suspended load. Always try to anticipate the movement of the load and avoid entering the swing path of the load.
- Prepare a place to land the load and lower the load gently to keep it stable before slackening the sling or chain.
- Stay clear of loads when slings are being pulled out from underneath.
- Loose loads will be blocked before unhooking.
- If you are using a sling, a significant amount of electrical charge is generated by a helicopter and rain or light blowing snow can increase this electrical charge. To avoid receiving a stunning (but not harmful) shock, the hookup person (who is trying to unhook the load) should resist reaching up to the machine or the cable as it hovers over the load. It is important to let the load or the cable ground itself first. Under some conditions the current can arc up to 20 centimeters.

5.0 Records

5.1 All training records shall be maintained in accordance with *S3NA-003-PR SH&E Training*.

5.2 All inspection records will be maintained on site with the machine.

6.0 References

6.1 29 CFR Part 1926.1400 – Cranes and Derricks in Construction

6.2 S3NA-003-PR SH&E Training

6.3 S3NA-202-PR Competent Person Designation

6.4 S3NA-309-PR Mobile or Heavy Equipment

6.5 S3NA-406-PR Electrical Lines, Overhead

6.6 S3NA-408-PR Elevated Work Platforms and Aerial Lifts

6.7 S4NA (US)-413-PR1 Process Safety Management

S3NA-310-FM1 Crane Pre-Operation Inspection

PROJECT INFORMATION	
Project Name:	
Project/Contract Number:	Date:
Site Safety Coordinator:	Crane Operator:
Crane Model No:	Crane Manufacturer:
Crane Number:	Hours:

GENERAL REQUIREMENTS

1.	Safety Manager has reviewed and accepted work platform use	☐ Yes	☐ No
2.	Job Hazard Analysis completed and attached	☐ Yes	☐ No
3.	Critical Lift Checklist completed and attached	☐ Yes	☐ No
4.	Area barricaded or otherwise secured from unauthorized personnel entrance	☐ Yes	☐ No

CRANE REQUIREMENTS

5.	Load lines are capable of supporting 5 times maximum intended load (10 times for rotation-resistant wire rope)	☐ Yes	☐ No
6.	Total weight of loaded platform and related rigging does not exceed 50 percent of rated capacity per boom angle and radius	☐ Yes	☐ No
7.	Crane does not have live boom; load line hoist is regulated with a device other than the hoist brake that regulates lowering speed.	☐ Yes	☐ No
8.	Crane has a positive acting anti-two-block device that deactivates hoisting action	☐ Yes	☐ No
9.	Boom angle indicator is functional and readily visible to the operator	☐ Yes	☐ No

RIGGING REQUIREMENTS

10.	Wire rope, shackles, and other rigging hardware are capable of supporting 5 times the maximum intended load	☐ Yes	☐ No
11.	Lifting bridles are four legs of equal length connected by common ring	☐ Yes	☐ No
12.	All eyes in wire rope slings are fabricated with thimbles	☐ Yes	☐ No
13.	Shackle bolts are secured against displacement (pinned or moused)	☐ Yes	☐ No
14.	Safety line passes through the eye of each bridle leg and is attached above the headache ball or to the crane hook	☐ Yes	☐ No
15.	Hook throat opening has been closed by pinning, bolting, or mousing safety latch	☐ Yes	☐ No
16.	Rigging is dedicated for platform use and is not used for any other purpose when not hoisting personnel	☐ Yes	☐ No

PLATFORM REQUIREMENTS

17.	Platform is posted with its weight and rated load capacity or maximum intended load	☐ Yes	☐ No
18.	A grab rail is installed inside the entire perimeter of the platform	☐ Yes	☐ No
19.	Access gates, if installed, do not swing outward and have a device to prevent accidental opening	☐ Yes	☐ No
20.	In addition to hard hats, employees are afforded overhead protection by the platform when exposed to falling objects	☐ Yes	☐ No
21.	All edges exposed to employee contact are smoothed to prevent injury from punctures or lacerations	☐ Yes	☐ No

PLATFORM LOADING

22.	The platform is not loaded in excess of its rated capacity	☐ Yes	☐ No
23.	The number of employees does not exceed the number required for the work to be performed	☐ Yes	☐ No
24.	The platform is not used to hoist tools or materials except for those necessary for employees to perform the work	☐ Yes	☐ No
25.	Personnel, tools, and materials are evenly distributed within the platform	☐ Yes	☐ No

PROOF-TESTING, TRIAL LIFT, AND INSPECTION

26. The platform and rigging has been proof tested to 1.25 times the rated capacity (minimum duration, 5 minutes) ☐ Yes ☐ No
27. After proof testing, the platform has been inspected for deficiencies ☐ Yes ☐ No
28. Loaded at least to anticipated weight, a trial lift from the ground to each location the platform is to be hoisted and positioned has been conducted (may be done concurrently with proof testing and must be repeated if the crane is repositioned). ☐ Yes ☐ No
29. After trial lift and prior to hoisting employees, an inspection has been made to ensure that the hoist rope is free of kinks, that multiple lines (if used) are not twisted around each other, that the primary attachment is centered over the platform, and that the load rope is properly stated on drums and sheaves. ☐ Yes ☐ No

OTHER

30. Tag lines are attached and ready for use, or a determination has been made that the use of tag lines creates an unsafe condition ☐ Yes ☐ No
31. A pre-lift meeting with all affected employees has been conducted ☐ Yes ☐ No
32. There is no adverse weather condition, winds are less than 15 mph, and there is no electrical storm activity or heavy rain ☐ Yes ☐ No
33. Employees will remain in continuous sight of and in communication with the operator or signal person. If radios are used, they have been tested ☐ Yes ☐ No
34. Employees have been tied off with full body harness above the headache ball, or to the load block ☐ Yes ☐ No

Remarks:

Crane Inspector:

Print Name | Signature | Organization | Date

Site Safety Representative:

Print Name | Signature | Organization | Date

Project Manager:

Print Name | Signature | Organization | Date

S3NA-310-FM2 Critical Lift Checklist

A critical lift is any lift that exceeds 75% of the crane's rated capacity, involves more than one crane, involves unusual or severe hazards, or any lift the PM identifies as Critical.

ADMINISTRATIVE INFORMATION:	
PROJECT NAME:	
PROJECT MANAGER (PM):	**DATE:**
SUBCONTRACTOR NAME:	**SUBCONTRACTOR PM:**
SUPERVISOR IN CHARGE:	**CRANE OPERATOR:**
SIGNAL PERSON 1:	**SIGNAL PERSON 2:**

CRITICAL LIFT REQUIREMENTS:

1. LIFT CONDITIONS:

a. Crane pad level, firm & stable ☐ Yes ☐ No
b. Has longest lift radius been identified ☐ Yes ☐ No
c. Have special hazards been identified ☐ Yes ☐ No
   i. Power lines ☐ Yes ☐ No
   ii. Obstructions in lift path ☐ Yes ☐ No
   iii. Location of utilities and structures ☐ Yes ☐ No
   iv. Weather conditions ☐ Yes ☐ No
d. Has a lift sequence been established and reviewed ☐ Yes ☐ No
e. Are personnel clear of lift area ☐ Yes ☐ No

2. LOAD CONDITIONS:

a. Is exact load weight known ☐ Yes ☐ No _____Pounds
b. Is weight of rigging known ☐ Yes ☐ No _____Pounds
c. Is the weight of the load block and line known ☐ Yes ☐ No _____Pounds
d. Has the center of gravity of the load been established ☐ Yes ☐ No
e. Is rigging adequate and in good condition ☐ Yes ☐ No

3. COMMUNICATIONS:

a. Have hand signals been reviewed ☐ Yes ☐ No
b. Has location of spotters been established ☐ Yes ☐ No
c. If radios are used: ☐ Yes ☐ No
   i. Have they been tested from location of use ☐ Yes ☐ No
   ii. Is frequency clear of other radio traffic ☐ Yes ☐ No

4. CONDITION OF CRANE (CHECKED BY OPERATOR):

a. Is pad blocking adequate and substantial ☐ Yes ☐ No
b. Is the crane level ☐ Yes ☐ No
c. Are ropes and pendants in good condition ☐ Yes ☐ No
d. Are adequate parts of line being used ☐ Yes ☐ No
e. Is line revved properly ☐ Yes ☐ No
f. Are controls in good working condition to insure smooth operation ☐ Yes ☐ No
g. Is the load within chart limits for the above conditions ☐ Yes ☐ No

h. What is the boom length .....

i. What is the maximum boom angle .....

j. What is the maximum load radius .....

5. PRE-LIFT MEETING:

Has a pre-lift meeting been conducted with all persons involved to review this information ☐ Yes ☐ No

6. LIFT DIAGRAM (INCLUDE CRANE SETUP, RADIUS, LOAD, ETC.):

APPROVAL SIGNATURES:	
SUBCONTRACTOR SUPERVISOR IN CHARGE:	SUBCONTRACTOR PM:
AECOM PROJECT MANAGER:	AECOM SAFETY REPRESENTATIVE:

S3NA-312-PR Stairways and Ladders

1.0 Purpose and Scope

1.1 To establish the minimum requirements for AECOM to use, handle, and store ladders.

1.2 This procedure applies to all AECOM North America (NA) based employees and operations.

2.0 Terms and Definitions

2.1 **Stepladder:** A self-supporting portable ladder that is non-adjustable in length, with flat steps and a hinged design for ease of storage. It is intended for use by one person.

2.2 **Single Ladder:** A non-self-supporting portable ladder that is non-adjustable in length, consisting of one section. It is intended for use by one person.

2.3 **Articulated Ladder:** A portable ladder with one or more pairs of locking hinges which allow the ladder to be set up in several configurations such as a single or extension ladder, with or without a stand-off, a stepladder, a trestle ladder, scaffold or work table.

2.4 **Extension Ladder:** A non-self-supporting portable ladder that is adjustable in length. It consists of two or more sections that travel in guides or brackets arranged so as to permit length adjustment. It is intended for use by one person.

2.5 **Fixed Ladder:** A non-self-supporting ladder that is non-adjustable in length and permanently attached to a structure at a Pitch ranging from 60 degrees to 90 degrees from the horizontal. The Preferred Pitch of a Fixed Ladder is between 75 degrees and 90 degrees from the horizontal. A Fixed Ladder is considered to be of “Substandard Pitch” if it is installed at an angle between 60 degrees and 75 degrees from the horizontal. Fixed Ladders having a Pitch greater than 90 degrees are not allowed.

2.6 **Job-Made Ladder**: A custom, made-to-fit specific job situations during construction or demolition operations. Their primary purpose is to provide access to or egress from a work area. They are not intended to serve as a workstation. They are temporary in nature and serve only until a particular phase of work is completed or until permanent stairways or Fixed Ladders are ready for use. They are not to exceed 24-feet in working length. In the event the required ladder length exceeds 24-feet, then two or more separate Job-Made Ladders are to be used in conjunction with **platforms that are protected with railings.** Job-made ladders must be in full compliance with local regulations.

3.0 Attachments

3.1 S3NA-312-FM Ladder Inspection

3.2 S3NA-312-ST Stairways and Ladders

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project managers** (**field task managers, supervisors**) and office managers are responsible for the implementation of this procedure for supervised **employees**.

4.1.2 **Region SH&E Managers** shall provide guidance as to application of the procedure.

4.1.3 **Employees** shall apply appropriate precautions and work practices in their use of ladders and stairways.

4.2 Training

4.2.1 All on-site staff will be oriented to the hazards and controls of any ladders and stairs present on the site.

4.3 Construction or Industrial Stairs

4.3.1 Verify stairs meet local regulations.

4.3.2 Always face the stairs when ascending or descending steep industrial stairs.

4.3.3 Caution must be exercised while using crossovers on conveyor systems. The conveyor system must be locked out and de-energized prior to use of the crossover unless other preventive measures have been established that provide an equal or greater degree of protection.

4.3.4 All parts of stairways, including the treads and landings, will be free of hazardous projections, such as protruding nails, etc.

4.3.5 Slippery conditions on stairways will be eliminated.

4.3.6 Handrails will be 30 to 34 inches (76 to 86cm) above stairway treads and free from protruding nails and splinters.

4.3.7 The uprights will be not less than 2 inches by 4 inches, spaced not more than 8 feet (2.4m) apart and properly anchored.

4.3.8 The rail cross section will be not less than 2 inches by 4 inches or equivalent.

4.3.9 Railings and toe boards will be installed around stairwells.

4.3.10 Sufficient illumination on all stairways, providing at least 5 foot candles of light on the steps, will be maintained.

4.3.11 All lamps providing stairway illumination will be substantially guarded either mechanically or by location.

4.3.12 Stairways and landings will be kept clear of debris, loose material, and equipment not in use.

4.3.13 Stairways, until permanently enclosed, will be guarded on all open sides with stair railings. Open sides of stairway landings, porches, balconies, and similar locations will be guarded with standard railings. (Vertical height of 42 inches (107cm) nominal from upper surface of top rail to floor, platform, runway, or ramp level.) The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard).

4.3.14 Before permitting foot traffic, stairways on which treads and/or landings are to be filled in later with concrete or other material will be fitted with secured wooden pieces to cover the entire tread and/or landing area, and supported to prevent undue deflection.

4.3.15 Temporary treads and/or landings will be replaced when worn below the level of the metal nosing.

4.3.16 On all structures of two or more floors (20 feet (6m) or more) in height, stairways, ladders or ramps must be provided for employees during the construction periods. Stairways must meet the following requirements:

- Rise height and tread width must be uniform throughout any flight of stairs including any foundation structures used as one or more treads of the stairs.
- Temporary stairs must have a landing not less than 30 inches (76cm) in the direction of travel at every 12 feet (3.7m) of vertical rise.
- Metal landings must be secured in place before filling.
- Debris and other loose materials will not be allowed on, under, or at approaches and landings to stairways.
- Slippery conditions on stairways will be eliminated as soon as possible after they occur.
- Spiral stairways will not be permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway.

4.3.17 Where doors or gates open directly on a stairway, provide a platform that extends at least 20 inches (50cm) beyond the swing of the door.

4.4 Ladders

4.4.1 Personal Protective Equipment

- Personal fall protection equipment must be worn when working above the regulated height in your location.

- PPE appropriate for the work location being constructed or industrial work site and/or client requirements.

4.4.2 Restrictions

- Site-constructed ladders (vertical construction ladders, straight or job-built ladders) and industrial or construction (temporary or permanent) stairs shall be built in accordance with state, provincial or territorial regulations.
- Use only heavy duty construction grade ladders of an approved standard.

4.5 General

4.5.1 The following are minimum requirements for the use and care of ladders by AECOM personnel. Compliance with ANSI A14.1, ANSI A14.3, or CAN/CSA-Z11-M81 (R2005)-Portable Ladders and applicable state, provincial or territorial regulations is also required.

- Ladders shall be inspected before use and if defective, removed from use.
- Ladders will be maintained in good condition at all times. Those that are defective in any way will be removed from service and tagged with an “unsafe equipment” tag until made safe for use or destroyed.
- Ladders purchased for use on AECOM sites will be appropriate for industrial applications (Class 1-A). Light-duty household ladders are not acceptable.
- Ladder safety climbing devices may be used in lieu of cage protection on fixed ladders of unbroken length of 20 feet (6m) in height.
- Landing platforms are not required in these cases except at regular step-off points. All ladder safety devices will be compatible with the ladders with which they are used.
- Fixed ladders will be installed wherever regular access by ladder is necessary.
- Ladders having metal parts (other than hardware) will not be used where potential electrical hazards exist unless they bear a manufacturer's label that indicates:
  - The ladder complies with ANSI 14.5.
  - It is approved for electrical use.
- Job-made ladders will be constructed in accordance with local regulations and standards.
- All personnel involved in the use of ladders on the project will be instructed in the requirements of this procedure.
- Standard ladders will not exceed the following limits:
  - stepladders – 20 feet (6m).
  - single ladders – 30 feet (9m).
  - extension ladders (2 section) – 49 feet (15m).
  - extension ladders (more than 2 sections) – 66 feet (20m).

4.5.2 Step Ladders

- The stepladder must be in good condition and the right ladder class/grade for the job to be performed.
- Only use stepladders on clean, even surfaces.
- The platform and top step of ordinary types of stepladders will not be used as steps.
- Do not work from the top two steps of a stepladder. The pail shelf is not a step.
- Only use a stepladder in the fully opened position with the spreader bars locked.
- Do not use stepladders as supports for scaffolds or as a straight ladder.
- Stepladders may be used as a work platform, however do not over reach while on a stepladder. Climb down and move the ladder to a new position.

4.5.3 Extension Ladders

- Extension ladders are to be used for access to a higher level only, not as a work platform.
- Ladders must be tied off
- Use polypropylene ropes on extension ladders that may be exposed to corrosive chemical.
- Keep both metal and wooden ladders away from electrical sources.

- Where a ladder is used for regular access and egress between levels, platforms should be provided at each landing area.
- The landing areas at both ends of the ladder must be clear of debris and other materials.
- The ladder should be set at the proper angle of one (1) horizontal to every four (4) vertical lengths.

4.5.4 Ladder Types

- OSHA, ANSI and CSA all have established “duty ratings” for portable ladders which identifies the conditions under which the ladder can be safely used. The following table generally describes these ratings:

TYPE	MAX WORK LOAD	RATED USE
Type IAA	375 lbs (170kg)	Super Heavy Duty
Type IA	300 lbs (136kg)	Extra Heavy Duty
Type I	250 lbs (113kg)	Heavy Duty Industrial
Type II	225 lbs (102kg)	Med. Duty Commercial
Type III	200 lbs (91kg)	Light Duty Household

4.5.5 Use of Ladders

- Use the appropriate type of ladder for the required use.
- Straight ladders will be tied, blocked, and equipped with safety shoes, or otherwise secured to prevent displacement.
- Set the ladder at the proper angle of 1 horizontal to every 3 to 4 vertical.
- The top of the ladder should extend 3 feet (1 metre) above the access level and rest on a surface of ample strength to support the load of the ladder and other applied loads.
- Always visually inspect ladders prior to use. Broken or damaged ladders must not be used. Ladders with loose, broken or missing rungs, split side rails, or other defects must be tagged out and removed from service.
- Do not paint or use painted wooden ladders as paint may hide unsafe wear and tear.
- Only one person shall be on a ladder at any time.
- Always face the ladder when ascending or descending.
- Always maintain three point contact with the ladder (i.e., two hands and one foot or two feet and one hand).
- Prior to using any ladder, ensure that your footwear is free of mud, snow, grease or other slippery materials.
- Check for overhead electrical conductors prior to setting up a ladder. Ensure that ladders do not come into contact with or encroach upon the minimum safe distances from energized electrical conductors.
- Do not use metal ladders or wire-reinforced wooden ladders in proximity to energized power lines or electrical equipment. When working near electrical equipment use only wood or fibreglass ladders approved for that use.
- Single and extension ladders must be equipped with non-slip safety feet, tied off at the top and bottom, or otherwise secured to prevent “kicking out” or slipping.
- Ladders should be set up on a firm level surface. If the base is to rest on soft, uncompacted or rough soil, a mud sill must be used to stabilize the ladder.
- Ladders will not be placed on boxes, barrels, or other unstable bases to form longer sections.
- A ladder will not be placed in front of a door opening toward the ladder unless the door is blocked open, locked, or guarded.
- Ladders projecting into passageways or doorways where they can be struck by personnel, moving equipment, or materials must be protected by barricades or guards.
- Ladders must not be used horizontally as substitutes for scaffold planks, runways or other service for which they have not been designed.

- When working from a ladder, it will be secured at both top and bottom. Three-point contact should be maintained or fall protection used if reaching outside of ladder rails.
- Workers must ensure that their bodies are kept between the side rails of the ladder. Extending beyond the side rails or straddling a space between a ladder and another object will reduce the stability of the ladder.
- Never carry materials, tools or other objects when ascending or descending from a ladder. Hoist lines or other appropriate methods should be used to transport materials from one work surface to another.
- No type of work requiring the use of both hands will be performed on a ladder over 6 feet (1.8m) from the ground or floor unless a safety harness is worn and the safety lanyard is secured to a substantial overhead anchorage point. Note: For General Industry, the height limit is reduced to 4 feet (1.2m).
- Ladders will not be spliced together to form longer sections.
- At no time will a worker stand or sit on the top two rungs of any ladder.

4.5.6 Care of Ladders

- Ladders will be handled with care and not be subjected to abuse or misuse.
- Immediate inspection and appropriate maintenance is required of any ladder exposed to fire, subjected to damaging chemicals, involved in a fall or collision, or which has become coated with oil or grease.
- When not in use, ladders will be stored where they are protected from potential damage caused by collision, temperature, moisture, etc.
- Users will return ladders to the proper storage location when the job is completed.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-312-FM Ladder Inspection

Project Name:					**Project Number:**													
Project Location:					**Inspector:**								**Date:**					
Inspect each ladder when it is put into service, every three (3) months, and prior to each use. Use the ✓ symbol for Yes or OK. Use the ✖ symbol for No or Replace. Use the 0 symbol for Not Applicable or N/A			ANSI /CSATYPE 1 OR TYPE 1A CERTIFICATION OR EQUIVALENT	PROPER HARDWARE (BRACES, RIVETS, SPEADERS, NUTS, BOLTS, FEET)	CRACKS IN WOOD, METAL, OR FIBERGLASS	ROT OR DECAY	ADEQUATE PRESERVATIVE TREATMENT FOR WOOD LADDERS	RIGIDITY	SPLINTERING OF SIDERAILS OR STEPS	CONDITION OF STEPS	CORROSION OF HARDWARE OR METALRUNGS (INTERIOR/EXTERIOR)	DENTS OR BENDS	CONDITION OF EXTENSION ROPES AND PULLEYS	SAFETY FEET	TIE-OFF ROPES ATTACHED TO ALL STRAIGHT, EXTENSION, AND STEP LADDERS		
LOCATION OF LADDER	**NUMBER**	**DATE INSPECTED**																

Project Name:					**Project Number:**														
Project Location:					**Inspector:**									**Date:**					
Inspect each ladder when it is put into service, every three (3) months, and prior to each use. Use the ✓ symbol for Yes or OK. Use the ✖ symbol for No or Replace. Use the 0 symbol for Not Applicable or N/A			ANSI /CSATYPE 1 OR TYPE 1A CERTIFICATION OR EQUIVALENT	PROPER HARDWARE (BRACES, RIVETS, SPEADERS, NUTS, BOLTS, FEET)	CRACKS IN WOOD, METAL, OR FIBERGLASS	ROT OR DECAY	ADEQUATE PRESERVATIVE TREATMENT FOR WOOD LADDERS	RIGIDITY	SPLINTERING OF SIDERAILS OR STEPS	CONDITION OF STEPS	CORROSION OF HARDWARE OR METALRUNGS (INTERIOR/EXTERIOR)	DENTS OR BENDS	CONDITION OF EXTENSION ROPES AND PULLEYS	SAFETY FEET	TIE-OFF ROPES ATTACHED TO ALL STRAIGHT, EXTENSION, AND STEP LADDERS			
LOCATION OF LADDER	**NUMBER**	**DATE INSPECTED**																	
COMMENTS **(clearly identify if a ladder must be removed from service):**																			
SIGNATURE:																			

S3NA-312-ST Stairways and Ladders

Jurisdiction	Regulation
United States	
OSHA	CFR 1926.1050-1060
Canada	
Alberta	OHS Code (2009) Sect 122 - 137
British Columbia	OHS Regulation (1997) Sect 4.39, 4.61, 4.62, 13.2 – 13.6, 20.4, 20.5, 20.74, 20.121
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.5, 13.6 – 13.21, 30.6
New Brunswick	OHS Regulation (91-191) Sect 115 – 119, 121, 122 - 125
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 37, 88 – 90
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 142, 143, 147 – 152
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 80, 89, 90, 93, 246 – 259
Ontario	O. Reg. 213/91 Sect 75 – 84, 115, 187
Prince Edward Island	OHS Regulations (EC180/87) Sect 22.1 – 22.6, 23. 1 – 23.10, 36.24
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 22 – 30, 167, 324 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.5.1 – 3.7.2, Schedule 0.1
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 251 – 256
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 1.55, 1.56, 1.58, 1.65, 10.20, 10.21 – 10.29

The following standards apply to ladders:

Association	Standard
American National Standard (ANSI)	A14.1-2000 Ladders - Wood - Safety Requirements A14.2-2000 Ladders - Portable Metal - Safety Requirements A14.3 -1992 Ladders - Fixed - Safety Requirements A14.3-2002 Ladders - Fixed - Safety Requirements A14.5-2000 Ladders - Portable Reinforced Plastic - Safety Requirements
PIP Standard	STF05501 (February 2002), *Fixed* Ladders *and Cages*, published by the Construction Industry Institute
Canadian Standards Association (CSA)	CAN3-Z11-M81, *Portable* Ladders CAN3-Z11-1969, *Portable* Ladders CAN/CSA-O141-91, Softwood Lumber

S3NA-313-PR Wildlife, Plants and Insects

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 North America (NA) based employees and operations.

2.0 Terms and Definitions

2.1 **Field Work**: Field work is defined as 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 (OM&M), 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 CERCLA 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 Attachments

3.1 S3NA-313-FM Tick Test Request Form

3.2 S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart

3.3 S3NA-313-WI2 Ticks

3.4 S3NA-313-WI3 Poisonous Spider Identification

3.5 S3NA-313-WI4 Mosquito Borne Diseases

3.6 S3NA-313-WI5 Plants of Concern

3.7 S3NA-313-WI6 Wild Parsnip Identification

3.8 S3NA-313-WI7 Configuration Clothing for Protection against ticks and insects

3.9 S3NA-313-WI8 Insect Repellent Active Ingredient Product Information

3.10 S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application

3.11 S3NA-313-WI10 Bird Droppings Safe Work Practices

3.12 S3NA-313-WI11 Large Carnivores

3.13 S3NA-313-WI12 Bear Safety

3.14 S3NA-313-WI13 Small Mammals

3.15 S3NA-313-WI14 Snakes

3.16 S3NA-313-WI15 Alligators

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Managers and Supervisors

- **Project Managers** and **Supervisors** responsible for managing field work will work with employees conducting the work 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.
- If biological hazards are identified as an exposure risk in the workplace, control measures that may be applied at the project site will be implemented to reduce the potential for employees to be exposed to injuries and illnesses while working.
- If the exposures cannot be eliminated or managed with engineering controls, the **Project Manager** or **Supervisor** will approve the use of PPE and protective repellents and lotions and ensure that exposed employees have and use these products.

4.1.2 District Operations Manager

- Approve the costs associated with the PPE and materials necessary to protect employees from the biological hazards covered by this Procedure.
- During the performance of project site visits, managers will assess the precautions being taken against the requirements of this Procedure.

4.1.3 Region SH&E Manager

- Participate in incident reporting and investigations when appropriate.
- Work with office SH&E Department and project Safety Professionals, provide training and guidance to employees consistent with this procedure.
- Assist project teams in identifying hazards and selecting appropriate control measures.

4.1.4 Operational Managers

- Assure implementation of this procedure in their regions and offices.
- Participate in incident reporting and investigations when appropriate.

4.1.5 Employees

- Participate in required training on this procedure.
- Participate in the development of THAs for the project, identify control measures to limit exposure and request PPE, repellents, and protective lotions required by this Procedure.
- Obtain approval from **Project 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 as detailed within the Procedure.
- Participate in incident reporting and investigations when appropriate.

4.2 Overview

4.2.1 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 and as part of the Task Hazard Analysis conducted by the project team, additional consideration must be given to other biological hazards.

4.2.2 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.

4.2.3 If additional biological hazards are identified, the project team should contact the **Region SH&E Manager** to discuss the hazards and identify effective control measures that can be implemented at the project site.

4.3 Planning and Hazard Assessment

4.3.1 The AECOM project team shall ensure that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this SOP are integrated into the project planning process and conveyed to AECOM employees conducting the field work. This information shall be communicated in the site specific Safe Work Plan (SWP), Health and Safety Plan (HASP), the THA, pre-project kickoff meetings, and tailgate meetings at the project site.

4.3.2 It is important to note that the precautions to be taken by AECOM **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 project-specific hazard assessments in accordance with *S3NA-511-PR Heat Stress.*

4.3.3 During the preparation of the project specific Safe Work Plan (SWP), HASP and project specific THA, **Project Managers**, **Supervisors**, and the project staff will determine what biological hazards might be encountered during the project and will 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.

4.3.4 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°F 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.

4.3.5 The hazard assessments must 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.

4.3.6 **Employees** in the field where biological hazards exist will 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 affected employees shall stop work and not proceed until the THA has been amended and protective measures implemented.

4.3.7 A decision flow chart and table for determining the potential for biological hazards in US states has been provided in *S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (US States).*

4.4 Restrictions

4.4.1 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.

4.5 Employee Sensitivity

4.5.1 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. Staff 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.

4.5.2 **Employees** also need to consider whether they are sensitive to the use of insect repellents.

4.6 Personal Protective Equipment

4.6.1 The selection of Personal Protective Equipment is dependent on the hazard present and a PPE Hazard Analysis should be conducted to determine situation specific PPE required. (refer to SOP *S3NA-208 Personal Protective Equipment Program*)

4.6.2 At a minimum, in addition to any project specific PPE, long sleeves and pants should be worn on field projects where the risk of biological encounter exists.

4.6.3 PPE for insects should include sunscreen, bug nets, bug jackets, or insect repellent. Socks should be pulled over pant legs and rubber boots should be worn where the threat of exposure is anticipated.

4.6.4 Epi-pens[1] or other personal medication should be carried by those staff that are aware that anaphylactic shock is a possibility for them.

4.7 Remedies

4.7.1 If you suspect exposure to an irritant, identify the cause including obtaining a specimen if possible. Document the occurrence as a safety precaution if the exposure should lead to complications.

4.7.2 Go to a doctor or call WorkCare for advice if necessary.

4.8 Training

4.8.1 Field staff must learn to recognize organisms that represent a threat in the regions in which they work – experienced field staff must provide on the job training to assist staff with hazard recognition.

4.8.2 Staff who have severe allergic reactions are strongly recommended to notify their project manager, field supervisor, and co-workers of the potential for a reaction and demonstrate what medication they might need and how it is administered.

4.9 Insects

4.9.1 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.

4.9.2 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.

4.9.3 Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will insert mouthparts to drink blood. The most serious concern is a possibility of contracting Lyme disease which is spread by the Black-legged or Deer Tick. The larger Wood Ticks are widespread in the west but these rarely carry diseases. Occasionally a tick can cause Tick Paralysis if it is able to remain feeding for several days. Full recovery usually occurs shortly after the tick is removed.

4.9.4 The Fire Ant (southern and western US) and the European Fire Ant (northeastern US 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.

4.10 Ticks

4.10.1 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.

4.10.2 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 *S3NA-313-WI2 Ticks* along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.

4.10.3 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.

4.10.4 To remove ticks that are embedded in skin, 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.

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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.*

4.10.5 Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If noted, report to medical help for inoculation.

4.10.6 If possible, submit any ticks found or captured to the following laboratories for species identification.

- Canada – National Microbiology Laboratory (NML) (Phone: (204) 789-2000; email: ticks@phac-aspc.gc.ca). The NML will conduct diagnostic testing for the Lyme disease agent as well as several other disease-causing agents. The NML results will not only benefit anyone bit by the tick, but will also assist the NML in their goal to accurately map the distribution of the tick species and associated diseases in Canada.
- US – IGeneX, Inc. (Phone: (800) 832-3200; www.igenex.com). IGeneX will test the tick for the presence of the Lyme bacteria. They also test ticks for *Babesia microti* and/or *Babesia duncani* (formerly WA-1), Ehrlichia, Bartonella henselae and Rickettsia (Rocky Mountain Spotted Fever). These diseases are also carried by ticks. The testing request form is attached as *S3NA-313-FM Tick Test Request Form*.

4.10.7 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.

4.11 Chiggers

4.11.1 Chiggers are mite larvae, approximately ½ mm 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.

4.11.2 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.

4.12 Spiders

4.12.1 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.

4.12.2 Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the US and others outside the US inject a toxin that causes extensive tissue damage and intense pain.

4.12.3 Additional information on spider identification can be found in attachment *S3NA-313-WI3 Poisonous Spider Identification*.

4.13 Mosquitoes

4.13.1 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. Positive cases of West Nile Virus have been confirmed throughout North America since 2007.

4.13.2 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.

4.13.3 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.

4.13.4 CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk to employees working in outdoor environments. 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 (EEE)
- Western Equine encephalitis (WEE)
- West Nile Virus
- St. Louis encephalitis (SLE)
- La Crosse (LAC) encephalitis

4.13.5 Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3NA-313-WI4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.14 Bees and Hornets

4.14.1 Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, and even on open ground. The flying/stinging insects are not specifically included in the scope of this procedure and the PPE and other protective measures are not normally effective against aggressive, flying insects. Avoid reaching into areas where visibility is limited.

4.14.2 If stung by a wasp or 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. 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.

4.14.3 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with 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.

4.15 Poisonous Plants

4.15.1 Poisonous plants including poison ivy, oak and sumac, which contain the oil urushiol that produces a rash, can lead to dermatitis and infections. Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the affected area, increasing susceptibility for an infection. It should be noted that each time an employee is exposed to urushiol the severity of the reaction increases. In cases that involve severe rashes, medical treatment may be necessary to control the rash.

4.15.2 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 *S3NA-313-WI6 Wild Parsnip Identification* for additional information and photos of wild parsnip.

4.15.3 Plants that field staff 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.

4.15.4 See *S3NA-313-WI5 Plants of Concern* for information on locations where some of these poisonous plants are found in the US.

4.15.5 Of the toxic plants in the cashew family, Poison Ivy (*Rhus radicans*) is most widespread occurring across southern Canada. It is usually a low sprawling shrub or ground cover but in southwestern Ontario it also grows as a thick woody vine that grows high into the tree canopy. Poison Oak (*Rhus diversiloba*) is a low shrub that grows only in southwestern British Columbia and Poison Sumac (*Rhus vernix*) is a tall shrub that grows in southern Ontario but is quite rare. All of these plants possess urushiol oils in nearly all parts of the plant. Touching the plant causes an itchy skin rash that shows up several days following contact. People have a wide range of reactions which in severe cases can lead to oozing blisters on large parts of the body. Some people apparently never react and others may develop an allergy after no reaction after years of frequent contact.

4.15.6 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 garden that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 5 m 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.

4.15.7 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.

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[2] *Phytodermatisi producer: keep skin covered and wash well after exposure*

4.15.8 Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. Fragile Prickly Pear cactus (*Opuntia fragilis*) is common in semi arid areas of the southern Prairie Provinces and interior British Columbia. Pieces will break off and imbed into one's ankle by scarcely brushing them. Devils Club (*Oplopanax horridum*) can form dominant understorey in humid forests among the western mountains. It contains semi-soft spines on the stems that will break off in the skin causing considerable irritation for days. In some areas of Ontario, Prickly-ash (*Zanthoxylon americanum*) a tall shrub with sturdy spines, sometimes forms dense single stands that are nearly impenetrable.

4.15.9 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 not to eat any berries or plants if you are not absolutely sure of their identity.

4.15.10 Of all the plants, Giant Hogweed presents the most serious health risk. Field staff should learn to recognize and avoid it if encountered.

4.15.11 Employees who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their **Supervisor** or **Project Manager** who will then forward the report to the **Regional SH&E Manager**.

4.16 Additional Biological Hazards

4.16.1 Additional Work Instructions are provided for protection and prevention from the following:

- *S3NA-313-WI11 Large Carnivores*
- *S3NA-313-WI12 Bear Safety*
- *S3NA-313-WI13 Small Mammals*
- *S3NA-313-WI14 Snakes*
- *S3NA-313-WI15 Alligators*

4.17 Habitat Avoidance, Elimination, and/or Control

4.17.1 Ticks, Spiders and Insects

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the project site 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, spiders, and poisonous plants during the clearing process.
- AECOM projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the AECOM **project 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.
- When projects must be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures outlined in this SOP shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. **Project 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.

4.17.2 Poisonous Plants

- 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 **Project Manager** and/or Client to gain 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 will need to occur with the **Project Manager** and Client to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- AECOM **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 **Region SH&E Manager**. If a SWP or HASP is prepared for the project, the clearing procedure should be included and the required PPE specified.

4.17.3 Bird Droppings

- Bird excrement may be encountered due to the nesting of pigeons and other birds and winged animals (e.g., bats) on or in structures. 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 *S3NA-313-WI10 Bird Droppings Safe Work Practices*.

4.18 Personal Precautions and Personal Protective Measures

4.18.1 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).
- Wear protective clothing.
- 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.

4.18.2 PPE

- The following recommendations may be considered by the project team to determine if the use of PPE is necessary for the type of work planned: Disposable gloves may be cotton, leather, or synthetic materials and must not be reused after removing.
- Clearing activities present the greatest risk of employee exposure but reduce the risks once completed. Recommendation – AECOM employees actively participating in clearing will use full protection from ticks and insects during the clearing activities including insect repellents, Tyvek® coveralls, and gloves.
- If the foliage being cleared includes poisonous plants, exposed skin will 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.
- Work in habitats with direct exposure to ticks, mosquitoes, and poisonous plants is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from biological hazards including insect repellents, Tyvek® coveralls or full length clothing, poisonous plant barrier creams and wipes, and gloves.
- Work in habitats with direct exposure to ticks and mosquitoes and no exposure to poisonous plants is likely and the scope of work typically does allow for worksite control measures like vegetative clearing: Recommendation – Protection including insect repellents and Tyvek® coveralls or full length clothing.
- Work in habitats with direct exposure to poisonous plants and no exposure to ticks or insects is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from poisonous plants including insect repellents, Tyvek® coveralls or full length clothing, poisonous plant barrier creams and wipes, and gloves.
- Industrial/Commercial/Office Facilities – Direct contact with biological hazards is considered unlikely or low risk: Recommendation – PPE for biological hazards are not required; however, Tyvek coveralls and insect repellentrepellent should be available if exposure to spiders, flying insects, or other biological hazards is encountered.
- Work in areas where no biological hazards are expected because of the local environment, winter weather, or property development: Recommendation – PPE for biological hazards is not required;

however, Tyvek® coveralls and insect repellentrepellent should be available if exposures to spiders, flying insects, or other biological hazards are encountered.

- The following precautions and protective measures shall be implemented by AECOM **employees** conducting field work where the biological hazards covered by this SOP exist:

4.18.3 Insects, Spiders, and Ticks

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Application of insect repellent to clothing and/or exposed skin.
- Routine personal checks.
- Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If stung by an insect or bitten by a spider or tick, attempt to identify the attacker and notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite, or any swelling or numbness beyond the site of the bite.
- Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the Centers for Disease Control and Prevention 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 apply DEET to their skin and let dry prior to putting FRC on, or 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.

4.18.4 Poisonous Plants

- **Employees** working in areas where poisonous plants exist shall wear either long sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. **Employees** must not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants will 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.
- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.
- Employees who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their **Supervisor** or **Project Manager** who will forward the report to the RSHEM.
- For dermatitis caused by Poison Ivy, Poison Oak, or Poison Sumac, calamine lotion is effective.

4.19 Selection and Configuration of Field Clothing

4.19.1 At a minimum, **employees** will wear long legged pants and long sleeve shirts or Tyvek® coveralls to reduce the amount of exposed skin when biological hazards are identified at the work site. Gloves will also be worn consistent with the recommendations of the site-specific SWP, HASP and/or THA to minimize hand exposure.

4.19.2 Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically-treated clothing will be taped to the work boots.

4.19.3 See *S3NA-313-WI7 Configuration Clothing for Protection* against ticks and insects for illustrations and instructions for configuring, taping, and tucking clothing.

4.19.4 Chemical Treatment of Field Clothing

- Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the Centers for Disease Control and Prevention 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 apply DEET to their skin prior to putting FRC on, or 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.

4.19.5 Permethrin

- When selected as part of a project's PPE requirements, the AECOM **Project Manager** shall ensure that field teams wear clothing treated with the chemical Permethrin, which is an insecticide with repellent properties registered with the U.S. Environmental Protection Agency (EPA), and recommended by the CDC. Information regarding the toxicity and product safety of Permethrin is provided in *S3NA-313-WI8 Insect Repellent Active Ingredient Product Information*. 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) employee treatment of their personal clothing using 0.5% Permethrin spray. 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 *S3NA-208-PR Personal Protective Equipment Program* and with the approval of your **Supervisor**. For more information visit the AECOM NA SH&E website.
- 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 5 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 must be applied directly to the skin.. Costs for clothing shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as a department expense. **Supervisor** or **Department Manager** approval is required prior to purchase.
- If an employee opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they must either: 1) wear Tyvek® coveralls taped to the boots, 2) full length clothing consisting of long legged pants and long sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an organic alternative to their work clothing.

4.19.6 Manual Treatment of Field Clothing

- If clothing pre-treated with Permethrin is not available or not purchased prior to field work, employees may manually treat their clothing with Permethrin spray. The outer surfaces of all external clothing to be worn during field work should be treated with 0.5% Permethrin spray a minimum of 2 to 4 hours prior to field work (boots, trousers, shirt, jackets, rain gear; refer to Section 4.16 for selection of field clothing) in accordance with recommendations provided by the New York State Department of Health presented in *S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application*. 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. Clothing treatment will last for approximately 5 wash cycles (check the specific instructions for the product used.)

4.19.7 Lemon Eucalyptus

- 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.

4.19.8 Purchase of PPE and Repellents and Lotions

- Costs for clothing, repellents, lotions, and other PPE shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as a department expense. **Supervisor** or **Department Manager** approval is required prior to purchase.
- Material Safety Data Sheets (MSDS) 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 MSDS should be obtained for the products used and placed into the office MSDS library and site-specific health and safety plans. Selected MSDSs are available on the AECOM NA SH&E web site.

4.20 **Personal Hygiene and Body Checks**

4.20.1 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.

4.20.2 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.

4.20.3 **Employees** will 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 *S3NA-313-WI2 Ticks*, the tick should be preserved with the date and location of the bite noted, and retained for identification if medical treatment is needed as described in Section 4.13.1 of this Procedure.

4.20.4 The presence of an imbedded tick, rash, or abnormal reactions will be reported as an SH&E Incident to the **Project Manager** or **Supervisor** who will forward the report to the **RSHEM** for follow up.

5.0 Records

5.1 None

6.0 References

6.1 Public Health Agency of Canada (http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php) on Ticks and Lyme Disease in Canada

6.2 Public Health Agency of Canada (http://www.phac-aspc.gc.ca/wn-no/index-eng.php) on West Nile Virus

6.3 United States Center for Disease Control (CDC) (http://www.cdc.gov/ncidod/dvbid/lyme/index.htm) on Lyme Disease

6.4 New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents. http://www.health.state.ny.us/nysdoh/westnile/pdf/2737.pdf

6.5 Spectrum Brands, 2007. Personal Insect Repellent Products. http://www.spectrumbrandshomeandgarden.com/CorpNav/AboutSpectrum/ProductCategories/insect_repellent.htm

6.6 U.S. Centers for Disease Control and Prevention, 2004. Tick Management Handbook. http://www.cdc.gov/ncidod/dvbid/lyme/resources/handbook.pdf

6.7 U.S. Environmental Protection Agency, 2006. Permethrin Facts: Preregistration Eligibility Decision Fact Sheet. http://www.epa.gov/oppsrrd1/reregistration/REDs/factsheets/permethrin_fs.htm

6.8 U.S. National Pesticide Information Center, 1997, National Pesticide Telecommunications Network Fact Sheet for Permethrin. http://npic.orst.edu/factsheets/permethrin.pdf

6.9 U.S. Environmental Protection Agency, 2005. New Pesticide Fact Sheet, Picaridin http://www.epa.gov/opprd001/factsheets/picaridin.pdf

S3NA-313-FM Tick Test Request Form

IGeneX, Inc.
795 San Antonio Road
Palo Alto, CA 94303
800/832-3200
www.igenex.com

TICK TEST REQUEST FORM

Revised: JUNE 2008

TO SEND A TICK:

- Place ticks (up to 20) in a small tube or plastic baggy with a small piece of moist cotton.
- Place container in a sealed plastic bag.
- Fill out lower portion of this form.
- Place form, check and sealed plastic bag in padded envelope or box.
- Send to IGeneX, Inc. and mark front of envelope or box with "TT".
- IGeneX does not "TYPE" or determine the species of the ticks. If you want to "TYPE" your tick, please contact your local Vector Control Center.
- Once your tick(s) have been processed, the tick can not be returned to you.
- For Multiple Ticks: up to 20 ticks will be tested together at one time unless indicated otherwise.
  If ticks are tested separately, the charge is per tick. Please test my ticks separately. Yes ☐

Please test the tick by PCR for:

☐	Test 140	Lyme Disease (B. burgdorferi)	$65.00
☐	Test 689	Babesiosis (B microti and/or B duncani)	$65.00
☐	Test 148	Ehrlichiosis (Ehrlichia)	$65.00
☐	Test 290	Bartonella henselae	$65.00
☐	Test 975	Rickettsia	$65.00

Name and Address of Sender:

_____

_____

_____

Phone: (_____) _____

If you would like results faxed or called, please indicate below. Otherwise, results will be mailed by USPS.

_____Please fax my completed results to:
(_____)_____-_____

_____Please call me with my results at:
(_____)_____-_____

☐ Check enclosed payable to IGeneX, Inc.

☐ Please charge my credit card for the above tests:

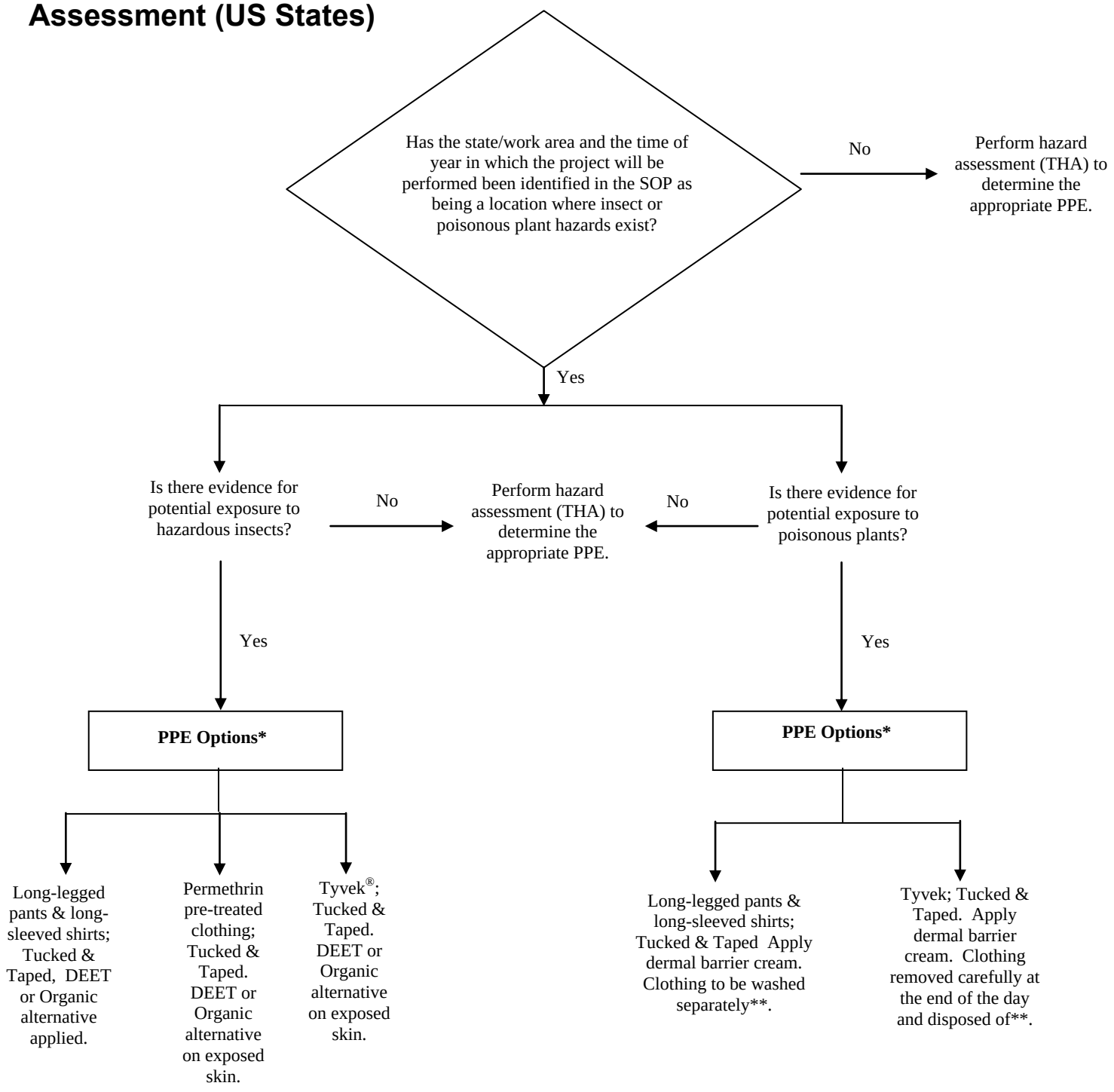
☐ Visa ☐ Mastercard ☐ Discover

Card Number: _____

Exp. Date_____

Signature_____

S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (US States)



* indicates that when both insect and poisonous plant hazards are recognized hazards at a project site, the most conservative combination of the available PPE choices will be selected.

** indicates that clothing that has been known or suspected to have come in contact with poisonous plants must be washed before it can be worn again. Similarly, Tyvek® that has been known or suspected to have come in contact with poisonous plants will be disposed of rather than reused during a subsequent day or project.

State by State Guideline for Exposure

States	Tick-Borne Diseases	Mosquito-Borne Diseases	Poisonous Plants
Alabama	Year Round Low Risk	Year Round	Year round
Alaska	No Risk	No Risk	No Risk
Arizona	No Risk	March - July	March - November
Arkansas	March - November	March - November	March - November
California	Low Risk	March - November	Year Round
Colorado	Low Risk	March - November	No Risk
Connecticut	March - November	Low Risk March - November	March - November
Delaware	March - November	Low Risk March - November	March - November
Florida	Year Round Low Risk	Year Round	Year round
Georgia	Year Round Low Risk	Year Round	Year round
Hawaii	No Risk	No Risk	No Risk
Idaho	No Risk	Low Risk March - November	No Risk
Illinois	March - November	March - November	March - November
Indiana	March - November	March - November	March - November
Iowa	March - November	March - November	March - November
Kansas	Low Risk	March - November	March - November
Kentucky	March - November	March - November	March - November
Louisiana	Year Round Low Risk	Year Round	Year round
Maine	March - November	March - November	March - November
Maryland	March - November	Low Risk	March - November
Massachusetts	March - November	March - November	March - November
Michigan	March - November	March - November	March - November
Minnesota	March - November	March - November	March - November
Mississippi	Year Round	Year Round	Year round
Missouri	March - November	March - November	March - November
Montana	Low Risk March - July	Low Risk March - July	No Risk
Nebraska	Low Risk	Low Risk	Low Risk
Nevada	Low Risk March - July	Low Risk March - July	Low Risk March - November
New Hampshire	March - November	March - November	March - November
New Jersey	March - November	March - November	March - November
New Mexico	No Risk	Low Risk March - July	No Risk
New York	March - November	March - November	March - November
North Carolina	March - November	March - November	March - November
North Dakota	No Risk	March - November	No Risk
Ohio	Low Risk March - November	March - November	March - November
Oklahoma	March - November	Low Risk March - November	March - November
Oregon	Low Risk March - November	Low Risk March - November	March - November
Pennsylvania	March - November	March - November	March - November
Puerto Rico	???	Low Risk March - November	Year round
Rhode Island	March - November	Low Risk March - November	March - November
South Carolina	March - November	Low Risk March - November	March - November

States	Tick-Borne Diseases	Mosquito-Borne Diseases	Poisonous Plants
South Dakota	Low Risk March - November	March - November	March - November
Tennessee	March - November	March - November	March - November
Texas	Year Round Low Risk	Year Round	Year round
Utah	Low Risk March - July	Low Risk March - July	No Risk
Vermont	March - November	Low Risk March - November	March - November
Virginia	Low Risk March - November	March - November	March - November
Washington	Low Risk March - November	Low Risk March - November	March - November
West Virginia	Low Risk March - November	March - November	March - November
Wisconsin	March - November	March - November	March – November
Wyoming	No Risk March - July	Low Risk March - July	No Risk

S3NA-313-WI2 Ticks

1.0 Background

1.1 The Public Health Agency of Canada (PHAC) works with the provinces, health authorities and other experts on research to define and monitor the occurrence of the ticks that carry *Borrelia burgdorferi*, the bacterium that causes Lyme disease. In Canada, the blacklegged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western blacklegged tick (*Ixodes pacificus*) are the species known to transmit this disease-causing agent, as well as other less common agents.

1.2 In Quebec, blacklegged tick populations are becoming established in parts of the Monteregie and Estrie regions in the southeast of the province. In Ontario, populations can be found in Long Point; Point Pelee National Park; Rondeau Provincial Park; Turkey Point; Prince Edward Point National Wildlife Area and St. Lawrence Islands National Park in the Thousand Islands region of eastern Ontario. In Nova Scotia, blacklegged tick populations are found in the Lunenburg, Bedford and Shelburne areas. An established population has also been found in the southeastern corner of Manitoba. Western blacklegged ticks, on the other hand, are found in British Columbia; they are fairly widely distributed but populations are largest in the lower mainland, on Vancouver Island, and in the Fraser Valley.

1.3 Although the distribution of blacklegged ticks in Canada appears to be limited, surveillance indicates that some of the established populations are spreading within certain areas of southern Canada. The potential expansion of localized tick populations makes it difficult to precisely define the geographic limits of any given population; however, people living in or visiting areas adjacent to established tick populations may have a greater chance of contact with blacklegged ticks. Although current evidence does not suggest a widespread distribution of blacklegged tick populations in Canada, the establishment of new populations appears to be an ongoing process. Hence, it is desirable to continue surveillance and to take precautions to reduce tick contact.

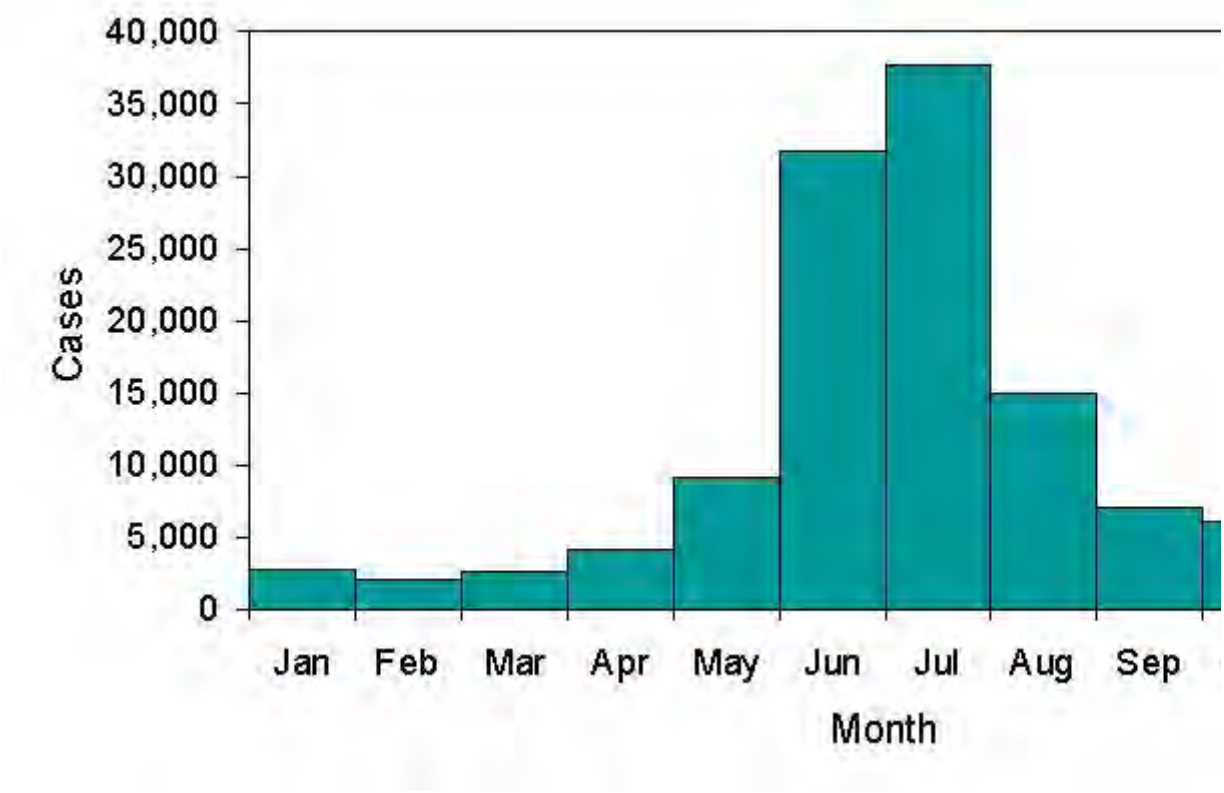
1.4 The rate of infection of ticks with the bacterium that causes Lyme disease varies. Infection rates are typically higher in adult ticks compared to the other stages (nymphs and larvae). Despite the lower rates of infection, people are most likely to acquire Lyme disease from a nymph because this stage is so small (see Figure 2) and thus more likely to go unnoticed and feed for a sufficient amount of time for the Lyme disease bacterium to be transmitted (24-36 hours). Infection rates are often greater in tick populations that have been established for long periods of time (such as Long Point) compared to newly established ones. As many as 60 percent of the adult ticks at Long Point are infected; however, infection rates in adults are more often between 10 and 25 percent at the other localities where ticks are established. Partly because of differences in the types of hosts that they feed upon, infection rates of the Lyme disease agent in *Ixodes pacificus* are much lower (1-3 percent) than *Ixodes scapularis*.

1.5 While there is a higher risk of coming in contact with infected blacklegged ticks in areas where populations are established, there is also a low risk of Lyme disease being contracted almost anywhere in Canada because migratory birds transport infected ticks over large geographic distances. Surveillance data indicates that about 12 percent of the ticks detected outside of areas where tick populations are established, and likely transported there on migratory birds, are infected with the agent of Lyme disease.

1.6 Source: http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php

Figure 1

Reported Cases of Lyme Disease by Month of Illness Onset United States, 1992-2004



Lyme disease patients are most likely to have illness onset in June, July, or August and less likely to have illness onset from December through March.

Lyme disease likelihood = April through November http://www.cdc.gov/ncidod/dvbid/lyme/ld_rptmthofill.htm

2.0 Tick removal tips from CDC

http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm

3.0 To Remove Attached Ticks

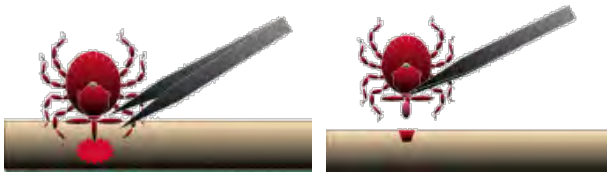
3.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.

3.2 Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your health care provider if illness occurs.)

3.3 After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.

3.4 Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms. Skin accidentally exposed to tick fluids can be disinfected with iodine scrub, rubbing alcohol, or water containing detergents.

3.5 Save the tick for identification in case you become ill. This may help your doctor make an accurate diagnosis of potential diseases by determining what type of tick it is. Place the tick in a sealable plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.



4.0 Devices Designed for Removing Ticks

4.1 **The Tick Tool - http://www.ticktool.com/index.html**

5.0 Folklore Remedies Don't Work

5.1 Folklore remedies, such as the use of petroleum jelly or hot matches, do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided.

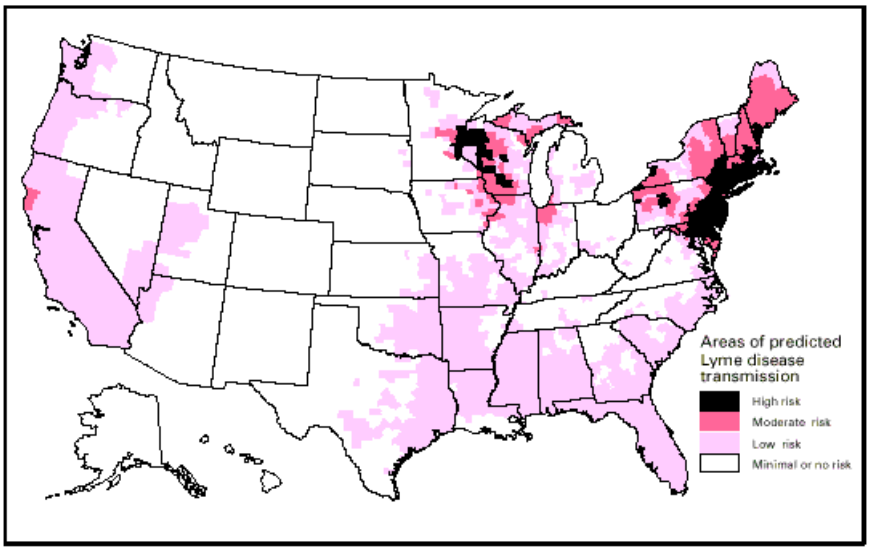
Information Regarding Common Tick-Borne Diseases and Tick Removal Procedures

Table 1
Common Tick-Borne Diseases in the U.S. and Information Resources

Disease	Tick Species	CDC Informational Web Pages
Lyme disease	• Black-legged or deer tick • Western black legged tick	http://www.cdc.gov/ncidod/dvbid/lyme/
Ehrlichiosis	• Lone star tick • Black-legged or deer tick • Western black legged tick	http://www.cdc.gov/Ncidod/dvrd/ehrlichia/Index.htm
Rocky Mountain spotted fever	• American dog tick • Rocky Mountain wood tick • Brown dog tick	http://www.cdc.gov/ncidod/dvrd/rmsf/index.htm

6.0 Distribution

Figure 2
Distribution Map for Lyme Disease Risk, U.S.

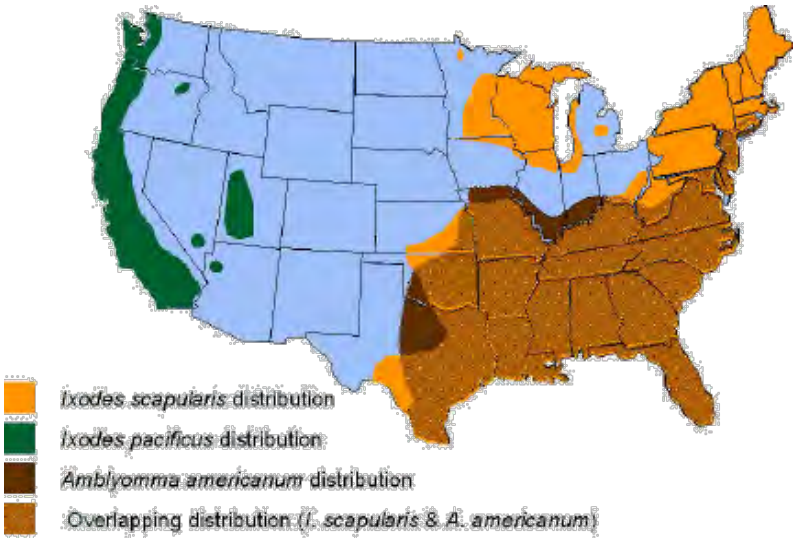


Note: This map demonstrates an approximate distribution of predicted Lyme disease risk in the United States. The true relative risk in any given county compared with other counties might differ from that shown here and might change from year to year. Risk categories are defined in the accompanying text. Information on risk distribution within states and counties is best obtained from state and local public health authorities.

Source: CDC, http://www.cdc.gov/ncidod/dvbid/lyme/riskmap.htm

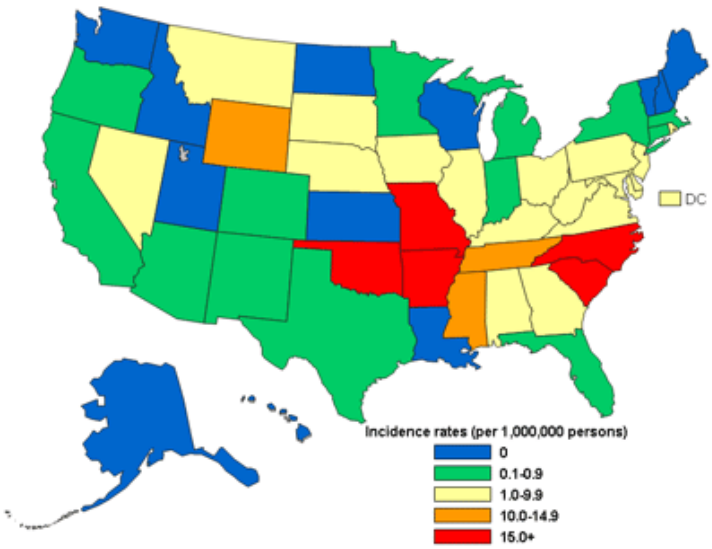
Figure 3
Distribution Map of Vector

Tick Species for Human Ehrlichiosis, U.S.



Source: CDC, http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm

Figure 4
Distribution Map of Annual Incidence
of Rocky Mountain Spotted Fever, U.S



Data for calendar year 2002

Source: CDC, http://www.cdc.gov/ncidod/dvrd/rmsf/Epidemiology.htm

S3NA-313-WI3 Poisonous Spider Identification

Black Widow Spider

- Abdomen usually shows hourglass marking.
- The female is 3-4 centimeters in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

- Central and South U.S., although in some other areas, as well.
- ¼-to-½-inch-long body and the size of silver dollar.
- Hides in decaying wood, baseboards, ceilings, cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.

Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If bitten by a spider, attempt to identify the spider, notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or any swelling or numbness beyond the site of the bite.

Additional USA Spider Identification charts are available at http://www.termite.com/spider-identification.html

S3NA-313-WI4 Mosquito-Borne Diseases

1.0 Background

1.1 CDC data indicates that mosquito-borne illnesses, including encephalitis, are a health risk to employees working in outdoor environments.

1.2 Mosquitoes pose a risk of causing infection with various forms of encephalitis and other diseases in AECOM employees. This section will focus on the transmission of encephalitis. West Nile encephalitis is an infection of the brain that is caused by a virus known as the West Nile virus.

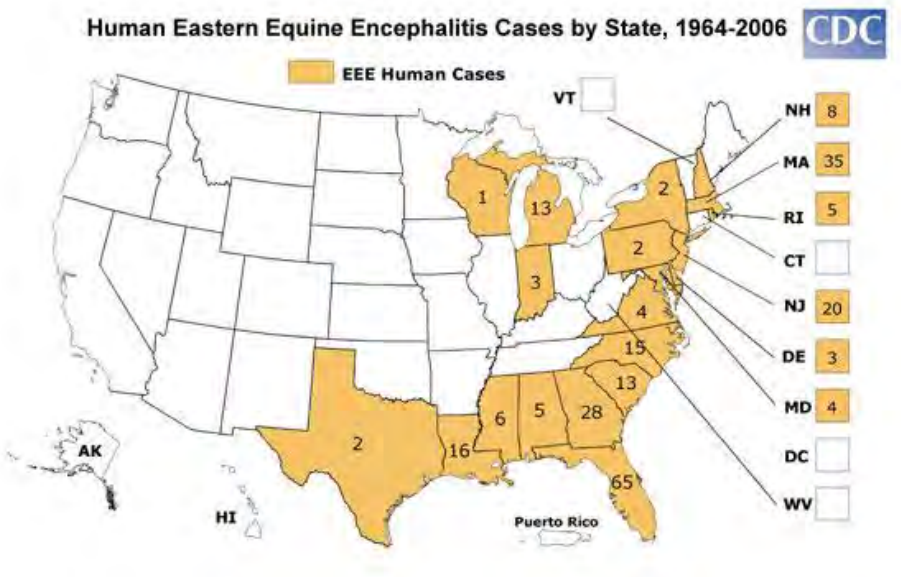
1.3 If other mosquito-borne diseases are identified in the project area, the local Public Health Department and CDC should be consulted to determine what diseases are present and exposure prevention recommendation.

1.4 According to the CDC, arboviral encephalitis is a virus that is “maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods”, e.g., mosquitoes. It exists in various forms in global distribution, and in four primary forms in the U.S.: 1) eastern equine encephalitis (EEE), 2) western equine encephalitis (WEE), 3) St. Louis encephalitis (SLE), and 4) La Crosse (LAC) encephalitis; all of which are transmitted by mosquitoes.

1.5 Mosquitoes are known to breed in standing water; therefore, when standing water is found at a job site, actions should be taken to drain the water. Typically, mosquitoes will fly only a quarter of a mile (400 meters) from their breeding location.

2.0 Distribution

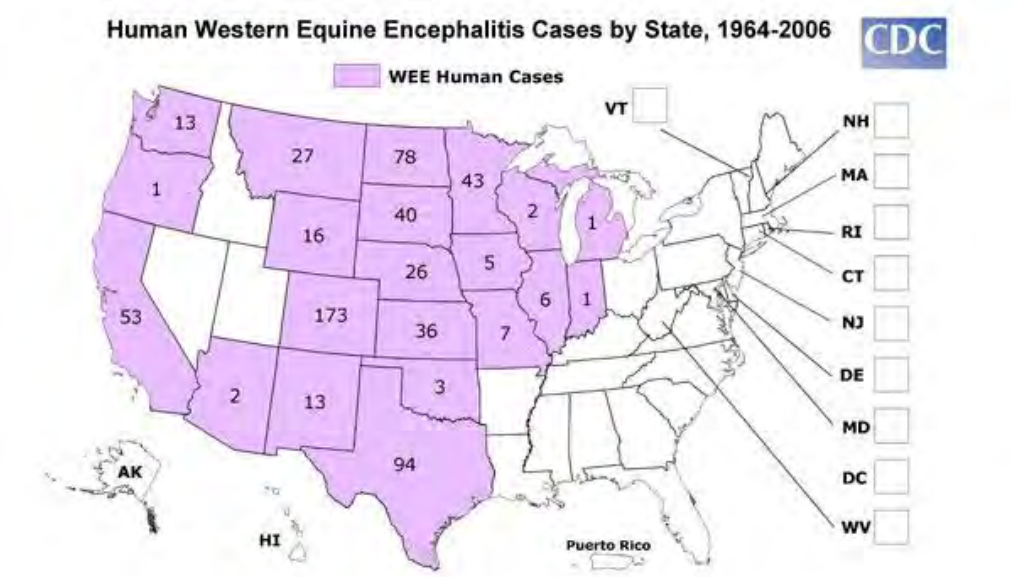
Figure 1
Distribution Map for EEE Cases



Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/EEE_Map.jpg

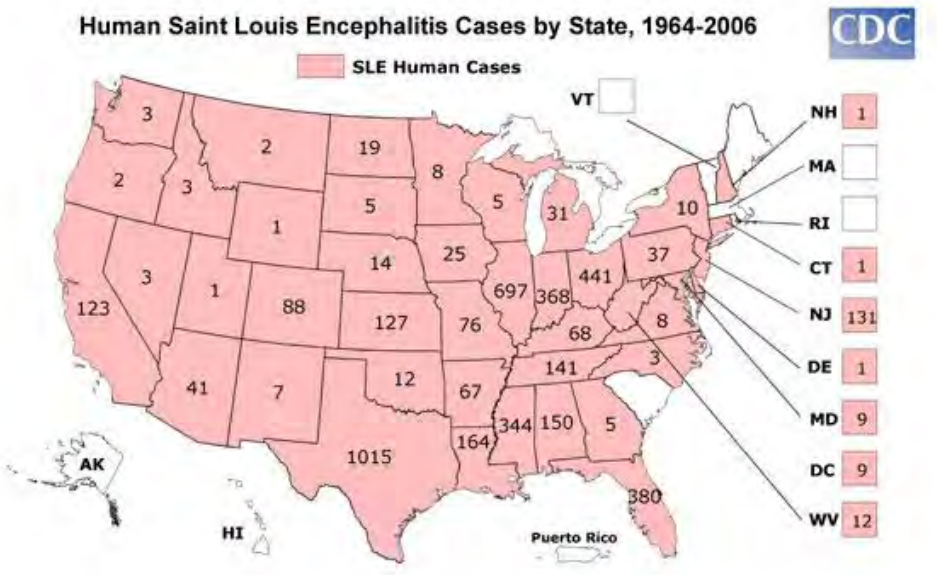
Figure 2

Distribution Map for WEE Cases



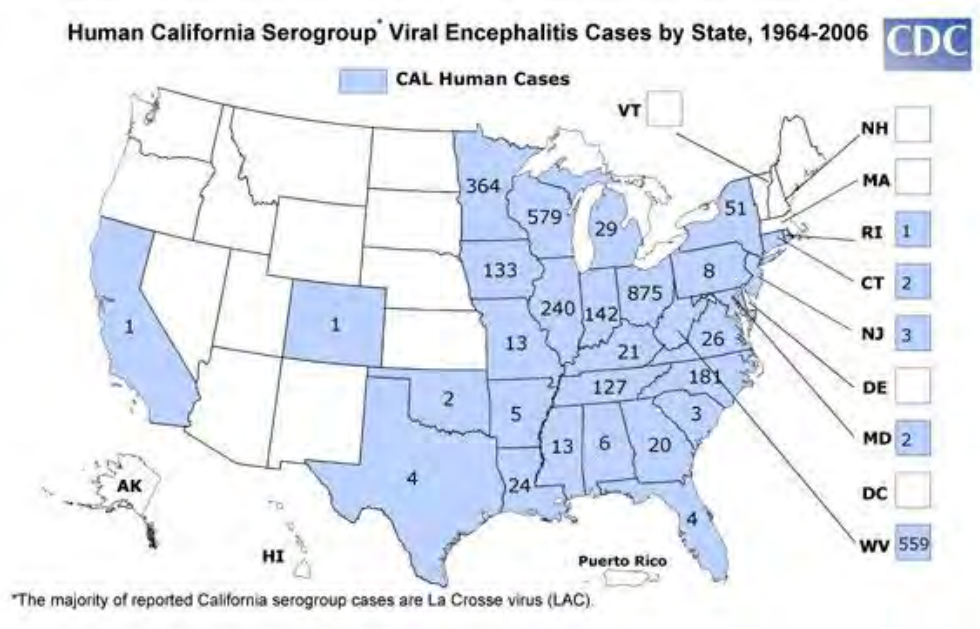
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/WEE_Map.jpg

Figure 3
Distribution Map for SLE Cases



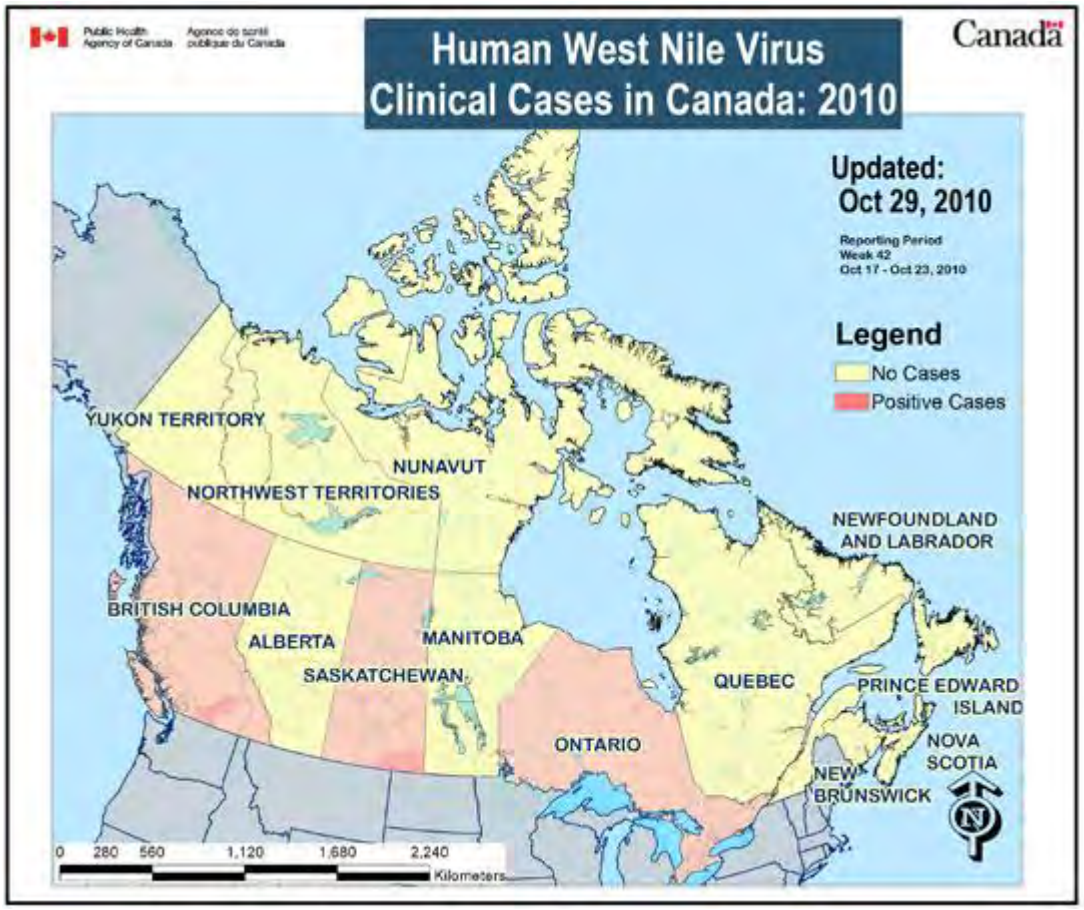
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/SLE_Map.jpg

Figure 4
Distribution Map for LAC Cases



Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/LAC_Map.jpg

Canadian Mosquito Borne Diseases



Source: http://www.eidgis.com/wnvmonitorca/

Disease	**Distribution**
California encephalitis	Canada-wide
Western equine encephalitis	Western Canada
Eastern equine encephalitis	Quebec, Ontario
St Louis encephalitis	Ontario, Quebec, Manitoba, Saskatchewan
Cache Valley	Ontario, Manitoba, Saskatchewan, Alberta

Source: Paediatr Child Health. 2000 May–Jun; 5(4): 206–212.

S3NA-313-WI5 Plants of Concern

1.0 Background

1.1 Poison ivy, oak and sumac (poisonous plants) pose a significant threat to AECOM employees due to the dermatitis that results from exposure to the oil on these plants, called urushiol.

1.2 Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the infected area, increasing susceptibility for an infection to result from the rash.

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

2.0 Treatment

2.1 In cases that involve severe rashes, medical treatment may be necessary to control the rash.

2.2 Employees that develop a rash as a result of exposure to poison ivy, oak or sumac should report the exposure immediately to their Supervisor, Project Manager and RSHEM.

Figure 1

Distribution Map for Poison Ivy

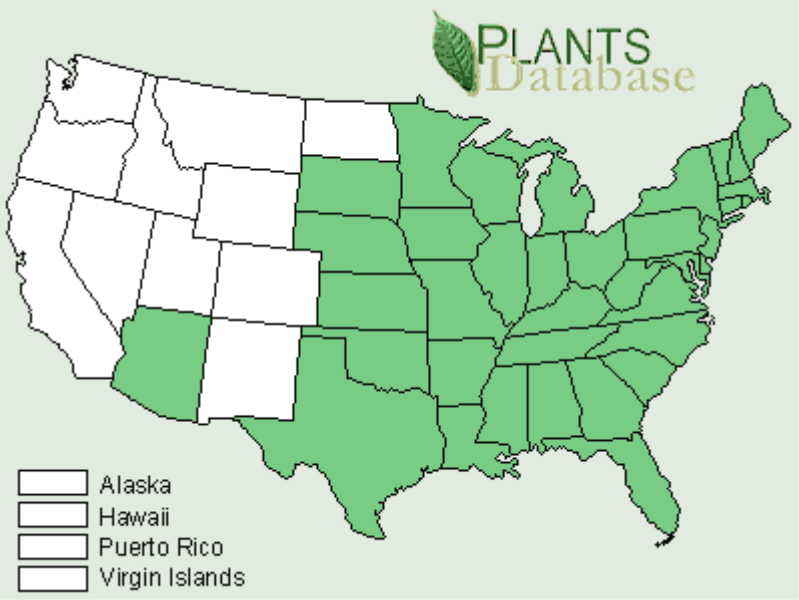


Figure 2
Distribution Map for Poison Oak

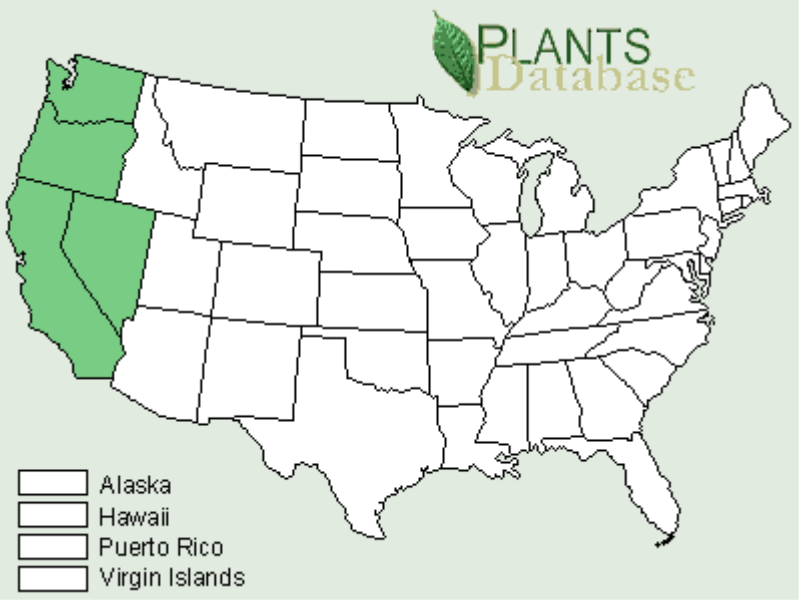
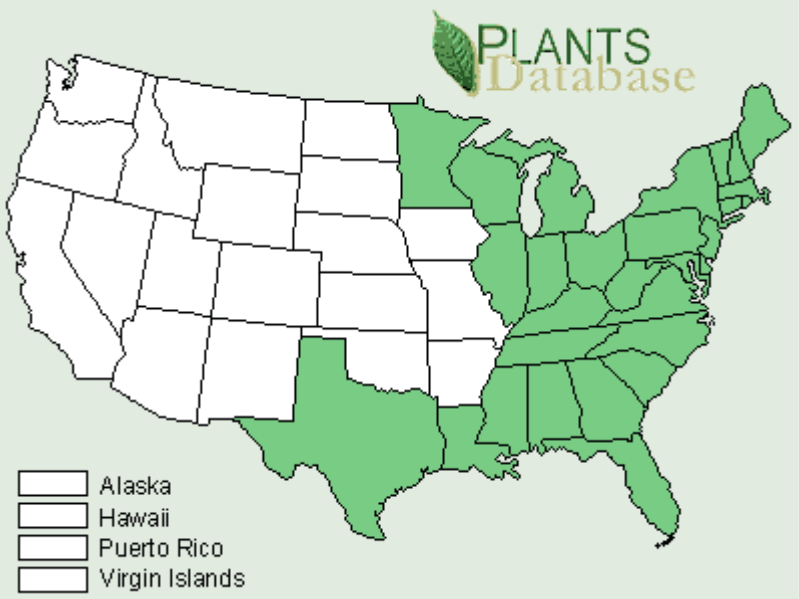


Figure 3
Distribution Map for Poison Sumac



Source for Figures 1, 2, and 3: http://www.tecnuextreme.com/plant-map.htm

S3NA-313-WI6 Wild Parsnip Identification

1.0 Background

1.1 Wild Parsnip (also known as Poison Parsnip) looks similar to a large carrot plant and is found in open places along roadsides and in waste places throughout the United States and Canada.

1.2 This plant produces a compound that causes severe blistering and discoloration after being exposed to sunlight—a condition known as photodermatitis. That is, when the skin comes in contact with this plant's juice and then is exposed to UV light, a severe burn develops.

2.0 Hazard

2.1 Everyone can get burned by wild parsnip. Unlike poison ivy, you don't need to be sensitized by a prior exposure. However, wild parsnip is only dangerous when the juice from broken leaves or stems gets on your skin—therefore, you can touch and brush against the undamaged plant without any danger.

2.2 If one gets some of the sap of Hogweed (or Meadow Parsnip or Cow Parsnip) in contact with skin, it is critical that they stay out of the sun for 8 hours. If one needs to remove the plant they should be completely covered with overalls, gloves, hat and safety glasses.

More information can be found at www.co.becker.mn.us/dept/soil_water/wild_parsnip.aspx

S3NA-313-WI7 Configuration Clothing for Protection Against Ticks and Insects

1.0 Configuration of Clothing

1.1 Loose-cuff trousers must be tucked into socks, wrapped with duct tape (or equivalent) completely around the cuff of the sock up on to the surface of the pant leg to prevent entry of insects between the sock and pants, and preferably reverse-wrapped with “sticky” side out (see figure below).

S3NA-313-WI8 Insect Repellent Active Ingredient Product Information

1.0 Application of Insect Repellent

1.1 Immediately prior to the commencement of work in the field, an AECOM-approved insect repellent shall be applied to exposed skin, and to the outer surface of pant leg cuffs tucked into socks, shirt tails tucked into pants at the waist, and shirt cuffs.

1.2 Table 1 provides a list of AECOM-approved insect repellent active ingredients; employees may utilize any brand containing the minimum concentration of active ingredients as listed.

1.3 All products are registered with the EPA and recommended by the CDC.

1.4 Employees should select the AECOM approved repellent which is best for them based on skin sensitivity/allergies, and personal preference, but be aware that reapplication frequency will be greater for Picaridin and lemon eucalyptus products.

1.5 Employees shall carefully read and comply with manufacturer recommendations and instructions on product labels prior to application. Repellent shall not be applied beneath clothing to minimize the potential for irritation and/or allergic reaction.

1.6 The chemical N,N-diethyl-*m*-toluamide (DEET) shall not be applied to Nomex™ fire retardant clothing as it reduces the effectiveness of the fabric.

Table 1
Approved Insect Repellents

Active ingredient and minimum concentration	Products Available	Approximate Duration of Effectiveness	Notes and Web Link to Product Safety Information
Permethrin (0.5%)	-Repel® Permanone -Coulston's Duranon™	2 weeks[1]	-Application to clothing and equipment only
DEET (23.8%)	-Deep Woods Off! ® -Repel® Sportsmen Formula®	5 hours[2]	-Cannot be applied to Nomex™ fabric
Picaridin (7%)	-Cutter Advanced™	4 hours[3]	-Protection equivalent to approximately 10% DEET
Oil of Lemon Eucalyptus (30%)	-Repel® Lemon Eucalyptus	2 hours[2]	-Protection equivalent to approximately 7% DEET -Natural, plant based product

[1] – New York State Department of Health, 2007
[2] – Fradin and Day, 2002
[3] – Spectrum Brands, 2007

1.7 Repellent shall be reapplied multiple times daily over the course of the day at a frequency identified during the hazard assessment based on manufacturers' recommendations, the approximate effective period provided in Table 1, and other factors such as perspiration, precipitation, etc.

1.8 All approved repellents are available at most department or sporting goods stores.

Product Safety Information

Facts about the repellants recommended by AECOM are available by clicking on the embedded link.

National Pesticide Telecommunications Network Fact Sheet: Permethrin and Picaridin

Picaridin

Picaridin Fact Sheet.pdf

Permethrin

Permethrin Fact Sheet.pdf

DEET

DEET Fact Sheet.pdf

Lemon Eucalyptus

Lemon Eucalyptus fact sheet.pdf

S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application

1.0 Application Recommendations

1.1 Source: New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents. **http://www.health.state.ny.us/nysdoh/westnile/pdf/2737.pdf**

1.2 Products containing permethrin are for use on clothing only—not on skin. Permethrin kills ticks and insects that come in contact with treated clothes. It is effective for two weeks or more if the clothing is not laundered.

2.0 Treat Clothing Only– DO NOT APPLY TO SKIN.

2.1 Read carefully and follow manufacturer's recommendations for application.

2.2 If you accidentally get the product on your skin, immediately wash with soap and water.

2.3 Apply to clothing in a well-ventilated outdoor area, protected from wind.

2.4 Only spray Permethrin products on the outer surface of clothing and shoes before you put them on - do not apply to clothing while it is being worn. Only spray enough product to lightly moisten the outer surface of the fabric causing a slight color change or darkening; do not saturate clothing. Do not exceed recommended spraying times. Pay special attention while treating socks, trouser cuffs and shirt cuffs to ensure proper coverage. Hang the treated clothing outdoors and allow clothing to dry for at least two hours (four hours under humid conditions) before wearing.

2.5 Do not treat clothing more than once every two weeks. Launder treated clothing separately from other clothing at least once before retreating.

2.6 Keep treated clothes in a separate bag. Those who frequent tick or mosquito habitats should consider having a set of clothes, preferably long-sleeved shirt, pants and socks that are used only in such settings. These clothes can be treated with a Permethrin-containing product according to the label directions, worn only when needed, and then placed in a separate bag when not in use. In hot weather, when long-sleeved shirt and pants may be uncomfortable, pants and jackets made of insect netting (either untreated or treated with repellent) can be worn. Such clothes are available in some sporting good stores and through outdoor equipment catalogs.

1. U. S. Environmental Protection Agency. 1999. Office of Pesticide Programs List of Chemicals Evaluated for Carcinogenic Potential-August 25, 1999. Office of Pesticide Programs. Washington, DC.

S3NA-313-WI10 Bird Droppings Safe Work Practices

1.0 Background

1.1 According to the National Institute for Occupational Safety and Health (NIOSH), histoplasmosis is an infectious disease caused by inhaling spores of a fungus called *Histoplasma capsulatum (*abbreviated *H. capsulatum)* that may inhabit accumulated masses of pigeon droppings and excrement of other birds and flying animals. Its symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. This form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated. The acute respiratory disease form of histoplasmosisis is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or non-productive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years. If symptoms occur, they may start within 3 to 17 days of exposure, with an average of 10 days. On a positive note, histoplasmosis is not contagious.

1.2 Psittacosis, although primarily a respiratory disease, can cause a wide variety of clinical manifestations. Generally, about 10 days after infection occurs, the clinical illness begins abruptly with fever, chills, weakness, fatigue, muscle pain, anorexia, nausea, vomiting, excessive sweating and difficulty with breathing, headache, backache, and sensitivity to light.

1.3 Hypersensitivity pneumonitis is also known as pigeon breeder's disease.

2.0 Symptoms

2.1 The acute form of hypersensitivity pneumonitis is clinically characterized by chills, fever, cough, breathlessness without wheezing, and malaise 4-10 hours after exposure. In general, an acute attack subsides after 18 to 24 hours.

3.0 Treatment

3.1 If a person should develop any of the symptoms as noted above, or others, it is important to see a physician and inform him of an exposure to pigeon/bird or bat excrement. A failure to diagnose the preceding conditions could occur if a treating physician is unaware of a patient's exposure to pigeon/bird or bat excrement.

4.0 Prevention

4.1 Prior to work in any area where pigeons or other flying animals may nest, a written statement from the client shall be obtained in regards to the potential for, and extent of, accumulation of excrement on/in the structure from pigeons and other winged animals.

4.2 The client shall be asked to provide appropriate details as to the basis for their statement (e.g., date of last visual survey for pigeon/bird or bat excrement accumulation, date of last excrement removal effort, etc.).

4.3 In no case will an AECOM employee or contract employee be permitted to commence structure inspection procedures without project management having received and evaluated the aforementioned written statement from the client.

4.4 According to NIOSH, the best way to prevent exposure to *H. capsulatum* spores during survey and inspection work is to avoid situations where excrement and other potentially-contaminated material can become airborne and inhaled. Therefore, it is preferable that the efforts to determine if, and to what extent, there is an accumulation of pigeon/bird or bat excrement on/in structures, or the efforts to clean-up/removal/disposal of such contaminated material, be left to the client or subcontracted out.

5.0 Safe Work Practices

5.1 In those cases where AECOM employees or contract employees are contracted by the client to determine the extent of accumulation of animal excrement in/on structures, the following minimum safety and health precautions shall be taken. (NOTE: precautionary measures are based on

recommendations and best practices prescribed in the NIOSH 2004 public document titled *Histoplasmosis – Protecting Workers at Risk*).

5.2 All workers shall wear disposable protective clothing (Tyvek® coveralls). Disposable overalls with hoods shall be donned when working in areas where *H. capsulatum* spore-contaminated material is likely to fall from overhead.

5.3 All workers shall wear disposable shoe coverings fitted with ridged soles made of slip-resistant material to reduce the likelihood of slipping on wet or dusty surfaces. Gloves shall be worn.

5.4 All workers shall wear a full facepiece air purifying respirator fitted with P100 (HEPA) cartridges. If entering an enclosed area in which the extent of excrement contamination is unknown, additional protective measures shall be taken such that workers shall wear a powered air-purifying respirator (APR) with full facepiece fitted with P100 (HEPA) cartridges. Any variance from these requirements must be approved by the Regional SH&E Manager. Workers donning APRs shall be medically screened, cleared, and trained in their proper use in accordance with AECOM safety program standards.

5.5 If contaminated material must be disturbed for purposes of removal/disposal or during the structure inspect process, it shall be wetted down prior to all work and will be rewetted as necessary to minimize airborne dusting.

5.6 After working in *H. capsulatum* spore-contaminated areas and before removing any respiratory protective equipment, workers shall remove all protective clothing and shoe coverings and seal them in a heavy-duty plastic bag for disposal.

5.7 Workers shall observe a high degree of personal hygiene, even if the exposure is casual. Special care shall be taken to wash hands, face, and other areas of exposed skin thoroughly before eating, drinking or smoking.

S3NA-313-WI11 Large Carnivores

1.0 Hazard

1.1 Most wild carnivores in the feline family (cougars, lynx, and bobcat) or the canine family (wolves and coyotes) are more predictable than bears and are not predatory towards humans; however, all wild animals can be dangerous if they feel threatened or if they are sick or starving.

1.2 Most ungulates (deer, moose, elk, and caribou) will avoid humans and will flee as soon as a human is sighted; however, females with young (during May and June) and males during the mating season (September to November) can be very aggressive, especially if provoked.

2.0 Personal Protective Equipment

2.1 Noise makers such as bear bangers, whistles and bells can be used as deterrents for an approaching animal.

2.2 Pepper (bear) spray can be used to ward off an imminent attack.

3.0 Safe Work Practice

3.1 Most negative encounters with ungulates or carnivores can be avoided with a few key preventative measures:

3.1.1 When working in wilderness isolation, always travel in pairs and make lots of noise.

3.1.2 Always store food in air-tight containers away from sleeping areas (if camping) and never carry strong smelling foods which could attract animals.

3.1.3 Keep your eyes open for fresh animal signs which may indicate a dangerous situation:

- Extensive fresh rubbing on branches in the fall might indicate the presence of a rutting male ungulate that may become aggressive to defend a potential mate.
- A fresh kill or carcass which might indicate the presence of a carnivore that may become aggressive to defend its food.

3.2 Maintaining a distance of at least 30 metres (100 feet) allows large animals an escape route. If you notice any signs of aggression or behavioral changes, you should move away to a safe location. Wildlife should not be enticed by reaching out or simulating calls.

3.3 Pets should be kept secure and away from wildlife as their actions can provoke an attack. Moose, deer and other wildlife may appear quite docile; however, if a dog makes them feel threatened, their behavior can become unpredictable.

3.4 If you are approached by a carnivore (wolf, coyote, or cougar):

3.4.1 Pick up small children immediately.

3.4.2 Try to appear bigger, hold your arms or an object over your head.

3.4.3 Face the animal and retreat slowly. Do not run or play dead.

3.4.4 Maintain steady eye contact with the animal.

3.4.5 If the animal continues to approach, deter an attack by yelling, waving a stick or throwing rocks.

3.4.6 If you are attacked, fight back. Hit the animal with a heavy stick or rock.

3.5 If you are approached by an ungulate (moose, elk, deer, bison or caribou):

3.5.1 An angry moose, elk or deer will face you with its head and ears lowered.

3.5.2 Back away slowly.

3.5.3 Look for something to get behind like a tree or a car. You can go faster around an obstacle than the ungulate can.

3.5.4 An ungulate is more likely to bluff charge but if it continues the charge and you are attacked in the open, curl up in a ball on the ground. Always protect your head with your arms and lie still.

3.5.5 Stay still after the attack until the ungulate moves away.

S3NA-313-WI12 Bear Safety

1.0 Hazard

1.1 An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.

1.2 The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criterion, as bears have been encountered within city limits, especially near landfills.

1.3 The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.

1.4 Preparing staff for any type of encounter is key to managing the risk.

2.0 Personal Protective Equipment

2.1 The best deterrent of a “bad bear encounter” is knowledge: a good understanding of the ecology and the behavior of the bears that will likely be encountered.

2.2 **Bear Spray and Bear Bangers**

2.2.1 Staff must have hands-on training for the safe use of bear spray (a pre-season practice run is a good use of expired bear spray).

2.2.2 Prior to work commencing, staff must ensure that the bear spray they are carrying is still valid and not past its expiration date.

2.2.3 During travel, bear spray must be sealed in an airtight container or bag and must not travel in the cab of a vehicle, aircraft, or helicopter.

2.3 **Firearms**

2.3.1 Environments and conditions which pose a high risk of bear encounters, may warrant the use of an armed wildlife monitor. Project managers, in consultation with appropriate project staff and SH&E Management, are responsible for determining the level of risk for their projects and whether or not such measures are required.

2.3.2 A person hired as an armed bear monitor must be properly trained in wildlife monitoring as well as certified in the expert usage of firearms.

2.3.3 The usage of an armed bear monitor is intended only as an additional precautionary measure to be used in specific environments to ensure the protection of field staff; staff should still be equipped and trained appropriately for the risk.

3.0 Restrictions

3.1 Staff must not work alone in areas where there is a medium or high risk of a bear encounter.

3.2 Generally, AECOM personnel shall not carry a firearm and attempt to function as a wildlife monitor and/or perform their professional duties. This can only be over-ridden with expressed permission of Regional Management.

4.0 Training

4.1 In-house Bear Awareness training must be undertaken by all field staff who work in bear country every three years at a minimum, or more often as required.

4.2 The Bear Awareness training involves testing and improving the employee’s knowledge about bear encounters, watching videos regarding bear awareness and behavior, and participating in group discussions about how to avoid and how to respond to bear encounters.

4.3 Specific considerations are given to black bear, grizzly bear, and polar bear encounters.

5.0 Safe Work Practice

5.1 Staff must be aware of wildlife signs and avoid wildlife encounters.

5.2 Bear Sign

5.2.1 **Fresh tracks**: It is often better to see the bear's tracks than to see the actual bear. If you can tell the direction that the bear is travelling in, it is prudent to change your course of direction. Bears will travel down the same pathways as people or other large animals use. If you have a clear track you can determine which type of bear has passed through the area. If you see more than one track, you can tell that it is possibly a female with cubs. Avoid females with cubs!

5.2.2 **Scat:** Bear scat will look different depending upon the bear's diet. Close examination of bear scat can sometimes give you an indication of what the bears have been eating at that time of year. If the scat contains remnants of human garbage, there is a human food conditioned bear in the area. These bears associate people with food and can be the most dangerous type of bear to encounter.

5.2.3 **Animal carcasses**: IF YOU COME ACROSS A CARCASS, LEAVE THE AREA IMMEDIATELY. Grizzly bears will often cover their kills for a few days and let it rot, then come back and eat it. THE BEAR WILL STAY CLOSE BY. Grizzly bears will defend their kill and this is a situation that could prompt a defensive attack by a bear.

5.2.4 **Torn-Up Logs and Stumps**: Bears will forage for insects in dead logs and rotting trees. You will often see torn up logs and stumps, evidence of their foraging.

5.2.5 **Evidence of Digging**: Holes dug into the ground are often made by grizzly bears digging for roots or ground squirrels. In particular Grizzlies will dig for food in the early spring soon after they leave their dens.

5.2.6 **Claw Marks on Trees**: Claw marks can be left on trees by black bears when they have climbed up a tree. Grizzly bears will also leave claw marks on trees and on the ground. Bears will often chew a small tree or a sign-post, so watch for signs of chew marks along the trail.

5.2.7 **Hair on Trees**: Bears will rub against trees, usually trees with rough bark, to scratch themselves. You can find evidence of bears by the hair left in the tree's bark. The higher the hair left on the tree, the bigger the bear. Remember that the bear will often stand on its back legs to scratch its back on the tree.

5.2.8 **Daybeds:** Bears will be most active in the early morning and in the evening. It would be prudent for field staff to restrict their field activities during the bear's most active foraging times as much as possible. During the heat of the day, bears will rest in daybeds. These can be shallow depressions of piled up leaves in the forest, trampled vegetation, a shallow scrape or a hole. Daybeds are usually located in cool places. Bears will make daybeds along streams and rivers. Daybeds are often associated with feeding places and therefore should be avoided.

5.3 Prevention

5.3.1 Your best defense against bears is to actively practice bear avoidance techniques when working in the field. You can prevent chance encounters by taking the following precautions:

- Know the areas and habitats bears use at different times of the year, and attempt to avoid such areas or be extremely cautious if you have to travel through them.
- Contact the local Fish & Wildlife Office to get current information on the bears in the area. Ask what other camps are in the area and if they are following good bear avoidance practices. (i.e., do they keep a clean camp?) If there are nearby human food sources available, e.g., an open dumpsite, the local bears may not be afraid to approach your camp.
- Always be aware of your surroundings. Stay alert. Watch for signs of bears along your route.
- Use binoculars to look around for bears when you are in open terrain.
- Never approach a bear if you see one feeding in the distance.
- Note the behavior of other wildlife in the area. Flocks of ravens can alert you to a possible animal carcass, and perhaps a bear. The area should be avoided. Bird or squirrel alarm calls might be telling you that a bear is near.
- Whenever possible, travel in daylight and try to avoid areas with restricted visibility. (dense brush)

- Make lots of noise, especially when travelling in dense vegetation. Sing, shout, or talk loudly. You can carry portable air horns or cans of rocks. (Please note that bear bells are not effective – they do not make enough noise to warn a bear that you are approaching. You need to be loud so the bear can hear you coming!) Remember that the noise you make can be masked by loud natural sounds such as the wind or water. Therefore it is possible that the noise you make can go unnoticed by a bear whose attention is focused on feeding. You must make every attempt not to surprise a bear. In areas of loud natural noise, be louder!
- Stay together and travel in groups. Bears are less likely to attack groups of people. When travelling in groups, stay close together. Being in a group doesn't help if the individuals have spread apart along the trail!
- Pets should not accompany you when you are travelling in bear country. If you must take your pet, keep the animal on a short leash at all times. Unleashed dogs will harass bears and once scared, run back to their owner with an angry bear in pursuit.
- Do not wear perfumes or cosmetic products when you are travelling in bear country. Do not mask your human scent.
- Women should use internal sanitary protection, (i.e. tampons) when menstruating and burn all used sanitary products after usage. Keep all used sanitary supplies in sealed bags until you have a chance to burn.
- Children should be kept very close by in bear country.
- Carry bear deterrents and know their limitations. Be familiar with how to use the deterrents, how to transport the deterrent safely and under what conditions it is most effective. Carry the deterrent in a belt, out in front and ready to grab at a moment's notice, never in your backpack.

5.4 Field Workers: Precautions in Bear Country

5.4.1 Field workers should take extra precautions when working in bear country.

5.4.2 Make every effort to go out into the field with another person; you should not be working alone in the field. One person can act as a lookout for the other. Keep watch for bear signs.

5.4.3 Never approach a bear.

5.4.4 Report where you are going and when you will return every time you leave camp. Have a plan of action if someone does not report back to camp at a specified time.

5.4.5 Bears do get used to a camp's schedule and you will have fewer surprise encounters if everyone in the camp comes and goes at the same time every day.

5.4.6 Take a two-way radio with you when you go out into the field.

5.4.7 Always carry bear deterrents with you in the field and understand each deterrent's limitations. Carry your deterrents on a belt, out in front and ready to use instantly. Do not carry your deterrents in your backpack.

5.4.8 Keep any food that you take with you sealed in odor-proof/bear proof containers. Make every attempt to take odorless food with you, not something with a heavy scent.

5.4.9 Pack out any garbage in odor-proof containers and burn once you return to camp.

5.4.10 The noise of an ATV or skidoo can scare off a bear. Starting the machine and revving it up can scare off a curious bear. DO NOT CHASE A BEAR WITH AN ATV OR SKIDOO. You may need to drive the ATV around in circles to scare off the bear, but do not chase the bear.

5.4.11 Take extra precautions when travelling along lakes or stream beds; bears use streams and river beds as travel routes. Be sure to carry noise makers.

5.4.12 Limit your workday so you are not out in the early morning or evening when bears are most likely to be foraging.

5.4.13 All Field Workers should be proficient in First Aid. Do not go out into the field without first aid training.

5.4.14 All Field Camps should have a First Aid Kit.

5.4.15 All Field Camps should have means of communication with local ambulance or Air-ambulance personnel.

5.4.16 A person's best defense against bears is to avoid them. If this is not possible, then being heard, smelled, or seen may lessen your chances of surprising a bear and/or provoking an attack.

5.4.17 All wildlife should be respected, avoided, and not harassed at any time.

5.4.18 Cooking in remote areas should be avoided. Any food should be stored in airtight containers and all garbage should be managed appropriately: “pack it in, pack it out”.

5.4.19 A bear in camp or within human structures is not a chance encounter. If this bear challenges you, you must fight, scream, and do whatever is necessary to live, no matter what species the bear is!

5.4.20 In general, there are two types of bear encounters: Defensive and Non-defensive for grizzly bears and black bears. Your response will vary based on your assessment of the situation (your training will help you in identifying these situations and the appropriate response).

6.0 Encounters

6.1 General Recommendations When Encountering a Bear

6.1.1 Consider your surroundings and assess the situation before you act.

6.1.2 Remain calm. Do not turn your back to a bear.

6.1.3 DO NOT RUN – You will trigger the bear’s natural response to chase you. Bears are extremely fast and you cannot outrun a bear. (They are as fast as an Olympic sprinter, so if you are not faster than an Olympic sprinter, don’t run! They can run 40 km/hr and you can’t!) You cannot outswim a bear either.

6.2 Bear Encounters in the Field

6.2.1 Your response will depend upon the type of encounter.

6.2.2 There are several different encounters listed.

6.2.3 Bears are more predictable than once believed and you can determine your best course of action in a confrontation by understanding the bear’s characteristics and motivation. There are two pieces of information you should be aware of in any bear encounter:

- The type of bear you are dealing with; and
- The reason for the encounter.

6.2.4 Some people believe that when you stand your ground against a predatory black bear attack, the bear will feel threatened and leave. This has been effective in some cases. HOWEVER, it is not effective against a grizzly bear predatory attack and it is very difficult to know when it will be effective against black bears. Polar bears do not follow the same behavioral patterns as grizzly and black bears, they are almost always aggressive and will not back down. Special considerations must be given to projects where polar bear encounters are anticipated.

6.3 If you can leave undetected:

6.3.1 Leave the area quietly in the same direction that you came from.

6.3.2 Move while the bear’s head is down. Stop moving when the bear lifts its head to check its surroundings.

6.3.3 Stay downwind so the bear will not pick up your scent.

6.3.4 When you have moved a safe distance away, you can either watch and wait until the bear leaves or make a wide detour around the bear.

6.3.5 If the bear is unaware of you and approaching: Allow the bear the right of way.

6.4 If you cannot leave undetected:

6.4.1 Let the bear know that you are present by smell first; therefore move upwind so they can pick up your scent.

6.4.2 If it is possible, try to keep the bear in your sight. Watch to see if the bear leaves when it smells that a person is nearby.

6.4.3 Attempt to move out of the way without being noticed by the bear. If you cannot do this, talk loudly to let the bear know where you are.

6.5 **If the bear is aware of you but in the distance:**

6.5.1 Remain calm.

6.5.2 Continue walking slowly in the same general direction, but head away from the bear.

6.5.3 DO NOT RUN. The bear can quickly outrun you if it is so inclined.

6.5.4 If the bear begins to follow you, drop your pack or some article, (not food) to distract the bear. This may distract the bear long enough for you to escape. If you drop food for the bear – you will help the bear associate food with humans and teach it that aggressive behaviour will be rewarded with food.

6.5.5 If it is a grizzly following you, climb a tree if there is a large tree around. Although grizzlies can climb trees, they are often not motivated enough to try. Very large grizzlies are not able to climb trees well. If grizzlies climb, they can go 3 to 4 meters. Grizzlies will try and push trees over so do not climb a small tree.

6.6 **If the bear is aware of you and close:**

6.6.1 A bear will feel threatened in a close confrontation. The bear's natural tendency will be to reduce or to remove the threat. Assist the bear by acting as non-threatening as possible.

6.6.2 Do not make direct eye contact with the bear.

6.6.3 Do not make any sudden moves.

6.6.4 Do not run!

6.6.5 The bear needs to identify you as a person, so talk in low tones and slowly wave your arms over your head.

6.6.6 Attempt to give the bear an opportunity to leave. Be sure the bear has an open escape route. Do not corner a wild animal.

6.6.7 Try to back away slowly and/or climb a tree if appropriate.

6.6.8 Attempt to deter the bear if you are in a safe position.

6.7 **If the bear is close and threatening:**

6.7.1 If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the bear is. Try to scare the bear off.

6.7.2 If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.

6.7.3 Talk to the bear in a calm authoritative tone of voice.

6.7.4 Do not startle or provoke the bear by making sudden moves.

6.7.5 Never imitate the bear's aggressive sounds, signals or posture. The bear is attempting to establish dominance and imitating its moves is a challenge to its dominance.

6.7.6 Back slowly away from the bear and drop a pack or some other article in order to distract the bear momentarily.

6.7.7 Remember that the bear may be defending cubs that you have not yet seen or they have a food cache nearby. Attempt to look as non-threatening as possible.

6.8 **If the bear is very close and approaching:**

6.8.1 A distance of less than 50 meters in an open area and closer in a forested area.

6.8.2 If the bear continues to approach, use your deterrent.

6.8.3 If the bear does not respond to the deterrent you must now STAND YOUR GROUND!

6.8.4 If the bear continues to approach and is acting aggressive, YOU MAY HAVE TO SHOOT if you are carrying a firearm.

6.9 **If the Bear Charges!**

6.9.1 A bear will charge you at high speed down on all four legs and often crouched low to the ground.

6.9.2 Bears do not charge when standing up on its hind legs.

6.9.3 Many charges are bluffs and the bear will often stop or veer off just at the last minute. It is difficult to know if the bear is bluff charging or not until it gets very close.

6.9.4 When faced with a charging bear you have two options:

- Use your bear deterrent; or
- Roll into a ball and cover your neck and head with your arms if you are unarmed and have no other choice.

6.10 **Playing Dead:**

6.10.1 Note: Playing dead is a very controversial topic among seasoned field personnel. Some will tell you to never play dead in any situation, others will swear that it is the only thing you should do. Playing dead is a personal choice that you will have to make.

6.10.2 If you play dead it is possible that you can prevent serious injuries if a chance encounter with a bear results in an attack. Playing dead may reduce the threat that you represent to the bear.

6.10.3 If you decide to play dead, it is important to protect your vital areas. The older information that is still found online states that the person should roll into a ball to protect their vital organs. This has been replaced and you are now advised to lie in the prone position. Lie flat on your stomach and lace your fingers behind your neck (to protect it), Spread your legs apart to provide stability if the bear tries to turn you over. Stay in this position. If the bear manages to roll you over, immediately roll back onto your stomach to protect your face, neck and vital areas. Do not try to resist or struggle as this will intensify or prolong the attack. Once the attack is over, DO NOT MOVE until the bear has left the area. Look around and be very sure that the bear is gone before moving. (If the bear is a female with cubs, she will leave and move her cubs to safety.) If the bear covers you with leaves and vegetation, it probably thinks you are dead. Grizzly's will often cover their prey with vegetation and leave the carcass to ripen for a few days.

6.10.4 It is important to note that if the bear attack is prolonged or if the bear begins to eat you, the attack has changed from what you may have first believed to be a defensive attack, to a predatory attack. Fight back in a predatory attack. Concentrate your efforts on the face, eyes and nose of the bear.

S3NA-313-WI13 Small Mammals

1.0 Hazard

1.1 Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against.

1.2 The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus).

1.3 Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

2.0 Personal Protective Equipment

2.1 Full-length clothing (long sleeves and pants).

2.2 Insect repellent.

2.3 Respiratory equipment (when directly handling wildlife).

2.4 Gloves (when directly handling wildlife).

3.0 Restrictions

3.1 Wildlife handling must only be completed under direct supervision of an experienced individual.

4.0 Training

4.1 Any staff that will be handling wildlife must be adequately trained and/or supervised by a wildlife biologist experienced in the job task.

5.0 Safe Work Practice

5.1 Wild animals can carry a variety of diseases that humans can contract: viral, parasitic, bacterial, and protozoal. Basic PPE such as full-length clothing, gloves and a respiratory mask will greatly reduce the risk of exposure.

5.2 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.

5.3 Proper techniques must be employed to avoid or minimize the risk of personal injury while, at the same time, avoiding or minimizing injury to the animal.

5.4 Gloves, catch sticks, caging, and other appropriate equipment may be necessary when handling a wild animal. Most of these animals will be extremely stressed, resisting every restraint attempt.

5.5 In the unfortunate circumstance that a person is bitten or scratched, he or she should cleanse the wound thoroughly with soap and flush with water immediately, providing for a mechanical removal of potentially infective organisms. This should be followed by cleansing under medical supervision and consultation with a physician to consider the potential exposure to the rabies virus.

6.0 Rabies

6.1 You will not be able to accurately determine if an animal has rabies simply by observation as traditional symptoms of rabies (foaming at the mouth, biting, etc.) do not occur in all animals nor at all stages. There are some mammals that are at a higher risk than others for the rabies virus, such as raccoons, skunks, stray cats and dogs, foxes, coyotes, rodents. and bats; however, any mammal can contract the virus.

6.2 Rabies is contracted by contact of an infected animal's saliva with an open wound – a bite or a scratch.

6.3 Symptoms of rabies in humans usually do not present themselves for a minimum of 10 days to a year or longer (the average is 30 to 50 days). Symptoms are typical of a flu, including malaise, loss of appetite, fatigue, headache, and fever. Over half of all patients have pain (sometimes itching) or numbness at the site of exposure. They may complain of insomnia or depression. Two to 10 days later, signs of nervous system damage appear; hyperactivity and hypersensitivity, disorientation, hallucinations, seizures, and paralysis.

6.4 Because rabies is so difficult to detect and positively identify, it is very important to consult a physician immediately. If rabies is a possibility, begin treatment with the rabies vaccine as soon as possible (unlike other vaccines, rabies vaccination begins after exposure because the virus takes a comparatively long time to induce disease).

7.0 Hantavirus

7.1 Rodents can carry a variety of diseases; of notable concern is the North American hantavirus which can cause Hantavirus Pulmonary Syndrome (HPS).

7.2 A common host of the hantavirus is deer mouse and related species (*Peromyscus spp*.), which are common throughout much of North America.

7.3 Although infection is rare, it can be fatal and; therefore, it is necessary that risk of exposure be minimized. Infection can be spread to humans when they:

7.3.1 Breathe air contaminated by deer mouse saliva, urine or feces containing infectious hantaviruses; or

7.3.2 Accidentally rub eyes, mouth or broken skin with hantavirus-infected deer mouse saliva, urine or feces.

7.4 The following precautions will be taken for all field operations:

7.4.1 Limit exposure to soils handling and use gloves where appropriate.

7.4.2 Wash or sanitize hands often throughout the day and before meals.

7.4.3 Equipment bags, storage areas, and vehicles will be inspected daily for signs of deer mouse infestation.

7.4.4 Rodent-proof storage containers will be used when practical.

7.4.5 Do not enter buildings infested with deer mice without adequate respiratory protection.

7.4.6 Droppings should never be removed by vacuuming or sweeping. Wetting down an area with a mixture of 1:9 household bleach and water solution will reduce risk of airborne exposure.

7.5 If flu-like symptoms develop three days to six weeks after exposure to rodents, a doctor should be contacted immediately (mechanical ventilation is the primary method of treatment).

8.0 References

8.1 Trapping and Tagging Small Mammals. A RIC Standard for British Columbia. 1993. Dr. Todd Zimmerling.

S3NA-313-WI14 Snakes

1.0 Hazard

1.1 **Snakes have the ability to inject venom.** A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

2.0 Personal Protective Equipment

2.1 Long pants and shirts.

2.2 Heavy gloves if staff will be handling debris or be close to the ground.

2.3 Rubber boots, or boots that fully cover the foot (not sandals!) and preferably are at least 10” high.

2.4 Snake Chaps that cover at least the shin.

2.5 Personal first aid kit.

3.0 Restrictions

3.1 Staff must not work alone in areas where the risk of a snake encounter is high.

4.0 Training

4.1 Staff must be notified of the hazard before work commences.

5.0 Safe Work Practice

5.1 Staff working in areas known to be inhabited by venomous snakes should take extra precautions, be able to identify the local snake species, and understand the best practices for administering first aid.

5.2 Most snakes in Canada are non-venomous; and most snake bites are not fatal, only painful. Learning to identify snake species will assist you in responding appropriately to an encounter, and will assist medical professionals in determining if antivenin needs to be administered if anyone is bit.

5.3 Most snakes are non-aggressive and will only attack if immediately threatened.

5.4 **Prevention**

5.4.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.

5.4.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.

5.4.3 Try as much as possible not to take a snake by surprise.

5.4.4 Stay on trails where possible, and watch where you place your hands and feet, especially when climbing or stepping over fences, large rocks, and logs, or when collecting firewood. Take care when overturning any objects on the ground when in snake country.

5.4.5 If you see a snake, give it as much room as possible. Most snakes have a strike distance that is only half the length of their body.

5.4.6 If you get very close to a rattlesnake, hold very still until it calms down and starts to move away. Then slowly move backwards until you are at least one snake-body length away.

5.5 **Treatment**

5.5.1 Venomous snakebites are rare, and they are rarely fatal to humans. Of the 8,000 snakebite victims in the United States each year, only about 10 to 15 die. In Canada the number of snake bites each year is very small. However, for any snakebite the best course of action is to get medical care as soon as possible.

5.5.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.

5.5.3 Keep the injured body part motionless and just below heart level.

5.5.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.

5.5.5 Do not allow him to eat or drink anything.

5.5.6 If medical care is more than half an hour away, wrap a bandage a few inches above the bite, keeping it loose enough to enable blood flow (you should be able to fit a finger beneath it). Do not cut off blood flow with a tight tourniquet. Leave the bandage in place until reaching medical care.

5.5.7 If you have a snakebite kit, wash the bite, and place the kit's suction device over the bite. (Do not suck the poison out with your mouth.) Do not remove the suction device until you reach a medical facility.

5.5.8 Identify the snake that caused the bite to determine if it is venomous, and if antivenin needs to be administered. Do not waste time or endanger yourself trying to capture or kill it. Note the shape & color of the snake's head.

5.5.9 If you are alone and on foot, start walking slowly toward help, exerting the injured area as little as possible.

- Note that there are several species of snakes that superficially resemble rattlesnakes. Several species, including Bull, Milk, Fox, and Rat Snakes will even rattle their tails when startled.
- Massasauga Rattlesnake is recognized as a Threatened Species in Ontario and it is an offence to harass, , or destroy the habitat of this species.
- One scorpion species, the Northern Scorpion (*Paruroctonus boreus*) occurs in semi-arid areas of southern British Columbia, Alberta, and Saskatchewan. It carries a stinger on the end of its tail. The sting is painful but not life threatening unless there is an allergic reaction.

6.0 Species

6.1 Venomous Snakes in Canada

Eastern Massasauga Rattlesnake (*Sistrurus catenatus*) found around Wainfleet, Windsor, Bruce Penninsula and eastern Georgian Bay in Ontario.	 Eastern Massasauga Rattlesnake picture by Michael Redmer/Courtesy Lincoln Park Zoo
Northern Pacific Rattlesnake (*Crotalus viridis*) found primarily in Okanagan and Thompson River valleys of southern British Columbia.	

Prairie Rattlesnake (*Crotalus viridis*) found in south eastern Alberta, and south western Saskatchewan.	

6.2 Venomous snakes in the U.S.

Rattlesnake(*Crotalus cerastes)* found mostly concentrated in the southwestern United States, they extend north, east and south in diminishing numbers and varieties. Every contiguous state has one or more varieties of rattlesnake. The rattlesnake is found in many different biomes ranging from along the coast at sea level, the inland prairies and desert areas to the mountains at elevations of more than 10,000 feet. Species include: Sidewinder, Santa Catalina, Western, Mojave, Red Diamond, Western Diamond, Ridge Nosed, Eastern Diamondback, and Pigmy.	 Western Rattlesnake  Eastern Diamondback
Copperhead (*Agkistrodon contortrix*) is the most common venomous snake found in the eastern US. It can be found in the states of Texas, Oklahoma, Kansas, Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, Illinois, Indiana, Ohio, Iowa, Pennsylvania, Maryland, New Jersey, Delaware, New York, Connecticut, and Massachusetts.	
Cottonmouths (water moccasins) (*Agkistrodon piscivorus)* found in the eastern United States from Virginia, south through the Florida peninsula and west to Arkansas, eastern and southern Oklahoma, and east and central Texas..	

Coral Snake (*Micrurus sp.)* found in the southern range of many temperate US states including North Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Arizona, and New Mexico.	 Eastern Coral Snake, *Micrurus fulvius*

7.0 References

7.1 *The Eastern Massasauga Rattlesnake Stewardship Guide. A resource and field guide for living with rattlesnakes in Ontario.* Sponsored by the Government of Canada, and distributed on behalf of the Toronto Zoo and the Eastern Massasauga Rattlesnake Recover Team.

7.2 http://www.rattlesnakes.us/

7.3 http://drdavidson.ucsd.edu/Portals/0/snake/Crotalus.htm

S3NA-313-WI15 Alligators

1.0 Hazard

1.1 Your chance of encountering an alligator is greatest during the animal's courtship and mating season, which takes place from March through September. This is when male alligators become most dominant and aggressive as they try to intimidate rival males and attract females by their show of power. Some males end up having to travel to find a mate. July through September is when mother alligators are guarding nests.

1.2 Mating season takes up much of the warmer months - a very popular time in the southeastern USA for outdoor activities - and alligators are solar-powered, so-to-speak. The warmth from the sun fires up their metabolism, giving them renewed energy; and renewed energy means great potential for conflict.

2.0 Encounter

2.1 The alligator is naturally wary of humans, and will flee quickly if you get too close to it, or it may utter a very audible and compelling warning hiss. In some cases; however, alligators may charge or attack. Here are some examples of such cases:

2.1.1 An alligator that is accustomed to being fed by humans may not be so shy.

2.1.2 An alligator that is surprised and alarmed by your approach may attack, thinking that it is being attacked itself.

2.1.3 A mother alligator caring for her nest or for live babies. If you see alligator babies, or if you encounter a nest (usually a mound of vegetation mixed with mud), remove yourself to a safe distance, the mother alligator is sure to be close by. If you get close, the mother may sound a very audible and intimidating warning hiss. Such a nest may be difficult to identify for a non-expert, but it is likely the mother will issue you a warning.

2.1.4 Alligator mothers are well-known to be practically fearless when defending their offspring, whether the little ones have hatched or not. A mother alligator was observed leaping, jaws agape, to attack a helicopter as it approached the nest area to land! (The helicopter carried biologists studying alligator nests.)

2.2 Also be careful near heavy vegetation in or near the water's edge. This is where an alligator likes to enjoy privacy and peace during the daylight hours. If you trudge through there and surprise it, the outcome may not be positive.

2.3 Generally, a good minimum distance to keep between you and an alligator or nest is 15 feet/ 4.6 meters.

2.4 When trying to get past an alligator, make sure not to walk between the alligator and the water, because if it's spooked, it's going to run to the water.

2.5 If an alligator does approach in a threatening manner, make as much noise and movement as possible. This should show the alligator that he has taken on more than he can handle and he'll back away.

3.0 Alligator Charge

3.1 The alligator is not a natural runner. Those short legs obviously don't serve it like a horse's legs do, and the alligator can actually tire out in a relatively short time. When it charges after a human or animal, it is either trying to scare it away or seize it. It has a fast and furious burst of energy which serves it well for stealth hunting -- grabbing prey when it doesn't expect it. Furthermore, the reptile is

opportunistic, which means, quite simply, it doesn't like to work very hard to get its food if it doesn't have to.

3.2 In the very rare event you are charged or chased by an alligator, move in as straight a line as possible away from it as fast as you reasonably can. In many cases, the vegetation features of the wild will serve to protect you by slowing the alligator down, like trees, bumps, bushes, etc. -- your comparatively long legs usually make it easier for you to maneuver through the trees and brush than an alligator's short legs do.

3.3 Most adult humans can outrun even a fast crocodilian, which has been clocked at a maximum of about 10 mph/17 kilometers per hour (kph), compared to a human speed of 15-17 mph/24-27 kph. But this doesn't matter much; an alligator will often give up the chase because it sees that the runner is moving away too quickly, and realizes that too much effort will be required to continue pursuit.

3.4 You may have heard somewhere that the zigzag run (running in a "z" pattern, side-to-side) is a good idea, but this is not only an unnecessary maneuver but probably a very unwise one. Here's why:

3.4.1 Unless you're an Olympic athlete, running zigzag over natural topography increases your risk of tripping and falling over rocks, plants, roots, and the like. And it goes without saying that falling while being pursued by an alligator is not good.

3.4.2 Furthermore, an alligator doesn't have the degree of stereoscopic vision we have. It actually has a small 'blind spot' directly in front of it. Hence, the alligator's vision is most effective in the 'sides' of its field of view. So, running zigzag not only slows your rate of distance from your pursuer, it may clearly indicate to the animal exactly where you are; even this point hardly matters since in many cases the alligator may keep its eyes shut while pursuing so as not to get them hit by twigs, grass stalks and branches in its path.

3.4.3 Finally, an alligator bites very effectively in a side-swiping motion, so if you are trying to run zigzag and are slowed down by plants, rocks, or other obstacles, the backwards flying leg of a running human is an optimal target for side-swiping, chomping jaws (the operative word here is "side").

3.5 Simply put, when faced with an attack, move directly away from the alligator as quickly as possible, navigating the terrain as carefully as possible. The zigzag idea will likely not serve you well.

4.0 Alligator Attack

4.1 If it seizes prey, and the prey fights back hard, the alligator may release it, depending on factors such as its own size relative to that of the victim, its own level of aggression, and its measure of hunger. Merely struggling to break free may not be enough counter-aggression to stop an alligator, and may actually prompt a devastating "death roll" response, in which the reptile furiously spins on its central axis to tear muscle and bone free of the victim's body.

4.2 These armored saurian are among the toughest beasts in the animal kingdom, so an attack victim should channel his or her nervous energy and will to survive and take the offensive by fighting hard. Not struggling...fighting very, very, very hard. Others on hand during such an event may be able to help by fighting the reptile, too. This should include punching the snout, poking the eyes, and even jabbing the ears, which are seen as small slits behind the eyes.

5.0 Additional Resources

5.1 Additional resources can be found at:

5.1.1 http://www.tpwd.state.tx.us/huntwild/wild/species/alligator/index.phtml

5.1.2 http://corkscrew.audubon.org/Wildlife/Alligators.html

S3NA-314-PR Working Alone and Remote Travel

1.0 Purpose and Scope

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

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Buddy System**: A system of organizing employees at a work site in such a manner that each employee is accompanied by at least one other employee or is escorted by a client or contractor representative during work site activities.

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

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

3.0 Attachments

3.1 S3NA-314-ST Working Alone

3.2 S3NA-314-WI Wilderness Isolation

4.0 Procedure

4.1 Employees are discouraged from working alone on any site. If they will be out of contact with other employees, they will establish a buddy system or check-in procedure with another employee or responsible person.

4.2 When traveling alone, staff will take appropriate precautions, including notifying someone of their travel plans as well as carrying a communication device and safety equipment, as appropriate.

4.3 Managers will provide the resources (staff, communication devices, etc.) and plans (emergency response plans, check-in procedures, etc.) necessary so that employees are not working alone or have a buddy system in place.

4.4 No staff person shall work by themselves or out of contact with other personnel if they are conducting a hazardous job task. On the following tasks, a buddy system will be established:

- Working from heights
- Working in a confined space
- Working in a trench
- Lock out/tag out
- Working with electricity
- Working with power tools/equipment
- Working with hazardous substances or materials
- Working with material under pressure
- Working where there is a possible threat of violence
- Working in isolation from first aid services or immediate/emergency assistance
- Traveling in severe weather
- Working in avalanche areas
- Working on water or ice

- Working in remote or wilderness isolation
- Working in a controlled area
- Extreme heat or cold stress environments
- Working around high traffic or mobile equipment

4.5 Office Work

4.5.1 Each office will have in place and will communicate as part of its local safety orientation its procedures for the safety and security of an employee working alone in the office.

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

4.5.3 If the building is monitored by a security service, employees working in the office after regular working hours or working alone will notify the security guard of their presence and anticipated hours. If the building does not have a security service, it is advisable that a staff person working alone notify a family member, friend, or manager of his or her location.

4.5.4 During all working hours, employees shall stay alert to unauthorized entries into the building and to other suspicious activities and shall report them immediately.

4.5.5 Contact numbers to be used in case of emergency are posted at all major exits.

4.6 Field Work

4.6.1 Prior to work commencing, a hazard assessment shall be prepared for all assignments on which employees are to work alone (in accordance with *S3NA-209-PR Project Hazard Assessment and Planning*). The hazard assessment shall consider travel time, weather, available communications, and the hazards associated with the task and work environment.

4.6.2 The assessment should also consider whether the employee assigned to work alone has sufficient training in the tasks to be performed to allow the employee to work safely alone. The employee's personal medical conditions may be considered if the employee has voluntarily made the medical condition know to the Supervisor or Project Manager.

4.6.3 The hazard assessment should identify the controls required for the safety of employees as applicable to the job task and location. Some controls associated with working alone or in remote isolation include a buddy system, standardized check-in times, specialized communication devices, and enhanced emergency supply kits.

4.7 Buddy System

4.7.1 When conducting hazardous work, staff will work with a buddy (another responsible individual) at all times.

4.7.2 Client or contractor personnel may be substituted for an AECOM employee's buddy only if they are designated by the client or contractor, are properly trained in this Standard Operating Procedure, and are properly trained in the site's emergency response procedures.

4.7.3 Once assigned as buddies, personnel shall remain in each other's line of sight and in direct voice contact at all times.

4.7.4 When unusual conditions do not permit line of sight and direct voice contact, the site supervisor will be informed. If permission from the site supervisor is obtained to continue the work, voice contact will be achieved using electronic communication devices such as, but not limited to, hand-held radio or cell phone.

4.7.5 When electronic communication devices are used, a protocol will be established and agreed to by each buddy to confirm that periodic effective and faultless communications are maintained:

- The person in communication with the field employee working alone will have direct communication with the employee at a frequency not to exceed each hour.
- The frequency shall be established considering task hazards, weather conditions, personal medical conditions, and the availability of emergency response.
- A missed communication event shall trigger emergency response procedures. The results of each communication event shall be documented in the project files.

4.8 Check-In Procedures

4.8.1 All field crews will establish check-in procedures prior to leaving the office and confirmed with the assigned Check-In Person.

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

- At a minimum, all crews will check-in by 5:00 p.m.
- Crews working in isolation or on hazardous sites will increase their check-in times accordingly (e.g., noon and 5:00 p.m.).

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

4.8.4 Staff working alone or in small crews in remote isolation will have an effective means of communication system including cell/radio/satellite phone as well as established check-in times.

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

4.9 Emergency Response Procedures (ERP)

4.9.1 All field staff AND the Check-In Person will be provided with the Emergency Response Plan (which is documented on the Task Hazard Analysis, if an ERP does not already exist for the site).

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

4.9.3 If communication is lost between buddies or a check-in time is missed, it will be assumed that an emergency situation exists (e.g., severe injury, illness, other accident situation), and the site’s emergency response procedures will be implemented. Site work will cease until the emergency is resolved and the site supervisor directs personnel to restart work.

4.9.4 The established contact person will follow the procedures below if a field staff member has missed a check-in:

- First, they will attempt to make contact with the field staff directly.
- If that fails to provide a response, they will contact other persons who may have been on site, including client supervisors, or other locations where the field staff might be (e.g., hotel, home, office).
- If the field staff still cannot be located, the emergency contact person notifies the project manager or manager responsible for the staff.
- Depending on the location and situation, they will then dispatch either another AECOM staff member, another on-site supervisor, or an appropriate emergency response agency (e.g., police) to travel to the last known location of the field staff.
- If the dispatched responder arrives at the site but cannot locate the field staff, the appropriate public emergency contacts (e.g., police, search and rescue) will be made and the staff members’ personal contacts shall be notified by Human Resources or the manager (if HR is unavailable).
- If the dispatched responder finds the crew in an emergency situation (medical, environmental, structural, etc.), the appropriate steps will be taken to isolate the hazard, administer first aid, and notify the appropriate agencies and emergency support services.

4.10 Training

4.10.1 All staff will receive an initial orientation that includes the hazards and controls associated with working alone.

4.10.2 If working in wilderness, all field staff will be able to orienteer using a map and compass—if not, the basic skills of orienteering will be provided by an experienced staff member before work commences.

4.10.3 Staff regularly working in remote, isolated wilderness locations will either participate in a wilderness survival course from a qualified provider (1 or 2 day) or will obtain management approval based on their level of experience/competence in wilderness situations.

5.0 Records

5.1 None

6.0 References

6.1 Canadian Centre for Occupational Health and Safety (http://www.ccohs.ca/oshanswers/hsprograms/workingalone.html)

6.2 Health Canada (http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/outdoor-plein_air-eng.php)

S3NA-314-ST Working Alone

The following Occupational Health and Safety regulations apply directly to working alone (and not with a specific job task):

Jurisdiction	Regulation
United States	
OSHA	n/a
Canada	
Alberta	OHS Code (2009) Sect 393, 394 Alberta's Occupational Health and Safety Code: An Explanation of the "Working Alone" Requirements (November 2006) Working Alone Safely - A Guide for Employers and Employees (September 2000)
British Columbia	OHS Regulation (1997) Sect 4.20.1 – 4.22
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 9.1 – 9.3
New Brunswick	Code of Practice for Working Alone Regulation - Occupational Health and Safety Act (N.B. Reg. 92-133)
Newfoundland/Labrador	n/a
Nova Scotia	n/a
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 14
Ontario	n/a
Prince Edward Island	OHS Regulations (EC180/87) Sect 53.1 – 53.5
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 322 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.22.1
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 35
Yukon Territory	n/a

S3NA-314-WI Wilderness Isolation

1.0 Planning

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

1.2 A Safe Work Plan will be approved by the Regional SH&E Manager.

2.0 Safety Equipment

2.1 All field staff should regularly carry a compass, fire starter, a small folding saw, and a map on their person.

2.2 All field staff should regularly carry a first aid kit and survival equipment applicable to the situation.

2.3 All field staff will be equipped with (or have access to) communication devices appropriate to the type of coverage anticipated in the project area.

2.4 When hiking long distances, it is recommended that a “mini survival kit” that includes the following items be carried:

- Lighter, matches, or a "flint' of fire steel
- Fire starter (tinder). Cotton balls with lip balm work well, or paper egg cartons with cotton balls and paraffin wax; if buying commercial fire starter, test it after several months.
- A whistle
- Heavy tinfoil (to melt snow, to cook on, or to boil water in)
- Some high-energy food
- A Mora knife or folding saw (Japanese tooth rake is best) or "camp chainsaw in a can"
- Cordage/rope (about 50 feet)
- Bear spray (and/or bear bangers)

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

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

3.0 Drinking Water

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

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

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

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

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

3.6 Well water, fast-moving rivers, and the deepest parts of lakes are the best locations to obtain water. Avoid stagnant water, shoreline water, and water close to human habitations and campsites.

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

3.8 Water Treatment

3.8.1 Each method of water treatment has its advantages and disadvantages. Use only treated or boiled water for drinking, brushing teeth, or washing fruits and vegetables that will be eaten raw.

3.8.2 Boiling. Heat is the oldest, safest and most effective method of purifying water. Bring the water to a boil for at least one minute (adding one more minute for each 300 m (1000 ft.) above sea level. If the water is cloudy, filter it before boiling. Boiling will give your water a flat taste that can be remedied by pouring the water quickly back and forth from one clean container to another, by letting the water cool, or by adding a pinch of salt per litre of water.

3.8.3 Chemical Purification. When boiling is not practical because of time and lack of a heat source, disinfection with chlorine or iodine compounds may be effective. Use two water containers: one for treating water and the other for carrying purified water. After disinfection, shake the container vigorously. Wait five minutes. Shake it again with the lid loose so that some water leaks out to cleanse the mouth of the container. Disinfection alone may not kill some protozoa. Pass the water first through a filter with a pore size of 0.5 micron (absolute) or less to remove protozoa, then disinfect it to kill viruses and bacteria. Disinfection will give the water a peculiar taste. If you find it unpleasant, try using flavoured drink crystals or concentrated citrus juice to mask the taste of the disinfectant. Add drink powders or juice only after the treatment time has elapsed.

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

Table 1: Summary of Water Purification Methods

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

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

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

S3NA-405-PR Drilling, Boring, and Direct Push Probing

1.0 Purpose and Scope

1.1 Provides the minimum requirements to be followed when drilling and boring work are performed.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 S3NA-405-FM1 Drill Rig Inspection

3.2 S3NA-405-FM2 Subsurface Investigation Checklist

3.3 S3NA-405-ST Drilling and Boring

3.4 S3NA-405-WI Core Drilling Machine Safety Card

4.0 Procedure

4.1 All client on-site safety procedures shall be understood and adhered to.

4.2 Be aware of the provincial/territorial regulations that govern drill rig operations and exposed moving parts.

4.3 **Roles and Responsibilities**

4.3.1 **Project Manager or Resident Engineer** is responsible for ensuring that sound principles of safety, training, inspection, maintenance, and operation consistent with all resource data available from the manufacturer, OSHA, and ANSI is provided to the operator and users by the Contractor or operating entity.

4.3.2 **Site Safety Coordinator (SSC)** shall assist the **Project Manager** in compliance with the requirements of this procedure.

4.3.3 The **SH&E Department** shall assist site management with guidance about this procedure.

4.3.4 **AECOM employees** engaged in project field activities shall be cognizant of contractor activities that may affect their safety and shall follow these procedures.

4.3.5 **AECOM Equipment Operator**

- In cases where AECOM owns and operates drilling, boring, or probing equipment, the lead equipment operator is responsible for the maintenance and safe operation of equipment under their control consistent with those responsibilities of a Contractor.
- Operations will be terminated during an electrical storm, and all crew members will move away from the rig. If lightning is observed, shut down all rig operations immediately.

4.3.6 **Contractors**

- **Contractors** have direct control over the application and operation of all drilling, boring, and probing equipment owned by their organization.
- It is the **Equipment Contractor** operator's responsibility to implement safe work practices provided by the **Contractor's** project management or supervisory staff supplemented by good judgment, safe control, and caution whenever operating drilling, boring, and probing equipment.

4.3.7 **Safety Representative**: Unless the **Contractor** has a designated **Safety Representative**, the **Contractor'**s responsible person for safety for the drill crew will be the drill rig operator. The safety person's responsibilities are to

- Consider the "responsibility" for safety and the "authority" to enforce safety to be a matter of first importance.

- Be the leader in using proper personal protective equipment (PPE) and set an example in following the rules that are being enforced on others. See section 4.5 for PPE required by this SOP.
- Enforce the use of proper safety equipment and take appropriate corrective action when proper PPE is not being used.
- Understand that the proper maintenance of tools and equipment and general housekeeping on the drill rig will provide an environment that promotes and enforces safety. See Sections 4.7 and 4.9 for housekeeping and maintenance requirements of this SOP.
- Ensure that the operator has had adequate training and is thoroughly familiar with the rig, its controls, and its capabilities prior to commencement of drilling activities.
- Inspect the l rig at least daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, and/or damaged pressure gauges and pressure relief valves. A Rig Inspection Form has been provided in S3NA-405-FM1 Drill Rig Inspection for use in performing inspections when the Contractor does not have their own.
- Check and test all safety devices such as emergency shutdown switches at least daily and preferably at the start of a work shift. Rig operation should not be permitted until all emergency shutdown and warning systems are working correctly. Wiring around, bypassing, or removing an emergency device is not permitted.
- Check that all gauges, warning lights, and control levers are functioning properly, and listen for unusual sounds on each starting of an engine.
- Ensure that all new rig workers are informed of safe operating practices on and around the rig. Provide each new rig worker with a copy of the organization's drilling operations safety procedures and, when appropriate, the rig manufacturer's operations and maintenance manual. The safety person should ensure that each new employee reads and understands the safety procedures.
- Ensure that a first aid kit and fire extinguishers are available and properly maintained on each rig and on each additional vehicle.
- Be well trained and capable of using a first aid kit, a fire extinguisher, and all other safety devices and equipment.
- Maintain a list of addresses and telephone numbers of emergency assistance units (ambulance services, police, hospitals, etc.), and inform other members of the drill crew of its location.
- See that new workers are instructed in rig safety, and observe the new worker's progress toward understanding safe operating practices.
- Observe the mental, emotional, and physical capability of workers to perform the assigned work in a proper and safe manner. Dismiss from the job site any worker whose mental and physical capabilities might cause injury to the worker or coworkers.
- Rig Crew and Other Field Personnel (Those employees involved in fieldwork): All personnel engaged in site activities are required to become thoroughly familiar with, and to conform to, the provisions of AECOM's safety plan, procedures, and such other safety directives as may be considered appropriate by **Project Managers**, **Safety Officers,** and **Supervisors**.
- Rig Workers: Personnel are encouraged to offer ideas, suggestions, or recommendations regarding any operational condition, procedure, or practice that may enhance the safety of site personnel or the public. Their primary responsibilities will be:
    - Perform all required work safely.
    - Familiarize themselves with and understand the plan, including proper use of personal protective equipment.
    - Report any unsafe conditions to supervisory personnel.
    - Be aware of signs and symptoms of thermal stress.

4.4 Training

4.4.1 All staff shall be provided with on-site orientation to the rig and its operator.

4.4.2 All operators and assistants shall have industry-standard safety training and be versed in the equipment to be utilized. This may include, but is not limited to, HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.

4.5 Personal Protective Equipment

4.6 For most geotechnical, mineral, and/or groundwater drilling projects, PPE should include

- Hard hat: Hard hats shall be worn by everyone working at a drilling/boring site. Hats should meet the requirements of ANSI Z89 and be kept clean and in good repair with the headband and crown straps properly adjusted for the employee.
- Safety shoes: Safety shoes or boots shall be worn by all drilling personnel and all visitors to the site who observe operations within close proximity of the rig. Safety shoes or boots should meet the requirements of ANSI Z4 1.1.
- Safety glasses: All rig personnel shall wear safety glasses meeting the requirements of ANSI Z87.1.
- High Visibility Class II Safety Vest shall be worn by all **AECOM employees**. All rig personnel should attempt to wear high-visibility clothing that should be close fitting and not have large cuffs or loose material that can catch on rotating or translating components of the rig.
- Close fitting gloves and clothing: All rig personnel should wear gloves for hand protection against cuts and abrasions that could occur while handling wire rope or cable and from contact with sharp edges and burrs on drill rods and other drilling or sampling tools. Gloves should be close fitting and not have large cuffs or loose ties which can catch on rotating or translating components of the rig.
- Other protective equipment: For some operations, the project may dictate use of other protective equipment. The management of the contractor and its safety person shall determine the requirements. Such equipment might include face or ear protection or reflective clothing. The design and composition of the protective equipment and clothing should be determined as a joint effort of management and the client.
- Each worker should wear noise reducing ear protectors around operating equipment or during elevated noise levels.
- When drilling, boring, or probing is performed in chemically or radiological contaminated ground, special protective equipment and clothing will probably be required.
- The clothing of the individual rig worker is not generally considered protective equipment; however, clothing should be close fitting and comfortable without loose ends, straps, draw strings or belts or otherwise unfastened parts that might catch on some rotating or translating component of the rig. Rings and jewelry should not be worn during a work shift.

4.7 Housekeeping

4.7.1 A key requirement for safe field operations is that the Contractor safety person understands and fulfills the responsibility for maintenance and “housekeeping” on and around the drill rig, including the following:

- Suitable storage locations should be provided for all tools, materials, and supplies so that tools, materials, and supplies can be conveniently and safely handled without hitting or falling on a member of the crew or a visitor.
- Storage or transporting tools, materials, or supplies within or on the mast (derrick) of the rig should be avoided.
- Pipe, drill rods, probe rods, casing augers, and similar tooling should be orderly stacked on racks or sills to prevent spreading, rolling, or sliding.
- Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.
- Work areas, platforms, walkways, scaffolding and other accesses should be kept free of materials, debris and obstructions and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.
- All controls, control linkages, warning and operation lights, and lenses should be kept free of oil, grease, and/or ice.
- Do not store gasoline in any portable container other than a non-sparking, red safety container with a flame arrester in the fill spout and having the word “gasoline” easily visible.

4.8 Traffic Control

4.8.1 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 passerby pedestrians.

4.8.2 All traffic control devices shall be installed, placed, and maintained in accordance with the Traffic Control Plan, client specifications, and/or the Manual of Uniform Traffic Control Devices (MUTCD). 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.

4.9 Maintenance & Inspection

4.9.1 Good maintenance and thorough inspection will make operations safer. Maintenance tasks should be done safely by a qualified maintenance person. Inspection and maintenance tasks include but are not limited to the following requirements:

- Inspections shall be completed at the beginning of each day by the equipment operator and in the presence of an AECOM employee when the equipment is not owned and operated by AECOM. A Rig Inspection Form is provided in S3NA-405-FM1 Drill Rig Inspection for use in performing inspections.
- Safety glasses should be worn when performing maintenance on a rig or on drilling or probing tools.
- The drill rig engine should be shut down to make repairs or adjustments to a drill rig or to lubricate fittings (except repairs or adjustments that can only be made with the engine running).
- Precautions should be taken to prevent accidental starting of an engine during maintenance by removing or tagging the ignition key.
- Wheels or the lowering of leveling jacks or both should be blocked ("zero energy state") and hand brakes set before working under a drill rig.
- When possible and appropriate, all pressure on the hydraulic systems should be released as well as the drilling fluid system and the air pressure systems of the drill rig prior to performing maintenance. In other words, reduce the drill rig and operating systems to a “zero energy state” before performing maintenance. Use extreme caution when opening drain plugs and radiator caps and other pressurized plugs and caps.
- Personnel shall not touch an engine or the exhaust system of an engine following its operation until the engine and exhaust system have adequate time to cool.
- Welding and cutting shall not occur on or near a fuel tank.
- Wire rope safety factors shall be in accordance with American National Standards Institute B 30.5-1968 or SAE J959-1966.
- Gasoline or other volatile or flammable liquids shall not be used as a cleaning agent on or around an l rig.
- The manufacturer's recommendations should be followed for applying the proper quantity and quality of lubricants, hydraulic oils, and/or coolants.
- All caps, filler plugs, protective guards, panels, high-pressure hose clamps, chains, or cables that have been removed for maintenance should be replaced.

4.10 Hand Tools

4.10.1 A large number of hand tools can be used on or around a drill or probe rig and in repair shops and more than an equal number of instructions for proper use exist. “Use the tool for its intended purpose” is the most important rule. Additionally, equipment operators and assistants should not use their hand in place of the proper tool; work shall be stopped until the correct tool can be found. The following are a few specific and some general suggestions that apply to the safe use of several hand tools that are often used on and around rigs:

- When a tool becomes damaged, either repair it before using it again or get rid of it.
- When using a hammer, any kind of hammer for any purpose, wear safety glasses and require all others around you to wear safety glasses.

- When using a chisel, any kind of chisel, for any purpose, wear safety glasses and require all others around you to wear safety glasses.
- Keep all tools cleaned and orderly stored when not in use.
- Use wrenches on nuts; don't use pliers on nuts.
- Use screwdrivers with blades that fit the screw slot.
- When using a wrench on a tight nut, first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and apply force to the wrench with both hands when possible and with both feet firmly placed. Don't push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-off device. Always assume that you may lose your footing – check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches should be wire brushed frequently to prevent an accumulation of dirt and grease which would otherwise build up and cause wrenches to slip. Replace hook and heel jaws when they become visibly worn.
- Avoid the use pipe wrenches in place of a rod-holding device whenever possible.
- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be smashed between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

4.11 Clearing Work Areas

4.11.1 Prior to set up, adequate site clearing and leveling should be performed to accommodate the rig and supplies and provide a safe working area. Clearing the site includes clearing the intended drilling area of underground utilities in accordance with *S3NA-417-PR Utilities*, *Underground*. Drilling or probing should not be commenced when tree limbs, unstable ground or site obstructions cause unsafe tool handling conditions.

4.11.2 Start-Up

- All rig personnel and visitors should be instructed to "stand clear" of the rig immediately prior to and during starting of an engine.
- Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the neutral-actuating positions, and the cathead rope is not on the cathead before starting a drill rig engine.
- Start all engines according to the manufacturer's manual.

4.12 Drilling and Probing Operations

4.12.1 The following safety measures shall be taken during drilling and 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 and hearing protection shall be worn in the presence of a rig.
- Services shall be cleared prior to drilling or probing.
- Hands shall be kept away from moving parts (augers).
- The emergency shut-off switch on the rig should be identified to site personnel and tested on a regular basis by the operator.
- Unauthorized personnel shall be kept clear of the rig.

4.12.2 Safety requires the attention and cooperation of every worker and site visitor.

- 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 *S3NA-417-PR Utilities, Underground* and *S3NA-406-PR Electrical Lines, Overhead*.
- 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 leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig should be releveled if it settles after initial set up. Lower the mast (derrick) only when the leveling jacks are down, and do not raise the leveling jack pads until the mast (derrick) is lowered completely.

- Before starting drilling operations, secure and/or lock the mast (derrick) if required according to the drill manufacturer's recommendations.
- The operator of a rig should only operate a drill rig from the position of the controls. If the operator of the rig shall leave the area of the controls, the operator should shift the transmission controlling the rotary drive into neutral and place the feed control lever in neutral. The operator should shut down the drill engine before leaving the vicinity of the drill.
- Throwing or dropping tools will not be permitted. All tools should be carefully passed by hand between personnel or a hoist line should be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a rig or while on the job.
- 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.
- Clean mud and grease from your 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 air and water lines and pumps should be drained when not in use if freezing weather is expected.
- 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 should be covered, protected, or backfilled adequately and according to local or state regulations on completion of the drilling project.
- “Horsing around” within the vicinity of the drill rig and tool and supply storage areas should never be allowed, even when the rig is shut down.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending or descending. Always use adequate fall protection and a full body harness when climbing above six feet 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.

4.13 Elevated Derrick Platforms

4.13.1 The following precautions should be used:

- When a rig worker first arrives at a derrick platform, the platform should immediately be inspected for broken members, loose connections, and loose tools or other loose materials.
- A derrick platform over 4 feet (1.2 m) above ground surface should have toe boards and safety railings that are in good condition.
- When climbing to a derrick platform that is higher than 6 feet (am), a fall arresting device shall be used. The fall arresting device should consist of a full body harness and fall protection. The harness should fit snugly but comfortably. The lifeline when attached to the derrick should be less than 6 feet (2 m) long and attached to a fall arrester. The harness and lifeline should be strong enough to withstand the dynamic force of a 250-pound (115 kg) weight (contained within the belt) falling 6 feet (2 m).
- When a rig worker is on a derrick platform, the lifeline should be fastened to the derrick just above the derrick platform and to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
- Tools should be securely attached to the platform with safety lines. Do not attach a tool to a line attached to your wrist or any other part of your body.
- When you are working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
- Loose tools and similar items should not be left on the derrick platform or on structural members of the derrick.
- Workers on the ground or the drilling floor should avoid being under rig workers on elevated platforms whenever possible.

4.14 Lifting Heavy Objects

4.14.1 Before lifting any object without using a hoist, make sure that the load is within your personal lifting capacity. If it is too heavy, ask for assistance.

4.14.2 Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform the lifting with the muscles in your legs, not with the muscles in your lower back.

4.14.3 If a heavy object shall be moved some distance without the aid of machinery, keep your back straight and unarched. Change directions by moving your feet, not by twisting your body.

4.14.4 Move heavy objects with the aid of handcarts or lifting devices whenever possible.

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4.15 Use of Wire Line Hoists, Wire Rope, and Hoisting Hardware

4.15.1 The use of wire line hoists, wire rope, and hoisting hardware should be as stipulated by the American Iron Steel Institute, Wire Rope Users Manual.

- All wire ropes and fittings should be visually inspected during use and thoroughly inspected at least once a week for abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper revving, jamming, crushing, bird caging, kinking, care protrusion, and damage to lifting hardware. Wire ropes should be replaced when inspection indicates excessive damage according to the Wire Rope Users Manual. All wire ropes that have not been used for a period of a month or more should be thoroughly inspected before being returned to service.
- End fittings and connections consist of spliced eyes and various manufactured devices. All manufactured end fittings and connections should be installed according to the manufacturer’s instructions and loaded according to the manufacturer's specifications.
- If a ball-bearing type hoisting swivel is used to hoist drill rods, swivel bearings should be inspected and lubricated daily to ensure that the swivel freely rotates under load.
- If a rod-slipping device is used to hoist drill or probe rods, do not drill through or rotate drill rods through the slipping device; do not hoist more than 1 foot (.3 m) of the rod column above the top of the mast (derrick); and do not hoist a rod column with loose tool joints while the rod column is being supported by a rod slipping device. If rods should slip back into the hole, do not attempt to break the fall of the rods with your hands or by applying tension to the slipping device.
- Most sheaves on exploration drill rigs are stationary with a single part line. The number of parts of line should never be increased without first consulting with the manufacturer of the drill rig.
- Wire ropes shall be properly matched with each sheave. If the rope is too large, the sheave will pinch the wire rope; if the rope is too small, it will groove the sheave. Once the sheave is grooved, it will severely pinch and damage larger-sized wire ropes and therefore shall be replaced.

4.15.2 The following procedures and precautions shall be understood and implemented for safe use of wire ropes and rigging hardware.

- Use tool-handling hoists only for vertical lifting of tools (except when angle hole drilling). Do not use tool-handling hoists to pull on objects always from the rig; however, drills may be moved using the main hoist if the wire rope is spooled through proper sheaves according to the manufacturer's recommendations.
- When struck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanism of the drill.
- When attempting to pull out a mired down vehicle or drill rig carrier, only use a winch on the front or rear of the vehicle and stay as far as possible away from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.
- Minimize shock loading of a wire rope. Apply loads smoothly and steadily. Avoid sudden loading in cold weather.
- Never use frozen ropes.
- Protect wire rope from sharp corners or edges.
- Replace faulty guides and rollers.

- Replace damaged safety latches on safety hooks before using.
- Know the safe working load of the equipment and tackle being used. Never exceed this limit.
- Clutches and brakes of hoists should be periodically inspected and tested.
- Know and do not exceed the rated capacity of hooks, rings, links, swivels, shackles, and other lifting aids.
- Always wear gloves when handling wire ropes.
- Do not guide wire rope on hoist drums with your hands.
- Following the installation of a new wire rope, first lift a light load to allow the wire rope to adjust.
- Never carry out any hoisting operations when the weather conditions are such that hazards to personnel, the public, or property are created.
- Never leave a load suspended in the air when the hoist is unattended.
- Keep your hands away from hoists, wire rope, hoisting hooks, sheaves, and pinch points while slack is being taken up and when the load is being hoisted.
- Never hoist the load over the head, body, or feet of any personnel. Never use a hoist line to "ride" up the mast (derrick) of a drill rig.
- Replacement wire ropes should conform to the drill rig manufacturer's specifications.

4.16 Use of Cathead and Rope Hoists

4.16.1 The following safety procedures should be employed when using a cathead hoist:

- Keep the cathead clean and free of rust and oil and/or grease. The cathead should be cleaned with a wire brush if it becomes rusty.
- Check the cathead periodically, when the engine is not running, for rope wear grooves. If a rope groove forms to a depth greater than 1/8 inches (3 mm), the cathead should be replaced.
- Always use a clean, dry, sound rope. A wet or oily rope may “grab” the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast.
- Should the rope “grab” the cathead or otherwise become tangled in the drum, release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear. If the rope “grabs” the cathead, and tools are hoisted to the sheaves at the top of the mast, the rope will often break, releasing the tools. If the rope does not break, stay clear of the drill rig until the operator cautiously returns to turn off the drill rig engine and appropriate action is taken to release the tools. The operator should keep careful watch on the suspended tools and should quickly back away after turning off the engine.
- The rope should always be protected from contact with all chemicals. Chemicals can cause deterioration of the rope that may not be visibly detectable.
- Never wrap the rope from the cathead (or any other rope, wire rope or cable on the drill rig) around a hand, wrist, arm, foot, ankle, leg or any other part of your body.
- Always maintain a minimum of 18 inches of clearance between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground.
- Never operate a cathead (or perform any other task around a drill rig) with loose unbuttoned or otherwise unfastened clothing or when wearing gloves with large cuffs or loose straps or lacings.
- Do not use a rope that is any longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not use more rope wraps than are required to hoist a load.
- Do not leave a cathead unattended with the rope wrapped on the drum. Position all other hoist lines to prevent contact with the operating cathead rope.
- When using the cathead and rope for driving or back driving, make sure that all threaded connections are tight and stay as far away as possible from the hammer impact point.
- The cathead operator shall be able to operate the cathead standing on a level surface with good, firm footing conditions without distraction or disturbance.

4.17 Use of Augers

4.17.1 The following general procedures should be used when starting a boring with continuous flight of hollow-stem augers:

- Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at low RPM.
- Apply an adequate amount of down pressure prior to rotation to seat the auger head below the ground surface.
- Look at the auger head while slowly engaging the clutch or rotation control and starting rotation. Stay clear of the auger.
- Slowly rotate the auger and auger head while continuing to apply down pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about one foot or more below ground surface.
- If the auger head slides out of alignment, disengage the clutch or hydraulic rotation control and repeat the hole starting process.
- An auger guide can facilitate the starting of a straight hole through hard ground or a pavement.
- The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnection auger sections, and inserting and removing the auger fork. The operator shall ensure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.
- Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tools during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger 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 rotating augers, 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 the auger. Never use your hands or feet to move cuttings away from the 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.

4.18 Rotary and Core Drilling

4.18.1 Rotary drilling tools should be safety checked prior to drilling:

- Water swivels and hoisting plugs should be lubricated and checked for "frozen" bearings before use.
- Drill rod chuck jaws should be checked periodically and replaced when necessary.
- The capacities of hoists and sheaves should be checked against the anticipated weight to the drill rod string plus other expected hoisting loads.

4.18.2 Special precautions that should be taken for safe rotary or core drilling involve chucking, joint break, hoisting, and lowering of drill rods:

- Only the operator of the drill rig should brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck.
- 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.
- In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
- 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 your 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 Site Movement of Equipment

4.19.1 The individual who transports a rig on and off a drilling site should:

- Be properly licensed and should only operate the vehicle according to federal, state, and local regulations.
- Know the traveling height (overhead clearance), width, length and weight of the rig with carrier and know highway and bridge load, width and overhead limits, making sure these limits are not exceeded with and adequate margin.
- Never move an l rig unless the vehicle brakes are in sound working order.
- Allow for mast overhand when cornering or approaching other vehicles or structures.
- Be aware that the canopies of service stations and motels are often too low for a drill rig mast to clear with the mast in the travel position.
- Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.
- Never travel on a street, road, or highway with the mast (derrick) of the rig in the raised or partially raised position.
- Remove all ignition keys if rig is left unattended.

4.19.2 Loading and Unloading

- Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.
- Load and unload on level ground.
- Use the assistance of someone on the ground as a guide.
- Check the brakes on the rig carrier before approaching loading ramps.
- Distribute the weight of the rig, carrier, and tools on the trailer so that the center of eight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the high of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.
- The rig and tools should be secured to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

4.19.3 Off-Road Movement

The following safety suggestions relate to off-road movement:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle (for 4 x 4, 6 x 6, etc. vehicles or carriers) when traveling off highway on hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Attempt to cross obstacles such as small logs and small erosion channels or ditches squarely, not at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.

- After the drill has been moved to a new drilling site, set all brakes and/or locks. Always block/chock the wheels.

4.20 Tires, Batteries, and Fuel

4.20.1 Tires on the rig shall be checked daily for safety and during extended travel for loss of air and they shall be maintained and/or repaired in a safe manner. If tires are deflated to reduce ground pressure for movement on soft ground, the tires should be inflated to normal pressures before movement on firm or hilly ground or on streets, roads and highways. Under-inflated tires are not as stable on firm ground as properly inflated tires. Air pressures should be maintained for travel on streets, roads, and highways according to the manufacturer's recommendations. During air pressure checks, inspect for:

- Missing or loose wheel lugs.
- Objects wedged between dual or embedded in the tire casing. Damaged or poorly fitting rims or rim flanges.
- Abnormal wear, cuts, breaks, or tears in the casing.
- The repair of truck and off-highway tires should only be made with required special tools and following the recommendations of a tire manufacturer’s repair manual.

4.20.2 Batteries contain strong acid. Use extreme caution when servicing batteries.

- Batteries should only be serviced in a ventilated area while wearing safety glasses.
- When a battery is removed from a vehicle or service unit, disconnect the battery ground clamp first.
- When installing a battery, connect the battery ground clamp last.
- When charging a battery with a battery charger, turn off the power source to the battery before either connecting or disconnecting charger leads to the battery posts. Cell caps should be loosened prior to charging to permit the escape of gas.
- Spilled battery acid can burn your skin and damage your eyes. Spilled battery acid should be immediately flushed off of your skin with lots of water. Should battery acid get into someone's eyes, flush immediately with large amounts of water and see a physician at once.
- To avoid battery explosions, keep the cells filled with electrolyte; use a flashlight (not an open flame) to check electrolyte levels and avoid creating sparks around the battery by shorting across a battery terminal. Keep lighted smoking materials and flames away from batteries.

4.20.3 Special precautions shall be taken for handling fuel and refueling the rig or carrier. Only use the type and quality of fuel recommended by the engine manufacturer.

- Refuel in a well-ventilated area.
- Do not fill fuel tanks while the engine is running. Turn off all electrical switches. Do not spill fuel on hot surfaces. Clean any spillage before starting an engine. Wipe up spilled fuel with cotton rags or cloths. Do not use wool or metallic cloth.
- Keep open lights, lighted smoking materials, and flames or sparking equipment well away from the fueling area.
- Turn off heaters in carrier cabs when refueling the carrier or the drill rig.
- Do not fill portable fuel containers completely full to allow expansion of the fuel during temperature changes.
- Keep the fuel nozzle in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Do not transport portable fuel containers in the vehicle or carrier cab with personnel.
- Fuel containers and hoses should remain in contact with a metal surface during travel to prevent the buildup of static charge.

4.21 First Aid (see S3NA-207-PR Medical Services and First Aid)

4.21.1 At least one member of the crew (and if only one, preferably the drilling and safety supervisor) should be trained to perform first aid. First aid is taught on a person-to-person basis, not by providing or reading a manual. Manuals should only provide continuing reminders and be used for reference. It is suggested that courses provided or sponsored by the American Red Cross or a similar organization would best satisfy the requirements of first aid training for drill crews.

4.21.2 For drilling and probing operations it is particularly important that the individual responsible for first aid should be able to recognize the symptoms and be able to provide first aid for electrical shock, heart

attack, stroke, broken bones, eye injury, snake bite, and cuts or abrasions to the skin. Again, first aid for these situations is best taught to drill crewmembers by instructors qualified by an agency such as the American Red Cross.

4.21.3 A first aid kit should be available and well maintained on each drill site. The contents of the first aid kit shall be placed in a weatherproof container with individual sealed packages for each type of item.

4.22 **Rig Utilization**

4.22.1 Do not attempt to exceed manufacturers' ratings of speed, force, torque, pressure, flow, etc.

4.22.2 Only use the drill rig and tools for the purposes that they are intended and designed.

4.23 **Rig Alterations**

4.23.1 Alterations to a rig or drilling or probing tools should only be made by qualified personnel and only after consultation with the manufacturer.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-405-FM1 Drill Rig Inspection

Project Name:
Project Number:
Date:
Subcontractor Inspected:
Site Manager:

General Safety		
Safety Officer Designated for Job:	☐ Yes	☐ No
Name:		
Safety Meeting Performed (Daily)	☐ Yes	☐ No
Personal Protective Equipment (PPE)		
Hard Hats	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No
Steel-toed Boots	☐ Yes	☐ No
Hearing Protection	☐ Yes	☐ No
Work Gloves	☐ Yes	☐ No
Orange Work Vests	☐ Yes	☐ No
Traffic Cones and Signs	☐ Yes	☐ No
Other	☐ Yes	☐ No
Disposal of PPE in Proper Waste Containers (if applicable)	☐ Yes	☐ No
Comments:		
Daily Inspections of Drill Rig		
Structural Damage, Loose Bolts	☐ Yes	☐ No
Proper Tension in Chain Drives	☐ Yes	☐ No
Loose or Missing Guards, Fluid Leaks	☐ Yes	☐ No
Damaged Hoses and/or Damaged Pressure	☐ Yes	☐ No
Gauges and Pressure Relief Valves	☐ Yes	☐ No
Comments:		

Check and test all safety devices such as:		
Emergency shutdown switches, at least daily	☐ Yes	☐ No
All gauges and warning lights, and ensure control levers are functioning properly	☐ Yes	☐ No
First aid and fire extinguishers on drill rig	☐ Yes	☐ No
Back up alarm functioning properly	☐ Yes	☐ No
Comments:		

Drill Crew Training Requirements		
40-hour OSHA Training	☐ Yes	☐ No
8-hour Annual Refresher Training	☐ Yes	☐ No
Drill Rig Training/Safe Operating Practices	☐ Yes	☐ No
First Aid/CPR	☐ Yes	☐ No
Emergency Procedures	☐ Yes	☐ No
Emergency Phone Numbers Posted	☐ Yes	☐ No
Site Orientation	☐ Yes	☐ No
Health and Safety Plan Review	☐ Yes	☐ No
Comments:		

Housekeeping		
Suitable storage for tools, materials, and supplies	☐ Yes	☐ No
Pipes, drill rods, casing, and augers stacked on racks to prevent rolling and sliding	☐ Yes	☐ No
Platforms and other work areas free of debris materials and obstructions	☐ Yes	☐ No
Comments:		

Hand Tools		
Tools in good condition	☐ Yes	☐ No
Broken tools discarded and replaced	☐ Yes	☐ No
Right tool used for the right job	☐ Yes	☐ No
Comments:		

Drilling Operations		
Mast or derrick down when moving rig	☐ Yes	☐ No
Overhead obstructions identified before mast is raised	☐ Yes	☐ No
Drill rig stabilized using leveling jacks or solid cribbing	☐ Yes	☐ No
Secure and lock derrick	☐ Yes	☐ No
Comments:		

Overhead and Buried Utilities		
Buried utilities identified and marked	☐ Yes	☐ No
Safe distance of drill rig from overhead power lines	☐ Yes	☐ No
Comments:		

Wire Line Hoists, Wire Rope, and Hardware		
Inspection for broken wires where reduction in rope diameter, wire diameter, fatigue, corrosion, damage from gear jamming, crushing, bird caging, kinking	☐ Yes	☐ No
Inspect and lubricate parts daily	☐ Yes	☐ No
Comments:		

Auger Operations—what to look for:

- A system of responsibility between the operator and the tool handler when connecting and disconnecting auger sections and inserting and removing auger fork.
- During connecting and disconnecting auger sections and inserting auger for the tool, handler should position himself away from the auger column while it is rotating.
- When securing the auger to the power coupling, pin should be inserted and tapped into place using a hammer or other similar device.
- Tool hoist should be used to lower second section of auger into place.
- Both operators should be clear of auger as it is being lifted into place.
- Long-handled shovel should be used to move dirt away from auger.

Overall Summary:

S3NA-405-FM2 Subsurface Investigation Checklist

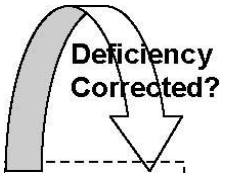
Name of Contractor:

Location: Project #:

Date: Time: Weather:

Person Conducting Inspection: Title:

*Note: As you conduct your inspection, you should be able to answer each question with a **YES**.*
*If the answer to any question is **NO,** this deficiency should be corrected as soon as possible.*



	YES	NO	OK	N/A
1. Do on-site personnel have required-level PPE (steel-toe boots, safety vests, hard hats, safety glasses, and gloves)?	☐	☐	☐	☐
2. Is there a copy of HASP and EAP available at each drill rig location?	☐	☐	☐	☐
3. Are there a PID, multi-gas meter, and a colorimetric pump available at each drill rig location?	☐	☐	☐	☐
4. Has the field screening equipment been calibrated in the morning?	☐	☐	☐	☐
5. Are calibration gases available at the site?	☐	☐	☐	☐
6. Are drilling fluids contained in the mud tub?	☐	☐	☐	☐
6a. Does mud tub setup provide adequate splash guards to protect the public?	☐	☐	☐	☐
6b. Does setup present five (5) feet of walk space for the public?	☐	☐	☐	☐
6c. Will the mud tub be emptied at end of day?	☐	☐	☐	☐
6d. Explain how the mud tub will be covered to prevent an accident.	☐	☐	☐	☐
6e. Are adequate containment practices being implemented to prevent mud tub liquids from being released onto pedestrian walkways?	☐	☐	☐	☐
7. Is the drill rig properly grounded?	☐	☐	☐	☐
8. Is there a DOT permit available on site at each drill rig location?	☐	☐	☐	☐
8a. Are operations in compliance with DOT permit?	☐	☐	☐	☐
9. Is there an orange snow fence with appropriate warning signage erected as a site barrier around the drill rig to keep pedestrians out of the work area?	☐	☐	☐	☐
10. Are hydrant water hoses out of the pedestrian sidewalk?	☐	☐	☐	☐
11. Are smoking and eating prohibited in the immediate work area?	☐	☐	☐	☐
12. Does each drill rig have a fire extinguisher, absorbent materials to cleanup a spill, and a first aid kit?	☐	☐	☐	☐
13. Is the waste from the mud tub properly contained in 55-gallon drums?	☐	☐	☐	☐
13a. Are drums properly labeled?	☐	☐	☐	☐
14. Are proper housekeeping procedures followed to avoid slips, trips, and falls?	☐	☐	☐	☐
15. Are decontamination/hand washing facilities available at the site?	☐	☐	☐	☐

COMMENTS:

S3NA-405-ST Drilling and Boring

Jurisdiction	Regulation
United States	
OSHA	29CFR 1910.212
Canada	
Alberta	OHS Code (2009) Sect 310, 362
British Columbia	OHS Regulation (1997) Sect 8.10, 16.27, 16.28
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 16.5, 22.5
New Brunswick	OHS Regulation (91-191) Sect 237, 241, 242
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 52, 61, 68, 71, 73
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 87, 88
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 39, 97, 141, 220
Ontario	O. Reg. 851 Sect 24
Prince Edward Island	OHS Regulations (EC180/87) Sect 30.2, 30.8
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 340 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.10.2, 3.10.13
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 135
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 1.12, 7.19

S3NA-405-WI Core Drilling Machine Safety Card

1.0 Objective / Overview

1.1 Core drilling machines are used on all types of jobs. They can be electrical or gas powered and come with a stand or can be hand held. Caution should be used when operating such a machine. It may look harmless and easy to run, but drilling machines have many hazards.

2.0 Safe Operating Guidelines

2.1 Clean the flanges before mounting the blade.

2.2 Make sure the blade is correct for the material being cut and that the arrow on the blade corresponds with the direction of rotation of the machine spindle.

2.3 Avoid tilting the blade when cutting.

2.4 Use only the machines that have an approved safety guard.

2.5 Remove the diamond blade from the machine during transit to prevent accidental damage.

2.6 Inspect the blades frequently to detect cracks or undercutting of the steel center.

2.7 Don't let excessive heat be generated at the cutting edge of the blade.

2.8 Use adequate water supply to both sides of the blade.

2.9 Follow the manufacturers recommended pulley sizes and operating speeds for specific blade diameters.

2.10 Make sure to tighten drive belts to ensure full available power.

2.11 Don't force the blade on the blade shaft or mount blade on an undersized spindle.

3.0 Potential Hazards

3.1 Electrical shock.

3.2 Flying debris.

3.3 Severe cuts.

3.4 Hearing loss.

3.5 Breathing fumes or dust.

3.6 Binding/biting – torque control.

4.0 Training Requirements

4.1 Review of Applicable SOPs (e.g., *S3NA-305-PR Hand and Power Tools*; *S3NA-302-PR Electrical, General*).

4.2 Demonstrated knowledge on the use of a coring machine.

4.3 Review and follow manufacturers' operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather gloves.

5.2 Face shield.

5.3 Steel-toed/composite-toed boots.

5.4 Hearing protection.

5.5 Respirator or dust mask.

6.0 Other Safety Tips

6.1 Keep fingers and hands away from the cutting edge.

6.2 Hold handle firmly when operating.

6.3 A subsurface utility clearance should be performed prior to initiating drilling operations.

6.4 Stand firmly and apply body weight at anchored side of guarded platform.

S3NA-406-PR Electrical Lines, Overhead

1.0 Purpose and Scope

1.1 Provides the safe work requirements to be observed where overhead power lines are present on a job site.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 Types of overhead lines:

2.1.1 Overhead power lines

2.1.2 Structural cable supports

2.1.3 Guy wires

2.1.4 Cable television / communication lines

3.0 Attachments

3.1 S3NA-406-FM Overhead Electrical Lines Acknowledgement Form

4.0 Procedure

4.1 An appropriate distance must be kept between equipment and overhead utility lines.

4.2 **Employees** must contact the power line operator before work is done or before equipment is operated within 15.25 metres (50 feet) of an energized overhead power line, in order to:

4.2.1 Determine the voltage of the power line, and

4.2.2 Establish the appropriate safe limit of approach distance as identified by provincial/territorial regulations.

4.3 The safe limit of 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 4.15 metres (13.5 feet).

4.4 **Employers** or **Project Managers** must formally notify (using the *S3NA-406-FM Overhead Electrical Lines Acknowledgement form*) all subcontractors or equipment operators of an energized overhead power line before work is done or equipment is operated in the vicinity of the power line at distances less than the safe limit of approach distances and obtain the operator's assistance in protecting workers involved.

4.5 **Employees** must not place earth or other material under or beside an overhead power line if doing so reduces the safe clearance to less than the safe limit of approach distances.

4.6 To maintain minimum safe clearances:

4.6.1 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).

4.6.2 Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.

4.6.3 Position signs or other devices to determine the “Danger Zone.”

4.6.4 Inform all on-site staff with the on-site clearances required.

4.6.5 Beware of atmospheric conditions, such as temperature, humidity, and wind, that may dictate more stringent safety procedures.

4.7 Operation of heavy equipment and cranes in areas with overhead power lines represents a significant hazard to all personnel on the job site. Accidental contact with an energized line or arcing between a

high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. Although maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. If work will (or may) occur within 50 feet of any energized line, the procedures outlined below will be observed.

4.8 Overhead power lines will be identified on each job site before the work commences. For each identified line, the **Project Manager** must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders, cranes, etc.) will occur within 50 feet (15.25 metres) of the line. Unless verified, it will be assumed that all lines are energized.

4.9 Safe working distance is the minimum distance that must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins and is based on the line voltage of the power line. Figure 4-1 lists the line voltages in kilovolts and the Minimum Safe Work Distance in the United States and Figure 4-2 indicates the Nominal Phase to Phase voltage rating in kilovolts for Canada. The following safe working distance criteria will be applied for all AECOM operations:

Figure 4-1: United States Overhead Line Criteria

Line Voltage (Kilovolts)	Minimum Safe Working Distance
0 – 50	10 feet
>50 – 200	15 feet
>200 – 350	20 feet
>350 – 500	25 feet
>500 – 750	35 feet
>750 – 1,000	45 feet

Source: American National Standards Institute, Publication B30.5.

Figure 4-2: Canadian Overhead Line Criteria

Column 1	Column 2
Nominal phase-to-phase voltage rating	Minimum Distance
Over 425 to 12,000	3.0 metres
Over 12,000 to 22,000	3.0 metres
Over 22,000 to 50,000	3.0 metres
Over 50,000 to 90,000	4.5 metres
Over 90,000 to 120,000	4.5 metres
Over 120,000 to 150,000	6.0 metres
Over 150,000 to 250,000	6.0 metres
Over 250,000 to 300,000	7.5 metres
Over 300,000 to 350,000	7.5 metres
Over 350,000 to 400,000	9.0 metres

Source: Canada Occupational Health and Safety Regulations Electrical Safety- Subsection 8.5(6).

4.10 Under no circumstances will any object pass closer than 3 metres to any energised, uninsulated electrical line.

4.11 Formally notify all subcontractors of Overhead Power lines with the attached *S3NA-406-FM Overhead Electrical Lines Acknowledgement* form.

4.12 Acceptable Safety Procedures

4.12.1 Where any work task will not allow the minimum safe working distance to be maintained at all times, an alternate means of protection must be identified and approved by the **SH&E Department.** In order of preference, acceptable procedures are

- De-energize the power line(s)/lockout by local utility authorities
- Install insulated sleeves on power lines
- Assign line spotters to assist the equipment operator

4.12.2 De-energize Power Lines

- Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site power lines are 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 owner of the line (generally the local electrical utility). Therefore, de-energizing of a line requires advance coordination with the line owner; generally, at least one week advance notice should be provided.

4.12.3 Install Insulating Sleeves

- Insulating sleeves can be placed over power lines to provide a contact and arcing barrier if work must occur closer to the power lines than the accepted safe work distance. Although not as desirable as line de-energizing, the use of these sleeves can provide an acceptable alternative where electrical lines are required to remain in service.
- As with de-energizing of distribution and transmission lines, placement of insulating sleeves can be performed only by the line owner. This requires advance coordination with the line owner; generally, at least one week advance notice should be provided. To install the sleeves, representatives of the line owner will require access to the job site.

4.12.4 Assign Line Spotters

- A line spotter is a person located at ground level who is assigned to observe equipment operations, with the specific duty of assisting the equipment operator to ensure that no part of the equipment gets too close to an energized, unprotected electrical line.
- Persons assigned to act as line spotters must meet the following requirements:
    - While acting as a line spotter, no other duties may be performed (e.g., the line spotter cannot also act as the load spotter during a lifting operations).
    - The spotter will have a radio or other direct means of communicating with the equipment operator at all times.
    - The spotter will be positioned at a right angle to the equipment operator's line of sight to maximize the sight angles between the personnel.

Under no circumstances will any portion of a piece of equipment pass closer than 10 feet to any energized, uninsulated electrical line.

4.13 Additional Safety Measures

4.13.1 The following additional safety measures can 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 in Section 4.1.

4.13.2 If an electrical power line is hit or an electrical arc occurs:

- All ground personnel must evacuate IMMEDIATELY to a distance of at least 50 feet (15.25 metres). DO NOT attempt to rescue any injured person until the line can be de-energized.
- The operator should remain in the cab until the line can be de-energized and should carefully try to extricate the equipment from the power line. This may not be possible where melting of insulator material or metal has occurred.
- Contact the line owner to report the line contact and request that the line be de-energized immediately.
- Once the line has been confirmed to be de-energized, the operator can safely evacuate the cab and rescue can commence for any injured personnel.
- Contact the **SH&E Department** to report the incident and implement any instructions provided.
- If the operator must evacuate while the line is still energized (because of fire or other life-threatening condition) he/she should jump clear of the equipment (making sure to avoid touching the equipment and the ground simultaneously), and land upright and with feet together. Once on the ground, proceed in a direct line away from the equipment using a short, shuffling gait (feet touching, sliding each foot no more than 1 foot forward at a time) to minimize shock hazard from electrical energy being transmitted through the ground.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-406-FM Overhead Electrical Lines Acknowledgement

Company information		
Name of Employer or Contracting Operation:		
Address:		
City:	**Province:**	**Postal Code:**
Telephone:	**Fax:**	
Project name:		
AECOM contact name:		
Acknowledgement		
I acknowledge that I have received a copy of the *S3NA-406-PR Electrical Lines, Overhead*, I understand that this project site may have Overhead Electrical Hazards, and I have discussed this procedure with all of our company staff who will be on this site.		
Name and Title (Print)	**Signature**	**Date**

S3NA-408-PR Elevated Work Platforms and Aerial Lifts

1.0 Purpose and Scope

1.1 Provides the requirements to be followed when the use of elevated work platforms and aerial lift equipment are planned.

1.2 This procedure applies to all AECOM North America (NA) based employees and operations.

2.0 Terms and Definitions

2.1 **Elevating Work Platform (EWP):** Includes aerial lifts, scissor lifts, articulating boom lifts, truck platforms, and crane-suspended personnel platforms.

3.0 Attachments

3.1 S3NA-408-FM1 Aerial Equipment Pre-operation & Work Zone Checklist

3.2 S3NA-408-FM2 Aerial Equipment Inspection

3.3 S3NA-408-ST Elevated Work Platforms and Aerial Lifts

4.0 Procedure

4.1 Restrictions

4.1.1 No person shall operate an elevated work platform until they have received adequate training, in accordance with manufacturer's specification.

4.1.2 The elevated work platform must be equipped with ground level controls so that in an emergency where there is no operator in the basket/bucket, the personnel lift can be operated from ground level. Personnel on the ground must be trained in how to operate the lift in the event of an emergency.

4.2 Roles and Responsibilities

4.2.1 **Project Manager (field task manager, supervisor)**

- The AECOM site management is responsible to see that sound principles of safety, training, inspection, maintenance, and operation consistent with all resource data available from the manufacturer, governing or regulatory authority is provided to the operator and users.
- The **Supervisor** has direct control over the use and operation of elevating work platforms. The **Supervisor** and the assigned operating personnel have the responsibility for proactive, safe employee behavior. Decisions about the use and operation of a EWP shall be made with due consideration that the equipment will be carrying personnel whose safety is dependent on those decisions.
- It is the operator's responsibility to implement safe work practices provided by project management, supervision or the task leader supplemented by good judgment, safe control, and caution whenever evaluating personnel in a platform, bucket or basket. The safety of all personnel in the EWP is dependent on safe use and operation by the operator.

4.2.2 **Region SH&E Manager**

- Provides technical guidance and support about this procedure.

4.2.3 **Site Safety Coordinator**

- The **Site Safety Coordinator (SSC)** shall assist the site manager in compliance with the requirements of this procedure.

4.2.4 **Employees**

- All **employees** engaged in project field activities involving EWPs shall follow these procedures.

4.3 General Equipment Requirements

4.3.1 Fall Protection – All employees on EWP or Aerial Lift shall wear and use a full body harness, fall arrest device and lanyard and be secured to the manufacturer's provided anchorage point at all times. Employees shall not secure themselves to a handrail or the work structure.

4.3.2 All aerial lifts shall be operated and maintained in accordance with manufacturer's specifications.

4.3.3 All aerial lifts used by AECOM must be certified by the manufacturer to meet requirements of the American National Standards Institute (ANSI) or the Canadian Standards Association (CSA) standard applicable to the device:

- For truck-mounted boom or scissor lifts – ANSI Standard 92.2.
- For manually propelled boom or scissor lifts – ANSI Standard 92.3.
- For self-propelled boom lifts – ANSI Standard 92.5.
- For self-propelled scissor lifts – ANSI Standard 92.6.
- For elevated rolling work platform – CAN3-B354.1M82.
- For self-propelled elevating work platform – CAN3-B354.2-M82 and CAN3-B354.2-M82.
- For boom type elevating work platform – CAN3-B354.4-M82.
- For vehicle-mounted aerial device – Can-CSA-C225-M88.

4.3.4 Lift controls on extendable and articulating boom platforms shall be clearly identified as to function.

4.3.5 Aerial lifts designed as personnel carriers shall have both work platform (primary) and lift mount (secondary) controls. Primary controls shall be within easy reach of the operator. Secondary controls shall be capable of overriding the upper controls. All controls shall be plainly marked to identify their function.

4.4 Personal Protective Equipment (PPE)

4.4.1 PPE required by regulation for the Construction or Industrial application

4.4.2 A Full Body Harness, meeting the requirements of ANSI/CSA, Class A, suitably sized for the body mass and shape of the worker.

4.4.3 A shock absorbing lanyard meeting the regulatory requirements and suitably sized for the body mass and shape of the worker. The lanyard should be as short as possible to allow the user to perform his/her work while anchored to the designated anchor point on the elevated work platform.

4.5 Operator Training

4.5.1 Elevated Work Platform or Aerial Lift operators shall be trained and certified by a source approved by the SH&E Department (e.g., vendor / equipment rental company or a competent staff operator). Documentation of training shall be maintained including the source, date, persons trained and outline of information.

4.5.2 A demonstration shall accompany any operator training to verify that the prospective operator possesses the actual skills to operate specific types of aerial lifts. Staff using Personal Fall Protection Equipment must be trained in Working at Heights and must be trained in the proper inspection, use, and care of the harness and lanyard that will be used in accordance with this procedure.

4.5.3 Instruction in the use and operation of the Elevated Work Platform or Aerial Lift will include typical observation and check of the Work Zone for proper marking, foreign objects, uneven or rough surfaces, and signal staff if required.

4.6 Equipment Inspection

4.6.1 **Pre-Operational Check -** The Aerial Equipment Pre-Operation Checklist (Attachment 1) shall be completed prior to each day of operation. The checklist will be submitted to the supervisor or task leader with explanation of any noticed defects.

4.6.2 NOTE: Any problems or malfunctions that affect safe operation of the equipment **shall be repaired prior to the use of the EWP.**

4.6.3 **Periodic Inspection –** Project management shall ensure that complete inspections scheduled in accordance with the manufacturer's recommendations are performed on the EWP. Periodic inspections shall be performed by the dealer or qualified mechanic familiar with such equipment

designated by project management. Inspections shall include the use of the Aerial Equipment Inspection (Attachment II) or a similar inspection form provided by the vendor.

4.6.4 **Post Incident Inspection –** An inspection shall be conducted before continuing the operation of an EWP following any incident where the EWP has obvious or suspected operational damage. This post incident inspection must be supported by communications to the dealer or manufacturer of the equipment requesting any additional specific inspection, maintenance checks or repairs.

4.6.5 **Maintenance/Repairs –** All maintenance and repairs shall be made by a qualified person in conformance with the manufacturer's recommendations. Scheduled maintenance may exceed the manufacturer's minimum requirements. EWP shall be immediately removed from service until repaired and their use discontinued any time there are problems or malfunctions that affect safe operation of the EWP.

4.6.6 **Records of all inspections and maintenance on EWP shall be maintained by the project.**

4.7 Equipment Operation

4.7.1 The operator of the Elevated Work Platform equipment shall review the work to be performed with the assigned staff including the work task(s), work zone set up, client requirements, any hazards, equipment controls, safety equipment, fall prevention, emergency response plan and coordination of the operation before undertaking the work.

4.7.2 The operator must make decisions about the use and operation of the EWP with due consideration that his/her own safety as well as the safety of other personnel on the platform is dependent on those decisions.

4.7.3 During operation, the EWP shall be used in accordance with project requirements, manufacturer operation specifications and the following guidelines:

- Conduct a work area hazard evaluation prior to initiating any elevated platform work. Plan work accordingly.
- The work area below EWP must be clear or barricaded from unauthorized person’s entry (e.g., project personnel, pedestrians, traffic) in case something is dropped from work platform.
- On public highways and roadways, a safe work zone must be established in compliance with appropriate local, state, provincial and federal requirements. In rail systems and airports, a safety work area shall be similarly established in conformance with client requirements and applicable standards.
- The EWP must be operated on a surface within the limits specified by the manufacturer.

4.7.4 Lift controls shall be tested each day prior to use to determine that they are in safe working condition. Controls shall be plainly marked as to their function.

4.7.5 Outriggers, stabilizers, extendible axles or other stability enhancing means are used as required by the manufacturer.

4.7.6 Guardrails must be in a safe condition and access gate(s) or openings are closed per manufacturer's instructions.

4.7.7 The load and its distribution on the platform and any platform extension(s) are in accordance with the manufacturer's rated capacity for that specific configuration. Never exceed manufacturer’s rated load limits.

4.7.8 Personnel must stand firmly on the platform floor, and shall not sit or climb on the edge of the basket or use planks, ladders or other objects to gain a work position or as a climbing device.

4.7.9 Fall Protection – Each person in the platform must wear a full body harness and be secured to the manufacturer provided anchorage point at all times.

4.7.10 Adequate clearance from overhead obstructions is maintained.

4.7.11 Safe operating distances are maintained from all potentially energized (exposed or insulated) power lines and parts including temporary construction power lines/cord sets. (*See S3NA-406-PR, Electrical Lines, Overhead*).

4.7.12 Safe distances are maintained from all potential hazards where a client’s moving equipment may be in transit and come in contact with an EWP or its parts. All client procedures, approval, permits and accompaniments shall be secured prior to operating an EWP.

4.7.13 Only essential materials and tools required to perform the work from the lift are in the platform and fit completely inside, taking into account total weight involved and the capacity of the equipment.

4.7.14 When operating from a barge, ensure that the EWP is positively secured to the barge deck by using tie down lines and appropriate anchorage points. Anchorage needs to ensure that wheels remain firm on the barge deck. Use four-point tie down or equivalent method. Never secure to anything loosely lying on the barge deck.

4.7.15 Never use the EWP for hoisting, towing or pulling.

4.7.16 Never place heavy objects on hand rails or come in contact with objects that could damage railings or platform.

4.7.17 Immediately report any problems or equipment malfunctions occurring during operation to the Supervisor or task leader.

4.7.18 Do not continue to operate an EWP if unsafe conditions occur during operations.

4.7.19 Never alter, disconnect or disable interlocks or other safety devices that would allow operation in violation of manufacturer's specifications.

4.7.20 Ensure care is taken to prevent entanglement in ropes, wires, cables, etc. Retract and lower the EWP to its lowest possible position before attempting to move an EWP. Ensure that the path of intended movement is clear of debris and personnel. Use a spotter attendant in congested or hazardous areas. Equipment movement speed shall be limited to surface and safe condition in accordance with the manufacturer's recommendations.

4.7.21 Shut engine off during refueling and fuel only in well-ventilated areas free of other flammable/combustible materials.

4.7.22 Should an EWP become snagged or caught on a structure preventing normal operation/motion, personnel should be removed from the platform before attempting to free the platform using ground controls.

4.7.23 Articulating boom and extendable boom platforms shall have both upper (platform level) and lower (ground level) controls. Lower controls shall override upper controls, but shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

4.7.24 Never attempt to operate an EWP from below (ground controls) when it is already in use, except in an emergency situation.

4.7.25 No more than two people shall be in an EWP at any one time without approval of the Supervisor. Under no circumstances shall more than two people be allowed in the EWP if the manufacturer prohibits such a practice.

4.8 Aerial Lifts

4.8.1 An aerial lift is a vehicle-mounted device used to elevate personnel to job sites above the ground. This includes extendible boom platforms, aerial ladders, articulating boom platforms, vertical towers, and combinations of these devices. It is not necessary that the device be able to rotate around a vertical axis to be classified as an aerial lift.

4.8.2 Follow all equipment operation and work area guidelines.

4.8.3 Lift controls on extensible and articulating boom platforms shall be clearly identified as to function and tested each day to verify safe working condition. An overall visual inspection shall be completed to ensure cracked welds and/or structural damage does not exist. Defective equipment shall be reported to the supervisor and not used until repairs are completed.

4.8.4 Aerial lifts shall be operated only by authorized persons.

4.8.5 Employees working in baskets shall always stand on the floor of the basket and may not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

4.8.6 The manufacturer's boom and basket load limits must not be exceeded.

4.8.7 Brakes on aerial lifts shall be set when in use. When outriggers are used, they must be placed on pads or on solid surfaces. When using aerial lifts on inclined surfaces, wheel chocks shall be used if they can be safely installed.

4.8.8 Aerial lift trucks shall not be moved with employees in an elevated basket unless the equipment is specifically designed for this operation.

4.8.9 Aerial lifts primarily designed as personnel carriers shall have both platform (upper) and lower controls. Upper controls shall be within easy reach of the operator. Lower controls shall override the upper controls. All controls shall be plainly marked to identify their function.

4.8.10 Lower level controls shall not be operated without permission from the employee(s) in the lift except in case of emergency.

4.8.11 Before moving an aerial lift for travel, the boom must be properly cradled and the outriggers stowed.

4.8.12 Aerial ladders on ladder trucks and tower trucks shall be secured in the lower travelling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.

4.9 Emergency Response

4.9.1 In the rare instance where personnel fall while attached to a Powered Personnel lift, it is essential that they be rescued promptly.

4.9.2 The Project Safety Plan must include detailed instructions for the immediate recognition and prompt rescue of a fallen worker. In urban centers or in industrial settings where trained rescue specialists have confirmed their availability and capability to affect a prompt rescue, the plan may simply include instructions for summoning the designated rescue team. In remote locations where it is not possible to summon rescue specialists to extract the fallen worker within 20 minutes of the fall occurrence, a rescue team must either be mobilized and on standby at the site or accompanying employees must be trained and equipped to effect a prompt rescue in accordance with the plan.

4.9.3 The rescuers who will implement the rescue plan must be properly trained in the applicable rescue techniques and must have the rescue equipment readily available.

4.9.4 After the fall, immediately assess the condition of the casualty. If the casualty appears to be seriously injured or unconscious, summon emergency medical responders to the site before initiating the rescue so that they will be enroute during the rescue.

4.9.5 After a fall, if there is a person left in the basket/bucket who is competent to operate the controls, he/she shall carefully and slowly maneuver the basket/bucket to move the casualty until suspended over a safe area (ground or bridge deck). Take great care that the casualty does not become entangled or snagged by any structures that are adjacent to the movement.

4.9.6 After a fall, if there is no person left in the basket/bucket who is competent to operate the controls, the designated person on the ground will switch control to ground level and will carefully maneuver the basket/bucket to move the casualty until suspended over a safe area (ground or bridge deck). Take great care that the casualty does not become entangled or snagged by any structures that are adjacent to the movement.

4.9.7 Operate the lift to lower the casualty to the safe area. If the casualty is injured, unconscious, or unable to stand, call other available personnel to assist laying the casualty down as the lift is lowered. If there are no other personnel available, swing the lift as needed, after the persons feet touch the ground, while carefully lowering the person into a lying position.

4.9.8 Once the casualty is on the ground, deck or other safe platform, and there is no tension in the lanyard, immediately reassess the condition of the casualty and begin first aid if needed.

4.9.9 In all cases, whether the casualty appears to be injured or not, evacuate him or her to the nearest medical facility for medical examination and treatment of any trauma or circulatory problems.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-408-FM1 Aerial Equipment Pre-operation and Work Zone Checklist

CHECKLIST MUST BE COMPLETED DAILY PRIOR TO INITIAL OPERATION			
FAULTY EQUIPMENT / DEVICES WILL BE IDENTIFIED AND REPAIRED BEFORE USE			
☑ = Acceptable O = Needs Improvement ☒ = Not To Be Operated N/A = Not Applicable			
EQUIPMENT / VEHICLE ID #		**LOCATION:**	
DATE:		**OPERATOR NAME:**	
MARK CONDITION			**COMMENTS**
Parking Brake			
Brakes Adjusted			
Tires Pressure & Condition			
Fluid Levels			
Steering System			
Horn			
Seat Belts			
Muffler / Exhaust System			
Rear View Mirrors			
Belts - Fan, Alternator			
Hydraulic Lines			
Fire Extinguisher			
Ladders, Tools, Equipment			
OPERATING CONTROLS			
Turn Signals			
Brake Lights			
Emergency Lights			
Head & Tail Lights			
Gauges			
Platform Controls			
Reflectors & Labels			
Windshield Wipers			
Back-Up Alarm			
Stabilizers Positioned			
Swing / Boom / Hoist Controls			
Travel Controls and Tracks			
Traverse Controls			
Elevation Controls			
Wheels Chocked			
WORK ZONE			
Platform Completely Enclosed			
Trained Operator			
Required PPE			
Fall Protection Equipment Used			
Cones, Barricades, Signage			
Establish Clear Work Zone			
Review Work Task(s) with Staff			
Traffic Directional Lights			
NOTE: WHEN VEHICLE IS NOT REQUIRED TO HAVE SPECIFIC ITEMS, IT MUST BE SHOWN AS N/A IN BOX			
THIS FORM MUST BE MAINTAINED IN THE PROJECT FILE			

S3NA-408-FM2 Aerial Equipment Inspection

TYPE EQUIPMENT:	EQUIPMENT NUMBER:	SERIAL NUMBER:
MAKE:		MODEL NUMBER:
MILEAGE:	DATE CHECKED:	LOCATION:
ENGINE MAKE:	YEAR MANUFACTURED:	HOURS:

	MARK ONE			COMMENTS (List percentage of wear on all wear items)
	GOOD	FAIR	REPAIR	
1. GENERAL APPEARANCE				
Hood & Panels				
Paint				
Undercarriage				
Tires – Type, Size				
2. ENGINE COMPARTMENT				
Oil Level & Condition				
Filters, Condition				
Fan / Radiator / Belts				
Gov. / Idling Device				
Exhaust System				
Fuel / Water / Oil / Lines				
Coolant – Level – Protect.				
Battery – Test Condition				
3. OPERATOR'S POSITION				
Controls				
Gauges				
Starting / Charging				
Engine Condition				
- Minor Repair				
- Major Repair				
Decals & Labels				
4. AERIAL EQUIPMENT				
Boom Condition				
Wear Pads				
Power Trac				
Hydraulic Fluid & Filter				
Emergency Lowering				
Aux. Power System				
Scissor Arms				
Safety Circuits				
Control Labels				
Basket & Door				
Platform & Railings				
Back-up Alarm				
Stabilizers				
Pads				
5. DOCUMENTATION, ETC				
Operator's Manual				
Service Manual				
Log Book				
Fire Ext.				

	MARK ONE			COMMENTS
6. OTHER COMPONENTS	GOOD	FAIR	REPAIR	
Certification Inspected By: Approved By: Name:				ESTIMATED HOURS TO REPAIR:

S3NA-408-ST Elevated Work Platforms and Aerial Lifts

Jurisdiction	Regulation
United States	
OSHA	29 CFR 1910.67 - Vehicle Mounted Elevating and Rotating Aerial Devices 29 CFR 1926, Subpart V – Power Distribution and Distribution
Canada	
Alberta	OHS Code (2009) Sect 346 – 350
British Columbia	OHS Regulation (1997) Sect 28.45
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 28.33 – 28.47
New Brunswick	OHS Regulation (91-191) Sect 231 – 234
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 101
Nova Scotia	Fall Protection and Scaffolding Regulations (N.S. Reg. 2/96) Sect 34 – 38
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 300 – 307
Ontario	O. Reg. 213/91 Sect 107, 143 – 149 O. Reg. 851 Sect 52 Guideline for the Safe Operation and Maintenance of Powered Lift Trucks
Prince Edward Island	Scaffolding Regulations (EC2006-44) Sect 17, 19
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 261 – 264 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.10.7, 3.10.8
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 192 – 194
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 10.32

The following standards apply to man lifts:

Association	Standard
American National Standard (ANSI)	ANSI A92.2 (latest revision) – Vehicle Mounted Elevating and Rotating Aerial Devices A92.3-1990, *Manually Propelled Elevating Aerial Platforms* A92.5-1992, *Boom-Supported Elevating Work Platforms* A92.6-1999, *Self-Propelled Elevating Work Platforms*
Canadian Standards Association (CSA)	CAN/CSA-Z185-M87 (R2001), Safety Code for Personnel Hoists CAN/CSA B354.1-04, Portable Elevating Work Platforms CSA B354.1-M82, Elevating Rolling Work Platforms CAN/CSA B354.2-01 (R2006), Self-propelled Elevating Work Platforms CSA B354.2-M82, Self-Propelled Elevating Work Platforms for Use on Paved/Slab Surfaces CSA B354.3-M82, Self-Propelled Elevating Work Platforms for Use as 'Off- Slab' Units CSA B354.4-M82, Boom-Type Elevating Work Platforms CAN/CSA B354.4-02, Self-propelled Boom-Supported Elevating Work Platforms CSA Standard C225-00 (R2005), Vehicle-Mounted Aerial Devices.

S3NA-409-PR Forklifts (operation of)

1.0 Purpose and Scope

1.1 Provides the requirements for the safe operation and maintenance of forklift trucks.

1.2 This procedure applies to all AECOM North America (NA) based employees and operations.

2.0 Terms and Definitions

2.1 **Forklift:** Powered industrial truck or truck.

3.0 Attachments

3.1 S3NA-409-FM Pre-Operation Checklist

3.2 S3NA-409-WI Rough Terrain Forklift Safety Card

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Operators

- Complete the *S3NA-409-FM Pre-Operation Checklist* , prior to daily use to ensure that truck systems are fully functional (e.g., brakes, lights, horn, operations).
- Shall not allow unauthorized personnel to ride on the trucks.
- Shall not operate the truck carrying loose items, tools or other equipment in the cab.
- Do not drive or attempt to lift or lower loads with vision obstructed without the assistance of an attendant. Slow down and sound the horn at intersections and where vision is obstructed.
- Use a safe speed of not more than 5 miles (8 km) per hour.
- Ride in reverse if the load obstructs forward view; paying close attention to the swing radius of the forks when turning.
- When leaving a truck unattended, lower forks to ground level, neutralize controls, shut power off, and set brakes. Wheels should be chocked if parked on an incline; never leave a truck unattended with a suspended load.
- Never allow ground personnel to stand under a suspended load.
- Maintain a safe distance from the edge of ramps or platforms.
- Use a load backrest extension to prevent load from falling backward.
- Only stable or safely arranged loads should be handled.
- Lift only loads that are within the rated capacity of the truck.
- Use seat belt if forklift truck is so equipped.
- Never engage in stunt driving or horseplay.
- Never use the truck for anything other than what it was designed for.

4.1.2 Project Manager (including Field Task Manager, Supervisor)

- Strictly enforce all industrial truck operation procedures.
- Ensure that all authorized personnel are trained in the operation of the trucks.
- Train all other employees on the applicable pedestrian safety rules.
- Make sure that overhead guards are used to protect against falling objects.
- Remove any defective trucks from service.
- Maintain the truck according to manufacturers' specifications.

4.1.3 Region SH&E Manager

- Provides technical guidance as to this procedure.

4.2 Training

4.2.1 Training will be provided by a qualified trainer with the knowledge, training, and experience to train operators and evaluate their competence.

4.2.2 All **operators** must successfully complete training according to the regulatory requirements before being allowed to operate a powered industrial truck.

4.2.3 Training is to consist of a combination of formal instruction and demonstration performed by the trainer; practical exercises performed by the trainee, and documented evaluation of the trainee's performance.

4.2.4 Training will include the following topics:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Differences between the truck and the automobile.
- Truck controls and instrumentation, where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Vehicle capacity.
- Vehicle stability.
- Vehicle inspection and maintenance.
- Refueling and/or charging and recharging of batteries.
- Operating limitations.
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.
- Surface conditions where the vehicle will be operated.
- Composition of loads to be carried and load stability.
- Load manipulation, stacking, and unstacking.
- Pedestrian traffic in areas in which the vehicle will be operated.
- Narrow aisles and other restricted places where the vehicle will be operated.
- Hazardous (classified) locations where the vehicle will be operated.
- Ramps and other sloped surfaces that could affect the vehicle's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

4.3 Refresher Training and Evaluation

4.3.1 Each forklift operator's performance will be evaluated once every three years or more frequently if required by regulation. Refresher training will be provided in the following circumstances:

- Operator has been observed to operate the vehicle in an unsafe manner.
- Operator has been involved in an accident or near-miss incident. (Note: complete a Near Miss Supervisors Report of Incident).
- Operator has received an evaluation that reveals that the truck is not being operated safely.
- Operator is assigned to drive a different type of truck.
- A condition in the workplace changes in a manner that could affect safe operation of the truck.

4.4 Certification

4.4.1 Once training is completed, the Regional SH&E Manager will verify that the operator has been certified through training and evaluation. The certification will include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person performing the training or evaluation.

4.5 Operations

4.5.1 The forklift will be inspected at the start of the day using the checklist (*S3NA-409-FM Pre-Operation Checklist*).

4.5.2 If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to a safe operating condition.

4.5.3 Trucks shall not be driven up to anyone standing in front of a bench or other fixed object to avoid a serious crushing injury.

4.5.4 No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.

4.5.5 Unauthorized personnel shall not be permitted to ride on powered industrial trucks.

4.5.6 Arms or legs shall not be placed between the uprights of the mast or outside the running lines of the truck.

4.5.7 When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set. Wheels shall be chocked if the truck is parked on an incline.

4.5.8 A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Trucks shall not be used for opening or closing freight doors.

4.5.9 There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.

4.5.10 An overhead guard shall be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.

4.5.11 A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it falling rearward.

4.5.12 Trucks shall not be parked so as to block fire aisles, access to stairways, or fire equipment.

4.5.13 If forklift equipment is used to lift a personnel platform, other requirements are necessary, including:

- As with all aerial lift equipment, employees shall be secured to the anchorage point with a full body harness and fall arrest system.
- The platform shall have a full railing system on all four (4) sides.
- The lift equipment shall be capable of supporting the weight of the platform, personnel and equipment to be used.
- The platform shall be designed for positioning personnel.
- The platform shall be secured to the lift equipment in addition to the support provided by the forks.
- Employees shall be trained to use the platform and regarding fall protection.
- Employees shall wear fall protection devices and be secured within the platform to the manufacturer's anchorage point.
- If the equipment is operated by a separate operator and not by employees within the platform, coordination between the operator and employees shall be established.
- See *S3NA-408-PR Elevated Work Platforms and Aerial Lifts*.

4.6 Loading

4.6.1 Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

4.6.2 Only loads within the rated capacity of the truck shall be handled.

4.6.3 The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.

4.6.4 Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

4.6.5 A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.

4.6.6 Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-409-FM Pre-Operation Checklist

Week of: Inspected By:

Truck ID:

Visual Checks	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Comments
TIRES – Inflated and free of damage								
FORKS & MAST – Not bent, worn or cracked								
LOAD BACK REST EXTENSION – In place, not bent, cracked or loose								
FIRE EXTINGUISHER – Mounted, charged, not damaged								
ATTACHMENTS – Operate okay, not damaged								
BODY – Free of excess grease, oil or lint								
OVERHEAD GUARD								
HYDRAULIC OIL – Full and free of leaks								
BATTERY – Emergency disconnect functions properly								
BATTERY – Vent caps, connector covers, cables								
BATTERY CONNECTIONS - Tight								
COVERS – Secure over battery and other hazardous areas								
LOAD RATING PLATE – Present and readable								
WARNING DECALS – Present and readable								
SEAT BELT – Accessible and not damaged								
ENGINE – Runs smooth and quiet, no leaks								
HORN – Working condition								
TURN SIGNAL – Operates smoothly								
LIGHTS – Work and aimed correctly								
GAUGES and INSTRUMENTS – Working correctly								
LIFT and LOWER – Operates smoothly, no excess drift								

Week of:	Inspected By:							
Truck ID:								
Visual Checks	**Mon**	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**	**Comments**
TILT – Operates smoothly, without excessive drift								
CONTROL LEVERS – Labeled, not loose and freely return to neutral								
STEERING – Smooth and responsive								
BRAKES – Work and function smoothly without grabbing, no fluid leaks								
PARKING BRAKE – Will hold the forklift on an incline								
BACKUP ALARM – Working conditions								
LPG COMPLIANCE PLATE – Present and readable								
Other Comments:								**PPE Required:**
								SAFETY BOOTS MUST BE WORN 

S3NA-409-WI Rough Terrain Forklift Safety Card

1.0 Objective / Overview

1.1 According to OSHA, an estimated 100 fatalities and 95,000 injuries annually are caused by unsafe operation of forklifts. This includes rough terrain forklifts (e.g., lulls, Skytrak telehandlers, etc.).

1.2 A rough terrain forklift is a wheel-type truck designed primarily as a lift truck having a vertical mast or pivoted boom (sometimes both). Rough terrain forklifts also have a variable length reach and may be equipped with attachments.

1.3 This type of forklift is intended for operation on improved natural terrain and at many construction sites. Along with mandatory operator training, measures to promote safe operation include reviewing the manufacturer's instructional booklet, proper maintenance procedures, and use of PPE.

2.0 Safe Operating Guidelines

2.1 Prevention measures are numerous, but a few things are clear: operator training, pre-task planning, and proper equipment maintenance/inspections are the cornerstones of safe use of all mobile equipment, including rough terrain forklifts.

2.2 In accordance with *S3NA-409-PR Forklifts (operation of),* operators must, prior to being permitted to operate a forklift, provide a copy of their driver's license and a valid Industrial Lift Truck Card issued by an authorized source.

2.3 Loads must not exceed rated lift capacity as unstable and dangerous machine conditions will result. Only lift the load vertically; never drag or tow a load horizontally.

3.0 Training Requirements

3.1 Operators must pass a combination oral/written/operational performance test approved by the SH&E Manager that demonstrates the ability to safely use a rough terrain forklift. Operators will receive refresher training every 3 years or when an accident, near-miss, or indication of unsafe operation occurs.

3.2 Observance of all provisions and operating rules contained in *S3NA-409-PR Forklifts (operation of).*

3.3 Review of manufacturer's operating guidelines for each specific type/model of rough terrain forklift and proper Task Hazard Analysis reviewed/completed for the task.

3.4 Review of methods for properly performing a daily pre-operation forklift inspection. A sample pre-operation inspection checklist is provided, *S3NA-409-FM Pre-Operation Checklist.*

4.0 Other Safety Tips

4.1 Do not exceed the truck manufacturer's capacity of the rough terrain forklift truck as equipped for handling suspended loads.

4.2 Conditions that may affect stability include ground/floor conditions, and speed.

S3NA-410-PR Hazardous Energy Control

1.0 Purpose and Scope

1.1 Establishes the requirements for AECOM employees to perform hazardous energy control (equipment lockout and tagout (LOTO)) operations.

1.2 This procedure applies to all AECOM North America based employees and operations.

1.3 All AECOM work is regulated by this procedure when:

1.3.1 An unexpected energization or start-up of machines and/or equipment would result in the release of stored energy which could cause injury to an employee.

1.3.2 Any employee (or contractor) is required to remove or bypass a guard or other safety device.

1.3.3 Any employee (or contractor) is required to place any part of his body into the mechanism of a piece of equipment or path of hazardous energy.

2.0 Terms and Definitions

2.1 **Affected Employee:** A trained person whose job requires him/her to operate or use a machine or piece of equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed

2.2 **Authorized Employee:** A person who locks out or tags out a machine or piece of equipment in order to perform servicing or maintenance on that machine or equipment.

2.3 **Cord and Plug-connected Equipment:** Equipment where the only energy source is electrical power provided by a plug-in connection

2.4 **Energy Source:** Any electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, or compressed gas energy source; energy stored in springs; and potential energy from suspended objects (gravity) that may injure personnel, cause property damage, and/or cause a release of hazardous substance to the environment.

2.5 **Energized:** Connected to an energy source or containing residual or stored energy

2.6 **Energy-isolating Device:** A mechanical device that physically prevents the transmission or release of energy. This includes locks, hairpins, tongs, lockable valves, clamshell devices for valves, blank flanges for piping systems, and restraining devices to prevent movement of parts.

2.7 **Energy Source:** Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other energy.

2.8 **Isolation:** A physical activity using a device which prevents the transmission or release of energy. Examples of devices used to isolate equipment/systems include, but are not limited to restraint blocks, electrical circuit breakers, disconnect switches, fuses, slip gates, slip blinds, or double valves. Control circuit devices, motor controllers, etc., are not acceptable isolation devices.

2.9 **Locking Device:** A device that utilizes a lock, key, and identification number to hold an energy isolation device in the safe position for the purpose of protecting personnel.

2.10 **Lockout:** The use of a locking device to ensure that an energy-isolating device and the equipment it controls cannot be operated until the lockout device is removed.

2.11 **Lockout/Tagout (LOTO) Specific Procedure:** A written procedure developed specifically for each piece of machinery or equipment capable of unexpectedly releasing energy. This procedure outlines in detail how lockout/tagout will be performed.

2.12 **Normal Production Operations:** The utilization of a machine or piece of equipment to perform its intended production function.

2.13 **Servicing and/or Maintenance:** Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment, and making adjustments or tool changes where employees could be exposed to the unexpected energization or start-up of the equipment or a release of hazardous energy.

2.14 **Tagout:** The use of a warning device to establish that an energy-isolating device and the equipment it controls may not be operated until the tagout device is removed.

3.0 Attachments

3.1 S3NA-410-FM1 Lock and Tag Removal Form

3.2 S3NA-410-FM2 LOTO Verification Checklist

3.3 S3NA-410-FM3 Emergency Lock Removal Form

3.4 S3NA-410-TP Equipment-Specific LOTO Procedure Template

3.5 S3NA-410-ST Hazardous Energy Control

4.0 Procedure

4.1 Region and District operations managers

4.1.1 Provide LOTO training to employees engaged in projects covered by this procedure

4.1.2 Assure that **Project Managers** are preparing and implementing LOTO procedures on their projects

4.2 **Project Manager** or **Resident Engineer** on the project is responsible for administering the procedure including:

4.2.1 Determining whether client employees or AECOM employees will be responsible for implementing any required lockout/tagout of energy sources at client facilities

4.2.2 Consulting with the SH&E Department regarding project specific requirements for lockout/tagout

4.2.3 Informing the field team about the client or facility's requirements for lockout

4.2.4 Ensuring that if AECOM is responsible for lockout/tagout, that only authorized employees work on or near equipment requiring hazardous energy control

4.2.5 Assuring that the written LOTO procedure in effect on a project is audited at least annually including the observation of workers performing the procedure

4.3 Supervisors

4.3.1 Assure that all **employees** under their direction are fully aware of, understand, and adhere to the Lockout/Tagout procedures.

4.4 Authorized Employees

4.4.1 Verifying with the **Project Manager** who is responsible for LOTO at client facilities.

4.4.2 Obtaining a lock, key and tags.

4.4.3 Meeting with the facility representative and affected employees to review the LOTO activities.

4.4.4 Implementing project specific LOTO procedures.

4.5 Affected Employees

4.5.1 Assist **Authorized Employees** with the safe shutdown and restart of equipment.

4.5.2 Assure that no attempt is made to restart equipment without the knowledge of all employees performing work on the equipment.

4.6 All Employees

4.6.1 Refrain from making any attempt to restart equipment that is locked or tagged out.

4.6.2 Avoid areas where other **employees** are working on equipment.

4.7 Training

4.7.1 The supervisor must orientate all personnel to the project, the hazards associated with the work to be performed and the Lockout/ Energy Control Procedures to be followed.

4.7.2 Proof of training must be documented on the Project Safety Plan and readily available for review.

4.8 General Procedures

4.8.1 Energy control means to neutralize and make inoperable all potential sources of energy or power in the equipment or machinery to be worked on. No part of the equipment should be capable of inadvertent activation or movement, which may lead to personal injury. Removing a fuse, closing a valve or turning a switch is not an acceptable isolation from the energy source.

4.8.2 Only staff orientated to the lockout/energy control procedure will be involved with the locking out, de-energizing and control of all potential sources of energy on energized systems.

4.8.3 Written procedures for lockout and energy control shall be developed and approved by the Site Supervisor or Client and must be implemented prior to performing work.

4.8.4 The site, project or Client specific procedures must be understood and followed for the health and safety of all workers affected by or involved with the locking out, de-energizing and control of all potential sources of energy prior to the performance of work on energized systems.

4.8.5 Be aware of all potential energy sources, such as:

- Chemical
- Hydraulic
- Radiological
- Electrical
- Mechanical
- Residual
- Gravitational
- Pneumatic
- Thermal
- X-ray testing of pipes

4.8.6 It is the responsibility of on-site supervisors to identify through meetings with Client representatives when and where their work requires the isolation and control of an energy source.

4.8.7 The supervisor must also identify and communicate to all on-site personnel how the sources of energy will be isolated, brought to a zero energy state, locked out of service and tested to verify the effectiveness of the controls.

4.8.8 Where the procedures are affected by the facilities or workers of the Client, procedures will follow the requirements of and be approved by the Client.

4.8.9 Padlocks and Danger Tags

- Where there is a danger of equipment being energized, the motor switch on all individual motor drives shall be locked in the open position.
- It shall be the responsibility of each employer to maintain an adequate supply of safety locks.
- Each worker affected shall affix their own individual lock.
- In addition, a danger tag shall also be applied to the lockout bearing: a brief description of the work being done; the company name, the worker's name, the supervisor's name, the date and emergency phone numbers.
- The tag and locks shall remain in place until the work has been completed.
- Where a lock has been abandoned or must be removed due to an emergency, the Site Supervisor or Client contact must be notified and the removal must follow the approved lock abandonment procedure.

4.8.10 LOTO of energy sources must be performed only by an **Authorized Employee**. If more than one employee is involved, either each individual **Authorized Employee** must use his/her own lock (multiple lockout), or a group lockout may be performed by the **employees'** supervisor/foreman.

4.8.11 The locks, tags, and equipment shall not be tampered with by any employee.

4.8.12 Only the person placing the lock and tag the equipment may remove the lock and tag.

4.8.13 If the **employee** who placed the lockout/tagout device/sign subsequently no longer works for the company, or cannot be located, only the authorized supervisor/foreman can remove the locks and tags in accordance with the procedure outlined below for Removal of Unattended Lockout/Tagout Devices.

4.9 Authorized Employees

4.9.1 Only **employees** that have completed training for Lockout/Tagout **Authorized Employees** will be permitted to perform work under Lockout/Tagout procedures.

4.9.2 Each **Authorized Employee** will also be responsible for reviewing any applicable equipment-specific Lockout/Tagout procedure prior to initiating work.

4.9.3 Any problems identified with the equipment-specific procedure are to be immediately reported as an incident or near miss and should be brought to the attention of the SH&E Department and all work on affected equipment halted.

4.10 Shift Change Procedures

4.10.1 If ongoing work requires carryover from shift to shift, or transfer of responsibility between **employees**, the following procedure will be implemented:

- The **employee**(s) who originally performed the lockout shall walk through the lockout/isolation steps with the new worker.
- At each isolation point the original worker shall remove his/her lockout/tagout device(s), to be immediately replaced by the new worker's device(s).
- Upon transfer of the lockout/tagout equipment, the new employee shall verify that the equipment is still isolated prior to continuation of work.

4.10.2 Under no circumstances shall the original devices remain in place and just the keys transferred.

4.10.3 For supervisor/foreman and/or group lockouts, the same procedure shall be used with the oncoming supervisor/foreman.

4.11 Removal of Unattended Lockout/Tagout devices

4.11.1 Only the person(s) who placed the lockout/tagout devices on the system can remove the devices, unless:

- The **Project Manager** has verified that the employee is not on site and is not available to return to the site to remove the lock.
- All reasonable efforts have been made to contact the employee to verify that the work is complete and the devices are about to be removed.
- The **Project Manager** inspects the locked-out/tagged-out device and ensures that the equipment is capable of being safely re-energized.

4.11.2 If all of the above apply, the locks and tags can be removed at the direction of the Project Manager. The Project Manager shall complete an *S3NA-410-FM1 Lock and Tag Removal Form* to document the event prior to removing the lock and file the form with the project records. A copy of the form shall be sent to the SH&E department member with oversight responsibility for the project.

4.11.3 **UNAUTHORIZED REMOVAL OF A LOCKOUT/TAGOUT DEVICE WILL RESULT IN IMMEDIATE DISMISSAL FROM THE PROJECT SITE AND POTENTIAL TERMINATION!**

4.12 Emergency Lock Removing Procedures

4.12.1 This procedure will ONLY be used in an emergency situation defined as an event that may cause injury, fire, explosion, over exposure or other hazards to the general public, the environment or personnel.

4.12.2 In an emergency event that requires a lock or tag to be removed by a person other than the person who placed the lock or tag, the following lock-removing procedure will be implemented by another Authorized Employee:

- Investigate and verify that all equipment and material in relation to the work has been completed and/or put into a safe configuration.
- Ensure all personnel have been removed from the hazardous location and Affected Employees on site are notified.
- Remove lock.
- Attempt to contact the person that originally provided LOTO to advise him that the LOTO has being removed.
- Complete the *S3NA-410-FM3 Emergency Lock Removal Form*. The Emergency Lock Removal Forms will be placed in the project files and send a copy to the SH&E department member with oversight responsibility for the project.
- Whenever a LOTO is removed for emergency purposes by anyone other then the employee who placed the LOTO, that person and all affected personnel must be contacted prior to the start of their next shift to inform them that the equipment/system is no longer locked out/tagged out.

4.13 Specific LOTO Procedures

4.13.1 Written procedures will be developed for the lockout and tagout of each piece of equipment that has potentially hazardous energy sources (*S3NA-410-TP Equipment-Specific LOTO Procedure Template*).

4.13.2 Each procedure must be reviewed and approved by the SH&E Department prior to implementation.

4.13.3 Equipment-specific written lockout/tagout procedures are not required, if ALL of the following conditions are met:

- The equipment's only energy source is electrical; and
- The unexpected start up of the equipment is controlled by unplugging the equipment from the electrical source; and,
- The plug or switch is under the exclusive control of the person performing the work.

4.13.4 Additionally, equipment-specific Lockout/Tagout procedures are not required if ALL of the following apply:

- The machine has no potential for stored or residual energy, or re-accumulation of stored energy after shutdown (i.e. contains a capacitor to store electrical energy or pressurized tank to store air/gas); and,
- The machine has a single energy source that can be readily identified and isolated (if more than one energy source is present (e.g., gas and electric), then written procedures shall be developed); and,
- The isolation and locking out of the single energy source completely de-energizes and deactivates the equipment; and,
- Servicing of the machine requires that its energy source must previously have been locked out and tagged out in accordance with this section; and,
- A single lock-out device achieves a locked-out condition.

4.13.5 Procedure Outline. All equipment-specific Lockout/Tagout procedures will be prepared to meet the following steps:

- Identify type and magnitude of energy.
- Notify affected employees that the machine/equipment will be shut down and locked out for servicing.
- Shut down machine/equipment by normal stopping procedure.
- Identify all energy-isolating device(s) for the machine or equipment being serviced.
- Lock out each device with individual locks. Tag out only if a device is not capable of being locked out.
- Relieve or restrain stored and/or residual energy.
- Verify the isolation of equipment and its zero energy state (attempt to restart the equipment.)
- Establish that energy to the equipment being worked on was isolated.

- Complete *S3NA-410-FM2 LOTO Verification Checklist LOTO Verification Checklist.*
- Perform work.
- Check work area to remove non-essential items and ensure equipment components are intact.
- Check work area to ensure all personnel are removed from the area.
- Verify that the controls are in neutral (off).
- Remove lockout device(s).
- Notify affected employees that the machine/equipment is ready for use.
- Reenergize the machine or equipment.

4.14 Non-Specific LOTO Procedures

In the absence of an equipment-specific LOTO procedure, the following procedures, in combination with a completed Task Hazard Analysis (or Job Safety Analysis), can be used as an acceptable substitute.

4.14.1 Process Equipment

- Determine what energy sources are present, such as electrical, gas, pressurized systems (e.g., steam, water, and hydraulics), heated fluids or gas (e.g., steam, hot water), and gravity (e.g., presses, elevated vehicles).
- Determine which of these sources requires isolation to perform the work.
- Determine the locations where each energy source for that piece of equipment can be turned off/isolated AND be locked out. For example, if a machine has an on/off button, pushing the button to the off position is not sufficient isolation, since the button cannot be locked out. You must then either unplug the equipment or find, close, and lock out the circuit breaker or electrical switch supplying the machine.
- Make sure anyone in the area knows you are about to turn off and lock out the equipment, and then close the isolation devices. Once closed, lock out the isolation devices so they cannot be inadvertently opened.
- Place an appropriate tag on each lock out device, with the appropriate warning (e.g., Do Not Open, Do Not Start) with date and time of isolation and a means of identifying who has performed the lockout.
- Once everything is locked out, verify that the isolation was successful by following manufacturers' directions or standard trade practice. Means of determining whether isolation was successful include:
    - Try to turn the equipment on.
    - Use pressure relief valves.
    - Try to ignite the pilot light.
- Complete the *S3NA-410-FM2 LOTO Verification Checklist LOTO Verification Checklist*
- Perform the necessary work.
- Ensure all tools and parts are removed from the work area.
- Remove the tags and locks used to isolate the various energy sources.
- Open up each isolation source. For fluid or gas systems, check for leaks at the area the work was performed as necessary.
- Inform personnel in the area that the lockout/tagout systems have been removed.
- If additional work is required (e.g., repair of leak, fine tuning of work), the lockout/tagout procedure must be re-established. Under no circumstances shall work be performed on the equipment without prior isolation of the energy sources.

4.14.2 High Voltage Electrical Systems

In general, AECOM personnel will provide lockout/tagout services in low voltage situations only (voltage is below 600 volts). For high voltage situations (above 600 volts), AECOM will either subcontract operations to an electrical subcontractor or obtain approval of the equipment-specific Lockout/Tagout procedure from the Group SH&E Manager and the Regional Manager. If an electrical subcontractor is utilized, they will be required to provide documentation of their high voltage certification.

4.14.3 Low Voltage Procedure

- Make sure the equipment to be worked on is turned off.

- Locate the source of the electrical supply and isolate the equipment. This can be accomplished by:
  - Turning the appropriate circuit breaker off.
  - Unplugging the equipment.
  - Disconnecting the source from the battery (e.g., pulling cables from automotive batteries).
- Lock the isolation circuit in the closed position using an appropriate locking device and a unique lock and key system.
- Tag the locked-out circuit. The tag used shall warn against the hazard (e.g., Do Not Start), and include a means of identifying the employee who installed the tag and lock.
- Go back to the equipment and try to turn it on to ensure that the proper source has been isolated. If the machine turns on, reverse the above steps (b-d), and start again until the proper circuit is isolated. Report the incident to site safety coordinator as a serious near miss and do not perform the task until proper isolation is performed and verified. The site (project) manager is responsible for developing the written procedure for LOTO of this equipment prior to authorizing re-work on it.
- Complete the LOTO Verification Checklist.
- Perform the required work.
- Upon completion of the work, inspect the area to ensure all tools and parts are removed. If tools or parts are noticed after the energy source is no longer locked out, steps (a-e) MUST be performed again prior to retrieval of the tools/parts. Under no circumstances shall the items be retrieved without the equipment being locked out.
- Inform anyone in the area that work has been completed and equipment is being energized.
- Remove the tag and lock.
- Turn on the closed circuit following the appropriate procedures (or reconnect the battery cables).
- Turn the equipment on to verify operation.

4.14.4 Pressurized Water or Air/Gas

- Turn the appropriate valve upstream from the area of work to the off position (closed). Note: if steam or water can enter the pipe from the normal downstream side, either verify that the check valve is operating properly, or ensure that all necessary valves have been closed to stop all fluid or steam flow into the section to be worked. If this procedure is being used in preparation of Confined Space Entry, positive isolation (i.e. line break, blind plate, or double-block and bleed) must be established on both sides prior to authorizing confined space entry.
- Using the appropriate device, lock the valve(s) in the closed position using a unique lock and key.
- Tag the locked-out valve(s). The tag shall warn against the hazard (Do Not Open) and include date and time of isolation and a means of identifying the employee who installed the lock and tag.
- Allow the system to be worked to cool down (in the case of steam or hot water).
- Relieve the pressure in the system and then drain any fluid from the system. If the system is not equipped with a pressure relief or drain system, make sure the pipes are cool to the touch and slowly open and drain in accordance with standard trade practice.
- Once the system has been bled to atmospheric pressure, the pipes or lines shall be disconnected, blinded, or closed by a valve and locked out and/or tagged accordingly. Observe line entry procedures when first opening the line.
- Complete the *S3NA-410-FM2 LOTO Verification Checklist*.
- Perform the necessary work.
- Ensure all sections are secure and closed.
- Remove the tag and lock.
- Slowly open the valve, stopping when water or steam flow has started. Observe the work performed to make sure no leaks are evident. If there are no leaks, then the valve can be completely opened. If leaks are observed, then re-close the valve, and follow steps 2-5 above to reapply the LOTO to the system.

4.14.5 Natural Gas Lines

- Turn off the valve upstream from the area to be worked.

- Using the appropriate device, lock the valve in the closed position using a unique lock and key.
- Ensure all spark sources in the area have been isolated or removed.
- Using non-sparking tools, remove the remaining gas in the line using standard trade practice. If in an enclosed area, make sure appropriate ventilation is present. If the flow of gas does not stop, then shut down the next upstream valve, or the gas main valve. Each additional valve closed must be locked out and tagged out.
- Complete the *S3NA-410-FM2 LOTO Verification Checklist*.
- Perform the required work. If hot work is necessary (i.e. soldering, grinding, welding), make sure the line has been purged of gas and that the hot work requirements of this manual are followed, including explosivity check prior to authorizing work.
- Make sure that all connections are secure. Also, have a solution of soap and water for leak testing.
- Remove all tools and parts from the area.
- Remove the lock(s) and tag(s) from the valve(s).
- Slowly crack open the valve(s).
- Test the work area for leaks using the soap solution. If leaks are detected, the system must be locked out and tagged out following steps 1-4 above before additional repairs can be made.
- If no leaks are detected, gradually open the isolation values to their normal position.

4.15 Annual Program Review

4.15.1 At least annually (or whenever any incident or serious near miss occurs due to inadequate lockout/tagout) , an independent Authorized Employee who is not involved in the procedure being inspected must conduct and document a review and inspection of the Energy Control Program specific to the identified facility. The inspection should include a meeting with authorized employees and any other affected employees.

4.15.2 The inspection procedure must include the following elements.

- Where lockout is used, discuss the authorized employee's responsibilities under the lockout/tagout program with the inspector.
- Hold group meetings with the authorized employees who are performing the inspection and all authorized employees who implement the procedure.
- Where tagout is used, discuss the authorized employee's responsibilities under the lockout/tagout program and the limitations of the tagout system.
- Review of lockout/tagout verification checklists and other documentation to ensure procedure is being correctly followed and documented.
- If deficiencies are noted during the inspection, corrective actions and retraining of employees, as necessary, must be performed immediately.
- The inspector shall provide a copy of all inspection documentation to the applicable AECOM Manager for review and filing.

These inspections shall at least provide for a demonstration of the procedures and may be implemented through random audits and planned visual observations. These inspections are intended to ensure that the energy control procedures are being properly and consistently implemented.

4.16 Training

4.16.1 Authorized Employees

Authorized Employees involved in or affected by lock out and their Supervisors and **Project Managers** will be trained in the following areas before being allowed to work on equipment requiring LOTO:

- Recognition of hazardous energy sources;
- Types and magnitudes of energy sources located in the workplace;
- Procedures for energy isolation and control, including specific procedures developed for specific equipment and systems;
- Purpose and use of the energy-control (lock out/tag out) procedure, equipment, and devices;
- Prohibitions and penalties for attempting to restart or re-energize equipment which has been locked out/tagged out, or to work on equipment without following the lock out/tag out procedures.

Authorized Employees are limited to those departmental supervisors and managers, and those selected employees who have successfully completed all of the required training listed above.

4.16.2 Affected Employees

Affected Employees will be trained in the purpose and use of the lock out/tag out procedure. All employees whose work operations may be in an area where lock out/tag out procedures may be utilized will be trained about the procedure and about the prohibition relating to attempts to restart or reenergize machines or equipment that are locked out/tagged out. These personnel are not required to be familiar with specific procedures for equipment and systems.

4.16.3 Retraining

Retraining or refresher training for Authorized and/or Affected employees will be conducted annually or whenever one of the following exists:

- The employee has a change in job assignment;
- There has been a change in the equipment or process;
- There has been a change in the energy-control procedure;
- An inspection reveals deviations from the standard procedures or inadequacies in the employee's knowledge or use of the lock out/tag out procedure;
- An incident occurs as a result of unexpected energy release.

4.16.4 Training Documentation

All employee training, including refresher training, will be documented in accordance with *S3NA-003-PR SH&E Training*. Employee training records will include type of training, date, and employee name. These records will be maintained for each employee for the duration of their employment.

Each office and project site shall maintain a current list of personnel trained in accordance with Authorized and Affected employees above.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-410-FM1 Lock and Tag Removal Form

TAG NUMBER	LOCK NUMBER	LOCATION USED	COMPONENT AFFECTED	DATE/TIME ATTACHED	MANAGER / SUPERVISOR	DATE/TIME RETURNED

S3NA-410-FM2 LOTO Verification Checklist

Equip ID (#)/Loto Location (S)—Device Type and Number: _____ Loto Reference Number: _____	Date:

Lockout-Tagout Checklist	Yes	No	Initials
Employee Notification Have all affected employees been informed that a LOTO is necessary and the reason for the LOTO?			
Energy Source Identification Has the type and magnitude of all energy sources and the respective method of control been identified?			
Equipment Shutdown Has the machine/equipment been shut down by the normal stopping procedure (depressing the stop button, open switch, close valve, etc.)?			
Deactivating Energy-Isolating Device Have all energy-isolating devices been deactivated so that the machine/equipment is isolated from all energy sources?			
Lockout Has a lock been placed on all appropriate energy isolating devices with an assigned individual lock(s)?			
Tagout Has a tag been placed on all appropriate energy isolating devices?			
Energy Dissipation Has all stored/residual energy (such as in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, air, steam, or water pressure) been dissipated/restrained by methods such as grounding, repositioning, blocking, bleeding down, etc?			
Zero Energy State Verification Has verification been made that the equipment is disconnected from all energy sources by first checking that no personnel are exposed, then verifying the isolation of the equipment by operating the push button or other normal operating controls?			
IF SO, THE EQUIPMENT IS NOW LOCKED OUT			
Restoring Equipment to Service	DATE:		
Job Completion Verification Has the machine/equipment and immediate area been checked to make sure that nonessential items have been removed and the machine/equipment components are operationally intact?			
Personnel Verification Have all personnel been safely positioned or removed from the area and all controls are in neutral?			
Lockout Removal And Equipment Startup Has all lockout and tagout devices been removed and the machine reenergized?			
Employee Notification Have all affected been notified that the LOTO is complete and that the machine/equipment is ready for use?			

NOTES:

S3NA-410-FM3 Emergency Lock Removal Form

This form will only be used in an emergency situation. For this form, an emergency is defined as an event that may cause injury, fire, explosion, over exposure, or other hazards to the general public, the environment, or personnel.

1. NAME of personnel whose LOTO is to be removed:			
2. METHOD(s) used to contact personnel whose LOTO is to be removed:			
3. LOCATION of LOTO:			
4. REQUIRED CONTACTS: Contact the following AECOM personnel to locate affected contractor personnel:			
Contact Name 1:			
Office Phone #	**Home Phone #**	**Pager #**	**Cell #**
Contact Name 2:			
Office Phone #	**Home Phone #**	**Pager #**	**Cell #**
Contact Name 3:			
Office Phone #	**Home Phone #**	**Pager #**	**Cell #**
Contact Name 4:			
Office Phone #	**Home Phone #**	**Pager #**	**Cell #**

5. NOTIFICATION:

An AECOM representative has been contacted. ☐ Yes ☐ No

Notification verified by: (Initial) OR, the special conditions for not contacting AECOM are as follows:

6. WALK DOWN:

A walk-down of the equipment / system has been performed to ensure that all personnel are removed from hazardous locations. ☐ Yes ☐ No

Notification verified by: (Initial)

	Print Name	**Signature**	**Date**
Project Manager			
SH&E Representative			

AFTER COMPLETION OF THESE STEPS, THE LOCK AND TAG MAY BE REMOVED

This form must be provided to the AECOM Project Management Team (PM and SSO) so the affected employee can be notified that his/her Lock-Out/Tag-Out has been removed

S3NA-410-TP Equipment-Specific LOTO Procedure Template

PROCEDURE REFERENCE NUMBER:

EQUIPMENT:	
EQUIPMENT NO:	**LOCATION:**

PURPOSE

This 7-step procedure establishes the minimum requirements for the lockout of energy isolating devices whenever servicing or maintenance is done on facility equipment. This procedure will be used to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any maintenance where the unexpected energization or startup of the equipment or release of energy could cause injury.

COMPLIANCE WITH THIS PROCEDURE

All employees are required to comply with the restrictions and limitations imposed on them during the use of this procedure. The authorized employees are required to perform the lockout in accordance with this procedure. Other employees, upon observing a piece of equipment which is locked and/or tagged out, will not attempt to start, energize, or use said equipment.

SEQUENCE OF LOCKOUT/TAGOUT

1. All affected employees will be notified that the equipment must be shut down and locked out to perform servicing or maintenance.

   Specific Instructions:

2. The authorized employee will identify the type and magnitude of the energy that the equipment utilizes, will understand the hazards of the energy, and will know the methods to control the energy.

   ENERGY

___ Electrical (440V)	___ Natural Gas	___ Spring
___ Hydraulic	___ Gravity	___ Steam
___ Chemical	___ Pneumatic	___ Thermal
___ Other:		

3. Shut down operating equipment by the normal stopping procedures (depress stop button, open switch, close valve, etc.).

   Specific Instructions:

4. Deactivate the energy isolating device(s) so that the equipment is isolated from the energy sources(s).

   Specific Instructions:

5. Lockout and tagout the energy isolating devices(s) with assigned individual locks and tags.

   Lockout Equipment Needed:

6. Dissipate any stored or residual energy (such as that in capacitors, springs, hydraulic systems, and air, steam, or water pressure, etc.) by methods such as grounding, repositioning, blocking, bleeding down, etc.

   Specific Instructions:

7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the normal operating control(s) or by testing to make certain the equipment will not operate. CAUTION: Return controls to "OFF" after verification. THE EQUIPMENT SHOULD NOW BE LOCKED OUT AT ZERO ENERGY STATE.

   Specific Instructions:

METHODS OF VERIFICATION

Verification should be determined via start-up attempts, visual observations and testing. For electrical verification, place local on/off switch to ON position and verify equipment will not operate. Return the switch to OFF position and commence work.

S3NA-410-ST Hazardous Energy Control

Jurisdiction	Regulation
United States	
OSHA	29 CFR 1910.147, Control of Hazardous Energy
Canada	
Alberta	OHS Code (2009) Sect 212 – 215.5
British Columbia	OHS Regulation (1997) Sect 10.1 – 10.12
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 16.14 – 16.18
New Brunswick	OHS Regulation (91-191) Sect 287.3 – 287.6, 292
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 73, 85
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 52 – 54
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 143 – 149
Ontario	O. Reg. 851 Sect 41 – 42.1
Prince Edward Island	OHS Regulations (EC180/87) Sect 3.01 – 3.10
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 185
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 139
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 9.12 – 9.17

The following standards apply to lockout and energy control:

Association	Standard
Canadian Standards Association (CSA)	CAN/CSA-Z460-05, Control of Hazardous Energy - Lockout and Other Methods

S3NA-411-PR Machine Guarding

1.0 Purpose and Scope

1.1 Provides the AECOM requirements for machine guarding practices for all equipment located 7 feet or less from grade level or the floor.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 S3NA-411-FM Machine Guarding Inspection Checklist

3.2 S3NA-411-WI Machine Guarding Safe Work Practice

4.0 Procedure

4.1 The **Project Manager/field task manager/supervisor** shall confirm that all equipment used or worked on by AECOM personnel is properly guarded and that employees are instructed not to remove any guards to operating areas or pinch points in the absence of controlling all sources of hazardous energy.

4.2 Typically, moving parts (e.g., rotating parts) require machine guards to prevent employee injury.

4.3 Guards will be firmly fixed or secured, with no more than ½-inch-diameter openings. If work equipment does not have the proper machine guards installed, it shall be removed from service and locked out/tagged out until the proper guard is installed.

4.4 Guards will conform to the following requirements:

4.4.1 Under no circumstances shall employees remove manufacturer-installed guards (except during maintenance procedures) or use guards in a manner not consistent with the manufacturer's directions.

4.4.2 When guarding is provided by two hand-control devices, the devices shall be constructed to prevent tie-down of either of the two or to prevent bridging (i.e., using something else such as a pipe to hold down both control devices simultaneously with one hand).

4.4.3 Employees shall not place any part of their body under any vehicle or equipment that is solely supported by a jack, overhead hoist, chain fall, or other temporary supporting means. Safety stands, blocks, or other support system capable of holding the total imposed weight shall be used.

4.4.4 Under no circumstances shall equipment control interlocks or "deadman" switches be bypassed (e.g., spring trigger taped down on an abrasive blast guns or other powered tools) and will be located within reach of the operator's working position.

4.4.5 Sufficient clearance will be provided around and between machines to allow for safe operations, set up and servicing, material handling, and waste removal.

4.5 **Auto-Starting Equipment**

Some process equipment starts automatically in response to control system inputs of system sensors. Since inadvertent startup can present special worker hazards, all auto-starting equipment will be identified, and a label affixed to each reading:

CAUTION
EQUIPMENT MAY START WITHOUT WARNING
DE-ENERGIZE BEFORE SERVICING

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-411-FM Machine Guarding Inspection Checklist

Y	N	N/A	Equipment Markings
			1. Are all emergency stop buttons colored red?
			2. Are empty compressed gas cylinders appropriately marked and their valves closed?
			3. Are manually operated valves and switches controlling the operation of equipment and machines clearly identified and readily accessible?
			4. Are storage cabinets used to hold flammable liquids labeled "Flammable—Keep Fire Away"?
			5. Is red used to identify acetylene (and other fuel-gas) hose, green for oxygen hose, and black for inert gas and air hose?
Y	**N**	**N/A**	**Housekeeping: Maintenance**
			6. Is all machinery and equipment kept clean and properly maintained?
Y	**N**	**N/A**	**Lockout**
			7. Are appropriate employees provided with individually keyed personal safety locks?
			8. Are correct lockout/tagout procedures in use?
			9. Are equipment control valves provided with a means for locking out?
			10. Are provisions made to prevent machines from automatically starting after a shutdown?
			11. Are suspended loads or potential energy (such as compressed springs, hydraulics, or jacks) controlled to prevent hazards?
			12. Is all machinery or equipment capable of movement, required to be de-energized or disengaged and locked out during cleaning, servicing, adjusting or setting up operations, whenever required?
			13. Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?
			14. Is there a means provided to identify employees who are working on locked-out equipment by their locks or accompanying tags?
Y	**N**	**N/A**	**Machine Guarding: General**
			15. Are all moving chains and gears properly guarded?
			16. Are machinery guards secure and so arranged that they do not offer a hazard in their use?
			17. Are rotating or moving parts of equipment guarded to prevent physical contact?
			18. Are the noncurrent-carrying metal parts of electrically operated machines bonded and grounded?
			19. Are work positions, machinery, pits or holes, and hazardous operations adequately guarded?
			20. Are workers protected from sharp objects which might pierce the feet or cut the hands (e.g., machinery, food handling and storage, sawing and cutting)?
			21. Is sufficient clearance provided around and between machines to allow for safe operations, set up and servicing, material handling, and waste removal?
Y	**N**	**N/A**	**Machine Guarding: Portable Power Tools**
			22. Are grinders, saws, and similar equipment provided with appropriate safety guards?
			23. Are power tools used with the correct shield, guard, or attachment recommended by the manufacturer?

			24. Does each portable power tool have a constant pressure switch (dead man switch) that will shut off the power when pressure is released?
Y	**N**	**N/A**	**Machine Guarding: Stationary Equipment**
			25. Are all pulleys and belts that are within 7 feet of the floor or working level properly guarded?
			26. Are fan blades protected with a guard having openings no larger than 1/2 inch when operating within 7 feet of the floor?
			27. Are foot-operated switches guarded or arranged to prevent accidental actuation by personnel or falling objects?
			28. Are machines constructed so as to be free from excessive vibration when the largest size tool is mounted and run at full speed?
			29. Are radial arm saws so arranged that the cutting head will gently return to the back of the table when released?
			30. Are saws used for ripping equipped with anti-kick back devices and spreaders?
			31. Are splash guards mounted on machines that use coolant to prevent the coolant from reaching employees?
			32. Are workers protected from fixed objects that may cause injury, such as sharp machine edges?
			33. Do arbors and mandrels have firm and secure bearings and are they free from play?
			34. Is equipment and machinery securely placed and anchored, to prevent moving?
			35. Is fixed machinery provided with appropriate safety guards to prevent injuries to the operator and other employees resulting from point of operation, ingoing nip point, rotating parts, flying chip, and spark hazards?
			36. Is there a power shut-off switch within reach of the operator's position at each machine?
Y	**N**	**N/A**	**Personal Protective Equipment (PPE)**
			37. Are all employees required to use PPE when handling chemicals (gloves, eye protection, respirators, etc.)?
			38. Are all employees required to use PPE as needed?
			39. Are employees exposed to the hazards created by welding, cutting, or brazing operations protected with PPE?
			40. If machinery is properly cleaned with compressed air, is air pressure controlled and PPE or other safeguards used to protect operators and other workers from eye and body injury?
			41. Is PPE functional and in good repair?
			42. Is protective clothing and equipment provided and used when cleaning up spilled toxic or otherwise hazardous materials or liquids?
			43. Is PPE provided and are all employees required to use PPE as needed to protect against injury?
			44. Does PPE have ANSI or ASTM specifications marked on it?
Y	**N**	**N/A**	**Portable Fire Extinguishers**
			45. Are all fire extinguishers inspected and recharged regularly, and noted on the inspection tag?
			46. Are appropriate fire extinguishers mounted, located, and identified so that they are readily accessible to employees?
			47. Are portable fire extinguishers provided in adequate number and type?

United States OSHA References: 29 CFR 1910.101; 106; 144; 147;132; 157; 212; 213; 217; 218; 219; 242; 243; 252; 253

S3NA-411-WI Machine Guarding Safe Work Practice

1.0 Why Is It Needed?

1.1 There are as many hazards created by moving machine parts as there are types of machines. Safeguards are an essential requirement for protecting workers from needless and preventable injuries.

1.2 A good rule to remember is: Any machine part, function, or process that may cause injury must be safeguarded. When the operation of a machine or accidental contact with it can injure the operator or others in the vicinity, the hazards must be either controlled or eliminated.

2.0 Where Mechanical Hazards Occur

2.1 Dangerous moving parts in three basic areas require safeguarding:

2.1.1 The **point of operation:** That point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

2.1.2 **Power transmission apparatus:** All components of the mechanical system that transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.

2.1.3 **Other moving parts:** All parts of the machine that move while the machine is working. These can include reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

2.2 Hazardous Mechanical Motions and Actions**.** A wide variety of mechanical motions and actions may present hazards to the worker. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any parts that impact or shear. These different types of hazardous mechanical motions and actions are basic in varying combinations to nearly all machines, and recognizing them is the first step toward protecting workers from the danger they present.

The basic types of hazardous mechanical motions and actions are:

2.2.1 **Motions**

- **Rotating motion** can be dangerous; even smooth, slowly rotating shafts can grip clothing and through mere skin contact force an arm or hand into a dangerous position. Injuries due to contact with rotating parts can be severe.
- Collars, couplings, cams, clutches, flywheels, shaft ends, spindles, meshing gears, and horizontal or vertical shafting are some examples of common rotating mechanisms that may be hazardous. The danger increases when projections such as set screws, bolts, nicks, abrasions, and projecting keys or set screws are exposed on rotating parts.
- In-running nip point hazards are caused by the rotating parts on machinery. There are three main types of in-running nips:
  - Parts can rotate in opposite directions while their axes are parallel to each other. These parts may be in contact (producing a nip point) or in close proximity. In the latter case the stock fed between the rolls produces the nip points. This danger is common on machines with intermeshing gears, rolling mills, and calendars.
  - Nip points are also created between rotating and tangentially moving parts. Some examples would be: the point of contact between a power transmission belt and its pulley, a chain and a sprocket, and a rack and pinion.
  - Nip points can occur between rotating and fixed parts which create a shearing, crushing, or abrading action. Examples are spoked handwheels or flywheels, screw conveyors, or the periphery of an abrasive wheel and an incorrectly adjusted work rest.
- **Reciprocating motions** may be hazardous because during the back-and-forth or up-and-down motion, a worker may be struck by or caught between a moving and a stationary part.

- **Traverse motion** (movement in a straight, continuous line) creates a hazard because a worker may be struck or caught in a pinch or shear point by the moving part.

2.2.2 **Actions**

- **Cutting action** may involve rotating, reciprocating, or traverse motions. The danger of cutting action exists at the point of operation where finger, arm and body injuries can occur and where flying chips or scrap material can strike the head, particularly in the area of the eyes or face. Such hazards are present at the point of operation in cutting wood, metal, or other materials.
    - Examples of mechanisms involving cutting hazards include band saws, circular saws, boring or drilling machines, turning machines (lathes), or milling machines.
- **Punching action** results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other materials. The danger of this type of action occurs at the point of operation where stock is inserted, held, and withdrawn by hand.
    - Typical machines used for punching operations are power presses and iron workers.
- **Shearing action** involves applying power to a slide or knife in order to trim or shear metal or other materials. A hazard occurs at the point of operation where stock is actually inserted, held, and withdrawn.
    - Examples of machines used for shearing operations are mechanically, hydraulically, or pneumatically powered shears.
- **Bending action** results when power is applied to a slide in order to draw or stamp metal or other materials. A hazard occurs at the point of operation where stock is inserted, held, and withdrawn.
    - Equipment that uses bending action includes power presses, press brakes, and tubing benders.

2.2.3 **Requirements for Safeguards**

Safeguards must meet these minimum general requirements:

- **Prevent contact**: The safeguard must prevent hands, arms, and any other part of a worker's body or clothing from making contact with dangerous moving parts. A good safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts.
- **Positioning of fixed machines:** Sufficient clearance will be provided around and between machines to allow for safe operations, set up and servicing, material handling and waste removal.
- **Secure**: Workers should not be able to easily remove or tamper with the safeguard. Guards and safety devices should be made of durable material that will withstand the conditions of normal use. They must be firmly secured to the machine.
- **Protect from falling objects:** The safeguard should ensure that no objects can fall into moving parts. A small tool which is dropped into a cycling machine could easily become a projectile that could strike and injure someone.
- **Create no new hazards**: A safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface which can cause a laceration. The edges of guards, for instance, should be rolled or bolted in such a way that they eliminate sharp edges.
- **Create no interference**: Any safeguard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the worker's apprehensions about injury.
- **Allow safe lubrication**: If possible, one should be able to lubricate the machine without removing the safeguards. Locating oil reservoirs outside the guard, with a line leading to the lubrication point, will reduce the need for the operator or maintenance worker to enter the hazardous area.

2.2.4 **Training**

Even the most elaborate safeguarding system cannot offer effective protection unless the worker knows how to use it and why. Specific and detailed training is therefore a crucial part of any effort to provide safeguarding against machine-related hazards. Thorough operator training with the use of manufacturers' instructions, should involve instruction or hands-on training in the following:

- A description and identification of the hazards associated with particular machines;

- The safeguards themselves, how they provide protection, and the hazards for which they are intended;
- How to use the safeguards and why:
- How and under what circumstances safeguards can be removed, and by whom (in most cases, repair or maintenance personnel only); and
- What to do (e.g., contact the supervisor) if a safeguard is damaged, missing, or unable to provide adequate protection and take the affect machine out of service until the guard is repaired or replaced.

This kind of safety training is necessary for new operators and maintenance or setup personnel, when any new or altered safeguards are put in service, or when workers are assigned to a new machine or operation.

3.0 Guards

Method	Safeguarding Action	Advantages	Limitations
Fixed	Provides a barrier.	Can be constructed to suit many specific applications In-plant construction is often possible. Can provide maximum protection. Usually requires minimum maintenance. Can be suitable to high-production, repetitive operations.	May interfere with visibility. Can be limited to specific operations. Machine adjustment and repair often require its removal, thereby necessitating other means of protection for maintenance personnel.
Interlocked	Shuts off or disengages power and prevents starting of machine when guard is open; should require the machine to be stopped before the worker can reach into the danger area.	Can provide maximum protection. Allows access to machine for removing jams without time-consuming removal of fixed guards.	Requires careful adjustment and maintenance may be easy to disengage jams.
Adjustable	Provides a barrier that may be adjusted to facilitate a variety of production operations.	Can be constructed to suit many specific applications. Can be adjusted to admit varying sizes of stock.	Hands may enter danger area; protection may not be complete at all times. May require frequent maintenance and/or adjustment. The guard may be made ineffective by the operator may interfere with visibility.
Self-adjusting	Provides a barrier that moves according to the size of the stock entering the danger area.	Off-the-shelf guards are often commercially available.	Does not always provide maximum protection may interfere with visibility may require frequent maintenance and adjustment.

S3NA-417-PR Utilities, Underground

1.0 Purpose and Scope

1.1 Establishes requirements to ensure that underground installations are identified properly before excavation work commences.

1.2 This procedure applies to all AECOM North America-based employees and operations.

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.

3.0 Attachments

3.1 S3NA-417-FM Identifying Underground Installations Checklist

3.2 S3NA-417-WI One Call System Definition and Directory

3.3 S3NA-417-ST Underground Utilities

4.0 Procedure

4.1 Ground disturbance may be a conducted for a variety of purposes, including, but not limited to, exposing existing buried lines, soil sampling, remedial excavations, or installing monitoring wells or test pits.

4.2 Improper ground disturbance may impact a buried pipeline or utility line and cause a major release of a hazardous substance, flood, or electrocution. Serious injuries and significant property damage have resulted from insufficient/inadequate identification of underground installations during the course of ground disturbance work.

4.3 To control hazards associated with coming in contact with such installations, the American Public Works Association's (APWA) guidelines for the uniform identification of underground installations has been adopted.

4.4 **Project Managers** are responsible for ensuring that all work, including the identification, location, and access to all underground utilities, is planned and performed in accordance with contract specifications and safety requirements.

4.4.1 The planning for associated work and avoidance of contacting underground utilities shall be part of the project safety planning in the HASP.

4.5 The **Lead Site Manager or Supervisor** is responsible for the execution of work in accordance with this and other associated AECOM SOPs, including:

- The review of the HASP.
- Verification that all steps have been taken to identify existing underground utilities in the area to be disturbed.

4.6 **Region SH&E Manager** provides guidance as needed.

4.7 **Personal Protective Equipment**

- Long sleeved shirt and pants (coveralls/Nomex LILA for upstream oil and gas)
- Safety toe boots
- Hard hat
- High-visibility clothing
- Gloves
- Respirator with organic vapor/particulate filter cartridge (for use when the exposure exceeds the occupational exposure limit stated on the MSDS), as required

- Hydrogen Sulfide (H2S) Monitor (for areas with known or suspected H2S

4.8 Training

4.8.1 Staff shall successfully complete a Ground Disturbance training course.

4.8.2 Some clients may also have required client-based Ground Disturbance training.

4.9 Underground Utility Lines

4.9.1 To avoid injury from electrical and other utilities on site, utility lines shall be located and marked prior to conducting any drilling or digging on site. If available, refer to site drawings or client interviews for information pertaining to utilities on site.

4.9.2 Types of underground lines:

- Gas line
- Potable water line
- Raw water line
- Sewer line
- Power line
- Cable television/communication line
- Cathodic protection lines
- Grounding cable
- Process piping/flow line

4.9.3 Prior to conducting the ground disturbance, you shall locate all pipelines and utilities that pass within (30 m) of the work area. This is your search and control area. To do so, you need to do the following:

- Notify all pipeline and utility companies, and confirm that their notification requirements are fulfilled prior to conducting a ground disturbance.
- Identify pipelines, power lines, utilities, and irrigation canals in a 30-foot (9.1 m) zone of the work area with the owner of the utility.
- On private property, a properly trained and competent third party utility locator shall be used.
- Get approval for work within a right-of-way (ROW) or within 15 feet (4.6 m) of a line if there is no ROW.
- Prepare a site map identifying the search area, the ground disturbance area, and known underground utilities.
- Confirm that all pipelines, power lines, and utilities are marked.

4.9.4 Look for pipeline indicators:

- Look for warning signs where pipelines cross roads or water courses.
- Look for cut lines, wells, tanks, or valves that may indicate the presence of pipelines.
- Look for ground settling from previous work.
- Talk to nearby landowners and residents.
- Look for vegetation appearing “different” from the surrounding vegetation (e.g., greener, taller, shorter, or more brown than surrounding vegetation).

4.9.5 When you are working within a pipeline right-of-way, you shall get written approval from the pipeline owner prior to doing your work.

4.9.6 Call the pipeline owner at least two full working days before you dig so the pipeline can be located and marked.

4.9.7 Expose the pipeline by hand/hydrovac before digging within 15 feet (4.6 m) of the pipeline with machinery (no machinery comes may come within 2 feet [60 cm] of the pipeline) with the supervision of the owner or their representative, and call the owner at least one full day before you cover the exposed line.

4.9.8 During ground disturbance:

- All underground utilities shall be hand exposed or hydrovac'd within 3.3 feet (1 m) of a mark out or within the distance required by the owner of the utility before operating any mechanized equipment.
- Make arrangements for supervision ("a Signal Person") during hand exposure.
- If for any reason these hand excavations are temporarily filled in, mark them.
- Make arrangements for supervision ("a Signal Person") during any mechanical excavation within 5 m of the underground utility.
- Make arrangements for supervision ("a Signal Person") during backfilling of utilities.
- Cutting back and shoring of excavations shall be completed to ensure that there are no cave-ins (follow *SOP S3NA-303-PR Excavation and Trenching*).
- Do not damage utilities by shovels when hand exposing and picks should not be used.
- Remember that all workers have the right and responsibility to refuse to carry out any work or procedures that they feel are unsafe.
- If the ground disturbance is deeper than 3.3 feet (1 m), all crew members shall have appropriate training for excavations and trenches and shall be protected from cave-ins or sliding/rolling materials (follow *SOP S3NA-303-PR Excavation and Trenching*).
- Remember that incidents, injuries, and near misses shall be reported immediately.
- Review the site-specific emergency response plan.

4.9.9 If you hit an underground facility, stop the work immediately and notify the owner of the facility.

- The owner shall be informed of the location of the contact and the type of damage that resulted.
- If the facility is a pipeline, the company (client) shall immediately notify the required agencies and regulatory bodies of the location of the contact and the type of damage that resulted.
- The government agencies will require a written record and the company (client) should conduct an incident investigation into the causes and make recommendations for the future prevention of this incident.

4.10 Identification of Installations

4.10.1 Various forms of underground utility lines or pipes may be encountered during AECOM deployments to field sites. Damaged utilities, in particular, can present other hazards including asbestos, explosion, electric shock, scalding, etc., and they shall be avoided. The presence of damaged utilities at any work location shall be immediately brought to the attention of the field Lead Manager or other member of the AECOM site management team.

4.10.2 Guidance will be provided on the appropriate action to be taken, which could include suspension of work until the responsible utility agency is contacted and the hazard is either isolated or eliminated.

4.10.3 Extreme caution shall always be exercised when attempting to locate underground utilities. The location of utilities can be in some cases not consistent as shown on drawings, as indicated by the placement of surface signage, or as described by personnel. Coordination and planning of the job shall be required with the client or owner.

- Prior to digging and drilling operations, the client shall always be informed of the potential location(s) of underground utility systems.
- If a utility permit is required from the client or owner, it shall be secured.
- The client shall explain how the utility line may be identified—e.g., red concrete encasement.
- All underground installations shall be considered "live" and "operational" until the owner, client, or utility authority isolates any hazardous energy or deactivates the system and can demonstrate that condition.
- Where a line placement and depth is known or suspected and where there is potential for contact, hand digging, or hand auguring, instrumentation and other investigative techniques shall be used.

4.10.4 The One Call System Definition and Directory or its equivalent shall be used to prepare for excavation work in the event the identity of an underground installation(s) is unknown.

4.10.5 Line location documentation (or appropriate regional agency or company) provides a listing of companies that have registered buried facilities in the proposed work area. Some public utilities and private companies are not members of the One Call System. In order to give line operators sufficient

time to respond to a request to locate, a minimum waiting period of 72 business hours is required prior to beginning work.

4.10.6 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines contained in this SOP or as contract-specified.

4.11 Surface Markings

4.11.1 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.

4.11.2 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 two inches.

4.11.3 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.

4.12 Uniform Color-Coding

4.12.1 The colors and corresponding installation type are as follows unless otherwise contract-specified.

4.12.2 Red: Electric Power Lines, Cables, Conduit, and Lighting Cables

4.12.3 Yellow : Gas, Oil, Stream, Petroleum, or Gaseous Materials

4.12.4 Orange :Communication, Alarm or Signal Lines, Cables, or Conduit

4.12.5 Green: Sewers and Drain Lines

4.12.6 White : Proposed Ground Disturbance area

4.12.7 Pink: Temporary Survey Markings

4.12.8 Purple: Nonpotable Water

5.0 Records

5.1 The following records on the identification of and response to underground utilities will be maintained in the project files:

5.1.1 All information regarding the identification of underground installations (this information can also be transferred to the appropriate drawings and/or prints and shall be available on site).

5.1.2 Drawings and/or prints shall be maintained for the life of this project.

5.1.3 Identifying Underground Installations Checklist.

6.0 References

6.1 American Public Works Association, Excavator’s Damage Prevention Guide and One-Call System Directory International 1990-1991, Utility Location and Coordination Committee.

S3NA-417-FM Identifying Underground Installations Checklist

Name of Contractor:

Location: Project #:

Type of Ground Disturbance Planned:

Date: Time: Weather:

Person Conducting Inspection: Title:

Responsibilities of the Ground Disturbance Contractor

Supply as much pertinent information as possible when calling in location (house #, pole #, facility #, landmark to measure distance, nearest intersection, etc.)

	Completed	N/A
Notify the One-Call Center 3 business days in advance but no more than 10 days prior to activities.	☐	☐
Hand expose or hydrovac within 2 feet (60cm) of a mark out or within the distance required by the owner of the utility before operating any mechanized equipment.	☐	☐
Mark and identify perimeter of proposed site of excavation or boring locations in white.	☐	☐
Protect and preserve markings, staking, or other designations until no longer necessary for safe excavation, demolition, or blasting.	☐	☐
Obtain new ticket every 30 business days.	☐	☐
Check surrounding area before initiating ground disturbance.	☐	☐
Recordkeeping		
Confirmation number received.	☐	☐
Copy of mark-out ticket readily available.	☐	☐
Site Map documenting ground disturbance area and identified utilities completed.	☐	☐
Records have been maintained to document any damage.	☐	☐

Comments:

S3NA-417-WI One Call System Definition and Directory

1.0 What Is It?

1.1 It is a communication system established by two or more utilities, governmental agencies, or other operators of underground facilities to provide one telephone number for excavating contractors and the general public to call for notification of their intent to use equipment for excavating, tunneling, demolition, or any other similar work. This one-call system provides the participating members an opportunity to identify and locate their underground facilities.

2.0 Why Is It Needed?

2.1 Damage to underground facilities increased considerably following the building boom of the 1950s, 1960s, and early 1970s when the trend was to go underground with utilities. Thousands of miles of underground facilities were vulnerable to excavating machines such as backhoes, and the resulting damage interrupted utility service and threatened life, health, and property.

3.0 How to Get It

3.1 Write or call the number of the Utility Location and Coordination Council (ULCC) One-Call Systems International Committee representing the area within your American Public Works Association (APWA) region shown on the map. They will be pleased to assist you. For further information on ULCC programs, write APWA headquarters.

4.0 Disclaimer

4.1 The purpose of this directory is to illustrate the extent of one-call service available. The accuracy of information is not guaranteed by APWA or the one-call systems. Users must verify information including the extent and limit of service from local sources.

Province/State	One-Call Agency	Number
Canada		
British Columbia	http://www.bconecall.bc.ca/	1.800.474.6886
Alberta	http://www.alberta1call.com/	1.800.242.3447
Saskatchewan	http://www.sask1stcall.com/	1.866.828.4888
Manitoba	www.callb4udig.mb.ca/	1.800.827.5094
Ontario	http://www.on1call.com/	1.800.400.2255
Québec	http://www.info-ex.com/	1.800.663.9228
British Columbia	http://www.bconecall.bc.ca/	1.800.474.6886
United States	http://www.mail-house.com/utility.htm	811
Alabama	Alabama Line Location Center, Inc.	1.800.292.8525
Alaska	Locate Call Center of Alaska, Inc.	1.800.478.3121
Arizona	Arizona Blue Stake, Inc.	1.800.STAKE.IT (1.800.782.5348)
Arkansas	Arkansas One Call System, Inc.	1.800.482.8998
California	Underground Service Alert North	1.800.227.2600
Colorado	Utility Notification Center of Colorado	1.800.922.1987

Province/State	One-Call Agency	Number
Connecticut	Call Before You Dig	1.800.922.4455
Delaware	Miss Utility of Delmarva	1.800.282.8555
Florida	Call Sunshine	1.800.432.4770
Georgia	Utilities Protection Center, Inc.	1.800.282.7411
Idaho	Dig Line	1.800.342.1585
	Kootenai County Utility Coordinating Council	1.800.428.4950
	One Call Concepts – Idaho	1.800.626.4950
	Palouse Empire Underground Coordinating Council	1.800.822.1974
	Shoshone County One Call	1.800.398.3285
	Utilities Underground Location Center	1.800.424.5555
Illinois	Digger (Chicago Utility Alert Network)	312.744.7000
	Julie, Inc.	1.800.892.0123
Indiana	Indiana Underground Plant Protection Services, Inc.	1.800.382.5544
Iowa	Underground Plant Location Service, Inc.	1.800.292.8989
Kansas	Kansas One-Call Center	1.800.DIG.SAFE
Kentucky	Kentucky Underground Protection Inc.	1.800.752.6007
Louisiana	Louisiana One Call System, Inc.	1.800.272.3020
Maine	Dig Safe – Maine	1.800.225.4977
Maryland	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.282.8555
Massachusetts	Dig Safe – Massachusetts	1.800.322.4844
Michigan	Miss Dig System, Inc.	1.800.482.7171
Minnesota	Gopher State One Call	1.800.252.1166
Mississippi	Mississippi One-Call System, Inc.	1.800.227.6477
Missouri	Missouri One Call System, Inc.	1.800.344.7483
Montana	Utilities Underground Location Center	1.800.424.5555
Nebraska	Diggers Hotline	1.800.331.5666
Nevada	Underground Service Alert North	1.800.227.2600
New Hampshire	Dig Safe – New Hampshire	1.800.225.4977
New Jersey	Garden State Underground Plant Location Service	1.800.272.1000
New Mexico	New Mexico One Call System, Inc.	1.800.321.ALERT
New York	New York City – Long Island One Call Center	1.800.272.4480
	Underground Facilities Protective Organization "UFPO"	1.800.962.7962
North Carolina	The North Carolina One Call Center, Inc.	1.800.632.4949

Province/State	One-Call Agency	Number
North Dakota	Utilities Underground Location Center	1.800.454.5555
Ohio	Ohio Utilities Protection Service	1.800.362.2764
Oklahoma	Call Okie	1.800.522.6543
Oregon	Douglas Utilities Coordinating Council	1.503.673.6676
	Josephine Utilities Coordinating Council	1.503.476.6676
	Rogue Basin Utility Coordinating Council	1.503.779.6676
	Utilities Notification Center	1.800.332.2344
	Utilities Underground Location Center	1.800.424.5555
Pennsylvania	Pennsylvania One Call System, Inc.	1.800.242.1776
Rhode Island	Dig Safe – Rhode Island	1.800.225.4977
South Carolina	Palmetto Utility Protection Service Inc. "PUPS"	1.800.922.0983
South Dakota	South Dakota One Call	1.800.781.7474
Tennessee	Tennessee One-Call System, Inc.	1.800.351.1111
	Rogue Basin Utility Coordinating Council	1.503.779.6676
	Utilities Notification Center	1.800.332.2344
Utah	Blue Stakes Location Center	1.800.662.4111
Vermont	Dig Safe – Vermont	1.800.225.4977
Virginia	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.441.8355
	Miss Utility of Virginia	1.800.552.7001
Washington	Chelan-Douglas Utilities Coordinating Council	1.509.663.6111
	Grays Harbor & Pacific County Utility Coordinating Council	1.206.532.3550
	Inland Empire Utility Coordinating Council	1.509.456.8000
Utah	Blue Stakes Location Center	1.800.662.4111
Vermont	Dig Safe – Vermont	1.800.225.4977
Virginia	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.441.8355
	Miss Utility of Virginia	1.800.552.7001
Washington	Chelan-Douglas Utilities Coordinating Council	1.509.663.6111
	Grays Harbor & Pacific County Utility Coordinating Council	1.206.532.3550
	Palouse Empire Utilities Coordinating Council	1.800.822.1974
	Upper Yakima County Underground Utilities Council	1.800.553.4344
	Utilities Council of Cowlitz County	1.360.425.2506
	Utilities Notification Center	1.800.332.2344
	Utilities Underground Location Center	1.800.424.5555
West Virginia	Miss Utility of West Virginia, Inc.	1.800.245.4848
Wisconsin	Diggers Hotline, Inc.	1.800.982.0299
Wyoming	Albany County Utility Coordinating Council	1.307.742.3615
	Call-in Dig-in Safety Council	1.307.382.9811
	Carbon County Underground Utility Coordinating Council	1.307.324.6666
	Central Wyoming Utilities Coordinating Council	1.800.759.8035

Province/State	One-Call Agency	Number
	Converse County Utility Coordination Council	1.800.562.5561
	Fremont County Utility Coordinating Council	1.800.489.8023
	Southeast Wyoming Utilities Coordinating Council	1.307.638.6666
	Southwest Wyoming One Call	1.307.362.8888
	Utilities Underground Location Center	1.800.454.5555
	Wyoming One-Call	1.800.348.1030
	Palouse Empire Utilities Coordinating Council	1.800.822.1974
	Upper Yakima County Underground Utilities Council	1.800.553.4344
	Utilities Council of Cowlitz County	1.360.425.2506
	Utilities Notification Center	1.800.332.2344
	Utilities Underground Location Center	1.800.424.5555
West Virginia	Miss Utility of West Virginia, Inc.	1.800.245.4848

S3NA-417-ST Underground Utilities

1.0 Regulations

1.1 Every province and territory has strict regulations governing the procedures and practices that MUST be followed. As these regulations vary slightly, before work can commence, the Project Manager MUST review these documents and identify how all of the hazards will be addressed and how the regulations will be adhered to:

1.1.1 Occupational Health and Safety Code

1.1.2 Regional or industry-specific regulations (e.g., Alberta EUB (Pipeline Act).

2.0 Occupational Health and Safety Regulations

2.1 The following Occupational Health and Safety regulations apply directly to ground disturbance:

Jurisdiction	Regulation
United States	
OSHA	CFR 1926.651
Canada	
Alberta	OHS Code (2009) Sect 441 – 464, Schedule 9
British Columbia	OHS Regulation (1997) Sect 20.78 – 20.101
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 26.0 – 26.47
New Brunswick	OHS Regulation (91-191) Sect 93 – 94.1, 180 – 188
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 139 – 148
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 153, 166 – 173
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 396 – 432
Ontario	O. Reg. 213/91 Sect 6, 7, 222 – 242
Prince Edward Island	OHS Regulations (EC180/87) Sect 12.1 – 12.15
Quebec	Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.15.1 – 3.15.10
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 257 – 265, Schedule Table 17
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 10.62 – 10.72

S3NA-418-PR Welding, Cutting, and Other Hot Work

1.0 Purpose and Scope

1.1 Establishes the minimum requirements for welding, cutting, and hot work activities.

1.2 This procedure applies to all AECOM North America-based employees and operations.

1.3 AECOM employees shall not operate a welder's torch; however, AECOM may oversee subcontractors who conduct welding, and therefore the requirements for hot work would still apply on our job sites and still require a permit. Other AECOM activities may also trigger the need for a Hot Work Permit and procedure (for example, engine ignition in flammable atmospheres).

2.0 Terms and Definitions

2.1 **Class 1 Area:** Any area in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

2.1.1 Guidance to identify Class 1 can be provided by area classification diagrams (as presented in the IM website) and by standards such as the following:

- American Petroleum Institute, API Recommended Practice 500, Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2, 2nd ed., November 1997.
- BP GP 44-60, Guidance on Practice for API RP 500 Area Classification.
- National Fire Protection Association 70™ National Electric Code®

2.2 **Class 1, Division 1**: Refers to the designation and classification of specific hazardous environments in the National Electrical Code (NEC). A Class I Hazardous Location is one in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive or ignitable. Refer to local regulations, Occupational Safety and Health Administration (OSHA) and NEC for information about this type of hazardous area. Dusts or fibers may also produce explosive or ignitable conditions.

2.3 **Combustible Material**: Any material that may ignite when introduced to an ignition source (e.g., wood, paper, cardboard and plastic).

2.4 **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 or that could produce temperatures high enough to cause the ignition of flammable gases and combustible materials

2.5 **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.

2.6 **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.

2.7 **Primary Source Ignition (PSI) Hot Work:** Any work with equipment and tools that are likely to ignite a flammable or combustible atmosphere, solid materials and liquids when used in a normal manner. Primary Source Ignition (PSI) hot work is often referred to as 'naked flame' hot work. High energy is present in the form of a flame, electric arc or incandescent sparks.

2.7.1 Examples of PSI hot work include, but are not limited to, the following:

- Welding and burning.
- Grinding.
- Torch cutting and soldering.

2.8 **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. Secondary source ignition (SSI) hot work is also referred to as 'spark potential' hot work.

2.8.1 Examples of SSI hot work include, but are not limited to, the following:

2.8.2 Sandblasting.

2.8.3 Using electrical and electronic equipment that is not intrinsically safe or explosion-proof (e.g., most electronic communication devices, flashlights).

2.8.4 Using spark-ignition engines (including vehicles) in a Class 1 area (e.g., vehicle entry into tank dike).

2.8.5 Using a rotating steel brush.

2.8.6 Electrical isolation testing.

2.8.7 Producing a friction spark, typically from a rusty surface.

2.9 **Sources of ignition:** In locations where flammable vapors may be present, precautions shall be taken to prevent ignition by eliminating or controlling sources of ignition. Sources of ignition 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 Attachments

3.1 S3NA-418-FM Hot Work Permit

3.2 S3NA-418-GL Hot Work Permit Applicabilty

3.3 S3NA-418-ST Welding, Cutting and Other Hot Work

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Hot Work Operator

- In the scope of this procedure, a **Hot Work Operator** is defined as an individual who operates hot work equipment to perform hot work operations.
- The **Hot Work Operator** shall perform the following duties:
  - Know and apply applicable company and regulatory policies, standards 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.
  - Cease hot work operations if unsafe conditions develop and notify the Field Tas Manager immediately for evaluation and appropriate action.

4.1.2 Project Manager, Field Task Manager, Supervisor

- Assures that AECOM employees receive the specified level of protection as to project welding, cutting and burning activities.
- Assures that a Hot Work Permit is issued and all control measures are maintained.

4.1.3 Authorized Air Monitor

In the scope of this procedure, the **Authorized Air Monitor** is an individual responsible for operating air-monitoring equipment to monitor the presence of flammable gas in the area where hot work is planned.

- The **Authorized Air Monitor** may also be the **fire watch** under certain conditions specified in Section B – **Fire Watch** of the Hot Work Permit.
- The **Authorized Air Monitor** shall not be a **hot work operator** during primary source ignition (PSI) hot work but may be a **hot work operator** during secondary source ignition (SSI) Class 1 hot work.
- The **Authorized Air Monitor** will sign as a performing authority on the Permit Cover Sheet indicating their role.

- The **Authorized Air Monitor** shall 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 A – Atmospheric Monitoring of the Hot Work Permit.
    - 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 Lower Explosive Limit (LEL) Mitigation Plan, according to Lower Explosive Limit Mitigation Plan of this procedure, is developed and documented in Section E - LEL Mitigation Plan of the Hot Work Permit 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 of the LEL before allowing hot work to proceed. (Refer to Lower Explosive Limit Mitigation Plan).
    - Stop all hot work if any air monitoring reading is greater than 10 percent of the LEL.

NOTE Refer to Air Monitoring (Class 1 Areas) of this practice for additional information regarding the **Authorized Air Monitor**ing and air monitoring requirements.

4.1.4 **Fire Watch**

- In the scope of this procedure, the **Fire Watch** is responsible for monitoring hot work and the surrounding area for incipient fires and changing conditions. The **fire watch** may also be the **authorized air monitor** under certain conditions specified in Section B – **Fire Watch** of the Hot Work Permit.
- The **Fire Watch** shall not be a **hot work operator**. If simultaneously performing the **authorized air monitor** role, the **fire watch** shall not have any additional roles. The **Fire Watch** shall not have any other duties besides those specified in this procedure during the hot work activities and for 30 minutes afterwards.
- The **Fire Watch** shall perform 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.
    - Confirm that safe conditions are maintained during hot work operations.
    - Make fire-extinguishing equipment readily available and be trained in its use.
    - Remain within communication range of the person(s) performing the hot work and maintain a line of sight with the hot work.
    - 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 he or she determines that a fire is not within the capacity of the available extinguishing equipment.
    - Remain in the hot work area at least 30 minutes after the hot work has ceased to detect and extinguish possible smoldering fires.

4.2 Performing hot work in classified and non-classified areas may be considered a hazardous activity, and a Hot Work Permit may be required. The Hot Work Permit has five purposes:

4.2.1 To serve as written permission to do the work.

4.2.2 To provide a minimum safety checklist.

4.2.3 To show the steps necessary for making the work site safe for conducting hot work.

4.2.4 To alert operating personnel to the work in progress.

4.2.5 To provide a record of safety steps taken for contract work.

4.3 *S3NA-418-GL Hot Work Permit Applicabilty* provides guidelines for determining whether a Hot Work Permit is required.

4.4 Occasionally AECOM staff may be working in the vicinity of welding operations. Exposure to welding operations can result in eye damage, burns, or respiratory illness.

4.5 Engineering controls will be implemented to control hot work hazards to the extent feasible.

4.6 Equipment will be used only for operations for which it is approved and as recommended by the manufacturer. Employees assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment will be thoroughly instructed in the safe use of such equipment by a qualified person.

4.7 Before any cutting or welding is performed, the area will be evaluated for flammables or combustibles by the Issuing Authority responsible for authorizing hot work. Where hot work permits are used, all welding activities shall be controlled and isolated from flammables and combustibles.

4.8 Training shall be provided as to the use of Hot Work Permits to all associated workers.

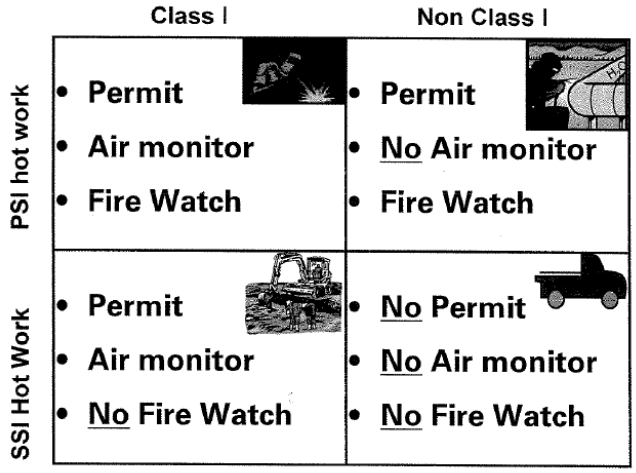
4.9 **Hot Work Permit**

4.9.1 A Hot Work Permit shall be prepared before any PSI hot work (other than in a designated area) or any SSI Class 1 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.

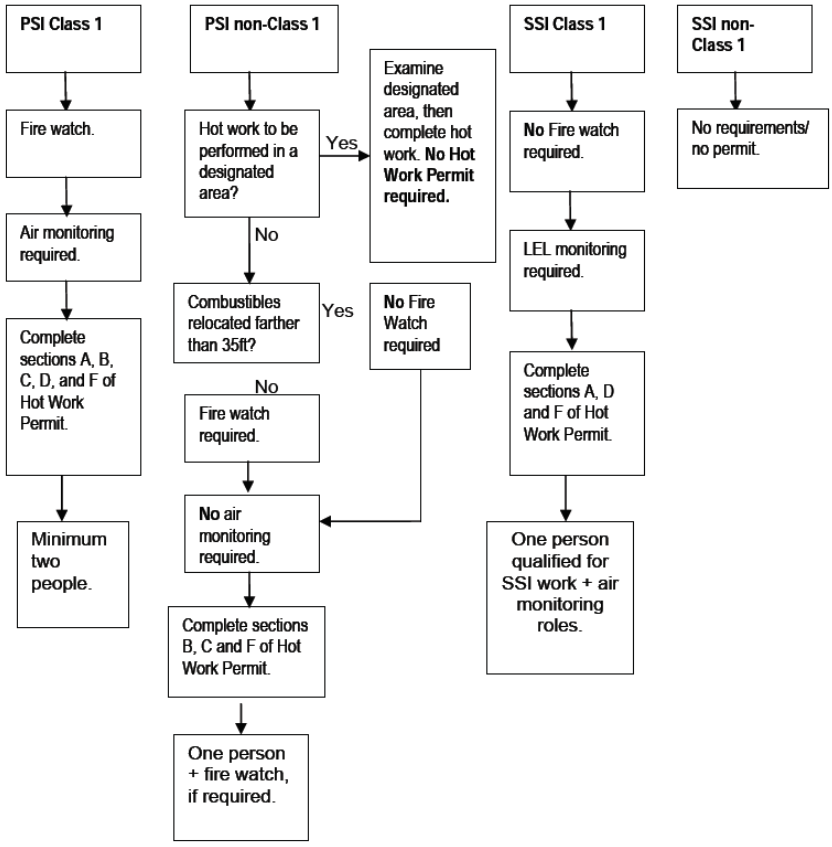
4.9.2 A Hot Work Permit is not required for SSI non-Class 1 hot work.

4.9.3 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 in previous conditions and conducting air monitoring if the hot work is performed in a Class 1 area.

4.9.4 Individuals who have the technical and procedural competencies as defined by AECOM and their roles within the Hot Work activity will provide input to the permit as necessary to address all hazards and permit conditions related to the hot work.



4.9.5 Hot Work Permit Applicablity



4.10 Non-Permissible Areas

4.10.1 All hot work is prohibited in areas not authorized by facility management and the following areas:

- Sprinkler-equipped buildings where sprinklers are impaired, unless the requirements of NFPA 25 are met.
- In the presence of explosive atmospheres (greater than or equal to 10 percent of the LEL).
- 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.

4.11 Preparation for All Primary Source Ignition (PSI) Hot Work

4.11.1 PSI hot work designates any work with equipment and tools that, when used in a normal manner, are likely to ignite a flammable or combustible atmosphere, solid materials and liquids.

4.11.2 PSI hot work, such as grinding, has been known to generate sparks with enough force to transport them up to 35' (10.67m) from the point of the hot work; therefore, it is possible to perform PSI hot work up to 35' (10.67m) away from a Class 1 location and yet still introduce an ignition source into a Class 1 area.

4.11.3 Prior to performing PSI hot work, the requirements presented in this section shall be met and shall be verified by the permit writer:

- The hot work equipment shall be in satisfactory operating condition and in good repair.
- All combustible and flammable materials shall be relocated at least 35' (10.67m) in all directions from the work site.

4.11.4 If relocating these materials is impractical, 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.
- A **fire watch** may be required.

4.11.5 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 (20lbs [9.07kg] minimum).
- A nonflammable, 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.

4.12 Preparation for Primary Source Ignition (PSI) Class 1 Hot Work

4.12.1 Prior to performing any PSI Class 1 hot work, the requirements set in Preparation for all Primary Source Ignition Hot Work of this procedure, this section and the relevant requirements of Air Monitoring of this practice shall be met and verified by the permit writer.

- A **fire watch** shall be assigned for the duration of the hot work and for 30 minutes after the hot work is completed to detect and extinguish any smoldering fires.
- The venting, draining or bleeding of flammable or combustible liquids and gases shall be stopped within 35' (10.67m) of the hot work.
- Affected excavations, conduits and manholes within 35' (10.67m) 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.
- Initial and continuous air monitoring shall be performed and documented on the Hot Work Permit. (Refer Air Monitoring [Class 1 Areas] of this practice.)

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 Preparation for Primary Source Ignition (PSI) Hot Work within 35' (10.67m) of Buildings or Other Structures

4.13.1 The conditions in Preparation for all Primary Source Ignition Hot Work and this section shall be met and verified before any PSI hot work is performed inside or within 35' (10.67m) of buildings or structures with building materials or contents that may be combustible or flammable.

- Openings or cracks in walls, floors or ducts within 35' (10.67m) of the hot work shall be tightly covered with fire-retardant or noncombustible 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 procedures 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.

4.14 Preparation for Secondary Source Ignition (SSI) Class 1 Hot Work

4.14.1 Secondary Source Ignition (SSI) Hot Work designates 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. Secondary source ignition (SSI) hot work is also referred to as 'spark potential' hot work.

4.14.2 Before any SSI Class 1 hot work is performed, initial air monitoring shall be performed and documented on the Hot Work Permit. (Refer to Initial Hot Work Air Monitoring [PSI Class 1] of this procedure.)

4.14.3 Periodic up to continuous air monitoring, as determined by the permit writer and documented on the Hot Work Permit Section D. – Area Monitoring Program, shall be performed and the results documented on the Section A – Atmospheric Monitoring on the Hot Work Permit.

4.14.4 Air monitoring equipment is to produce an audible alarm when LEL exceeds 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.

4.14.5 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.

4.15 Air Monitoring (Class 1 Areas)

4.15.1 Flammable and combustible liquids and gases are present in Class 1 areas. 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.

4.15.2 If the hot work will be performed in a tank or vessel, the air monitoring requirements for confined spaces will apply.

4.15.3 When the possibility exists for an oxygen-deficient atmosphere the oxygen level could be below the level required by the air monitor to give the correct flammability (LEL) reading. This could 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.

4.15.4 General Requirements

- Hot work is prohibited if air-monitoring readings are greater than or equal to 10 percent of the LEL.
- All air monitoring associated with hot work will 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 prior to use. The **authorized air monitor** shall maintain documentation of the calibrations in Section A – Atmospheric Monitoring of the Hot Work Permit.

4.15.5 Initial Hot Work Air Monitoring (Primary Source Ignition Class 1)

- Initial hot work air monitoring should be conducted as close to the start of the hot work as possible.
- Initial air monitoring shall be conducted prior to the authorization and issuance of all Hot Work Permits for PSI Class 1 hot work.
- Initial air monitoring shall be performed by an authorized gas tester surveying at least a 35' (10.67m) radius from the point of the hot work with a properly functioning, calibrated air monitor equipped with LEL and O2 sensors.
- For all PSI Class 1 hot work, initial air monitoring shall be done according to the Area Monitoring Program on the Hot Work Permit.
- If initial air monitoring indicates the presence of any flammable gas, the hot work may not proceed until an LEL mitigation plan is developed, documented on Section E – LEL Mitigation Plan of the Hot Work Permit and implemented. (Refer to Lower Explosive Limit Mitigation Plan of this practice.)

4.15.6 Continuous Hot Work Air Monitoring (Primary Source Ignition Class 1)

- All PSI Class 1 hot work requires attended continuous air monitoring while the hot work is being performed. An authorized gas tester shall attend to the monitor and survey the perimeter of the permitted area at least once an hour. The survey shall cover at least a 35' (10.67m) radius from the point of the hot work.
- During drilling operations where the potential of flammable gas is known to exist or the potential of flammable gas exists, the borehole may be classified as a Class 1 area and continuous gas monitor will be used in the immediate proximity of the top of the hole.
- 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 need 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. (Refer to Lower Explosive Limit Mitigation Plan of this practice.)
- If the implementation of the LEL Mitigation Plan controls the flammability level to less than 10 percent of the LEL, the authorized gas tester will continue monitoring the area while hot work continues. If at any time the LEL reading reaches 10 percent, the hot work shall stop until the source of the flammable gas is controlled to less than 10 percent of the LEL.

4.15.7 Initial and Continuous Hot Work Air Monitoring (Secondary Source Ignition Class 1)

- Vehicles, mobile plant equipment and other non-intrinsically safe equipment present potential ignition sources. Consequently, SSI hot work in Class 1 areas (e.g., a tank dike) requires the completion of a Hot Work Permit and the performance of air monitoring.
- Air monitoring shall be performed for SSI hot work in Class 1 areas:
  - 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 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 area 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.

4.15.8 Area Monitoring Program

- An Area Monitoring Program shall be developed before any Class 1 hot work is performed.
- The following information, which is documented in Section D of the Hot Work Permit, shall be included in the Area Monitoring Program:
  - The area where the hot work will 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 35' (10.67m) 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 will be monitored by the authorized gas tester. At a minimum, this includes a 35' (10.67m) 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 the Confined Space

Defined Practice.)

4.16 Lower Expolsive Limit Mitigation Plan

4.16.1 Section E of the Hot Work Permit documents the location of confirmed sources of flammable gas and the controls needed to reduce the LEL reading to less than 10 percent of the LEL.

4.16.2 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.

4.16.3 The following information shall be documented in Section E of the Hot Work Permit:

- 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 will be implemented to effectively reduce the flammability level to less than 10 percent of the LEL within the hot work area.
- The percent LEL measured after controls, if any, have been implemented.

If at any time the LEL reading is greater than or equal to 10 percent of the LEL, the hot work will stop immediately and will not resume until controls are implemented to reduce the LEL level to less than 10 percent of the LEL.

4.17 Fire Watch

4.17.1 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 35' (10.67m) of shielded combustible material.
- Within a 35' (10.67m) 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.
- Where fire alarms or suppression systems have to be disabled.

4.17.2 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.

4.17.3 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.

4.17.4 When required, a **fire watch** will be maintained for at least 30 minutes after completion of welding/cutting operations so that possible smoldering fire can be detected and extinguished.

4.17.5 Firewatchers will have fire-extinguishing equipment readily available and be trained in its use.

4.17.6 They will be familiar with facilities and procedures in the event of a fire. They will watch for fires in all exposed areas and attempt to extinguish them only when obviously within the capacity of the equipment available. The Fire Department will be immediately notified of all fires.

4.17.7 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.

4.18 Welding and Cutting General Requirements

4.18.1 Equipment will be used only for operations for which it is approved and as recommended by the manufacturer.

4.18.2 Employees assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment will be thoroughly instructed in the safe use of such equipment by a qualified person.

4.18.3 Engineering controls will be implemented to control hot work hazards to the extent feasible.

4.18.4 Before any cutting or welding is performed, the area will be evaluated for flammables or combustibles by the Supervisor responsible for authorizing hot work.

4.18.5 A written Hot Work Permit (Attachment 1 or the equivalent) may be required by clients particularly in process plant facilities based on conditions or on projects that AECOM controls. In the latter case, the PM or site lead manager should review any Contractor/Subcontractor Hot Work permits issued.

4.18.6 Where hot work permits are used, all welding activities shall be controlled and isolated from flammables and combustibles.

4.18.7 Avoid looking directly at the welding arc.

4.18.8 Avoid prolonged exposure to welding/paint fumes.

4.18.9 Avoid touching recently welded joints.

4.18.10 Employees should see a Doctor if irritation or “red eye” occurs as a result of welder’s flash. Symptoms include:

- Pain that may be mild to very severe
- Bloodshot eyes
- Light sensitivity
- Watery eyes
- Blurred vision
- The feeling of having something in your eye

4.18.11 Employees should seek urgent medical help if any of the following symptoms are experienced:

- Blurred vision
- Vision changes
- Seeing spots or flashes of light
- Pain when moving your eyes
- Worsening pain

4.19 Gas Welding and Cutting Safety

4.19.1 Fuel-gas hoses and oxygen hoses will be easily distinguishable from each other. The contrast will be made by different colors or by surface characteristics readily distinguishable by touch. Oxygen and fuel-gas hoses will not be interchangeable. A single hose having more than one gas passage will not be used.

4.19.2 When parallel sections of oxygen and fuel-gas hose are taped together, not more than 4 inches out of 12 inches will be covered by tape.

4.19.3 All hoses in use will be inspected at the beginning of each work shift. Defective hose will be removed from service.

4.19.4 Hoses, cables, and other equipment will be kept clear of walkways, ladders, and stairs.

4.19.5 Clogged torch tip openings will be cleaned with approved cleaning wires, drills, or other devices designed for this purpose.

4.19.6 Torches to be used will be inspected at the beginning of each work shift for leaking shutoff valves, damaged hose couplings, and clogged tip connection. Defective torches will not be used.

4.19.7 Torches will be ignited by friction lighters or other approved devices only. Matches, flame lighters, or hot work will not be used to ignite a torch.

4.19.8 Oxygen and fuel-gas pressure regulators, including related gauges, will be in proper working order and equipped with “Flashback” arrestors attached to the gauges. NOTE: Flashback arresters are in addition to “Backflow” devices.

4.19.9 All oxygen cylinders and fittings will be kept away from oil or grease. Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus will be kept free from oil or greasy substances and

will not be handled with oily hands or gloves. Oxygen will not be directed at oily surfaces or greasy clothes, or used within a fuel oil or other storage tank or vessel.

4.19.10 Torches and hoses will be completely depressurized (bled) of pressurized gas, prior to storage, or at the end of each shift.

4.19.11 Torches and hoses will not be stored in enclosed areas (e.g., gang boxes, lockers) while connected to cylinders and gauges will be removed at the end of shift.

4.19.12 Oxygen connections will include a means to prevent backflow.

4.19.13 Fuel gas cylinders will be provided flashback protection.

4.20 Arc Welding and Cutting Safety

4.20.1 Electrode holders which are designed for arc welding/cutting and are capable of safely handling the maximum rate current will be used.

4.20.2 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, will be fully insulated against the maximum voltage encountered and properly grounded.

4.20.3 All arc welding/cutting cables will be completely insulated and flexible, capable of handling the maximum current requirements of the work.

4.20.4 Only cables free from repair or splices for a minimum distance of 10 feet from the electrode holder will be used. Cables with standard insulated connectors or splices with insulating quality that is equal to that of the cable are permitted.

4.20.5 If it is necessary to splice lengths of cable, insulated connectors equivalent to that of the cable will be used. If connections are made by cable lugs, they will be securely fastened together and provide a good electrical contact. Exposed metal parts of the lugs will be completely insulated.

4.20.6 If electrode holders are left unattended, the electrodes will be removed and the holder placed so that they cannot make electrical contact with employees or conducting objects.

4.20.7 To avoid the possibility of electric shock, electrode holders will not be dipped in water.

4.20.8 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 will be turned off.

4.20.9 Any faulty or defective equipment will be reported to the supervisor and tagged out of service until repaired.

4.20.10 All arc welding/cutting operations will be shielded by noncombustible or flameproof screens to protect employees and other persons working in the vicinity from the direct ray of the arc.

4.21 Storage and Handling of Compressed Gas Cylinders

4.21.1 Compressed gas cylinders will be legibly marked with either the chemical or trade name of the gas. Such markings will be stenciled, stamped, or labeled and will not be easily removable.

4.21.2 The marking will be located on the shoulder of the cylinder.

4.21.3 Compressed gas cylinders will be equipped with approved connections

4.21.4 Acetylene cylinders will be stored and used valve end up.

4.21.5 Cylinders will not be stored near highly combustible/flammable materials, especially oil or grease.

4.21.6 Cylinders will be stored in an upright and secure position with caps installed and separated from fuel-gas cylinders or combustible materials (especially oil or grease), by a minimum distance of 20 feet, or by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least one half hour.

4.21.7 Cylinders will be not dropped, struck by objects, or permitted to strike each other violently.

4.21.8 Cylinder valves will be closed and gauges removed before moving cylinders

4.21.9 Cylinder valves will be closed and gauges removed at the end of the shift or when work is finished.

4.21.10 Valves of empty cylinders will be closed.

4.21.11 Cylinders will be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames will not reach them.

4.21.12 Cylinder valves will always be opened slowly.

4.21.13 An acetylene cylinder valve will not be opened more than one and one-half turns of the valve stem and preferably no more than three-fourths of a turn.

4.21.14 Where a special wrench is required to operate a cylinder valve, it will 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 will be available for immediate use.

4.21.15 Regulators will be removed, valve caps in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders will have a proper support rack installed.

4.21.16 A suitable cylinder truck, chain, or other steadying device will be used to prevent cylinders from being knocked over while in use or storage.

4.21.17 Cylinders will not be placed where they may become part of an electric circuit. Tapping of an electrode against a cylinder to strike an arc will be prohibited.

4.22 Personal Protective Equipment

4.22.1 Selection and Use

- Selection and use of personal protective equipment will comply with *S3NA-208-PR Personal Protective Equipment Program*
    - If you are required to observe the welding operation, use welder's helmet fitted with a filter shade that is suitable for the type of welding that is being performed.
    - If you are required to observe the chipping and grinding operation, use coated safety goggles or safety glasses with both UVA and UVB radiation protection.
    - Contact lenses should not be worn if there is a potential exposure to dust particles or chemicals that can irritate the eye.

4.22.2 Eye and Face Protection

- Eye and face protection will comply with the following:
    - Welding helmets and hand shields will be used during all arc welding/cutting operations, excluding submerged arc welding. Cutting/welding goggles will 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. Helpers or attendants will wear proper eye protection.
    - Safety goggles or other approved eye/face protection are for use during gas welding operations on light work, torch brazing, or inspection.
    - All operators and attendants on resistance welding or brazing equipment will use face shields or goggles, depending on the particular job.

4.22.3 Protective Clothing

- Hot work will require the following protective clothing:
    - Except when engaged in light work, all welders will wear flameproof gauntlet gloves.
    - Flameproof aprons made of leather, or other suitable material, may also be desirable for protection against radiated heat and sparks.
    - Woolen clothing will be worn in preference to cotton because it is not so readily ignited. Nylon clothing is not permitted for welding/cutting operations. All outer clothing, such as jumpers or overalls, will be reasonably free from oil or grease.

4.22.4 Respiratory Protective Equipment

- Respiratory protective devices will be required when one or more of the following conditions exist:
    - Feasible engineering controls are insufficient to mitigate the hazards.
    - 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.

- Too much heat is generated.
- Hazardous fumes, gases, or dusts of toxic metals, particularly lead, cadmium, chrome, beryllium, and zinc are present in the base metal or in coatings.
- Respiratory protective equipment will be selected, used, and maintained in accordance with SH&E 115 – Respiratory Protection.

4.22.5 Mechanical Ventilation

- Mechanical ventilation will consist of either general dilution systems or local exhaust systems. Local exhaust systems are preferred.
- General mechanical ventilation will 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.
- General ventilation may not be used as the only means of control when toxic metals are involved in the operation.
- Local exhaust ventilation will consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system will 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
- Contaminated air exhausted from a working space will 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.
- All makeup air will be clean and suitable for breathing.
- Oxygen will not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.
- The project Site Safety Representative will 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.

4.22.6 Fire Protection

- When possible, objects to be welded, cut, or heated will be moved to a designated safe location. If this is not possible, all movable fire hazards in the workspace will be taken away to a safe place.
- If the object to be welded, cut, or heated cannot be moved and all fire hazards cannot be removed (e.g., equipment, walls, floors, etc.), positive means will be taken to confine the heat, sparks, and slag to protect the immovable fire hazards as well as opposite sides.
- No welding, cutting, or heating will be done where the application of flammable paint, the 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 will be taken so that no sparks will drop through the floor. The same precautions will be taken in the presence of cracks or holes in walls, open doorways, and open or broken windows.
- Approved fire extinguishing equipment will be present in the immediate work area. A minimum of a 10- pound ABC fire extinguisher is required.

4.22.7 Welding/Cutting on Containers

- No welding, cutting, or other hot work will be performed on empty drums, barrels, tanks, or other containers until they have been thoroughly cleaned. (*This is to ensure 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 a hazard.)* Any connection to the drum or vessel will be disconnected or blanked off.
- All hollow spaces, vacancies, or containers will be ventilated to remove gases before preheating, cutting, or welding. Purging with inert gas is recommended.
- In addition to the requirements presented in SH&E SOP 713 – Confined Space Entry, welding/cutting in confined spaces such as a tank, boiler, pressure vessel, or small compartment will require the following precautionary measures:
  - Local exhaust ventilation will be provided, unless workers wear supplied-air respirators.
  - Gas cylinders and/or welding machines will be placed outside the confined space.

4.22.8 Manifolding of Cylinders

- Cylinder manifolds will be installed under the supervision of an experienced person(s) and must

comply with proper practices in construction and use.

- All manifolds and parts will be appropriate for the gases for which they are approved.
- When acetylene cylinders are manifolded, approved flashback arresters will 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 will be provided with a backflow check valve.

5.0 Records

5.1 None

6.0 References

6.1 American Petroleum Institute, API Recommended Practice 500, Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2, 2nd ed., November 1997.

6.2 CSA Standard W117.2 regarding Safety in Welding, Cutting and Allied Processes

6.3 National Fire Protection Association 70™ National Electric Code®

6.4 “Practical Solution Guide to Arc Flash Hazards”, developed by the Electrical Safety Authority

S3NA-418-FM Hot Work Permit

Name of Contractor: _____

Location: Project #:

Date: Time: Weather:

Person Preparing Permit: Title:

Person Conducting Hot Work: Title:

THIS PERMIT BECOMES VOID:

1. At the end of the shift, or
2. Whenever conditions change significantly, or
3. On any emergency signal

TYPE OF HOT WORK

☐ **PSI CLASS I (Complete full permit)** ☐ **PSI NON-CLASS I (Complete section B, C, and F)** ☐ **SSI CLASS I (Complete section A, D, and F)**

A. ATMOSPHERIC MONITORING
(Initial and continuous monitoring are required for all Class I Hot Work [PSI and SSI])

AUTHORIZED AIR MONITOR 1 NAME: _____ AUTHORIZED AIR MONITOR 1 SIGNATURE: _____ YES/NO/NOT APPLICABLE

INSTRUMENT 1 SERIAL NUMBERS: _____ DATE AND RESULTS OF LAST CALIBRATION: _____ PRE-USE CALIBRATION CHECK PERFORMED:

INSTRUMENT 2 SERIAL NUMBERS: _____ DATE AND RESULTS OF LAST CALIBRATION: _____ PRE-USE CALIBRATION CHECK PERFORMED:

Initial Reading %LEL (if >0% fill out section E)

Time	%LEL	Time	%LEL	Time	%LEL	Time	%LEL	Time	%LEL

Continuous Reading %LEL

Time	%LEL	Time	%LEL	Time	%LEL	Time	%LEL	Time	%LEL

B. FIRE WATCH

YES NO

1. Will PSI Class I work be performed?
2. Will PSI Non-Class I work be performed within 35' (10.67 m) of combustible materials?
3. Will PSI hot work be performed where wall or floor openings within 35' (10.67m) would compose combustibles in adjacent areas?
4. Is PSI hot work to be performed where combustibles are adjacent to the opposite side of partitions, ceilings, or roofs being worked on?
5. Will fire alarms or suppression systems be disabled for hot work?

Note: If the answer to any of the fire watch conditions to the left is YES, a dedicated fire watch must be assigned.

Note: The fire watch is authorized to perform air monitoring.

Fire Watch 1:

Fire Watch 2:

C. WORK AREA PREPARATION FOR HOT WORK

	YES	NO	NOT APPLICABLE
1. Is the hot work equipment in proper working order?			
2. Are the proper material safety data sheets available for review?			
3. Have combustible materials been relocated more than 35' (10.67m) from hot work or been properly shielded?			
4. Is firefighting equipment in proper working order?			
5. Have ducts, drains, and sewers been adequately covered to prevent sparks from entering?			
6. If hot work is to be performed indoors, have combustible floors been wet down or properly shielded?			

7. If arc welding equipment will be used, have measures been taken to protect personnel from shock?			
8. If required, is a 20 lb. (9.07kg) fire extinguisher available and appropriate for the type of fire expected?			
9. If hot work is to be performed in or on containers, vessels, tanks, or similar equipment, have they been cleaned, purged, or ventilated, or have other precautions been taken to verify that they are safe for hot work?			

LIST ANY PERSONAL PROTECTIVE EQUIPMENT THAT IS REQUIRED (OTHER THAN THE MINIMUM REQUIRED):

D. AREA MONITORING PROGRAM

DOCUMENT WHERE AIR MONITORING WILL OCCUR, WHAT POTENTIAL GAS OR VAPOR SOURCES EXIST WITHIN THE HOT WORK AREA, AND THE WIND DIRECTION:

E. LOWER EXPLOSIVE LIMIT (LEL) MITIGATION PLAN
(Required if initial or continuous monitoring LEL is greater than 0%)

% LEL DETECTED:		% LEL AFTER CONTROLS IMPLEMENTED		NOT APPLICABLE		*(If not applicable, continue monitoring source)*

DOCUMENT THE LOCATION OF CONFIRMED SOURCE(S) OF GAS/VAPOR AND WHAT CONTROLS (IF ANY) HAVE BEEN IMPLEMENTED *(Note: Hot work is prohibited if the LEL reading is greater than or equal to 10% in the hot work area.)*

F. AUTHORIZING SIGNATURES

AUTHORIZED AIR MONITOR: *I have performed initial air monitoring with a survey of the hot work area. I agree to perform continuous air monitoring while hot work is being performed in a Class I area and to stop hot work if the LEL reading is greater than or equal to 10%.*

Name: **Signature**:

FIRE WATCH: *I agree to maintain a line of sight with the hot work operation at all times, to have immediate access to a fire extinguisher and to remain at the hot work are for 30 minutes after the hot work is completed to verify the area if fire-safe.*

Name: **Signature:**

HOT WORK OPERATORS: *I have reviewed and understand the permit the permit conditions specific to the scope of work. I agree to perform hot work operations within these conditions, to stop any work that I deem to be unsafe, and to notify the performing authority upon completion or interruption of this permitted work.*

Name: **Signature***:*

The location where this work is to be done has been examined, necessary precautions have been taken, and permission is granted for this work.

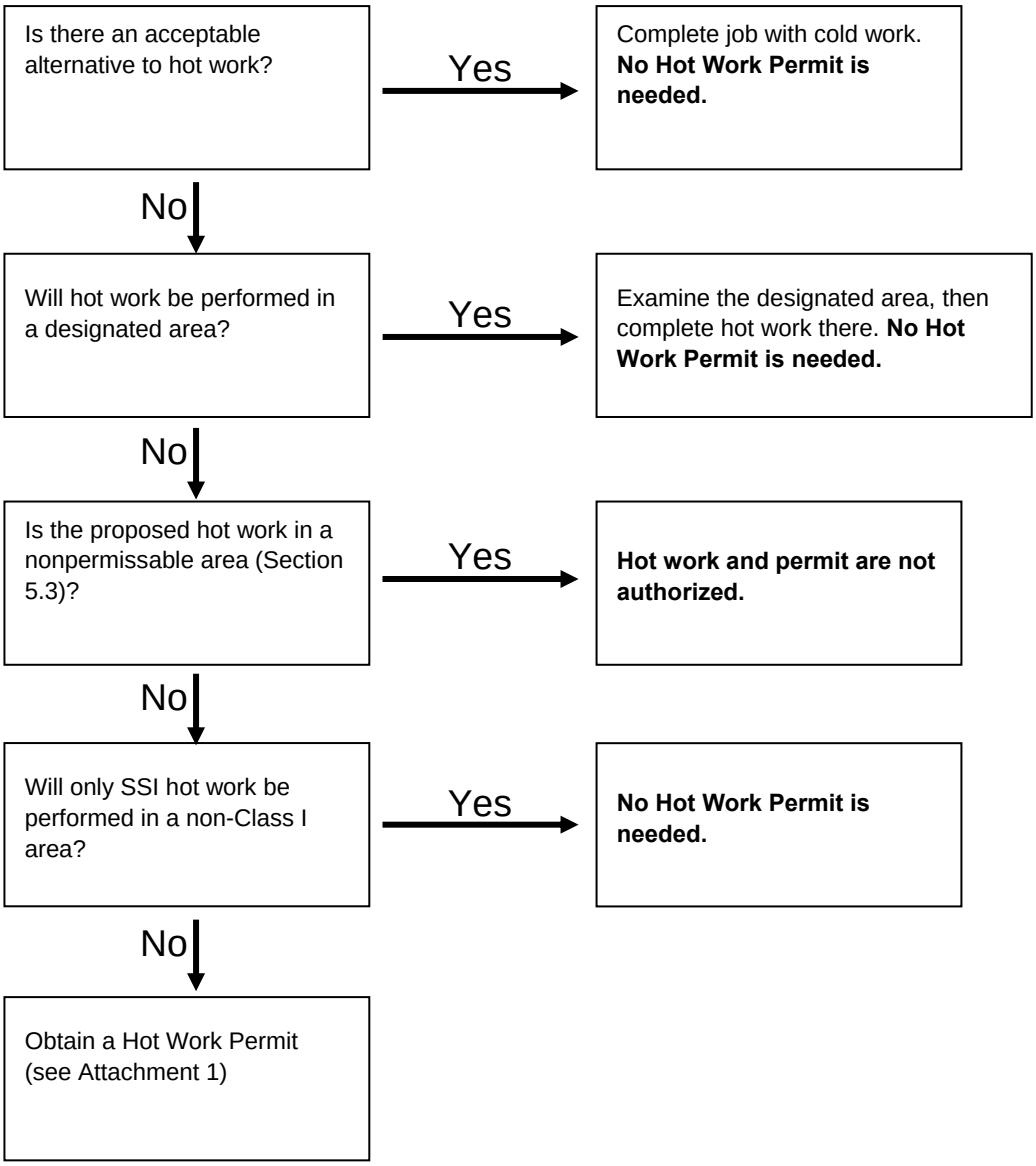
Permit expires:
Signed:
Site Safety Coordinator

Time Hot Work Started:

Time Hot Work Completed:

S3NA-418-GL Hot Work Applicability

Guidelines for determining whether a Hot Work Permit is required are provided below.



S3NA-418-ST Welding, Cutting and Other Hot Work

The following Occupational Health and Safety regulations apply directly to hot work and welding activities:

Jurisdiction	Regulation
United States	
OSHA	OSHA General Industry 29CFR1910.106, Hazardous Materials – Flammable and combustible liquids 29CFR1910.251-255, Welding, Cutting, and Brazing 29CFR1910.307, Electrical – Hazardous (classified) locations OSHA Construction 29CFR1926.350-354, Welding and Cutting 29CFR1926.407, Electrical – Hazardous (classified) locations.
Canada	
Alberta	OHS Code (2009) Sect 169, 171 – 174
British Columbia	OHS Regulation (1997) Sect 12.112 – 12.126
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 17.1 – 17.9
New Brunswick	OHS Regulation (91-191) Sect 273 – 285
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 75 – 78
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 109 – 119
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 154 – 167
Ontario	O. Reg. 213/91 Sect 122 – 124
Prince Edward Island	OHS Regulations (EC180/87) Sect 37.1 – 37.24
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 313 – 321 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.10.7.6, 3.14.1 – 3.14.8
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 370, 373
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 13.08 – 13.12

S3NA-505-PR Cold Stress Prevention

1.0 Purpose and Scope

1.1 To protect workers from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all workers can be repeatedly exposed without adverse health effects.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Cold Stress:** The production of physiological effects due to cold temperatures and\or wind chill.

2.2 **Equivalent Chill Temperature (ECT):** Also known as Wind Chill (see below)

2.3 **Frostnip:** Superficial cooling of tissues without cellular destruction.

2.4 **Frostbite:** Freezing of tissue, resulting in tissue destruction.

2.5 **Hypothermia:** Condition of reduced core body temperature to 95^{o}F (35^{o}C) resulting in loss of dexterity, loss of mental alertness, collapse, and possible death.

2.6 **Wind Chill:** The combined effect of air temperature and wind. Also expressed as "equivalent chill temperature" (ECT), wind chill is defined as heat loss resulting from the effects of air temperature and wind velocity upon exposed skin.

3.0 Attachments

3.1 S3NA-505-WI1 Temperature Thresholds

3.2 S3NA-505-WI2 Symptoms and Treatment

3.3 S3NA-505-ST Cold Exposure

4.0 Procedure

4.1 Restrictions

4.1.1 Staff working in extreme cold (wind chill or ECT below 10^{o}F or -12^{o}C) shall not work alone.

4.1.2 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frost bite.

- If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist.
- Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure.
- Schedule work for the warmest part of the day or when the wind is most calm.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Because prolonged exposure to cold air or to immersion in cold water at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection shall be used.

4.2 Roles and Responsibilities

4.2.1 **Project Managers/field task managers**

- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign personnel physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating worker capability.
- Confirm personnel are properly trained to recognize the symptoms of cold stress.

4.2.2 **Region SH&E Managers**

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.
- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.2.3 **Supervisors**

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.

4.2.4 **Employees**

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly vested condition.
- Report all suspected cold stress-related illnesses.

4.3 Training

4.3.1 Before they begin work in a cold environment, project staff who might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. Workers that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress.

4.3.2 Personnel potentially exposed to cold stress will receive training including, but not limited to:

- Sources of cold stress, the influence of protective clothing, and the importance of acclimatization
- How the body loses heat.
- Recognition of cold-related illness symptoms
- Cold stress preventative/corrective measures
- Tthe harmful effects of excessive alcohol consumption in a cold stress environment
- The hazards associated with unstable snow or ice build ups
- First aid procedures for symptoms related to cold stress

4.4 Personal Protective Equipment

4.4.1 Wear multiple layers of loose fitting clothing to maintain immobile layers of warm air next to the body.

4.4.2 Avoid cotton, especially blue jeans.

4.4.3 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.

4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.

4.4.5 Confirm extra blankets or sleeping bags are on-site.

4.4.6 Sunglasses and sunscreen should be used when there is a persistent combination of snow and direct sun.

4.4.7 If shelter is not readily available, consider supplying temporary shelters

4.4.8 Confirm that staff carry fire starter materials ifworking in remote areas..

4.4.9 Pack warm, sweet drinks, and high calorie food for snacks.

4.5 General Cold Stress Prevention Measures

4.5.1 In order to prevent hypothermia:

- Wear multiple layers of clothing to maintain immobile layers of warm air next to the body. Avoid cotton, especially blue jeans.
- When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
    - Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
    - Next remove head gear and neck wrappings.
    - Then coats/parkas should be opened at the waist and sleeves.
    - Finally, layers of clothing should be taken off.
    - When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.
- Garments worn to keep out rain and spray should also allow water vapor to escape.
- Take advantage of heat from the sun and stay out of the wind as much as possible.
- Have available emergency shelter providing protection from wind and rain and insulation from the ground.
- Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
- Get adequate rest; conserve energy.
- Get adequate nutrition to replenish energy stores; rest after meals.
- Drink adequate fluids to avoid dehydration.
- If any project staff member shows signs of hypothermia, stop and treat him/her.

4.5.2 In order to prevent frost bite:

- Dress to prevent hypothermia and protect the feet and hands.
- Avoid obstruction of circulation by, for example, tight boots or tightly fitting clothing.
- Avoid nicotine, particularly cigarettes, and alcohol.
- Keep ears and nose covered and out of the wind.
- Frostbite of the corneas of the eyes can be prevented by protective goggles.
- Adopt a “buddy system” of constantly watching the faces of others in the party for white skin tissue, which is evidence of frostbite (frostnip).
- Practice constant personal vigilance for signs of trouble in one’s own fingers and toes; when in doubt, investigate thoroughly before it is too late.

4.5.3 Adequate, insulating dry clothing that will help maintain core temperatures above 96.8^{o}F (37^{o}C) shall be provided to workers if work is performed in air temperatures below 40^{o}F (5^{o}C). Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.

4.5.4 An Equivalent Chill Temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in *S3NA-505-WI1 Temperature Thresholds.* Unless unusual or extenuating circumstances exist, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32^{o}F (0^{o} C) regardless of wind speed. However, older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions that should be considered.

4.5.5 Continuous exposure of skin should not be permitted when the air speed and temperature results in an ECT of –25^{o}F (-32^{o} C) or below.

4.5.6 At air temperatures of 40^{o}F (5^{o}C) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.

4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.

4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.

4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.

4.5.12 Supplies such as PPE, fuels, enclosures, de-icing, traction aids, warm drinks, and batteries will be specified by the SH&E Manager and/or the Project Manager. These supplies will be inspected at least weekly during cold weather projects and replaced when necessary.

4.6 Cold Stress Prevention Measures for the Hands

4.6.1 Special protection of the hands is required to maintain manual dexterity for the prevention of accidents including, but not limited to the following:

- If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60°F (15° C), special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30°F (-1° C).
- If the air temperature falls below 60°F (15° C) for sedentary work, 40°F (5° C) for light work, or 20°F (-6° C) for moderate work, and fine manual dexterity is not required, workers should use gloves.

4.6.2 To prevent contact frostbite, workers should wear anti-contact gloves:

- When cold surfaces below 20°F (-6° C) are within reach, each worker should be warned to prevent inadvertent contact by bare skin.
- If the air temperature is 0°F (-18° C) or less, workers should protect their hands with mittens. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.

4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40°F (5° C). The workers should wear cold protective clothing appropriate for the level of cold and physical activity.

4.6.4 Additional Cold Stress Prevention Measures For work practices at or below 10°F (-12° C) ECT, the following will apply:

- The worker should be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
- New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing.
- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
- The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.
- Workers should be instructed in safety and health procedures, which should address:
  - Proper rewarming procedures and appropriate first aid treatment.
  - Proper clothing practices.
  - Proper eating and drinking habits.
  - Recognition of impending frostbite.

- Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
- Safe work practices.

4.6.5 Eye protection for workers employed outdoors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against blowing ice crystals and ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.

4.6.6 Workers handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40^{o}F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of “cryogenic fluids” or those liquids with a boiling point that is just above ambient temperature.

4.6.7 Trauma sustained in freezing or subzero conditions requires special attention, because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Work-Warming Regimen

4.7.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below -15^{o}F (–26^{o}C), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure.

4.7.2 The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.

4.7.3 When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing should be loosened to permit sweat evaporation or a change of dry work clothing provided.

4.7.4 A change of dry work clothing should be provided as necessary to prevent workers from returning to the cold environment with wet clothing.

5.0 Records

5.1 Training records will be maintained by the SH&E Department

5.2 Exposure assessments will be documented in the project files.

6.0 References

6.1 See attachment S3NA-505-WI1 Temperature Thresholds.

S3NA-505-WI1 Temperature Thresholds

1.0 Purpose and Scope

1.1 The following table gives apparent temperatures (wind chill) for various combinations of wind and air temperature, as well as guidelines to the danger of skin exposure.

Table 1. Wind Chill Chart (C)

Actual Temp (°C)	Wind Speed in km/hour									
	8	16	24	32	40	48	56	64	72	80
	Ambient Temperature (°C)									
0	-2	-8	-11	-14	-16	-17	-18	-19	-19	-20
-5	-7	-14	-18	-21	-23	-25	-26	-27	-28	-28
-10	-12	-20	-25	-28	-31	-33	-34	-35	-36	-36
-15	-18	-26	-32	-35	-38	-40	-42	-43	-43	-44
-20	-23	-32	-38	-43	-46	-48	-50	-51	-52	-52
-25	-28	-38	-45	-50	-53	-56	-57	-59	-59	-60
-30	-33	-45	-52	-57	-61	-63	-65	-67	-67	-68
-35	-39	-51	-59	-64	-68	-71	-73	-75	-75	-76
-40	-44	-57	-65	-71	-75	-79	-81	-83	-83	-84
-45	-49	-63	-72	-78	-83	-86	-89	-90	-91	-92
-50	-54	-69	-79	-85	-90	-94	-96	-98	-99	-100

Note: A. Little Danger: if less than one hour of exposure to dry skin.
B. Danger: Exposed flesh freezes within one minute.
C. Great Danger: Flesh may freeze with in 30 seconds.

*Source: *Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio.*

Table 2. Equivalent Chill Temperature Chart (F)

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Chill Temperature (°F)									
Calm	50	40	30	20	10	0	-10	-20	-30	-20
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-24	-33	-46	-58	-70
15	36	22	9	-5	18	-32	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-75	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	35	-51	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Wind speeds >40 mph have little additional effect	LITTLE DANGER				INCREASING DANGER			GREAT DANGER		
	Trenchfoot and immersion foot may occur at any point on this chart.									

Table 3. Work-Warming Schedule Guidelines

Air Temp. (Sunny Sky) °F	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind		25 mph Wind		Air Temp. (Sunny Sky) °C
	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	
above 5°	Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		Normal Work Schedule		above -15°
5° to –1°											100 min	2	-15° to -17°
0° to –4°									100 min	2	75 min	2	-18° to -20°
-5° to –9°							100 min	2	75 min	2	55 min	3	-21° to -22°
-10° to –14°					100 min	2	75 min	2	55 min	3	40 min	4	-23° to -25°
-15° to –19°			100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	-26° to -28°
-20° to –24°	100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work		-29° to -31°
-25° to –29°	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work				-32° to -34°
-30° to –34°	55 min	3	40 min	4	30 min	5	Cease Work						-35° to -37°
-35° to –39°	40 min	4	30 min	5	Cease Work								-38° to -39°
-40° to –44°	30 min	5	Cease Work										-40° to -42°
-44° & below	Cease Work												-43° & below

Modified from ACGIH 2002 Threshold Limit Values for Chemical Substances and Physical Agents.

Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.

Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.

Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater then 50% overcast/clouds, apply the schedule for conditions two steps lower. These modifications are additive with any applicable modifications from Note 2.

Note 4: For wind speeds in excess of 25 mph, cease all nonemergency work when temperatures fall below 5°F.

S3NA-505-WI2 Symptoms and Treatment

1.0 Cold Stress-related Illnesses

1.1 Frostbite

1.1.1 Frostbite is a localized cold injury characterized by freezing of the tissues with ice crystal formation.

1.1.2 This injury is almost always limited to the upper and lower extremities or to such appendages as the ears or nose.

1.1.3 Conditions conducive to frostbite include sub-zero temperatures, hypothermia (most important predisposing factor), dehydration, obstruction of the blood supply to the extremities (by constricting clothing, especially on the feet or at the wrists or ankles), contact with cold metal, contact with organic liquids (such as gasoline or solvents that have been left outdoors in sub-zero temperatures), use of substances that cause vasoconstriction (such as smoking tobacco), or other injury or shock.

1.1.4 Symptoms of frostbite include:

- Pain in the involved tissue is the earliest symptom.
- Sudden and complete cessation of cold or discomfort in affected fingers or toes, often followed by a pleasant feeling of warmth.
- Subsequently the only symptom may be the absence of any sensation in the frozen part.
- Paleness in the affected tissues.
- Firm or hard tissues.
- Purple tissue, if a large area, such as an entire hand or food, is frostbitten.

1.1.5 If exposure occurs in temperatures that are below freezing (32ºF or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Symptoms due to frostbite may include, but is not limited to:

- Superficial redness of the skin
- Slight numbness
- Blisters
- Obstruction of blood flow (ischemia)
- Blood clots (thrombosis)
- Skin discoloration due to insufficient oxygen in the blood (cyanosis)

1.1.6 Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration.

1.1.7 Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

1.2 Hypothermia

1.2.1 Hypothermia is a lower than normal body temperature that occurs when outer cold cools the body faster than the body can produce heat to stay warm.

1.2.2 Hypothermia can be caused by exposure to wind, cold, and/or moisture. The combination of wind, cold, and moisture can be deadly.

1.2.3 Early warning signs of hypothermia:

- Feeling of being cold and tired.
- Heavier breathing and increased pulse rate.
- Tendency to keep moving (e.g., stamping feet, rubbing hands, continued walking/pacing).
- Goose bumps, holding arms tightly wrapped around the body, hunching of shoulders.

- Shivering.

1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:

- Pain in the extremities.
- Severe shivering and numbness.
- Low core body temperature.
- Drowsiness and muscular weakness.
- Apathy.
- Mental confusion.
- Loss of consciousness.
- Shock.
- Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

2.1 Frostbite

2.1.1 Wrap the victim in woolen blanket and keep dry until he or she can be brought inside.

2.1.2 Remove the victim from the cold environment.

2.1.3 Do not rub, chafe, or manipulate frozen parts.

2.1.4 Place the victim in warm water (102ºF to 105ºF) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.

2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.

2.1.6 Do not allow the victim to walk if his or her feet are affected.

2.1.7 Have the victim gently exercise the affected parts once they are thawed.

2.1.8 Seek immediate medical attention for thawing of serious frostbite.

2.2 Hypothermia

2.2.1 Bring the victim into a warm room or shelter as quickly as possible.

2.2.2 Give artificial respiration and stop any bleeding, if necessary.

2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.

2.2.4 Remove all wet clothing.

2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.

2.2.6 Do not allow the victim to sleep.

2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.

2.2.8 Keep the victim still. Do not try to walk.

2.2.9 Do not rub numb skin.

2.2.10 Get medical attention as soon as possible.

S3NA-505-ST Cold Exposure

The following Occupational Health and Safety regulations apply directly to cold and snow hazards:

Jurisdiction	Regulation
United States	
OSHA	Title 29, Code of Federal Regulations, Sections 1910.1027 and 1926.1127
Canada	
Alberta	n/a
British Columbia	OHS Regulation (1997) Sect 7.33 – 7.38
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.14
New Brunswick	OHS Regulation (91-191) Sect 44
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10
Nova Scotia	n/a
NWT/NU Territories	n/a
Ontario	O. Reg. 851 Sect 39, 129
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Schedule 4
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70 Cold Conditions Guidelines for Outside Workers
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9

S3NA-507-PR Hazardous Materials Communication / WHMIS

1.0 Purpose and Scope

1.1 Provides a Hazard Communication Program so that AECOM employees are informed of the hazards of the chemicals to which they may be exposed in the course of their work by way of container labeling and other forms of warning, material safety data sheets (MSDS), and employee training.

1.2 This procedure applies to all AECOM North America based employees and operations.

1.3 The program applies to the use of any hazardous substances which are known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

2.0 Terms and Definitions

Additional definitions can be found in the Hazardous Material Regulations (HMR), the Transportation of Dangerous Goods (TDG) Regulations, and the International Air Transport Association (IATA) Dangerous Goods Regulation (DGR).

2.1 **Acute Effect:** An adverse effect on the human body with immediate onset of symptoms.

2.2 **Article:** A manufactured item: (1) which is formed to a specific shape or design during manufacture; (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and, (3) which does not release or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.

2.3 **Carcinogen:** Those chemicals appearing in any of the following reference sources are established as carcinogens for hazard communication purposes:

- National Toxicology Program (NTP) Annual Report on Carcinogens.
- International Agency for Research on Cancer (IARC) Monographs, Volumes 1-34. Note: The Registry of Toxic Effects of Chemical Substances published by NIOSH indicates whether a substance has been found by NTP or IARC to be a potential carcinogen.

2.4 **Chemical Name:** The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.

2.5 **Chronic Effect:** An adverse effect on the human body with symptoms which develop slowly over a long period of time or which frequently recur.

2.6 **Combustible Liquid:** Any liquid having a flash point at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flash points of 200°F (93.3°C), or higher, the total volume of which makes up 99% or more of the total volume of the mixture.

2.7 **Common Name:** Any designation or identification such as code name, code number, trade name or brand name used to identify a substance other than by its chemical name.

2.8 **Container:** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains a hazardous chemical. For purposes of this Safety Operating Procedure (SOP) and Occupational Safety and Health Administration (OSHA) standard, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.

2.9 **Establishment:** Any separate and distinct AECOM office, laboratory or other company facility.

2.10 **Exposure:** Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes or otherwise come into contact with a hazardous substance.

2.11 **Flammable:** A substance that falls into one of the following categories:

- **Flammable Aerosol**: An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or flashback (a flame extending back to the valve) at any degree of valve opening;
- **Flammable Gas**: A gas that at ambient temperature and pressure:
  - Forms a flammable mixture with air at a concentration of 13% of volume or less; or
  - Forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.
- **Flammable Liquid**: Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flash points of 100°F (37.8°C) or higher, the total of which make up 99% or more of the total volume of the mixture.
- **Flammable Solid**: A solid, other than a blasting agent or explosive as defined in 8 CCR 5237(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.
  - A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

2.12 **Flash Point:** Minimum temperature of a liquid at which it gives off sufficient vapors to form an ignitable mixture with the air near the surface of the liquid or within the container used.

2.13 **Hazardous Chemical:** Those chemicals appearing in any of the following reference sources are established as hazardous chemicals for hazard communication purposes.

- 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, OSHA.
- Hazardous Products Act, R.C.S. 1985, c. H-3, section 2, Canada
- For operations within the state of California, the list of hazardous substances prepared by the California Director of Industrial Relations pursuant to Labor Code Section 6382. The concentrations and footnotes, which are applicable to the list, shall be understood to modify the same substance on all other source lists or hazard determinations set forth in § 8 CCR 5194(d)(3)(B) and (d)(5)(D).

2.14 **Hazardous Substance:** A hazardous chemical or carcinogen, or a product or mixture containing a hazardous chemical or carcinogen provided that:

- The hazardous chemical is 1% or more of the mixture or product or 2% if the hazardous chemical exists as an impurity in the mixture; or
- The carcinogen is 0.1%or more of the mixture or product.
- Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.

2.15 The following materials are not covered by the Hazard Communication Standard:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC 6901 et seq.) when subject to regulations issued under that act by the Environmental Protection Agency.
- Tobacco or tobacco products
- Wood or wood products. Note: Wood dust is not exempt since the hazards of wood dust are not “self-evident” as are the hazards of wood or wood products
- Consumer products (including pens, pencils, adhesive tape) used in the work place under typical consumer usage
- Articles (i.e. plastic chairs)
- Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place

- Foods, drugs, cosmetics in retail store packaged for retail sale
- Any drug in solid form used for direct administration to the patient (i.e., tablets or pills)

2.16 **Hazardous Substance Inventory (HSI) / WHMIS Log:** A listing of all chemicals stored or used at an office or project site. Note that the list may be imbedded in a project Health and Safety Plan.

2.17 **Immediate Use:** Means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

2.18 **MSDS:** A Material Safety Data Sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Controlled Products regulations, schedule 1).

2.19 **MSDS Administrator:** The individual or group designated by the Office Manager to maintain the establishment-specific inventory list or log and the MSDS binder required if that establishment uses or stores hazardous substances.

2.20 **NFPA:** A system of categories, colors and numbers was created to provide basic hazard information. It enables firefighters and other emergency personnel to easily decide whether or not to evacuate an area or proceed with emergency control operations. The three principal categories of identification are Health, Flammability and Instability. A numerical range of “0 to 4” indicates the severity of the hazard. A “4” indicates the most severe and a “0” indicates a minimal hazard.

2.21 **Mixture:** Any solution or intimate admixture of two or more substances which do not react chemically with each other**.**

2.22 **Reactivity:** A measure of the tendency of a substance to undergo chemical reaction with the release of energy.

2.23 **Solubility:** The ability of substance to blend and mix uniformly with another.

2.24 **Specific Gravity (density):** Ratio of the weight of a substance to the weight of the same volume of another substance. As used in this directive, specific gravity or density refers to the weight of substance as compared to the weight of an equal volume of water.

2.25 **Vapor Density:** The weight of a vapor-air mixture resulting from the vaporization of a volatile liquid at equilibrium temperature and pressure conditions, as compared with the weight of an equal volume of air under the same conditions.

2.26 **WHMIS:** The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labeling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education and training programs.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region SH&E Managers** will:

- Audit their regional offices to assure that they maintain an establishment-specific Hazardous Substance Inventory (HSI).
- Audit their regional offices to assure that if an establishment-specific HSI is required, that MSDSs are available for each substance listed on the HSI.
- Provide interpretation of MSDSs and hazard information for WHMIS labels/NFPA labels and other information to assist in training employees.
- Provide hazard communication training to AECOM employees and file documents of this training in the Corporate SH&E office.

- Review MSDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.1.2 **Office Managers** will:

- Have an operations-specific, written hazard communication program which at least describes how the requirements of this Procedure and the US OSHA and Canadian Hazard Communication requirements for labels and other forms of warning, material safety data sheets, and employee information and training will be met.
- Appoint an MSDS administrator for their establishment if they store or use hazardous substances.
- Confirm, if required, that the MSDS Administrator maintains an HSI for their establishment.
- Confirm that MSDS are available for all substances listed on their establishment's HSI.
- Confirm that a copy of this Procedure and the site-specific MSDS are available to all employees. Employees shall be instructed in the location of this Procedure and the MSDS.
- Confirm that all employees in their office affected by the HAZCOM standard are provided with the appropriate training, including new employees.

4.1.3 **Project Managers (field task managers, supervisors)** will:

- Confirm that all employees under their supervision have received the initial and periodic training required by this SOP prior to assigning employees to tasks involve the use of, or potential exposure to, hazardous substances.
- Notify employees of hazardous substances covered by this SOP that are used in their work area.
- Determine the potential fire, toxic, or reactivity hazards which are likely to be encountered in the handling or utilization of a hazardous substance and will communicate this information to their affected employees, before any are permitted to work with it.
- Confirm that an MSDS is available for each hazardous substance used, or potentially encountered, in the work areas or on the projects that are under their supervision.
- Notify subcontractors (working for AECOM) of any hazardous substances that are used or stored by AECOM to which the subcontractor's employees may be exposed.
- Notify clients or property owner/operators of chemicals brought onto their property by AECOM or AECOM's subcontractors.
- Request MSDSs from all subcontractor organization for the relevant chemicals they bring onto an AECOM controlled site.

4.1.4 **Employees** will:

- Confirm that they have received appropriate hazard communication training prior to working with materials that fall under the standard.
- Only work with materials for which they have been instructed on how to find an MSDS and how to work with that material safely.
- Provide a copy of all MSDSs received to the MSDS Administrator at their facility.
- Verify that an MSDS is available in their work area for each hazardous substance that they use.
- Confirm that containers of hazardous substances that they use are properly labelled.

4.2 All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.

4.3 Should AECOM assign employees that do not read and speak English to tasks with chemical exposures, communications will be provided in the language understood by that employee.

4.4 Hazardous Waste Exemption

4.4.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. However, AECOM employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 – Hazardous Waste Operations And Emergency Response. This standard requires that:

- Employees receive 40-hour initial and 8-hour annual SH&E training; and that
- Information on the hazards of hazardous wastes be documented in a site-specific Health and Safety Plan (HASP) and communicated to all employees in site-specific briefing on-site training required by the standard.

4.4.2 Therefore, AECOM HAZWOPER projects are not required to comply with the requirements of this SOP as they relate to the hazardous wastes that are present at those project sites.

4.4.3 AECOM's Health And Safety Plan (HASP) requirements are specified in *S3NA-509-PR Hazardous Waste Operations and Emergency Response.*

4.5 Hazardous Substance Inventory

4.5.1 Establishment-Specific Hazardous Substance Inventory or WHMIS Log

- If an AECOM establishment uses or stores additional hazardous substances, an establishment-specific HSI must be maintained at that establishment.
- If it is determined that an office-specific HSI is needed, the AECOM **Office Manager** shall assure that one is developed and maintained by someone appointed as the establishment's MSDS Administrator.
- The content of the office-specific written inventory shall be updated as new hazardous substances are procured for, or removed from, the establishment and shall be verified by the **Region SH&E Manager** through regular inspections of the establishment.
- In order to meet the 30-years-after-employment-termination record retention requirement, the office-specific HSIs shall be treated as a permanent record.

4.6 Material Safety Data Sheets

4.6.1 Establishment-Specific MSDS Inventory

- If it is determined that an AECOM establishment is required to maintain an establishment-specific inventory ,MSDSs for the specific hazardous substances must be maintained on file at that establishment.
- The **Region SH&E Manager** shall audit the local office program for MSDS request and maintenance and report deficiencies to the appropriate management level, as necessary, to assure compliance with this SOP.

4.6.2 Field Project Sites and Client Facilities

- The **Project Manager** and/or the **Site Safety Officer** shall access or obtain, and maintain copies of MSDS from:
  - All AECOM subcontractors bringing chemicals onto the project site; and
  - The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.

4.6.3 Employee Access to MSDSs

- MSDSs should be maintained at the local establishment that uses that hazardous substance. Copies of the MSDS should be made available to the employee upon request to the office's MSDS Administrator.

4.6.4 Field Access to MSDSs

- When hazardous substances are brought into the field, the user must assure that a copy of the MSDS for that substance accompanies it and is available at the field location where it is to be used.

4.6.5 MSDSs for AECOM Products

- It is unlikely that AECOM activities would create a chemical for which a new MSDS were needed. If such a chemical were created, the Corporate SH&E Department shall work with the appropriate operations groups to draft, review, and publish the new MSDS.

4.6.6 Content of the Material Safety Data Sheet

- As a minimum, the MSDS must contain the following information:
  - The name, address, and telephone number of the source of the product or material, preferably those of the manufacturer
  - The trade name and synonyms of the product or material
  - Chemical names of hazardous ingredients, including, but not limited to, those in mixtures
  - An indication of the percentage, by weight or volume, which each ingredient of a mixture bears to the whole mixture
  - Physical data pertaining to the product or material, including boiling point (in °F); vapor pressure (in mm of mercury); vapour density of gas or vapour (air = 1); solubility in water (in percent by weight); specific gravity of material (water = 1); percentage volatile by volume (at 70 °F); evaporation rate for liquids (either butyl acetate or ether may be taken as 1); and appearance and odour
  - Fire and explosion hazard data pertaining to the product or material, including flash point (in °F); flammable limits (in percent by volume in air); suitable extinguishing media or agents; special fire fighting procedures; and unusual fire and explosion hazard information
  - Health hazard data pertaining to the product or material, including exposure limits, effects of overexposure and medical conditions aggravated by exposure, and emergency and first-aid procedures
  - Reactivity data, including stability, incompatibility, hazardous decomposition products, and hazardous polymerization
  - Procedures to be followed and precautions to be taken in cleaning up and disposing of materials leaked or spilled
  - Special protection information, including use of personal protective equipment, such as respirators, eye protection, and protective clothing, and ventilation or other control measures
  - Special precautionary information about handling and strong
  - Any other general precautionary information
- MSDSs that do not contain this information shall be returned to the distributor or manufacturer to be updated.

4.6.7 Trade Secrets

- Some hazardous substance suppliers may claim the information requested on MSDSs is proprietary and not provide the information to AECOM.
- When MSDSs supplied to the AECOM Regional SH&E Manager indicate that proprietary information has been withheld, the Regional SH&E Manager will either obtain the necessary information to make a hazard assessment or reject the material for use within AECOM.

4.7 Labeling

4.7.1 Containers of hazardous substances used or stored in each AECOM establishment must be labeled, tagged or marked with the following information:

- Identification of the hazardous substance(s)

- Appropriate hazard warnings
- Name and address of the manufacturer, importer or other responsible parties
- Safe Handling Instructions
- Statement that an MSDS is available for the product

4.7.2 Labels on containers shall not be removed or defaced. Labels or other forms of warning shall be legible, in English and French (Canada), and prominently displayed on the container.

4.7.3 Any failure to have the appropriate labeling information on a container at any time will be cause to suspend use of the product until the container is properly labeled.

4.7.4 Carcinogen Labeling

- Chemicals which have been indicated as positive or suspect carcinogens by either OSHA, ACGIH, the International Agency for Research on Cancer (IARC) (World Health Organization), or the National Toxicology Program (NTP) will be considered to be carcinogenic for purpose of the HCS. Those chemicals identified as being “known to be carcinogenic” by NTP must have carcinogen warnings on the label and information on the MSDSs.

4.7.5 Stationary Process Containers

- If there is stationary process equipment within a work area, signs, placards, process sheets, batch tickets, operating procedures, or other such written materials may be used in lieu of fixed labels on the containers, as long as the alternative method conveys the appropriate hazard information. The written materials shall be readily accessible to the employees in the work area.

4.7.6 Portable Containers

- Portable containers of hazardous substances need not be labelled when the substance is transferred from labelled containers and is intended for immediate use of the employee who performs the transfer.
- Containers of hazardous substances transferred from labelled containers and not intended for the immediate use of the employee performing the transfer shall be labelled with the chemical name and a hazard warning label in accordance with the National Fire Protection Association’s (NFPA) 704M Hazard Identification System shall be attached.

4.8 Chemical Storage

4.8.1 Hazardous chemicals are to be stored in their original, labeled containers with the lids securely closed and taped if possible. Flammable and combustible materials must be stored in fire impervious cabinets in designated stockroom areas. Chemicals must be stored in compliance with instructions provided on their labels, MSDS, or the manufacturer’s specifications.

4.8.2 All hazardous chemicals must be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.

4.8.3 Hazardous chemicals shall not be stored with foods or beverages. Food and beverages shall not be consumed in areas where hazardous chemicals are used or stored.

4.9 Chemical Use in Offices

4.9.1 In general, hazardous substances should not be taken into office areas, conference rooms, or break areas. If this general requirement is infeasible, contact the SH&E Department for guidance.

4.9.2 General exceptions to this rule are the following:

- Liquid paper
- Toner
- Cleaners
- Isobutylene calibration gas
- pH calibration solutions for instruments

4.10 Employee Information and Training

4.10.1 Each AECOM **employee** who handles or is exposed to hazardous substances must be provided information and training on hazardous substances in their work area.

- At the time of their initial assignment
- Whenever a new hazard is introduced into their work area

4.10.2 As a minimum, the training requirements apply to AECOM personnel in the following job categories:

- All personnel who perform field work that involves the use of, or potential exposure to, hazardous substances
- Laboratory Employees

4.11 Initial Training Content

4.11.1 The Initial Training will provide instruction in the following:

- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area (such as personal monitoring, visual appearance or odor of hazardous substances being released, etc.);
- The physical and health hazards of substances in the work area and measures and procedures AECOM has implemented to protect employees; and
- The details of this hazard communication program (SOP), including an explanation of the labeling system and the MSDS, and how he/she can obtain and use appropriate hazard information.

4.11.2 The Initial Training will also inform the employee of the following:

- Any operations in their work area in which hazardous substances are present
- Location and availability of this written hazard communications program (SOP)
- Their right to personally receive information regarding hazardous substances to which they may be exposed
- Their right to have their physician receive information regarding hazardous substances to which they may be exposed
- Their right against discharge or other discrimination (in California) due to the employee's exercise of rights afforded pursuant to provisions of the California Hazardous Substances Information and Training Act

4.12 Periodic Training and Training for Non-Routine Tasks

4.12.1 Additional training will be provided to employees who have received initial training whenever:

- A new hazardous substance is introduced into their work area
- A new or revised MSDS is received, which indicates significantly increased risks to employee health as compared to those stated on the previous MSDS
- Non-routine tasks are performed, which will potentially result in exposure to hazardous substances, or exposure under circumstances, which were not addressed during initial training

4.12.2 Supervisors, in coordination with their **Region SH&E Manager**, shall provide such training through an explanation of the information on the contents of the MSDS for that substance.

4.12.3 When training their employees, supervisors shall explain:

- Any health hazards associated with use of the substance or mixture
- Proper precautions for handling
- Necessary personal protective equipment or other safety precautions to prevent or minimize exposure

- Emergency procedures for spills, fire, disposal, and first aid

4.12.4 For most projects involving field work, this periodic training requirement will be facilitated through the implementation of the site specific HASP that has been developed for the project.

4.13 Documentation of Initial and Periodic Training

4.13.1 All training required by this SOP shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.14 Chemical Usage

4.14.1 Prior to using any chemical, a Task Hazard Analysis (THA) shall be completed by the employees assigned to use the chemical. The analysis will identify the hazards associated with the tasks to be performed and prescribe the Personal Protective Equipment (PPE) to be used.

4.15 Office Specific Written Program

4.15.1 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program. If the local office decides to implement the requirements of the standard in any way that differs from this procedure, they shall verify the changes with the SH&E department, document the changes, and communicate the differences to all affected employees.

4.15.2 For Canadian operations, all relevant MSDS must be current (no more than 3 years old) and readily available (in French and English) for all hazardous materials.

4.16 Canada-specific

4.16.1 Consumer products are exempt from supplier labels and MSDS requirements. Some cleaning solvents may be packaged as consumer products and these must be labeled in accordance with the Consumer Product Act requirements.

4.16.2 In addition to the labelling of storage containers in the workplace, the contents of process piping (including valves), process vessels and reaction vessels are required to be identified through the use of colour coding, labels, placards or other modes of identifications that must be communicated to workers through training programs. It is very important for employees to be aware of and understand Client labelling requirements for these types of process systems.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-508-PR Hazardous Materials Handling, Shipping, and Manifesting

1.0 Purpose and Scope

1.1 Prescribes the minimum requirements for shipping samples, hazardous materials (HZM) and dangerous goods. It is designed to provide a framework for compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR)published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air.

1.2 Applies to all AECOM North America based staff and operations.

2.0 Terms and Definitions

A complete list of definitions can be found in their entirety in the HMR, the TDG Regulations, and the IATA DGR. The below represents those terms most likely to affect AECOM's operations.

2.1 **Agency Letter:** A letter approved by both AECOM's Legal Department and the client and that authorizes AECOM to act as its agent for the purpose of arranging for the transport and/or disposal of waste, and indeminifies AECOM's liability when acting"As an Agent of [client's name]".

2.2 **Carrier:** A person engaged in the transportation of passengers or property by land, water, or air either as a common, contract, private carrier, or civil aircraft.

2.3 **Dangerous goods:** Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the TDG Regulations and/or IATA regulations or which are classified according to the TDG Regulations and/or IATA regulations. Generally synonymous with hazardous materials.

2.4 Delegations of Authority **(DOA):** The framework of authority within which AECOM (North America) carries out its day-to-day operations.

2.5 **Generator:** The party that created the hazardous waste; hazardous waste generators are divided into categories based on the amount of waste they produce each month.

2.6 **Hazardous materials (HzM):** A substance or material which has been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials.

2.6.1 Hazardous materials may include, but are not limited to: batteries, adhesives, paints, compressed gases, nuclear density meters, laboratory reagents, field samples, soil and sand siftings, hazardous wastes, and materials used for bench scale and pilot plant operations. While most environmental samples (both water and soil) do not meet the definition of hazardous material, extreme care must be taken to properly classify materials. HzM Classifications are as follows:

- Class 1 Explosives
- Class 2 Gases
- Class 3 Flammable Liquid
- Class 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet
- Class 5 Oxidizer, Organic Peroxide
- Class 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance
- Class 7 Radioactive

- Class 8 Corrosive
- Class 9 Miscellaneous Hazardous Material

2.7 **Hazardous Waste (HzW):** A "solid waste" which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (1) Pose a substantial present or potential hazard to human health or the environment when impropoerly treated, stored or disposed of, or otherwise mismanaged; or (2) cause or contribute to an increase in mortality, or an increase in irreversible or incapacitating illness. Four types of hazardous waste exists:

- Listed Waste: Wastes that USEPA has determined are hazardous. The lists include the F-list (waste from common manufacturing and industrial processes), K-list (wastes from specific industries), and P- and U-lists (wastes from commercial chemical products).
- Characterized Wastes: Wastes that do not meet any of the listings above but that exhibit ignitability, corrosivity, reactivity, or toxicity.
- Universal Wastes: Batteries, pesticides, mercury-containing equipment and lamps.
- Mixed Wastes: Waste that contains both radioactive and hazardous waste components.

2.8 **Hazardous Waste Manifest System:** A set of forms, reports, and procedures designed to seamlessly track hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the off-site waste management facility that will store, treat, or dispose of the hazardous waste.

2.9 **HzM employee:** A person who is employed by AECOM who in the course of employment directly affects dangerous goods/hazardous materials transportation safety. This term includes employees who prepare hazardous materials for transportation, or are responsible for safety of transporting hazardous materials.

2.10 **HzM employer:** A person who uses one or more of its employees in connection with transporting dangerous goods/hazardous materials in commerce, causing hazardous materials to be transported or shipping in commerce.

2.11 **HMR:** Hazardous Material Regulation

2.12 **IATA:** International Air Transport Association.

2.13 **ICAO:** International Civil Aviation Organization

2.14 **Manifest:** A paper document that contains information on the type and quantity of the waste being transported, instructions for handling the waste, and signature lines for all parties involved in the disposal process, which must be signed by each party that handles the waste.

2.15 **Materials of Trade (MOT) :** A hazardous material, other than a hazardous waste, that is carried on a motor vehicle:

- For the purpose of protecting the health and safety of the motor vehicle operator or passengers;
- For the purpose of supporting the operation or maintenance of a motor vehicle (including its auxiliary equipment); or
- By a private motor carrier in direct support of a principal business that is other than transportation by motor vehicle.

2.16 **NAPL:** Non-aqueous phase liquid

2.17 **Offeror:** Any person who performs functions including selecting packaging, physical transfer of hazardous materials, classifying hazardous materials, preparing shipping papers, signing hazardous material certifications on shipping papers (as agent for), marking or placarding vehicles or packagings, or providing placards to carriers.

2.18 **Reportable Quantity (RQ):** The spill- or incident-related quantity of a material listed in the applicable Federal, State, or Provinicial regulations requiring a formal report.

2.19 **Serious Hazardous Materials Incident:** Anytime a material is found outside of its containment and has the potential to harm people or the environment.

2.20 **Shipper:** see Carrier

2.21 **Transporter:** An entity that moves hazardous waste from one site to another by highway, rail, water, or air.

3.0 Attachments

3.1 S3NA-508-WI1 Hazardous Materials Shipping Guidelines

4.0 Procedure

4.1 General Requirements

4.1.1 Employees designated as HzM DOT Level 1 or 2 Shippers are the only individuals authorized to physically transport or prepare documents to ship HzM via a carrier.

4.1.2 Specific technical names must be used on shipping documents (i.e., Shipper's Declaration for Dangerous Goods); never use an acronym (i.e., LNAPL) as the technical name.

4.1.3 Shipments of HzM must be placed in appropriate containers to prevent any leaks or releases of the HzM.

4.1.4 All HzM shipments via a carrier must be reported to INFOTRAC prior to shipment.

4.1.5 AECOM staff are not authorized to physically transport HzM quanitities, in a motor vehicle, in excess of the MOT limits.

4.1.6 AECOM staff are only authorized to sign a client's Hazardous Waste Manifest if:

- The necessary approvals have been obtained per the DOA (North America);
- The client could not logistically sign the manifest given they were not on the site;
- An Agency Letter was signed by the client and approved by the Legal Department; and
- AECOM staff completed the required training.

4.1.7 AECOM will never be identified as the GENERATOR on a client's Hazardous Waste Manifest.

4.1.8 Never sign a client's Hazardous Waste Manifest as AECOM, sign "As an Agent of [client name]".

4.2 Roles and Responsibilities

4.2.1 **Project Managers** will be responsible for the following:

- Verifying the potential to ship HzM via a carrier during the planned scope of services and if confirmed, identify the appropriately trained individuals are available to support the HzM shipment.
- Prior to authorizing an AECOM employee to sign a client's Hazardous Waste Manifest, the Project Manager will:
    - Verify with the Office of Risk Management that the necessary DOA approvals are in-place;
    - Obtain an Agency Letter approved by both the client and AECOM's Legal Department.
- Prior to assignment, confirm that employees are properly trained to perform their job-specific assignments.
- Filing copies of all HzM shipping documents in the project files.
- Providing for the appropriate storage of the HzM in the office or other necessary location.

4.2.2 **Supervisors** will be responsible for the following:

- Verifying that the HzM to-be shipped is prepared/packaged by the designated DOT Level 1 or 2 Shipper.
- Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to AECOM's Incident Reporting Line.

4.2.3 **Employees** will be responsible for the following:

- Shipping or transporting HzM as authorized.
- Signing a client's Hazardous Waste Manifest as authorized.
- Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to the Supervisor.

4.2.4 **DOT Level 1 Shippers** will be responsible for the following:

- Identifying, with the support of a DOT Level 2 Shipper, the appropriate HzM shipping requirements (i.e., packaging, labelling, regulated status, and shipping documents).
- Preparing the necessary HzM shipping documents.
- Contacting a DOT Level 2 Shipper if uncertain of the shipping requirements.
- Maintaining the appropriate training as required by the HMR, TDG, and IATA.

4.2.5 **DOT Level 2 Shippers** will be responsible for the following:

- Serving as the HzM shipping Subject Matter Expert for the Geography, Region, or other business unit , as appropriate.
- Supporting information requests from DOT Level I Shippers.

4.2.6 **Americas SH&E Director** will be responsible for the following:

- Contracting a 24-hour emergency response service with a telephone number that will be answered by a person either with information on the hazards of the shipment or with immediate access to such a person.
- Maintaining the annual renewal of AECOM's U.S. DOT Hazardous Materials Registration.
- Posting AECOM's Hazardous Materials Registration on myAECOM.

4.2.7 **Americas SH&E Training Director** will be responsible for the following:

- Defining the training to be required of employees involved in HZM shipping and facilitate the delivery of that training.

4.2.8 **Region SH&E Managers** are responsible for the following:

- Provide resources to employees involved in shipping hazardous materials.
- Approving the designation of a DOT Level 2 Shipper.
- Supporting the delivery of HzM shipping and Hazardous Waste Manifest training.

4.2.9 **Region Counsel** will be responsible for the following:

- Reviewing and approving the Agency Letter authorizing AECOM to sign a client's Hazardous Waste Manifest "As an Agent of [client's name]".
- Updating the template Agency Letter to address additional liabilities, as necessary.
- Providing the template Agency Letter to Project Managers, as requested.

4.2.10 **Office of Risk Management** will be responsible for the following:

- Supporting Project Managers in understanding the applicable DOA requirements as it pertains to signing a client's Hazardous Waste Manifest "As an Agent of [client's name]".

4.3 Training

4.3.1 **Employees** involved in shipping hazardous materials/dangerous goods (e.g., packaging, preparing paperwork, loading and/or unloading, and transporting hazardous materials) are required to have documented training prior to shipping activities. Training requirements are based on the type of materials shipped (e.g., calibration/compressed gases, laboratory reagents, field samples, hazardous wastes, etc.) and employee responsibility.

4.3.2 **DOT Level 1 Shipper *Performance Training*:** The specific content of this 4-hour training will vary depending on the country in which you are performing work (Canada vs. US) and is focused on proper procedures for packaging, labeling and shipping HzM/HzW over land and sea. This training has a three year renewal requirement.

4.3.3 **DOT Level 2 Shipper *Performance Training*:** A comprehensive 2-day HzM shipping training course typically completed in an in-person seminar.

4.3.4 **IATA *Performance Training*:** This training supplements Level 1 training and provides additional information for the proper shipment of HzM/HzW via air transportation. This training has a two year renewal requirement.

4.3.5 **Resource Conservation and Recovery Act (RCRA) Part B Awareness Training (US Project Sites):** Applicable to employees shipping HzW, including listed wastes, from US project sites. General RCRA Awareness training can be completed through online vendors. Additional project-specific training regarding HzW generation, project site roles and responsibilities, HzW management and shipment will need to be coordinated between the Project Manager and Client. Training may also include procedures for signing waste documents, i.e. profiles and characterization forms, where permitted by client contracts. Training will be provided in accordance with Permits, Consent Orders or other Regulatory Agency-issued agreements regarding project site HzW generation. This training has an annual renewal requirement.

5.0 Records

5.1 Bill of Lading

5.2 Shipper's Declaration for Dangerous Goods

5.3 Agency Letter

5.4 Hazardous Waste Manifest

6.0 References

6.1 None

S3NA-508-WI1 Hazardous Materials Shipping Guidelines

1.0 Purpose and Scope

1.1 The following information outlines the generally accepted guidelines for preparing a HzM or Dangerous Goods package for shipment in compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR)published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air. However, this information is not implied or to be construed as a replacement for the regulatory requirements, rather this information is intended to help an individual better understand the necessary steps and formulate questions surrounding the shipment of HzM and/or Dangerous Goods.

1.2 **Shipping**

1.2.1 Select the best way to ship the hazardous material based on the quantity, hazard(s), and mode of transportation (e.g., air, land, water). Since more restrictive requirements apply to air shipments, ground shipment (e.g., use of a lab courier service) is encouraged for shipping HzM.

1.2.2 Most (if not all) package shipments (Common Carriers such as Federal Express, UPS, etc.) are transported by air. Air transportation of hazardous materials is regulated by IATA. AECOM will occasionally ship HzM internationally (e.g., Puerto Rico is considered an international destination by Federal Express). AECOM **employees** must follow the IATA DGR for any air transportation of hazardous materials.

1.3 **Ground transportation of HzM may use either HMR or TDG Regulations protocols**

1.3.1 Specific packaging and shipping instructions apply to all dangerous goods shipments. These instructions vary by chemical/product and are different for passenger aircraft and cargo aircraft.

1.3.2 Carrier-specific requirements can be obtained from the Internet or by calling the carrier's customer service line.

1.3.3 The process for offering HzM for shipment includes:

- Determine the proper shipping name, hazard class, labeling requirements, and packing group.
- Determine and comply with the proper packaging instructions.
- Choose the proper package based on the packaging instruction and the type and quantity of material being shipped.
- Ensure package contents are compatible.
- Package, mark and label according to applicable regulations and instructions.
- Prepare shipping papers and complete the bill of lading or shipper's declaration for dangerous goods, according to applicable regulations and according to the carrier's specific requirements.
- Include on the shipping documents the shipper's certification, emergency response information and telephone number.
- Include with the shipment a copy of the applicable emergency response information with shipping papers for responders to use in emergency situations. This information includes, but is not limited to, appropriate pages from the DOT Emergency Response Guidebook (ERG) and/or Material Safety Data Sheets (MSDS).

1.3.4 AECOM personnel participating in shipping HzM are required to provide a 24-hour emergency response telephone number that must be answered by a person either with information on the hazards of the shipment or with immediate access to such a person. AECOM has selected INFOTRAC® (http://www.infotrac.net/) to provide 24-hour emergency response support service. All HzM shipping papers which list INFOTRAC® for 24-hour emergency response must list AECOM's account number **74984**.

1.3.5 Determine the placard or placards required for the materials being offered for transportation, provide placards and affix as required.

1.3.6 Notify the carrier of the proper shipping name, hazard class and total quantity of each hazardous material being offered for transportation, and make a final check for compliance with regulations and instructions before tendering the shipment to the carrier. All HzM shipping papers and dangerous goods airbills must be typed.

S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities

1.0 Purpose and Scope

1.1 Provides requirements for AECOM operations pertaining to hazardous waste and emergency response (HAZWOPER) services.

1.2 This procedure applies to all AECOM North America-based employees and operations.

1.3 In Canada there is no direct federal or provincial counterpart to HAZWOPER; however, as due diligence and in compliance with applicable provincial duty of care/general duty clauses, staff working in Canada will comply with this procedure.

2.0 Terms and Definitions

2.1 **Emergency Response**: A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrollable release of a hazardous substance. Responses to incidental release of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by maintenance personnel are not considered to be emergency responses within the scope of the HAZWOPER standard. Responses to releases of hazardous substances where there is no potential safety or health hazard are not considered to be emergency responses.

2.2 **Health and Safety Plan**: A document prepared for each project that contains site-specific information including the Emergency Response Plan for the project.

2.3 **Incident Command System (ICS)**: ICS is a standardized on-scene incident management concept designed specifically to allow responders to adopt an integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries. In the ICS the first person responding to an incident becomes the Incident Commander and turns that title and duties over to more qualified responders as they arrive on scene.

2.4 **First Responder**: First responders are individuals who are likely to witness or discover a hazardous substance release, injury, fire, or other incident and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond first aid, initial control of the incident, and notifying the authorities and others of the incident.

2.5 **Hazardous Materials Specialist**: Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities in regards to site activities.

2.6 **Hazardous Materials Technician**: Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

2.7 **Incident Commander**: The Incident Commander (IC) is responsible for all aspects of the response, including developing incident objectives and managing all incident operations. The title and responsibilities are typically assumed by a qualified IC from the client or public sector.

2.8 **Hazardous Waste**: Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be

discarded commercial products, like cleaning fluids or pesticides, or the byproducts of manufacturing processes. Hazardous waste are divided into

2.8.1 Listed wastes (http://www.epa.gov/osw/hazard/wastetypes/listed.htm),

2.8.2 Characteristic wastes (http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm),

2.8.3 Universal wastes (http://www.epa.gov/osw/hazard/wastetypes/universal/index.htmwastes), and

2.8.4 Mixed wastes

2.8.5 Specific procedures determine how waste is identified (http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm), classified, listed, and delisted.

2.9 **Hazardous Materials:** A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Additionally a hazardous material may be defined as any substance or chemical which is a "health hazard" or "physical hazard," including chemicals that are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents that act on the hematopoietic system; agents that damage the lungs, skin, eyes, or mucous membranes; chemicals that are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive, or water-reactive; and chemicals that in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists, or smoke that may have any of the previously mentioned characteristics. This may be caused when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing into the environment, by being transported or moved, and items or chemicals that are "special nuclear source" or byproduct materials or radioactive substances.

3.0 Attachments

3.1 S3NA-509-FM1 Direct Reading Instrument Monitoring Log

3.2 S3NA-509-FM2 Instrument Calibration Log

3.3 S3NA-509-FM3 Personal Sampling Data Sheet

3.4 S3NA-509-FM4 Emergency Information and Hazard Assessment

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region Operations Managers** and **District Managers** shall be responsible for the following:

- Provide support to the implementation of Health and Safety Plans and Emergency Action Plans.

4.1.2 **Project managers** shall be responsible for the following:

- Prepare or request a HASP for every AECOM project.
- Verify that all personnel working on the project are qualified.
- Request client's emergency response procedures.
- Appoint a **Site Safety Officer (SSO)** for each project.
- Communicate the site-specific emergency response details to all employees assigned to a field project.
- Confirm that the necessary communications equipment for the project is available.
- Confirm that an accident/incident investigation is performed and a report is filed.

4.1.3 **Region SH&E Managers** shall be responsible for the following:

- Provide technical guidance for the development and implementation of Health and Safety Plans and Emergency Action Plans.
- Prepare emergency action plans as part of project HASPs and emergency reference sheets.
- Interface with the local emergency responders when necessary.
- Interface with clients regarding facility emergency response procedures.

4.1.4 **Site Safety Officer** is responsible for the following:

- Verify that a HASP is available for the project.
- Communicate the site-specific emergency response details to all **employees** assigned to a field project.
- Stop work and initiate emergency response procedures as required.
- Account for all AECOM and subcontractor employees after site evacuation.
- Conduct pre-entry briefing and daily tailgate meetings and review facility and site-specific emergency procedures.
- Brief on-site and off-site responders in the event of an emergency.

4.1.5 **Employees**

- Maintain HAZWOPER training.
- Follow the HASP and emergency procedures prepared for the project.
- Initiate emergency response via verbal communications or the alarm system if first to encounter the emergency.

4.1.6 All personnel (e.g., AECOM **employees**, general laborers, equipment operators, chemists, supervisors, etc.) performing activities at hazardous waste sites that expose or potentially expose them to hazardous wastes and health hazards are considered HAZWOPER site workers and must meet the training and medical surveillance requirements specified in 29 CFR 1910.120(e) and (f), respectively. Additional training may be required based on site activities including related exposures and risks (e.g., confined space entry, excavations, fall protection, other materials [lead], etc.). These additional training requirements are to be outlined in the project- or site-specific health and safety plan (HASP).

4.2 Personnel Qualifications—Medical Surveillance and Training

4.2.1 HAZWOPER-qualified employees will participate in the following medical surveillance and training requirements.

4.2.2 Medical Surveillance

- Specific HAZWOPER medical examination protocols have been developed by **AECOM's Corporate Medical Provider (CMP)** to meet the requirements of 29 CFR 1910.120(f). To be medically qualified to perform HAZWOPER work, **employees** receive the following medical examinations:
    - Initial (Baseline) Examination—The initial examination is part of pre-employment requirements and must be completed (with results received) prior to the employee's start of work date.
    - Annual Examination—HAZWOPER-qualified **employees** will complete a medical examination once each year. Medical qualification expires on the anniversary date of the last examination completed. There will be no "grace period" exemptions beyond this date without the express approval of the **Region SH&E Manager**. At the recommendation of the **SH&E Department**, the **CMP** may approve an alternate examination frequency at periods of up to two years (biennial) in cases in which the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel).
    - Termination Examination—When reassigned to non-HAZWOPER duties, or at the conclusion of employment at AECOM, HAZWOPER-qualified personnel will be provided with the opportunity to receive a termination medical examination.
    - Special Examinations—The SH&E Department and the CMP will jointly determine the need for special examinations because of
        - Unusual exposure conditions.
        - In response to possible overexposures.
- The **CMP** will determine the medical protocol elements for each of these examinations based on exposure information provided by the **SH&E Department**. The **CMP** will evaluate the results of each employee's examination and will provide a written statement of medical clearance

clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120(f)) and approval of the employee to perform unrestricted HAZWOPER activities. for initial and annual examinations, the **CMP** will also evaluate the **employee** for the use of air purifying and supplied air respiratory protection. The written evaluation from these examinations will indicate the **CMP's** approval/limitations on the employee's use of respiratory protection.

4.2.3 AECOM Training

- All personnel assigned to work at a hazardous waste site must participate in training meeting the requirements of 29 CFR 1910.120(e).
- Initial 40-Hour Training—Before being assigned to a HAZWOPER site, AECOM employees must complete 40 hours of off-site training meeting the requirements of 29 CFR 1910.120(e)(3)(i). At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification must be provided to the employee's SH&E Coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the site supervisor when working on any HAZWOPER site.
- In addition to the initial 40-hour training, the **employee** must receive three days of actual supervision by a trained experienced supervisor.
    - Available Training Sources:
        - On-site training provided by the SH&E Department.
        - Outsourced training providers approved by the SH&E Department.
- Refresher 8-Hour Training—To remain qualified to perform on-site HAZWOPER work activities, each AECOM **employee** will complete 8 hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120(e)(8) at yearly intervals following completion of Initial 40-hour training. At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification must be provided to the employee's SH&E Coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the site supervisor when working on any HAZWOPER site.
    - Available Training Sources:
        - Internet-based training approved by **SH&E Department**
        - On-site training provided by the **SH&E Department**
        - Outsourced training providers approved by the **SH&E Department**
- Supervisor 8-Hour Training—Any AECOM employee acting in a management capacity for HAZWOPER activities (e.g., project management personnel, field managers/foremen, site safety officers, etc.) must complete an additional 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120(e)(4). Although this training is required only once, supervisors must maintain their overall HAZWOPER qualification through annual completion of refresher training. At the conclusion of Supervisor 8-Hour Training personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction and the training date. A copy of this certification must be provided to the employee's SH&E coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the senior site supervisor when working on any HAZWOPER site.
    - Available Training Sources:
        - On-site training provided by the **SH&E Department**
        - Outsourced training providers approved by the **SH&E Department**
- 24-Hour HAZWOPER Training—Site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120(e)(3)(ii). Personnel potentially qualifying for this alternative training include:
    - Site support personnel who will not work in any Exclusion Zone areas.
- Subcontractors and site visitors whose duties will not entail significant exposure to site contaminants defined as not working in any areas where airborne contaminant concentrations

exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels.The **Region SH&E Manager** or **SH&E department** designee must approve the substitution of 24-hour training for initial 40-hour training. Persons qualifying for 24-hour training must provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training must complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work and must provide proof of this training (as necessary to demonstrate retraining) prior to beginning work on site.

4.2.4 Subcontractor Personnel

Any subcontractor organization whose employees will support AECOM operations at a HAZWOPER site will:

- Provide the **AECOM Project Manager** with a copy of their written HAZWOPER medical surveillance and training program requirements. The elements of the program(s) must be similar to those for AECOM's own program, as detailed above.
- Provide the **Project Manager** with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
  - A copy of the physician's signed medical clearance for each **employee** (preferred), or
  - A letter identifying the medical status and clearance expiration date of every **employee**, signed by the company's safety director or an officer of the company.
  - A copy of the each employee's training certifications, which will include:
    - The initial 40-hour training certificate (24-hour training may be substituted with SH&E department approval).
    - The most current Refresher training certificate (must be current within the previous one-year period).
    - A copy of the Supervisor training certificate for each person serving in a site supervisory capacity (e.g., **field managers/foremen, site safety officers,** etc.).

4.3 Project SH&E Documentation—Health and Safety Plans

4.3.1 The project SH&E documentation prepared for HAZWOPER activities is referred to as a site-specific Health and Safety Plan (HASP), and must meet the requirements presented in 29 CFR 1910.120(b)(4).

4.3.2 The required plan elements include:

- A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions).
- A summary of the work activities to be performed under AECOM's scope of activities.
- A safety and health risk or hazard analysis for each on-site task that will be performed. Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task.
- Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses.
- Personal protective equipment (PPE) requirements for each work task.
- Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used.
- Site control measures.
- Decontamination procedures.
- An emergency response plan, *S3NA-509-FM4 Emergency Information and Hazard Assessment*, addressing actions to be taken in the event of each type of credible incident that might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

4.3.3 Responsibility for development of each AECOM HASP will be coordinated between the **Project Manager** and the **Region SH&E Manager** or **SH&E Department** designee as part of project initiation. Regardless of where the HASP is developed, it will be reviewed and approved by the **SH&E Department** prior to submission to any agency outside of AECOM.

4.4 Contractors and Subcontractors

4.4.1 The health and safety of any contractor's or subcontractor's employees is solely the responsibility of that contractor or subcontractor, who shall evaluate the hazards and potential hazards to their own employees and shall adhere to their own Health and Safety Plan.

4.4.2 In addition, all AECOM subcontractors' Health and Safety Plans will, at a minimum conform to the requirements of the AECOM Health and Safety Plan. The AECOM Health and Safety Plan does not, nor is it intended to, address procedures of contractors or subcontractors during their site activities.

4.5 Field Emergency Response Plans

4.5.1 AECOM employees are not expected to take action or to participate in rescues or responses to chemical releases beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911.) If AECOM employees are to participate in the response to a chemical release beyond the initial reaction, there must be a contractual provision for this response and the employees must be specifically trained for this response. This document is designed to provide guidelines on how to prepare a written plan that will ensure prompt and proper response to an emergency situation that arises during field investigations and to outline the duties of AECOM employees during a field emergency and the associated training requirements.

4.5.2 Site specific health and safety plans that are prepared to comply with the HAZWOPER standard (29 CFR 1910.120) must address emergency response. This standard specifically outlines the elements that must be contained in an emergency response plan. However, the definition of emergency response, as written in 29 CFR 1910.120, focuses on emergencies involving the uncontrolled release of hazardous substances. Under 29 CFR 1910.120, an employer can opt to evacuate employees from the danger area when such an emergency occurs. AECOM does not expect its employees to actively assist in the handling of uncontrollable chemical releases that may occur during the implementation of field programs. As such, and as provided by the HAZWOPER standard, AECOM is exempt from the emergency response plan requirements of the standard as long as it provides an emergency action plan within the HASP that complies with 29 CFR 1910.38 (a). Therefore, all emergency response plans required under 29 CFR 1910.120 will be written to comply with 29 CFR 1910.38 (a).

4.5.3 The HAZWOPER standard does not prohibit AECOM employees from performing limited response activities. AECOM employees can provide response assistance by placing absorbent pillows or vermiculite around a small, contained spill that occurs during sampling efforts. AECOM's SH&E SOP 203—*Spill Containment Program*, describes the specific procedures that AECOM will follow when responding to an incidental chemical spill.

4.5.4 Field Project Preparation

- Every HASP that is prepared by AECOM will contain an emergency response section in which the required elements of an emergency action plan will be contained. For all projects that do not require a HASP, an emergency reference sheet will be prepared; minimally, the sheet will list the telephone numbers of the local emergency responders and the local hospital and provides directions to the local hospital. When AECOM is working at an operating facility, the emergency response procedures of the facility will be appended to the HASP or the emergency reference sheet.
- There are two types of emergency situations that AECOM personnel must be prepared for and that must be addressed in the emergency action plan. These include:
    - Emergencies related to the operations of our clients at the facility where AECOM is working.
    - Emergencies related to our own on-site activities/investigations.
- AECOM employees are typically not expected to take action or participate in responses to chemical releases beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911.)

- AECOM **employees** are not to accept the role of Incident Commander without specific authority from the **Region SH&E Manager** and the General Operations Manager responsible for the project. Assuming the role of the Incident Commander requires training beyond the scope of this Procedure.

4.5.5 Client Facility Emergency Response Procedures

- AECOM implements field programs on active properties, including manufacturing facilities. These facilities have typically developed an emergency response plan that is specific to facility-related emergencies. If AECOM is working at an operating facility, emergency procedures established by the facility must be followed in the event of a facility catastrophe. AECOM personnel must be aware of and familiar with the alarm signals used at the facility to alert personnel to an emergency. AECOM personnel must also know where to assemble in the event of a facility evacuation as the facility must be able to account for all personnel, including subcontractors such as AECOM in the event of an evacuation.
- The first priority in AECOM's preparation of a project emergency action plan is to ensure that the responsibilities under the client's emergency response plan are fully understood. Because of the nature of their business, many of our clients have in-house fire brigades, medical staff, and hazardous materials teams that can assist AECOM in the event of an emergency related to our field activities. In many instances, our clients prefer or require that subcontractors seek emergency assistance through their facility first before calling outside responders to the site.
- A copy of the facility's procedures must be made available to AECOM so that the information can be incorporated into the HASP or attached to the emergency reference sheet. If this information is not available to AECOM prior to arriving on site, the SSO must meet with client representatives upon arrival to the facility to review procedures in the event of an emergency related to plant operations.

4.5.6 Emergency Action Plan

- As a minimum, each emergency action plan must contain the following topics as required by 29 CFR 1910.38 (a):
  - Procedures and contact information for reporting emergencies to public service responders and on-site (client or host employer) emergency control centers.
  - Emergency escape procedures and emergency escape route assignments.
  - Procedures to be followed by employees who remain to operate critical site operations before they evacuate.
  - Procedures to account for all employees after emergency evacuation is complete.
  - Rescue and medical duties for those employees who are to perform them.
  - Preferred means of reporting fires and other emergencies.
  - PPE to protect employees from expected exposures and potential exposures during an emergency.
  - Names of persons or departments who can be contacted for further information (i.e. emergency reference sheet).
  - Availability of medical surveillance for workers who might have been exposed to chemicals, bloodborne pathogens, or other biological agents as a result of project work or emergency response.
- In addition, each plan must establish the specific alarm system that will be used on site to warn employees of an AECOM emergency. The chosen alarm signals should not conflict with alarm signals already in place at the facility.

4.5.7 Escape Routes and Procedures

- Prior to the commencement of on-site activities, the **SSO** must determine how AECOM employees will evacuate each AECOM work area of the site. Two or more routes that are separate or remote from each other for each work area must be identified. Multiple routes are necessary in case one is blocked by fire or chemical spill. These routes must not overlap because, if a common point were obstructed, all intersecting routes would be blocked.

- Prominent wind direction should also be considered when designating escape routes and assembly areas. Escape routes and assembly areas should be upwind of the site whenever possible.
- Upon arrival to the site, the **SSO** must verify that the selected routes are appropriate for evacuation. During an emergency, the quickest and most direct route should be selected. However, when working at an operating facility, the established escape routes of the facility should be used whenever possible. In the event of a facility-related emergency, all AECOM employees must meet at the facility's assembly area so that the client can verify that AECOM has evacuated the property.

4.5.8 Accounting Method for All Employees after Evacuation

- The **SSO** is responsible for determining that all AECOM employees have been successfully evacuated from the work area(s). It is the responsibility of each AECOM subcontractor to verify that all of its employees evacuated the site and to report this information to the AECOM **SSO**. All employees must meet at the designated assembly area. A headcount is an acceptable way to determine complete evacuation when the field team is of a small size. The site log-in book should be referenced when attempting to account for more than 10 people. In the event of a facility-related emergency, the **SSO** must notify facility representatives that all AECOM employees and AECOM subcontract employees have successfully evacuated the work area(s). The **SSO** must notify emergency responders if any employee is unaccounted for and where on the site they were last seen.
- In the event of a project-related emergency, the SSO will provide off-site emergency responders or on-site HAZMAT teams or fire brigades (Incident Commander) with all available knowledge about the emergency situation upon their arrival to the scene.

4.5.9 Employees Who Remain to Operate Critical Site Operations Before They Evacuate

- All equipment and operations are required to cease in accordance with the established alarm signal procedures. The only exception will be related to health and safety. The **SSO** must determine at the time of the emergency if health and safety will be jeopardized by immediate stoppage of any particular piece of equipment. If such a determination is made, personnel involved in critical operations must be minimized. Once it is determined that the operation is no longer needed or the threat to the operators is imminent, operations will cease and the operators will immediately evacuate.

4.5.10 Rescue and Medical Duties

- Only currently trained individuals will administer first aid or CPR. If the injury is life threatening, the Emergency Medical System (EMS) should be called (911). Depending on the procedures established for the project, the SSO would contact an emergency responder directly or notify the facility representatives for medical assistance. If the employee needs medical attention that can not be provided on-site, the SSO shall escort the individual to the local hospital identified on the emergency reference sheet and shall remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the Project Manager and Regional SH&E Manager.

4.5.11 Preferred Means of Reporting

- Unless facility representatives specifically indicate that they prefer AECOM personnel to notify them first of an emergency, the **SSO** will directly contact the appropriate emergency responders listed on the emergency reference sheet.

4.5.12 Alarm Signals

- An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. However, verbal communications must be supplemented any time voices cannot be clearly perceived above ambient noise levels and any time a clear line of sight can not be easily maintained among all AECOM personnel because of distance, terrain, or other obstructions.
- Portable two-way radio communications may be used when employees must work out of the line of sight of other workers.
- When verbal communications must be supplemented, the following emergency signals shall be implemented using handheld portable air horns, whistles, or similar devices. Signals must be

capable of being perceived above ambient noise by all employees in the affected portions of the workplace.

- One Blast: General Warning—A relatively minor and localized, yet important, on-site event. An example of this type of an event would be a minor chemical spill where there is no immediate danger to life or health yet personnel working on the site should be aware of the situation so that unnecessary problems can be avoided. If one horn blast is sounded, personnel must stop all activity and equipment on-site and await further instructions from the SSO.
- Three Blasts: Medical Emergency—A medical emergency for which immediate first aid or emergency medical care is required. If three horn blasts are sounded, all first aid and/or CPR trained personnel should respond as appropriate. All other activity and equipment should stop and personnel should await further instructions from the **SSO**.
- Three Blasts Followed by One Continuous Blast: Immediate Threat to Life and Health—A situation that could present an immediate danger to life and health of personnel onsite. Examples include fires, explosions, large hazardous chemical release, severe weather-related emergencies, or security threats. If three horn blasts followed by a continuous blast are sounded, all activity and equipment must stop. All personnel must evacuate the site and meet in the designated assembly area where the **SSO** will account for all employees. The **SSO** will arrange for other emergency response actions if necessary. Information concerning the need to follow decontamination procedures during an emergency evacuation will be addressed in the emergency action plan.
- The **SSO** or his designate will acknowledge the distress signal with two short blasts on the air-horn or whistle.
- One Continuous Blast Following Any of the Above: All Clear/Return to Work—Personnel who sound the initial alarm are required to send an all clear signal when the emergency is over.

4.5.13 Emergency Reference Sheet

- An emergency reference sheet (see *S3NA-509-FM4 Emergency Information and Hazard Assessment*) must be prepared for projects not requiring a HASP. Each emergency reference sheet must list the following:
  - Emergency phone numbers for local police, fire, and ambulance service.
  - In-house facility extensions for reporting an emergency (applies to operating facilities only).
  - Phone number and address of closest hospital with an emergency room to the site.
  - Directions to the hospital from the site.
  - Map highlighting the site-to-hospital route.
  - Phone number for the Poison Control Center.
  - Names and phone numbers of AECOM representatives and facility representatives.

4.5.14 On-site and Off-site Communications

- Regardless of the size or location of AECOM's field projects, it is extremely important that both on-site and off-site communications be maintained so that in the event of an emergency employees can contact each other or place a phone call immediately with the appropriate responder(s).
- Walkie-talkies are required when members of the field team are working in separate areas of the site and verbal communications are no longer effective because of distance. A walkie-talkie must be available for each team that is working in a separate area of the site.
- When AECOM is working at an occupied facility, access to a telephone may not be a problem. When AECOM is working on abandoned properties or when there is no access to a phone, a cellular telephone must be brought to the work location.

4.5.15 Evacuation

- Although emergency evacuation procedures are included in AECOM's initial 40-hour HAZWOPER training, emergency procedures at each site will be different. Therefore, employees must be instructed about the specifics of the emergency procedures developed for

the site during the site-specific pre-entry briefing that must be held daily prior to the commencement of field activities. Update training is required anytime escape routes or procedures change. An evacuation drill will be conducted for projects that are scheduled for one month or longer. Visitors and untrained employees shall not be allowed into the project area until they receive a safety briefing including evacuation alarms and procedures.

4.5.16 First Responder

- First responders shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:
  - An understanding of what hazardous substances are, and the risks associated with them in an incident.
  - An understanding of the potential outcomes associated with an emergency.
  - The ability to recognize the presence of hazardous substances and physical hazards in an emergency.
  - An understanding of the role of the first responder.
  - The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.5.17 First Responder HAZWOPER Operations Level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper personal protective equipment provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

4.5.18 Hazardous Materials Technician

Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

4.5.19 Hazardous Materials Specialist

Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the local emergency response plan.
- Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.
- Know the state emergency response plan.
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.
- Understand in-depth hazard and risk techniques.
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.
- Be able to determine and implement decontamination procedures.
- Have the ability to develop a site safety and control plan.
- Understand chemical, radiological, and toxicological terminology and behavior.

4.6 Personal Protective Equipment (PPE) Ensembles

4.6.1 Defined HAZWOPER PPE ensembles are specified for general use on all AECOM HAZWOPER operations. The project HASP may specify modifications to these requirements to meet site-specific conditions.

4.6.2 Level D Ensemble

- The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work uniform which will be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering hazardous substances or health hazards while working in controlled work areas.
- Level D Equipment List
  - Hard hat
  - Eye protection
  - Safety-toe work boots
  - Shirts with sleeves and long pants (shorts are unacceptable for use)
  - Hearing protection (as required)

4.6.3 Modified Level D Ensemble

- The Modified Level D ensemble provides moderate skin protection against contact with hazardous substances, but no respiratory protection. Its use is appropriate where there is a moderate-to-low potential for skin contact with known hazardous substances and health hazards, but no significant inhalation hazard is anticipated. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:
- Modified Level D Equipment List
  - Chemical-resistant disposable outer coveralls
  - Chemical-resistant outer gloves taped to outer coveralls1
  - Chemical-resistant inner gloves1
  - Chemical-resistant safety-toe boots (taped to outer coveralls)

4.6.4 Level C Ensemble

1 Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.

- The Level C ensemble provides moderate skin protection against contact with hazardous substances and moderate respiratory protection. Its use is appropriate where there is the potential for skin contact with known hazardous substances and health hazards, together with a limited and well-defined potential for exposure via inhalation.
- Level C Equipment List
    - Full-face air-purifying respirator (APR) equipped with cartridge types as designated in the project HASP2
    - Chemical-resistant disposable outer coveralls
    - Chemical-resistant outer gloves taped to outer coveralls3
    - Chemical-resistant inner gloves3
    - Hard hat
    - Safety-toe boots taped to coveralls; the use of boot covers (e.g., booties) or chemical-resistant boots may be specified
    - Hearing protection (as required)

4.6.5 Level B Ensemble

- The Level B ensemble provides both the highest level of inhalation exposure protection and considerable skin contact protection. Its use is appropriate where there are significant known or suspected hazardous substances and health hazards, involving both skin and inhalation exposure (up to and including Immediately Dangerous to Life or Health [IDLH] conditions) or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g., oxygen deficient atmospheres or chemicals with poor warning properties). The use of Level B PPE requires prior approval by the Regional SH&E Manager.
- Level B Equipment List
    - Supplied air respirator (SCBA or air line system with Grade D or better breathing air)
    - Chemical-resistant disposable outer coveralls
    - Chemical-resistant outer glove taped to outer coveralls3
    - Chemical-resistant inner gloves3
    - Hard hat
    - Chemical resistant safety-toe boots taped to coveralls
    - Hearing protection (as required)

4.6.6 Level A Ensemble

- The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires prior approval by the Americas SH&E Director.
- Specific Level A ensemble components will be determined on a case-by-case basis by the SH&E Department.

4.7 Employee Exposure Monitoring

4.7.1 Exposure monitoring at HAZWOPER sites will be conducted to determine explosive and oxygen levels, monitor and control employee exposures to airborne contaminants, and to determine and regulate controlled work area boundaries (e.g., support zone, contamination reduction zone, and exclusion zone) for the protection of non-HAZWOPER workers and the general public.

4.7.2 Direct Reading Exposure Monitoring Requirements

- Explosive levels, oxygen levels, and airborne contaminants present potential hazards to HAZWOPER personnel working within controlled work areas and to non-HAZWOPER workers and the general public present outside the controlled work areas. On-site exposure monitoring

2 Selection of specific cartridges will be made by the SH&E Department (or Competent Person – Respiratory Protection as designated by the DSM) based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on the manufacturer's cartridge performance data.

3 Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.

will be utilized to assess the magnitude of these hazards and to provide indications of any necessary control procedures to mitigate unacceptable hazards. *S3NA-509-FM1 Direct Reading Instrument Monitoring Log* will be used to record all monitoring efforts using direct reading instruments and will remain part of the project file.

- Specific exposure monitoring requirements will be established in individual HASPs and will be implemented by the project team(s) subject to the following requirements:
    - Direct reading instrumentation will be used in accordance with the following table:

Direct Reading Instrument	Example Trade Names	Use
Flame Ionization Detector (FID)	OVA	Detection of select organic vapors
Photo ionization detector (PID)	miniRAE, Micro-TIP	Detection of select organic vapors
Portable gas chromatograph	OVA	Detection of select organic vapors
Explosive meter	MSA ALTAIR, QRAE II, BW GasAlert	Determine explosiveness (as a percent of the Lower Explosive Limit [LEL])
Oxygen monitor	MSA ALTAIR, QRAE II, BW GasAlert	Determine oxygen concentration (in percent)
Single gas meters (mono-tox) • Hydrogen sulfide • Carbon monoxide • Oxides of nitrogen • Cyanide		Determine airborne concentrations of selected contaminants (in parts per million)
Colorimetric Detector Tubes	Drager	Determine airborne concentrations of selected contaminants (in parts per million)
Aerosol monitor	Mini-RAM	Determine airborne particulate concentration (in milligrams per cubic meter)

- Selected instruments will be capable of discriminating contaminant concentrations to concentrations of at least one-half of the HASP-specified exposure limit. All direct-reading instrumentation will be calibrated daily as directed by the manufacturer. S3NA-509-FM2 Instrument Calibration Log will be used to record instrument calibrations.

4.7.3 Work Area Exposure Monitoring

- Work area exposure monitoring will include breathing zone readings for the maximum exposed worker(s).
- Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the HASP.

4.7.4 Perimeter Exposure Monitoring

- Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site.
- Perimeter exposure monitoring will be conducted at locations downwind from the project activities at a minimum (also upwind if the potential exists for offsite contamination to migrate onto the site).
- Sample results will be recorded in a log book or on the sample log form provided in *S3NA-509-FM3 Personal Sampling Data Sheet*

- Records will indicate individual name, SSN (last 4 digits is acceptable), and job/operation at the time of sample collection.
- Samples sent out for independent laboratory analysis will follow chain of custody requirements.
- Exposure results will be posted on site and explained in a safety briefing.
- **Employees** will receive a written statement of results within 15 days of receipt from the laboratory.
- Results of all personal exposure monitoring will be provided to the **SH&E department** for inclusion in the employee medical records.

5.0 Records

5.1 All forms and documents generated during a HAZWOPER project will be maintained in the project file.

6.0 References

6.1 Federal Emergency Management Agency—FEMA: Incident Command System www.fema.gov

6.2 29 CFCR 1910.120, Hazardous Waste Operations and Emergency Response

6.3 29 CFR 1910.38, Emergency Action Plans

S3NA-509-FM1 Direct Reading Instrument Monitoring Log

Project: Job No.:

Date: Operator:

Instrument: Calibration:
(Amt, Component, Date)

Sampling Technique:

Sample Interval:

Background Reading:

Action Level/Response:

Time	Location	Reading (units)	Detection Limits (Scale)

S3NA-509-FM2 Instrument Calibration Log

Instrument Information	
Instrument Name:	Manufacturer:
Serial Number:	Last Service Date:
Parameter(s):	Calibration Gas:
Calibration Procedure:	
Daily Calibration Results	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	
Date:	Calibration Result:
Name:	Signature:
Notes:	

Project: Job No.:

Date: Operator:

Instrument: Calibration:

S3NA-509-FM3 Personal Sampling Data Sheet

Client: Method:

Site Location: Job No.: Sampling Media:

Sample ID.	Pump No.	Air Flow Calibration (L/min)			Start Time	Stop Time	Total Time Minutes	Volume (Liters)	Sampler's Initials	Date	Results		Remarks (Location of sampling, Employee name, SSN)
		Pre	Post	Average							Amount (mg)	Conc. ppm , mg/m^3	

S3NA-509-FM4 Emergency Information and Hazard Assessment

EMERGENCY INFORMATION AND HAZARD ASSESSMENT

EMERGENCY REFERENCES

Ambulance: 911

Fire: 911

Police: 911

Medical Services/Regional Hospital (including a map is advisable):

Poison Control Center: http://www.aapcc.org/poison4.htm

Emergency Muster Point:

In case of a site/facility emergency, please meet at:

The escape route from the site and an emergency muster point will be determined and provided to all workers during the project mobilization.

Client Contacts:

Office: Cell:

AECOM Project Representatives:

Office: Mobile:

AECOM Medical Records and Medical Consultant

WorkCare
Anaheim, CA 94502
Telephone: 800-455-6155

S3NA-510-PR Hearing Conservation Program

1.0 Purpose and Scope

1.1 Establishes procedures to confirm that personal noise exposure remains within acceptable limits and establishes the requirements of an acceptable hearing conservation program.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Decibel (dB):** Logarithmic unit of measurement of sound level.

2.2 **Action Level:** An eight-hour, time-weighted average of 85 decibels measured on the A-scale, slow response, or equivalently; a noise dose of 50 percent.

2.3 **Standard Threshold Shift (STS):** When one's hearing threshold has changed (relative to the baseline audiogram) an average of 10 dB or more at 2000, 3000, or 4000 Hz in either ear).

2.4 **Noise Reduction Rating (NRR):** The measure, in decibels, of how well a hearing protector reduces noise, as specified by the Environmental Protection Agency.

3.0 Attachments

3.1 S3NA-510-FM Site-Specific Hearing Conservation Program

3.2 S3NA-510-WI Hearing Protection Guidelines

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region SH&E Managers** or their designate

- Provide access to initial and refresher hearing conservation training.
- Inform employees of noise monitoring results when full-shift noise exposure is at or above the action level.
- Designate areas and tasks where employees' exposure is at or above the action level.
- Conduct noise monitoring, as applicable, and support hazardous noise assessment/evaluation efforts.

4.1.2 **Project or Office Managers**

- Implement the hearing conservation program.
- Confirm that a hazardous noise assessment/evaluation has been conducted.
- Confirm that a hazardous noise assessment/evaluation is conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
- Implement engineering controls to reduce noise levels when such measures are considered feasible and when required by regulation.
- Purchase, monitor, and replenish for employees' use a supply of hearing protection devices with a minimum Noise Reduction Rating (NRR) of 26 dBA.
- Confirm that individuals included in the program receive training and that the training meets the criteria outlined in this program.
- Investigate and implement corrective action to all reports of nonconformance with this procedure, including reports of standard threshold shifts or employees' failure to wear hearing protectors in designated areas.

4.1.3 **Supervisors**

- Maintain an awareness of the noise levels in work areas for which he/she is responsible.
- Place warning signs in areas where sound levels would require the use of hearing protectors.
- Request that a hazardous noise assessment/evaluation be conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
- Confirm that all employees are aware of the requirements for hearing protection for any designated area or task.
- Enforce the use of hearing protection by employees in designated areas and for designated tasks.

4.1.4 Employees

- Comply with the requirements of the Hearing Conservation program.
- Wear hearing protection devices in designated areas or for designated tasks.
- Inspect and maintain hearing protection devices.
- Report any suspected change in noise levels of work area to supervisor.
- Report any signs or symptoms experienced that could be the result of overexposure to noise to supervisor.
- Participate in audiometric testing and hearing protection training when required.

4.2 Requirements

4.2.1 The requirements of this procedure apply to all locations/facilities/projects where employee noise exposure may equal or exceed 50 percent of the allowable noise dose or Permissible Exposure Limit (PEL). Table 1 provides information relative to the current PEL for noise exposure expressed as a time-weighted average.

Table 1. Permissible Exposure Limit

SOUND LEVEL (dBA)	TIME (hours)
85	8
90	4
95	2
100	1
105	0.5
110	0.25
115	0.125

4.2.2 Table 2 provides information relative to the Action Level (or 50 percent allowable noise dose) expressed as a time-weighted average. The action levels outlined in the table below and PELs described in Table 1 are calculated without regard to the protection afforded by the use of hearing protectors.

Table 2. Action Levels for Hearing Conservation Program

SOUND LEVEL (dBA)	TIME (hours)
85	4
90	2
95	1
100	0.5
105	0.25
110	0.125
115	0.0625

4.3 Training Program

4.3.1 All employees with potential exposure above the action levels established in Table 2 of this procedure or who otherwise utilize any type of hearing protector will participate in a hearing conservation training program.

4.3.2 Training Objectives

4.3.3 The initial and subsequent annual hearing conservation training will address, at a minimum, the following topics:

- The effects of noise on hearing, recognizing hazardous noise, and symptoms of overexposure to hazardous noise.
- When and/or where hearing protectors are required to be worn.
- The purpose of hearing protectors.
- The advantages, disadvantages, and effectiveness of various types of protectors.
- Instructions on how to select, use, fit, and care for hearing protectors.
- The purpose of audiometric testing, including an explanation of the test procedures.
- Hearing Conservation Program requirements and responsibilities.

4.3.4 Hearing protection training is conducted biannually for all affected employees or more frequently for employees who do not properly use hearing protectors or otherwise fail to comply with this policy.

4.4 Audiometric Testing

4.4.1 All AECOM personnel with exposure greater than the action level may be enrolled in the medical surveillance program and undergo a baseline audiogram. Thereafter, annual audiograms will be compared with the baseline exam.

4.4.2 Enrolled employees will receive audiograms during their exit physicals.

4.4.3 When a Standard Threshold Shift (STS), as identified by the AECOM Medical Consultant, is noted between the last valid baseline and the annual audiogram, the following steps will be taken:

- A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours or will be provided with adequate hearing protection prior to testing.
- If the STS persists, ear protection will be upgraded to one with a greater NRR. The minimum NRR will be 26 dBA.
- The employee will be counseled and AECOM will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.
- Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.
- The employee will be notified in writing by either the SH&E Department or the AECOM Medical Provider of the STS, within 21 days of determination, as required by regulation.
- The employee's supervisor will be notified of the shift in hearing threshold.

4.4.4 If the employee who has experienced an STS is exposed to 85 dBA for eight hours or 80 dBA for 12 hours, mandatory use of ear protection is required.

4.5 Monitoring of Noise Levels

4.5.1 As deemed necessary by an SH&E Professional, or a Project Safety Plan AECOM will periodically monitor personal and area noise levels using noise dosimetry and/or sound level meters.

4.6 Hearing Protectors

4.6.1 Selection of appropriate hearing protectors must be based on actual or anticipated exposure levels. At a minimum, hearing protectors must provide a level of protection that brings actual or anticipated exposure below the PEL established for the time period shown in the table above. Additional information relative to hearing protector use is as follows:

- Hearing protection will be mandatory for all employees exposed to 85 dBA for eight hours.

- Hearing protection will be mandatory for all employees working in any area that has not been evaluated for noise exposure and the ambient noise level in the area is such that you must raise your voice to have a normal conversation with someone less than four feet from you and/or when within 25 feet of an operating piece of heavy equipment.
- Hearing protection will be mandatory for all employees who work on or near heavy equipment unless personal dosimetry or other techniques have been used to document actual exposure.
- Hearing protectors will be made available to all employees who may be exposed to 85 dBA for eight hours.
- Hearing protection will be mandatory for all employees exposed to 85 dBA for any period of time and who have experienced an STS.

5.0 Records

5.1.1 Noise exposure measurement records will be retained for three years at the project/facility.

5.1.2 Audiogram records will be retained in the employee's medical records as per AECOM's Medical Surveillance Procedure for a period as directed by regulation or AECOM's Medical Provider.

5.1.3 Employee training session documentation will be retained for the duration of employment.

6.0 References

6.1 None

S3NA-510-FM Site-Specific Hearing Conservation Program

Site (Project)

1.0 Monitoring

As per regulation, noise monitoring will be conducted by the following procedure:

Such monitoring will consist of (*check those that apply*):

☐ Noise Dosimetry ☐ Sound Level Meter Survey

Specific instrumentation to be used is (make/model):

Make	Model

and will be calibrated at a frequency of and documented in the .

Monitoring strategy is as follows (*list all equipment and activities on site that may involve sound pressure levels above 80 dBA and an explanation of the strategy to document actual exposures*):

Area/Equipment	Monitoring Strategy

Where areas or equipment are not clearly identified, all monitoring will be documented utilizing an illustrated layout (*attach form developed for the specific site*). Monitoring frequency will be in accordance with the strategy outlined above and when the following changes in site conditions/activities occur:

1.
2.
3.
4.
5.

2.0 Employee Notification

All site employees exposed above the regulated action level (85 dBA – 8 hour TWA) will be notified of the monitoring results by (*insert name/title*) at an interval not to exceed after completion of monitoring.

Notification shall be written, with a copy to the SH&E Department. Documentation of employee notifications and corresponding signatures of notified employees will be kept in the site health and safety logbook/files.

3.0 Observation of Monitoring

All employees affected by the monitoring, or a designated employee representative, shall be given the opportunity to observe noise monitoring procedures. This will be achieved by:

4.0 Audiometric Testing Program and Requirements

AECOM personnel who perform field activities where noise exposure above action levels is expected are required to participate in an audiometric testing program. Additionally, any subcontractors performing work on AECOM projects where noise levels exceeding action level will be required to provide documentation that they participate in an audiometric testing program that meets the applicable regulations. Documentation of participation in the testing program will be maintained by and will be located at .

5.0 Hearing Protectors and Estimating Attenuation

A selection of suitable hearing protectors will be made available to all employees who are expected to have 8-hour TWA noise exposures above 85 dBA. The types anticipated to be available include:

Protection Type	Attenuation

Hearing protector attenuation will be evaluated by for specific noise environments according to the following method prior to determining their suitability for use:

1.
2.
3.

The following site personnel will be required to wear hearing protectors during specific activities and the results of site-specific monitoring conducted in accordance with this procedure. (*This section can be completed after monitoring, if necessary*).

Employee Name	Activity Type	Type of Protection

Hearing protectors will be properly fitted by upon initial distribution to site workers.

Training in the use and care of hearing protectors shall be conducted by during the initial site-specific health and safety training. Training contents shall meet the requirements set forth in this procedure and the applicable regulations.

Hearing protectors will be distributed by from the storage location at the .

6.0 Access to Information and Training Materials

All information required by regulation to be made available to the employees will be posted by (*insert name/title*) at the .

Local Occupational Health and Safety Regulations will also be kept on site.

7.0 Recordkeeping

Records required by AECOM's Hearing Conservation Program and Regulations shall be completed by and shall be maintained at the and placed on permanent file at the for the minimum duration required by the standard. Employees can access their individual records by contacting .

All records required by this section will be transferred to any employee's successive employer if AECOM ceases to do business.

8.0 Approvals

Project Manager: Date:

SH&E Representative: Date:

S3NA-510-WI Hearing Protection Guidelines

1.0 Comparison

Comparison of Hearing Protection	
Ear Plugs	**Ear Muffs**
Advantages: • small and easily carried • convenient to use with other personal protection equipment (can be worn with ear muffs) • more comfortable for long-term wear in hot, humid work areas • convenient for use in confined work areas	***Advantages:*** • less attenuation variability among users • designed so that one size fits most head sizes • easily seen at a distance to assist in the monitoring of their use • not easily misplaced or lost • may be worn with minor ear infections
Disadvantages: • requires more time to fit • more difficult to insert and remove • require good hygiene practices • may irritate the ear canal • easily misplaced • more difficult to see and monitor usage	***Disadvantages:*** • less portable and heavier • more inconvenient for use with other personal protective equipment • more uncomfortable in hot, humid work area • more inconvenient for use in confined work areas • may interfere with the wearing of safety or prescription glasses; wearing glasses results in breaking the seal between the ear muff and the skin and results in decreased hearing protection

2.0 Care and Use

2.1 Follow the manufacturer's instructions.

2.2 Check hearing protection regularly for wear and tear.

2.3 Replace ear cushions or plugs that are no longer pliable.

2.4 Replace a unit when head bands are so stretched that they do not keep ear cushions snugly against the head.

2.5 Disassemble ear muffs to clean.

2.6 Wash ear muffs with a mild liquid detergent in warm water, and then rinse in clear warm water. Sound-attenuating material inside the ear cushions must not get wet.

2.7 Use a soft brush to remove skin oil and dirt that can harden ear cushions.

2.8 Squeeze excess moisture from the plugs or cushions and then place them on a clean surface to air dry.

S3NA-511-PR Heat Stress

1.0 Purpose and Scope

1.1 Establishes a heat stress prevention program to help ensure that employees know and recognize the symptoms of heat stress-related illnesses and are prepared to take appropriate corrective action.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Acclimated**: Workers 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 worker with potentially hazardous materials in the workplace. Such materials include: Tyvek® coveralls (all types) and polyvinyl chloride (PVC) coveralls and rain suits.

2.3 **Unacclimated**: Workers 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.

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

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

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

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

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

2.9 **Sunburn**: Is caused by unprotected exposure to ultraviolet light that is damaging to the skin. The injury is characterized by red painful skin, blisters, and/or peeling.

3.0 Attachments

3.1 S3NA-511-FM Heat Stress Monitoring Log

3.2 S3NA-511-WI1 Temperature Thresholds

3.3 S3NA-511-WI2 Symptoms and Treatment

3.4 S3NA-511-ST Heat Exposure

4.0 Procedures

4.1 Restrictions

4.1.1 Staff working in extreme heat or sun for extended periods of time away from a shelter or vehicle must not work alone.

4.1.2 Staff shall not be exposed to levels that exceed those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.

4.1.3 Clothing corrections shall be applied in accordance with the heat stress and strain section of the ACGIH Standard.

4.2 Roles and Responsibilities

4.2.1 **Project Managers'/field task managers'** responsibilities:

- Evaluate the need for heat stress prevention measures and incorporate as appropriate into the Health and Safety Plan.
- Implement heat stress prevention measures, as applicable, at each work site.
- Develop/coordinate a work-rest schedule, as applicable.
- Ensure heat stress hazard assessments/evaluations were completed for the planned activities.
- Assign personnel physically capable of performing the assigned tasks.
- Ensure that personnel are properly trained in the recognition of heat stress-related symptoms.

4.2.2 **Region SH&E Managers'** responsibilities**:**

- Provide heat stress awareness training.
- Assist project teams develop appropriate work-rest schedules.
- Conduct/support incident investigations related to potential heat stress-related illnesses.

4.2.3 **Site Supervisors'** responsibilities**:**

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned employees.
- Ensure that employees have been trained on the recognition of heat stress-related illness.
- Ensure that adequate supplies of appropriate fluids are readily available to employees.
- Ensure that a proper rest area is available.
- Conduct heat stress monitoring, as applicable.
- Implement the work-rest schedule.
- Ensure that first aid measures are implemented once heat stress symptoms are identified.
- Ensure personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- Report all suspected heat stress-related illnesses.

4.2.4 **Employees'** responsibilities:

- Observe each other for the early symptoms of heat stress-related 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 rested and hydrated condition.
- Report all suspected heat stress-related illnesses.

4.3 Controls

4.3.1 If staff are or may be exposed, the supervisor shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of workers, and
- Develop and implement a heat stress exposure control plan.

4.3.2 If staff are or may be exposed, the supervisor shall implement engineering controls (e.g., shelters, cooling devises, etc.) to reduce the exposure of staff to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.

4.3.3 If engineering controls are not practicable, the supervisor shall reduce the exposure of workers to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard 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 staff are or may be exposed, the supervisor shall provide and maintain an adequate supply of cool, potable water close to the work area for the use of a heat exposed worker.

4.3.5 If a staff person 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, if available, or by a physician.

4.3.6 Heat stress can be a significant field site hazard, especially for workers wearing CPC. The workforce will gradually work up to a full workload under potentially stressful conditions to allow for proper acclimation.

4.3.7 Site personnel 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. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.

4.3.8 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 workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must 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.

4.4 Symptoms and Treatment

4.4.1 Workers 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.

4.4.2 Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.4.3 Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.

4.5 Prevention

4.5.1 All staff working in extreme heat or sun should understand the following guidelines for preventing and detecting heat exhaustion and heat stroke.

- If you experience heat exhaustion or heat stroke you must immediately seek shelter and water.
- 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.

4.5.2 Prevention of heat-related illnesses:

- Avoid strenuous physical activity outdoors during the hottest part of the day.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Avoid sudden changes of temperature. Air out a hot vehicle before getting into it.
- If you take diuretics, ask your doctor about taking a lower dose during hot weather.
- Drink 8 to 10 glasses of water per day. Drink even more if you are working or exercising in hot weather.
- Avoid caffeine and alcohol as they increase dehydration.
- If you exercise strenuously in hot weather, drink more liquid than your thirst seems to require.

4.6 Personal Protective Equipment

- 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

- 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 oz. 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.
- Additional salt is usually not needed and salt tablets should not be taken.
- Replacement fluids should be cool, but not cold.
- Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.
- Dry clothing or towels will be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- 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.
  - Wearing cooling devices such as vortex tubes or cooling vests beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

4.8.1 Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

4.8.2 At the start of the workday each worker'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 an automated pulse count device may be utilized. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

- Each worker's maximum heart rate at the start of any break should be less than [180 minus worker's age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
- At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be remeasured and the end-of-break criteria again applied.

4.8.3 Use a clinical thermometer or similar device to measure the oral/ear temperature at the beginning (before drinking liquids) and end of each break period and apply the following criteria:

- If the oral temperature exceeds 99.6^{o}F, shorten the next work cycle by one-third without changing the rest period.
- If the oral temperature still exceeds 99.6^{o}F (36.6^{o}C) at the beginning of the next rest period, shorten the following work cycle by one-third.

4.8.4 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 remeasured and the end-of-break criteria again applied.

4.8.5 All physiological monitoring of heat stress will be documented using *S3NA-511-FM Heat/Cold Stress Monitoring Log*.

4.9 Training

4.9.1 Project staff and their supervisors that may be exposed to the hazard will be oriented to the hazard and the controls prior to work commencing.

4.9.2 Those personnel potentially exposed to heat stress will receive training including, but not limited to

- Sources of heat stress, influence of protective clothing, and importance of acclimatization.

- How the body handles heat.
- Recognition of heat-related illness symptoms.
- Preventative/corrective measures.
    - 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.

5.0 Records

5.1 None

6.0 References

6.1 S3NA-003-PR SH&E Training

6.2 S3NA-208-PR Personal Protective Equipment

6.3 S3NA-314-PR Working Alone and Remote Travel

S3NA-511-FM Heat Stress Monitoring Log

The purpose of this form is to track entry into hot zones wearing chemically protective clothing and monitor employees for heat stress-related illness. It is the responsibility of the foreman or supervisor-in-charge to ensure that each person entering the hot zone completes the required information. Vital signs must be taken by a competent person.

Project Name:			**Foreman/Supervisor:**						**Work/Rest Schedule1:** IN *(min)* OUT *(min)*							
Date:	**Water Provided**[2]		**Acclimated**[3]		**Initial Vitals**[3]	**Vital Signs and Time In/Out**[4]										
Employee Name	Yes	No	Yes	No	**Vitals**	In	Out	**Vitals**	In	Out	**Vitals**	In	Out	**Vitals**	In	Out
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
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					P			**P**			**P**			**P**		
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					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		

1. Please refer to S3NA-511-PR, Heat Stress. Section 6.3 provides specific details on how to develop a work-rest schedule.
2. Each employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.
3. A worker is “acclimated” if he/she has worked in a hot environment for at least 7 to 10 consecutive days. If a worker is acclimated, check “Yes.” If a worker is not acclimated, check “No” and reduce the “Min In” by 50 percent for that employee until the 7- to 10-day period is reached.
4. “Vitals” refers to employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work operations in the hot zone. Each time the employee exits the hot zone, vitals must be taken and evaluated for heat stress criteria. Section 6.4 of S3NA-511-PR *Heat Stress* provides specific instructions for taking and evaluating employee vital signs.
5. Body temperature vital signs will be recorded in °F.

S3NA-511-WI1 Temperature Thresholds

1.0 Work-Rest Schedule

The prevention of heat stress is best performed through supervisor observation of employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the work supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the workers (e.g., acclimated/not), and protective clothing being used.

1.1 Establishing a Work-Rest Schedule

1.1.1 AECOM permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method: This method is preferred, if a WBGT meter is available.
- Adjusted Temperature Method:This method should be used only if WBGT data is not available.

1.1.2 Either procedure will provide the work supervisor with a recommended routine; however, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

1.2 WBGT Work-Rest Schedule Guidelines

1.2.1 Table 1, the Non-CPC Activities WBGT Chart, is intended for use where personnel are not utilizing CPC. Where workers are required to utilize CPC, Table 2, the CPC Activities WBGT Chart, will be used.

1.2.2 WBGT readings are compared directly with the values the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85°F (29.4°C)	81°F (27.2°C)	78°F (25.6°C)	
75% Work – 25% Rest	86°F (30°C)	83°F (28.3°C)	81°F (27.2°C)	
50% Work – 50% Rest	88°F (31.1°C)	85°F (29.4°C)	83°F (28.3°C)	81°F (27.2°C)
25% Work – 75% Rest	90°F (32.2°C)	87°F (30.6°C)	86°F (30°C)	85°F (29.4°C)

Modified from ACGIH's 2002 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers

Table 2. CPC Activities WBGT chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74°F (23.3°C)	70°F (21.1°C)	67°F (19.4°C)	
75% Work – 25% Rest	75°F (23.9°C)	72°F (22.2°C)	70°F (21.1°C)	

50% Work – 50% Rest	77°F (25°C)	74°F (23.3°C)	72°F (22.2°C)	70°F (21.1°C)
25% Work – 75% Rest	79°F (26.1°C)	76°F (24.4°C)	75°F (23.9°C)	74°F (23.3°C)

Modified from ACGIH's 2002 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers

1.3 Adjusted Temperature Work-Rest Schedule Guidelines

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments will be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the Adjusted Temperature, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest schedule.

Table 3. Temperature Adjustment Factors

Time of Day	
Before daily temperature peak[1]	+2°F (+1.11°C)
10 am – 2 pm (peak sunshine)	+2°F (+1.11°C)
Sunshine	
No clouds	+1°F (+0.56°C)
Partly Cloudy (3/8 – 5/8 cloud cover)	-3°F (-1.67°C)
Mostly Cloudy (5/8 – 7/8 cloud cover)	-5°F (-2.78°C)
Cloudy (>7/8 cloud cover)	-7°F (-3.89°C)
Indoor or nighttime work	-7°F (-3.89°C)
Wind (*ignore if indoors or wearing CPC*)	
Gusts greater than 5 miles per hour at least once per minute	-1°F (-0.56°C)
Gusts greater than 10 miles per hour at least once per minute	+2°F (+1.11°C)
Sustained greater than 5 miles per hour	-3°F (-1.67°C)
Sustained greater than 10 miles per hour	-5°F (-2.78°C)
Humidity (*ignore if wearing CPC*)	
Relative Humidity greater than 90%	+5°F (+2.78°C)
Relative Humidity greater than 80%	+2°F (+1.11°C)
Relative Humidity less than 50%	-4°F (-2.23°C)
Chemical Protective Clothing (CPC)	
Modified Level D (coveralls, no respirator)	+5°F (+2.78°C)
Level C (coveralls w/o hood, full-face respirator)	+8°F (+4.45°C)
Level C (coveralls with hood, full-face respirator)	+10°F (+5°C)
Level B with airline system	+9°F (+5.56°C)
Level B with SCBA	+9°F (+5.56°C) and right one column[2]
Level A	+14°F (+7.78°C) and right one column[2]
Other	Specified in the HASP
Miscellaneous	

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

[2] Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Regimen	Adjusted Temperature			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
No specified requirements	< 80°F (22.67°C)	< 75 (23.88°C)	< 70 (21.11°C)	< 65 (18.33°C)
15 minute break every 90 minutes of work	80°F – 90°F (22.67°C) - (32.22°C)	75 – 85 (23.88°C) - (29.44°C)	70 – 80 (21.11°C) - (22.67°C)	65 – 75 (37.77°C) - (23.88°C)
15 minute break every 60 minutes of work	>90 – 100 (32.22°C) - (37.77°C)	> 85 – 95 (23.88°C) - (35°C)	>80 – 85 (22.67°C) - (23.88°C)	>75 – 80 (23.88°C) - (22.67°C)
15 minute break every 45 minutes of work	>100 – 110 (37.77°C) - (43.33°C)	>95 – 100 (35°C) - (37.77°C)	>85 – 90 (23.88°C) - (32.22°C)	>80 – 85 (22.67°C) - (23.88°C)
15 minute break every 30 minutes of work	>110 – 115 (43.33°C) - (46.11°C)	>100 – 105 (37.77°C) – (40.55°C)	>90 – 95 (32.22°C) - (35°C)	>85 – 90 (23.88°C) - (32.22°C)
15 minute break every 15 minutes of work	>115 – 120 (46.11°C) - (48.88°C)	>105 – 110 (40.55°C) - (43.33°C)	>95 -100 (35°C) - (37.77°C)	>90 – 95 (32.22°C) - (35°C)
Stop Work	**>120** (48.88°C)	**>110** (43.33°C)	**>100** (37.77°C)	**>95** (35°C)

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

S3NA-511-WI2 Symptoms and Treatment

1.0 Heat Stress-related Illness Symptoms

1.1 There are three stages of heat-related illness:

1.1.1 Heat Cramps

- Heat cramps are painful muscle cramps caused by over-exertion in extreme heat.
  - Muscle spasms, and
  - Pain in the hands, feet, and abdomen

1.1.2 Heat Exhaustion

- Heat exhaustion is the next stage. Symptoms include:
  - Cool, moist, pale, flushed or red skin
  - Heavy sweating
  - Headache
  - Nausea or vomiting
  - Dizziness, and
  - Exhaustion.
- Mood changes (irritable, or confused/can't think straight)
- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting

1.1.3 Heat Stroke

- Heat stroke. Heat exhaustion can sometimes lead to heat stroke, which can be fatal and requires emergency treatment. Heat stroke happens when you stop sweating and your body temperature continues to rise, often to 105° F (40.5° C) or higher. Symptoms of heat stroke:
  - Vomiting
  - Decreased alertness level or complete loss of consciousness
  - High body temperature (sometimes as high as 105° F (40.5° C))
  - Skin may still be moist or the victim may stop sweating and the skin may be red, hot, and dry
  - Rapid, weak pulse, and
  - Rapid, shallow breathing.
- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong rapid pulse
- Coma

2.0 Recommended Treatment for Heat Stress-related Illnesses

2.1 Heat Cramps

2.1.1 Treatment:

- Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary.
- Take more frequent breaks and drink more water.
- Move victim to a cool place.
- Administer drinks of cool water.

- Apply manual pressure to cramped muscles.
- Seek medical attention if symptoms are not alleviated or if more serious problems are indicated.

2.1.2 Heat Exhaustion

- Treatment of heat exhaustion:
  - Get out of the sun to a cool location and drink lots of water, a little at a time.
  - Remove or loosen tight clothing.
  - If you are nauseated or dizzy, lie down.
- Move the victim to a cool place.
- Remove as much clothing as possible and elevate the feet.
- Administer drinks of cool water and fan to cool.
- Seek medical attention immediately.

2.1.3 Heat Stroke

- Treatment of heat stroke, or if a person's temperature exceeds 102° F (38.9 ° C) :
- Call for immediate medical help and then try to lower the temperature as quickly as possible:
  - Apply cool (not cold) water the person's whole body, then fan the person.
  - Stop cooling once the person's temperature appears to be down; be careful not to overcool.
  - Do not give aspirin or acetaminophen to reduce the temperature.
- Treat as a true medical emergency. Seek medical help immediately
- Reduce body temperature quickly
- Douse with cool water (not cold water)
- Wrap in wet sheet
- If available, use cold packs under arms, neck, and ankles
- Protect from injury during convulsion
- Ensure that the person's airway is open.
- Transfer to a medical facility immediately.

S3NA-511-ST Heat Exposure

The following Occupational Health and Safety regulations apply directly to heat stress hazards:

Jurisdiction	Regulation
United States	
OSHA	1910.132
Canada	
Alberta	n/a
British Columbia	OHS Regulation (1997) Sect 7.28 – 7.32, 8.21, 12.72, 12.73
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.13
New Brunswick	OHS Regulation (91-191) Sect 44
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10
Nova Scotia	n/a
NWT/NU Territories	n/a
Ontario	O. Reg. 213/91 Sect 112 O. Reg. 851 Sect 129 Heat Stress (Health and Safety Guidelines) (April 2003)
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 121 – 124, Schedule 4, Schedule 5
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9, 12

S3NA-519-PR Respiratory Protection Program

1.0 Purpose and Scope

1.1 This procedure establishes methods that AECOM will use to prevent employee exposure to hazardous concentrations of airborne contaminants or to supply breathing-quality air to employees working in oxygen-deficient atmospheres.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Air-purifying respirator:** A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

2.2 **Approved:** Equipment tested and listed by the Bureau of Mines, jointly by the Mining Enforcement and Safety Administration (MESA), and the National Institute for Occupational Safety and Health (NIOSH), or jointly by the Mine Safety and Health Administration (MSHA) and NIOSH.

2.3 **Assigned protection factor (APF):** The ratio of the ambient concentration of an airborne substance (outside the respirator) to the concentration of the substance inside the respirator. NIOSH defines this as 10 for an approved half-face respirator and 50 for an approved full-face respirator.

2.4 **Atmosphere-supplying respirator:** A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

2.5 **Breakthrough:** The first perception of an odor, taste or irritation experienced while wearing an air-purifying respirator. Breakthrough is generally an indication that the cartridges are saturated and are no longer filtering out the contaminant. Breakthrough can also be an indication of an improperly functioning respirator.

2.6 **Confined space:** An enclosure, such as a storage tank, process vessel, boiler, silo, tank car, pipeline, tube, duct, sewer, underground utility vault, tunnel, or pit, that has limited means of egress and poor natural ventilation and that may contain hazardous contaminants or be oxygen deficient.

2.7 **Canister or cartridge:** A container that has a filter, sorbent, or catalyst, or a combination of these items and that removes specific contaminants from the air passed through the container.

2.8 **Demand respirator:** An atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

2.9 **Emergency situation:** Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

2.10 **Employee exposure:** Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

2.11 **End-of-service-life indicator (ESLI):** A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

2.12 **Escape-only respirator:** A respirator intended to be used only for emergency exit.

2.13 **Filter or air purifying element:** A component used in respirators to remove solid or liquid aerosols from the inspired air.

2.14 **Filtering facepiece (dust mask):** A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

2.15 **Fit factor:** A quantitative estimate of the fit of a particular respirator to a specific individual, typically estimating the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

2.16 **Fit test:** The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

2.17 **Helmet:** A rigid respiratory inlet covering that also provides head protection against impact and penetration.

2.18 **HASP:** Health and Safety Plan

2.19 **Hazardous atmosphere:** Any atmosphere, either immediately or not immediately dangerous to life or health, that is oxygen-deficient or that contains a toxic or disease-producing contaminant exceeding the legally established permissible exposure limit (PEL) or, where applicable, the Threshold Limit Value (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH).

2.20 **High efficiency particulate air (HEPA) filter:** A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

2.21 **Hood:** A respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

2.22 **Immediately dangerous to life or health (IDLH):** An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

2.23 **Loose-fitting facepiece:** A respiratory inlet covering that is designed to form a partial seal with the face.

2.24 **Maximum use concentration (MUC):** The protection factor (PF) of an approved respirator assembly times the permissible exposure limit (PEL). MUC = PF x PEL

2.25 **Negative pressure respirator (tight fitting):** A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

2.26 **Oxygen deficient atmosphere:** An atmosphere with oxygen content below 19.5% by volume.

2.27 **Powered air-purifying respirator (PAPR):** A respirator that contains a blower that passes ambient air through an air-purifying component. Air-purifying respirators may be half-face (covering the nose and mouth) or full-face (covering the eyes, nose, and mouth).

2.28 **Physician or other licensed health care professional (PLHCP):** An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services required by paragraph (e) of this section.

2.29 **Positive pressure respirator:** A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

2.30 **Powered air-purifying respirator (PAPR):** An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

2.31 **Program administrator:** The individual that has the responsibility to verify full compliance with this SOP and determines the need for medical evaluations or any other additional medical attention in regards to the use of a respirator.

2.32 **Pressure demand respirator:** A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

2.33 **Qualitative fit test (QLFT):** A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

2.34 **Quantitative fit test (QNFT):** An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

2.35 **Respiratory inlet covering:** That portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

2.36 **Self-contained breathing apparatus (SCBA):** An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

2.37 **Service life:** The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

2.38 **Supplied-air respirator (SAR) or airline respirator:** An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

2.39 **Tight-fitting facepiece:** A respiratory inlet covering that forms a complete seal with the face.

2.40 **User seal check:** An action conducted by the respirator user to determine if the respirator is properly sealed to the face.

3.0 Attachments

3.1 S3NA-519-FM1 Respiratory Equipment Fit Test

3.2 S3NA-519-FM2 Respiratory Equipment Maintenance Log

3.3 S3NA-519-FM3 Respiratory Equipment Inspection

3.4 S3NA-519-WI1 Fit Testing Protocol

3.5 S3NA-519-WI2 User Seal Check Procedures

3.6 S3NA-519-WI3 Respirator Cleaning Procedures

4.0 Procedure

4.1 **Roles and Responsibilities**

4.1.1 **Program Administrator.** The AECOM Americas **SH&E Director** is the Respiratory Protection Program Administrator. The **Program Administrator** shall:

- Verify full compliance with this SOP.
- Determine the need for medical evaluations or any other additional medical attention related to the use of a respirator.
- Perform the program evaluations described in this SOP.

4.1.2 **District/office manager** and **project manager (including Operations Field Manager, supervisors, etc)** shall**:**

- Verify compliance with the respiratory protection program set forth in this procedure.
- Verify that only those employees who are medically qualified, properly trained, and fit tested are assigned to respirator work.
- Verify that respirators are provided, repaired, or replaced as may be required due to wear and deterioration.

4.1.3 **Region SH&E Manager** shall**:**

- Monitor compliance with the various aspects of this program.
- Provide technical assistance regarding respirator selection and use, evaluate the effectiveness of this program, and support respirator training and fit testing.
- Audit company compliance with this procedure.

4.1.4 **Employees** shall**:**

- Will use the provided respiratory protection in accordance with instructions and training received.
- Will guard against damage to the respirator.
- Will report immediately any malfunction of the respirator to the supervisor or other responsible person.

4.2 **Medical Surveillance**

No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator.

4.2.1 Prior to wearing a respirator, **employees** will complete an initial baseline medical surveillance examination performed by a PLHCP in accordance with the requirements of the Medical Surveillance Program (*S3NA-605- PR Medical Surveillance Program)*.

4.2.2 **Employees** who continue to use respiratory protection will receive an annual medical surveillance examination.

4.2.3 Additional medical examinations will be provided to employees who wear respirators if/when:

- An **employee** reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, or the respirator program administrator determines that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature, etc.) that may result in a substantial increase in the physiological burden placed on an employee.

4.2.4 All medical surveillance examinations shall occur during normal working hours; shall be convenient, understandable, and confidential; and the employee will be given chance to discuss results with examining physician.

4.3 Training

4.3.1 Project staff that may be exposed to the hazard will be oriented to the hazard and the controls prior to beginning work.

4.3.2 Atmospheric testing will be carried out by someone trained in the use, calibration, and interpretation of the test equipment.

4.3.3 **Employees** who may be required to use a breathing apparatus shall be properly trained in the operation, maintenance, cleaning and storage of the apparatus.

4.3.4 All staff will receive an orientation to the hazards on the job site as well as initial Field Safety training which outlines appropriate PPE requirements.

4.3.5 **Employees** who wear respiratory protection must receive training before they are assigned to a task that requires the use of respiratory protection.

4.3.6 Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to verify safe respirator use.

4.3.7 Frequency of Training

- All employees who may have the need to wear respiratory protection are required to participate in AECOM's internal SH&E training program.
- In addition, AECOM's SH&E Department will conduct respirator training classes, as necessary, for those who may need to wear respiratory protection but did not participate in AECOM's HAZWOPER training classes.

4.3.8 Basic Respirator Training Program

Respirator training classes will include, at a minimum, the following:

- Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used.

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- The limitations and capabilities of the respirator.
- Proper fitting, including demonstrations and practice in wearing, adjusting, determining the fit of, and performing a user seal check (in accordance with *S3NA-519-WI1 Fit Testing Protocol)* each time respirator is donned.
- How to inspect, put on, use and remove the respirator.
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
- The procedures for maintenance and storage of the respirator.
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- The general requirements of the OSHA and OH&S Respiratory Protection Standard.

4.4 Respirator Selection

4.4.1 AECOM will maintain air purifying respirators and cartridges from at least two providers (i.e. MSA and North).

4.4.2 Prior to fit testing, the employee shall be allowed to pick the most comfortable respirator from the brands offered.

4.4.3 The type of respirator most commonly used by AECOM staff is a cartridge type air purifying respirator (APR). Many different types of APRs exist, and field staff should always fit test an APR prior to use.

4.5 Fit Testing Procedures

4.5.1 A respirator that doesn't fit properly will not provide adequate protection.

4.5.2 Four types of tests can be used:

- Positive Pressure Sealing Check: Close off the exhalation valve and exhale gently. The fit is satisfactory if a slight positive pressure can be built up inside the face piece for a full 10 seconds without detecting any outward leakage of air between the sealing surface of the face piece and the wearer's face.
- Negative Pressure Sealing Check: Close off the inlet opening of the cartridges by covering them with the palm of the hands. Inhale gently and hold breath for at least 10 seconds. The face piece should collapse slightly with no detection of inward leakage of air into the face piece.
- Isoamyl Acetate Test (banana oil test): A tube or bottle of banana oil is held in front of and around the mask. The fit is adequate if the wearer does not detect the odour of bananas. During the test, the wearer should be demonstrating movements that approximate a normal working situation, including deep breathing, side-to-side and up-and-down head movements, and talking.
- Irritant Smoke Test (Stannic Chloride Test): The procedure is similar to that of the banana oil test except that an irritant smoke is used. The wearer of the mask will cough (involuntary reaction) if he/she detects the irritant smoke in the mask.

4.5.3 Fit Testing Frequency

Additional fit tests will be performed:

- Whenever there is an indication that changes in the **employee's** physical condition might have an effect on respirator fit. (Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.)
- Whenever there is an indication that changes in the **employee's** physical condition might have an effect on respirator fit. (Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.)
- If the **employee** notifies his/her supervisor or Regional SH&E Manager that the fit of his/her respirator is unacceptable.

4.5.4 Fit Testing Records

A written record of each fit test performed must be maintained in the **employee's** health and safety records. *S3NA-519-FM1 Respiratory Equipment Fit Test* will be used to document each fit test.

4.6 Interference with Gas-Tight Seal

Respiratory protection can only be worn when it can be determined that there is no obstruction of contact between the wearer's skin and the sealing surfaces of the mask whatsoever. Such obstruction can include facial hair, head hair, and the temple bars of eye glasses.

4.6.1 Respirator wearers cannot be afforded protection from hazardous airborne contaminants when conditions prevent a complete gas-tight face seal.

4.6.2 Although eyeglass temple bars will interfere with the formation of a gas-tight face seal in the case of full-face respirators, this problem is correctable by use of internally mounted spectacle kits. Management and supervisors shall verify that **employees** under their supervision who regularly wear eyeglasses, and who will require the use of a full-face respirator, are provided with appropriate spectacle kits at company expense.

The use of contact lenses in hazardous atmospheres or in operations involving intense heat, molten metals or the potential for chemical splash shall be prohibited.

4.6.3 Because facial hair (even beard stubble) will interfere with a gas-tight seal, employees shall be required to be clean- shaven whenever the use of respiratory protection is specified.

4.6.4 Respiratory Protection will only be assigned to those **employees** without physical obstructions to a gas-tight face seal to jobs that may require the use of respiratory protection. Candidates for employment shall be made aware that their versatility may be limited if they cannot wear a respirator and that this can affect their job assignments.

4.7 Specification of Proper Level of Respiratory Protection

4.7.1 The **Region SH&E Manager** or his/her designated and qualified representative is responsible for specifying the proper selection and use of all respiratory protective devices, including half-face and full-face air purifying respirators, airline respirators, and self-contained breathing apparatus. This information is generally specified as part of the written site-specific Health and Safety Plan (HASP).

4.7.2 **Employees** engaged in activities not covered by a HASP must consult with the **Region SH&E Manager** or his/her designated representative to determine the proper equipment prior to use. Whenever appropriate, exposure levels will be measured to verify that the actual use conditions are within the limitations of the approvals specified by NIOSH/MSHA for the selected respirator.

4.7.3 Conditions Required for Air-Purifying Respirator (APR) Use

Air-purifying respirators (APR) shall only be specified for use when it can be determined that the following conditions exist:

- The oxygen concentration is greater than 19.5%.
- The contaminant is known and its concentration can be quantified.
- The airborne contaminant concentration is below its IDLH.
- A canister or cartridge is available which is approved for the contaminant.
- The contaminant concentration is below the concentration for which the canister is approved.
- The contaminant concentration is below the Maximum Use Concentration (MUC) of the respirator.

In all cases where OSHA has specified that a particular respirator be used (asbestos, formaldehyde, benzene, arsenic, lead, etc.), that respirator, or one providing equal or better protection, shall be specified.

4.7.4 APR Filter and Chemical Cartridges

An adequate supply of the following cartridges shall be maintained in stock at each office location where respiratory protective equipment:

- High efficiency particulate air (HEPA) filter cartridges;
- Organic vapor cartridges; and
- Combination HEPA/acid gas/organic vapor cartridges

4.7.5 Change Out Schedule

Filter cartridges shall be changed out whenever an increase in breathing resistance is detected by the user.

When available, chemical cartridges that are equipped with end-of-service life indicators (ESLI) shall be utilized. In those cases, cartridges should be changed when indicated by the ESLI.

In the absence of cartridges equipped with an ESLI, employees shall change chemical cartridges on the following schedule:

- Immediately if breakthrough is perceived;
- In accordance with the change out schedule developed by the Regional SH&E Manager in the site-specific Health and Safety Plan (HASP); and
- After each day's use.

The change out schedule will be based upon the anticipated contaminant concentration, environmental conditions, employee work rate, and the specific data provided by manufacturer

When powered air-purifying respirators **(**PAPRs) are worn, the same rules apply with the exception that filter cartridges should be changed when airflow through the filter elements decreases to an unacceptable level, as indicated by the manufacturer's test device.

4.8 Air-Supplying Respirator Use

4.8.1 Conditions Requiring Use of Air-Supplying Respirators

Air-supplying respirators will be specified for use when it has been determined that any of the following conditions exist:

- The oxygen concentration is less than 19.5%;
- The contaminant is unknown or its concentration cannot be quantified;
- The airborne contaminant concentration is above its IDLH;
- An air-purifying respirator canister or cartridge that removes the contaminant is not available;
- The contaminant concentration is above the concentration for which an air-purifying canister or cartridge is approved; or
- The contaminant concentration is above the Maximum Use Concentration (MUC) of a full-face air-purifying respirator.

No employee may engage in an operation requiring the use of an air-supplied respirator unless a representative of the SH&E Department has reviewed the operation and approved its use.

The determination of the type of air-supplying respirator (i.e., SCBA, air-line, demand, pressure demand, etc.) which is appropriate for the job, outside standby persons, communication, proper training and equipment, notification procedures, and necessary action all require planning. Mandatory equipment including SCBA or SAR with auxiliary air supply & emergency appropriate retrieval equipment or equivalent rescue means will be made by the **Region SH&E Manager** or his/her designated representative at the time of review. The need for any additional precautions (i.e.,

equipment specific training, on-site H&S support, etc.) will also be determined by the **Region SH&E Manager**.

4.9 Minimum Procedures for IDLH atmospheres

4.9.1 One **employee** or, when needed, more than one employee shall be located outside the IDLH atmosphere. This employee shall be responsible for communicating with the **employees** in the IDLH atmosphere, alerting rescue services if needed, and restricting entrance to the IDLH area by untrained and unapproved persons.

4.9.2 Visual, voice, or signal line communication shall be maintained between the **employee**(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

4.9.3 The **employee**(s) located outside the IDLH atmosphere shall be trained and equipped to provide effective emergency rescue or to initiate onsite rescue services.

4.9.4 If on-site rescue services are to be used, the **Site Safety Officer** shall confirm that the service is available to respond prior to any employees entering the IDLH area.

4.9.5 **Employee**(s) located outside the IDLH area and/or on-site rescue services shall be equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment would create a hazard to the workers in the IDLH area.

4.10 Breathing Air Quality

Compressed air used for respiration shall be of high purity and shall meet, as a minimum, the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1).

Oxygen shall NOT be used as a source of breathing air at any time in open-circuit SCBAs or air-line respirators.

4.10.1 Compressor Supplied Breathing Air

All compressors used for filling SCBA air cylinders or for supplying air-line respirators shall be equipped with the following safety and standby devices:

- The compressor intake shall be located to verify that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
- Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
- A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere shall be provided.

If an oil-lubricated compressor is used to supply breathing air, it shall be equipped with both of the following devices:

- A continuous reading carbon monoxide monitoring system set to alarm should the carbon monoxide concentration exceed 10 ppm; and,
- A high temperature alarm which will activate when the discharge air exceeds 110% of the normal operating temperature in degrees Fahrenheit.

An in-line purifying filter assembly to remove oil, condensed water, particulates, odors, and organic vapors shall be used in conjunction with the air compressor.

Routine inspection and maintenance of air compressor shall be performed.

4.10.2 Compressed Air Cylinders

Breathing air cylinders shall be legibly identified with the word AIR by means of stenciling, stamping, or labeling as near to the valve end as practical.

Cylinders shall be stored and handled to prevent damage to the cylinder or valve.

Cylinders shall be stored upright with the protective valve cover in place and, in such a way (e.g. supported with substantial rope or chain in the upper one third of the cylinder, or in racks designed for this purpose) as to prevent the cylinder from falling.

Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125^0 F. Cylinders with visible external damage, evidence of corrosion damage, or exposure to fire shall not be accepted or used.

Only cylinders within current hydrostatic test periods shall be used. Steel cylinders must be hydrostatically tested every five years and fiberglass wrapped aluminum cylinders must be tested every three years.

4.10.3 Compressed Air Cylinder Systems for Air-Line Respirators

Compressed air cylinder systems used to supply air-line respirators shall be equipped with low pressure warning bells (e.g., Scott Pak-Alarm) or similar warning devices to indicate air pressure in the manifold below 500 psi. When such systems are used, one employee shall be assigned as safety standby within audible range of the low pressure alarm.

Air-line hose couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying air-line respirators with nonrespirable gases or oxygen.

The air pressure at the hose connection to air-line respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.

4.10.4 Compressed Air Cylinder Systems for Recharging SCBAs

When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3000 psi.

4.10.5 Escape/Egress Units

Escape/egress unit respirators are intended for use in areas where escape with a short-term (5 minutes) air supply is necessary.

They may be used as adjuncts to airline pressure demand respirators as a backup air supply or as independent emergency devices in areas where respiratory protection is not normally required.

Appropriate training shall be conducted and documented prior to assigning employees to tasks or locations subject to the use of these respirators.

Escape/egress units (5 minutes) shall never be used to enter a hazardous atmosphere or as primary standby respirators for confined space entry.

4.10.6 Respirator Inspection, Cleaning, Maintenance, and Storage

When respirator use is required, only properly cleaned and maintained NIOSH/MSHA approved respirators shall be used.

4.10.7 Inspection

- Respirators should be inspected before and after use. Those for emergency use should be inspected once per month.
- All connections, including gaskets, o-rings should be checked for damage and tightness.
- The face piece should be inspected for cracks and rubber or elastomer parts should be checked for deterioration and pliability.
- All respirators shall be inspected routinely by the user before, during, and after each use. Defects shall be reported to supervision. No defective respirator shall be issued or worn.

- Routinely used respiratory equipment shall be inspected by an individual qualified by experience or training to do the work.

4.10.8 Cleaning and Maintenance

- Respirator facepiece assemblies shall be cleaned and sanitized minimally after each day of use in accordance with the requirements specified in *S3NA-519-WI3 Respirator Cleaning Procedures*.
- Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.
- Respiratory equipment shall be maintained according to manufacturer's instructions.
- Where respirators are assigned to individual employees, management shall verify compliance with cleaning and maintenance requirements by periodic inspection and field audits of respiratory equipment.
- Respirators must be cleaned after each use and then placed into a clean bag for storage.
- Prior to cleaning, the filters, cartridges, or canisters must be removed and discarded.
- The respirator should then be inspected for any damaged parts (repair should only be done by trained personnel with the proper tools) and cleaned with a hot water/mild detergent solution.
- In field situations, a premoistened towelette (e.g., baby wipes) can be used. The mask should then be rinsed with clean warm water and dried.
- Alcohol should never be used to clean masks as it can damage the face pieces and rubber parts.

4.10.9 Storage

- Store clean respirators so that they are protected from dust, excessive moisture, damaging chemicals, temperature extremes and direct sunlight. They should be placed in a sealed plastic bag and stored in the original box.

When not in use, respirator facepieces shall be placed in clean Ziploc-style bags and stored to protect against dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals.

4.11 Hygiene

Employees must leave the work area to wash, change cartridges, or if they detect breakthrough or resistance.

4.12 Program Evaluation

4.12.1 The **Region SH&E Manager** will conduct evaluations of the workplace as necessary to verify that the provisions of the current written program are being effectively implemented and that it continues to be effective.

4.12.2 The **Region SH&E Manager** will regularly (i.e., during annual training) consult employees required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the employee is exposed;
- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance.

4.13 Costs

4.13.1 The costs for training, medical examinations, fit testing, respirators, and cleaning materials should be considered as operational costs for the respective AECOM business lines.

5.0 Records

5.1 Medical Records

Medical records under this section will be maintained at a minimum in accordance with 29 CFR 1910.1020 – Access to Employee Exposure and Medical Records (*S3NA-604 Medical Records*).

5.2 Fit Test Records

Fit test records will include the name of the employee tested; the type of fit test performed; the specific style, make, model, and size of the respirator tested; the date of the test; and the pass/fail results for QLFTs or QNFT test documentation (i.e., strip charts).

5.3 Training Records

- Respiratory protection training records will be maintained by the employee with copies provided to their SH&E Coordinators or Administrators.
- On-site records of training and fit testing will be maintained as necessary.
- For situations where training is required by and provided by clients, copies of SH&E Records shall be maintained by AECOM.

6.0 References

6.1 The following standards apply to respiratory equipment:

Association	Standard
Canadian Standards Association (CSA)	Z180.1-00, Compressed Breathing Air and Systems Z94.4-02, Selection, Use and Care of Respirators
Department of Labor - Occupational Safety and Health Administration	29 Code of Federal Regulation 1910. 134 29 Code of Federal Regulation 1926.103

S3NA-519-FM1 Respiratory Equipment Fit Test

Date of Testing:		**Respirator Type(s):**	
Employee Name:		**Location:**	
Method & Testing Agent:			
Test Exercise	**Pass / Fail**	**Test Exercise**	**Pass / Fail**
Sensitivity Check		Normal Breathing	
Deep Breathing		Turning Head (side to side)	
Moving Head (up/down)		Rainbow Passage*	
Bending Over		Normal Breathing	

Successful Respirator Fit Determined: ☐ **Yes** ☐ **No**

I certify that I have been tested with the respirator(s) listed above. I have also had the opportunity to ask questions and those questions have been answered to my satisfaction. I also understand that the above fit test is voided if respirator limitations are not followed or the respirator is not worn or if conditions (e.g., facial hair) prevent a good face seal.

Employee Signature:	Date:
Signature of Tester:	Date:

***Rainbow Passage.** "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."*

Date: Tester:	MSA Comfo II HM S ☐ M ☐ L ☐	MSA Ultra Twin FM S ☐ M ☐ L ☐	North 7700 HM S ☐ M ☐ L ☐	North 7600 FM S ☐ M/L ☐	HM S ☐ M ☐ L ☐	FM S ☐ M ☐ L ☐
Qualitative Test Agent(s): IAA ☐ Smoke ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor
Date: Tester:	MSA Comfo II HM S ☐ M ☐ L ☐	MSA Ultra Twin FM S ☐ M ☐ L☐	North 7700 HM S ☐ M ☐ L ☐	North 7600 FM S ☐ M/L ☐	HM S ☐ M ☐ L ☐	FM S ☐ M ☐ L ☐
Qualitative Test Agent(s): IAA ☐ Smoke ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor
Date: Tester:	MSA Comfo II HM S ☐ M ☐ L ☐	MSA Ultra Twin FM S ☐ M ☐ L ☐	North 7700 HM S ☐ M ☐ L ☐	North 7600 FM S ☐ M/L ☐	HM S ☐ M ☐ L ☐	FM S ☐ M ☐ L ☐
Qualitative Test Agent(s): IAA ☐ Smoke ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐
Quantitative Test Device	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor	Overall Fit Factor

Instructions

1. Complete the employee information at the top of the record (one record per employee).
2. Enter the date of the test and the name of the person conducting the fit test.
3. Circle the brand and model of respirator tested (e.g., MSA Comfo II, North 7700, etc.) or enter another brand and model in one of the last two columns.
4. Circle the size of the respirator tested.
5. For qualitative fit tests, circle the test agent used - IAA = Isoamyl Acetate, Smoke = Irritant Smoke (Stannic Chloride) and the outcome of the test (i.e., Pass or Fail).
6. For quantitative fit tests, enter the name of the instrument used and the overall fit factor measured by the test.
7. Keep a copy in the employee's training files and enter subsequent (e.g., annual) tests until the record is filled.

S3NA-519-FM2 Respiratory Equipment Maintenance Log

Unit No.	Respirator Type	Cleaned	Sterilized	Date	Performed by

S3NA-519-FM3 Respiratory Equipment Inspection

Date:		**Inspected by:**	
Air Purifier Unit #:			

	N/A	Pass	Fail
Examine Face Piece for:			
Excessive dirt	☐	☐	☐
Cracks, tears, holes, or distortion from improper storage	☐	☐	☐
Inflexibility (stretch and massage to restore flexibility)	☐	☐	☐
Cracked or badly scratched lenses in full face pieces	☐	☐	☐
Incorrectly mounted full-face piece lens or broken or missing mounting clips	☐	☐	☐
Lens sealed properly in receptacle, retaining clamp secured	☐	☐	☐
Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s) (if appropriate)	☐	☐	☐
Examine the Head Straps or Head Harness for:			
Breaks	☐	☐	☐
Loss of elasticity	☐	☐	☐
Broken or malfunctioning buckles and attachments	☐	☐	☐
Excessively worn serrations on the head harness that might permit slippage (full face pieces only)	☐	☐	☐
Tears in headband at cradle attachment	☐	☐	☐
Examine the Inhalation and Exhalation Valves for:			
Foreign material, such as detergent residue, dust particles, or human hair under the valve seat	☐	☐	☐
Cracks, tears, or distortion in the valve material	☐	☐	☐
Improper insertion of the valve body in the face piece	☐	☐	☐
Cracks, breaks, or chips in the valve body, particularly in the sealing surface	☐	☐	☐
Missing or defective valve cover	☐	☐	☐
Examine the Air Purifying Elements for:			
Incorrect cartridge, canister, or filter for the hazard	☐	☐	☐
Incorrect installation, loose connection, missing or worn gaskets, or cross-threading in the holder	☐	☐	☐
Expired shelf life date on cartridge or canister	☐	☐	☐
Defects Noted:			
Unit Deemed Suitable for Use	☐ Yes		☐ No

S3NA-519-WI1 Fit Testing Protocol

1.0 Selection

1.1 The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

1.2 Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

1.3 The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape and if fitted and used properly will provide adequate protection.

2.0 Comfort

2.1 The test subject shall be instructed to hold each chosen face piece up to the face and to eliminate those that obviously do not give an acceptable fit.

2.2 The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort.

2.3 If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

2.4 Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

- Position of the mask on the nose
- Room for eye protection
- Room to talk
- Position of mask on face and cheeks

3.0 Fit Test Criteria

3.1 The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension, not overly tightened;
- Fit across nose bridge;
- Respirator of proper size to span distance from nose to chin;
- Tendency of respirator to slip;
- Self-observation in mirror to evaluate fit and respirator position.

3.2 The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in *S3NA-519-WI2 User Seal Check Procedures* or those recommended by the respirator manufacturer that provide equivalent protection to the procedures in *S3NA-519-WI2 User Seal Check Procedures.*

3.3 Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side to side and up and down slowly while taking in a few slow deep breaths. Another face piece shall be selected and retested if the test subject fails the user seal check tests.

3.4 The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, mustache, or sideburns that cross the

respirator sealing surface. Any type of apparel that interferes with a satisfactory fit shall be altered or removed.

3.5 If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

3.6 If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

4.0 Exercise Regimen

4.1 Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

4.2 The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use and that could interfere with respirator fit.

5.0 General Test Exercises

5.1 The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

5.1.1 **Normal breathing**. In a normal standing position, without talking, the subject shall breathe normally.

5.1.2 **Deep breathing.** In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

5.1.3 **Turning head side to side.** Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

5.1.4 **Moving head up and down.** Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

5.1.5 **Talking.** The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

5.1.6 **Rainbow Passage.** "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."

5.1.7 **Grimace.** The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

5.1.8 **Bending over.** The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

5.1.9 **Normal breathing**. In a normal standing position, without talking, the subject shall breathe normally (this is the same as the first test).

5.2 Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds.

5.3 The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

5.4 The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test and the fit test must be repeated.

6.0 Qualitative Fit Test (QLFT) Protocols

6.1 General

6.1.1 AECOM will ensure that persons administering QLFT are able to calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

6.1.2 AECOM will ensure that that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

6.2 Irritant Smoke (Stannic Chloride) Protocol

6.2.1 This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

6.2.2 **General Requirements and Precautions:**

- The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
- Only stannic chloride smoke tubes shall be used for this protocol.
- No form of test enclosure or hood for the test subject shall be used.
- The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.
- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

6.2.3 **Sensitivity Screening Check**

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute or to an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.
- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

6.2.4 **Irritant Smoke Fit Test Procedure**

- The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
- The test subject shall be instructed to keep his/her eyes closed.
- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the face piece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

- If the person being tested has not had an involuntary response and/or has not detected the irritant smoke, proceed with the test exercises.
- The General Test Excercises (Section 5.0) shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.
- If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.
- Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- If a response is produced during this second sensitivity check, then the fit test is passed.

7.0 Quantitative Fit Test (QNFT) Protocols

7.1 General

- AECOM will confirm that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.
- AECOM will ensure that QNFT equipment is kept clean and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

7.2 Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol

7.2.1 The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount TM) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device installed on the respirator to allow the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator, and a minimum fit factor pass level of at least 500 is required for a full face piece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

7.2.2 **Portacount Fit Test Requirements**

- Check the respirator to make sure the sampling probe and line are properly attached to the face piece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) according to the manufacturer's instructions.
- Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.
- Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; self-observation in a mirror to evaluate fit and respirator position.
- Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.
- Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
- The test subject shall be instructed to perform the exercises in General Test Excercises (Section 5.0).

- After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

7.2.3 **Portacount Test Instrument**

- The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
- Since the pass or fail criterion of the Portacount is user programmable, the test operator shall confirm that the pass or fail criterion meet the requirements for minimum respirator performance.
- A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

S3NA-519-WI2 User Seal Check Procedures

1.0 Requirements

1.1 The individual who uses a tight-fitting respirator is to perform a user seal check to confirm that an adequate seal is achieved each time the respirator is put on.

1.2 Either the positive and negative pressure checks listed here or the respirator manufacturer's recommended user seal check method shall be used.

1.3 User seal checks are not substitutes for qualitative or quantitative fit tests.

2.0 Facepiece Positive and/or Negative Pressure Checks

2.1 **Positive pressure check**

2.1.1 Close off the exhalation valve and exhale gently into the facepiece.

2.1.2 The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal.

2.1.3 For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

2.2 **Negative pressure check**

2.2.1 Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold your breath for 10 seconds.

2.2.2 The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand.

2.2.3 The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.

2.2.4 If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

3.0 Manufacturer's Recommended User Seal Check Procedures

3.1 The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures, provided that the employer demonstrates that the manufacturer's procedures are equally effective.

S3NA-519-WI3 Respirator Cleaning Procedures

1.0 Requirements

1.1 These procedures are general in nature. The cleaning recommendations provided by the manufacturer may be used for the respirators used by their employees, provided such procedures are as effective as those listed here.

1.2 Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth (i.e., confirm that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user).

2.0 Procedures for Cleaning Respirators

2.1 Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

2.2 Wash components in warm (43^{o}C [110^{o}F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

2.3 Rinse components thoroughly in clean, warm (43^{o}C [110^{o}F] maximum), preferably running water. Drain.

2.4 When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

- Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43^{o}C (110^{o}F); or,
- Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43oC (110oF); or,
- Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

2.5 Rinse components thoroughly in clean, warm (43^{o}C [110^{o}F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

2.6 Components should be hand dried with a clean, lint-free cloth or air-dried.

2.7 Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

2.8 Test the respirator to ensure that all components work properly.

2.9 After the fit test, wipe down the respirator with a sanitary swab.

S3NA-520-PR Spill Response, Incidental

1.0 Purpose and Scope

1.1 This procedure defines the role of AECOM employees in the event of a chemical spill in AECOM offices, laboratories, or storage areas and during field investigations, including the appropriate containment procedures that AECOM employees will follow.

1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 **Emergency Response**: A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrolled release of a hazardous substance or whenever a release requires that a federal or state agency be notified, such as:

2.1.1 A release at or above a reportable quantity (RQ) of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance (40 CFR 302.8) is required to be reported to the National Response Center (NRC).

2.1.2 A hazardous chemical release at or above an RQ under the Emergency Planning and Community Right-to-Know Act (EPCRA) (Title III under the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 350-372) is required to be reported to state and local officials.

2.1.3 A release in violation of a facilities Spill Prevention, Control, and Countermeasure (SPCC) Plan (40 CFR 112).

2.2 **Incidental Releases**: A response to a spill or release of a hazardous substance (in quantities below its RQ) where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area using equipment and materials available to them at the time or the spill or release. Any spill or release that cannot be managed with the personnel, materials, and equipment at the site shall be considered an Emergency Response.

2.2.1 Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses. Handling of incidental releases shall be in accordance with applicable standard operating procedures.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Supervisor/Project Manager** shall become the individual in charge at the incident until relieved by more qualified personnel. All AECOM emergency responders and their communications shall be coordinated and controlled through this individual. The individual in charge shall implement the Incident Command System (ICS) and shall be responsible for the following tasks:

- Designate a safety officer who is knowledgeable about the operations being implemented at the emergency response site and who will have specific responsibility to identify and evaluate hazards and to provide direction on the safety of operations for the emergency at hand. If the safety officer judges activities to be an Immediately Dangerous to Life or Health (IDLH) and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

- Identify all hazardous substances or conditions present and address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance, and handling procedures.
- Implement appropriate emergency operations.
- Limit the number of emergency response personnel at the emergency site.
- Implement the buddy system in groups of two or more.
- Provide standby, backup personnel with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation as necessary.
- Verify that personal protective equipment (PPE) meets, at a minimum; the criteria contained in 29 CFR 1910.156(e) when worn while performing firefighting operations beyond the incipient stage for any incident.
- Determine if employees, who are engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard, wear positive pressure self-contained breathing apparatus, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection is appropriate.
- When deemed necessary for meeting the tasks at hand, an approved, self-contained, compressed air breathing apparatus may be used with approved cylinders from other approved, self-contained, compressed air breathing apparatuses provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatuses shall meet U.S. Department of Transportation and National Institute for Occupational Safety and Health criteria.
- Ensure that the PPE worn is appropriate for the hazards to be encountered.
- Implement appropriate decontamination procedures after emergency operations have terminated.
- Responsibility for the emergency response shall be transferred upon arrival of a more qualified AECOM Incident Commander or a Public Service Incident Commander.

4.1.2 **Region Safety, Health and Environmental Manager** is responsible for the following:

- Provide technical assistance to the Incident Commander regarding the correct way to respond to the spill.
- Decide whether AECOM or an outside emergency response company will clean up the spill.
- Prepare project-specific Spill Response Plans when required.
- Report spills, as necessary, to state/provincial environmental agencies.
- Review the incident report and facilitate the post-response discussion.
- Review and revise this SOP as necessary based on recommendations from post-response discussions.

4.1.3 **AECOM Employees** are responsible for the following:

- Follow precautions and safe handling practices to avoid spills.
- Alert Supervisor/Project Manager to any deteriorating hazardous materials containers within the office or project area.
- Report all spills and leaks to the Supervisor/Project Manager immediately.
- Secure the spill area as quickly as possible and prevent the migration of exterior spilled materials or substances to drains or other openings.

4.1.4 **First Responder Awareness Level** are those employees who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response by notifying the proper authorities of the release. They take no further action beyond notifying the authorities of the release.

4.1.5 First responders at the awareness level shall have sufficient training or experience to demonstrate competency in the following areas:

- An understanding of what hazardous substances are and the risks associated with them in an incident.
- An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
- The ability to recognize the presence of hazardous substances in an emergency.
- The ability to identify the hazardous substances, if possible.
- An understanding of the role of the first responder awareness individual in the employer's emergency response plan, including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.
- The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.1.6 **First Responder Operations Level** are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures.

First responders at the operational level shall receive at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper PPE provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and PPE available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

4.1.7 **Hazardous Materials Technicians** are employees who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

Hazardous materials technicians shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and PPE available with the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

4.1.8 **Hazardous Materials Specialists** are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those

duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities.

4.1.9 Hazardous materials specialists shall receive at least 24 hours of training equal to the technician level and in addition have competency in the following areas:

- Know how to implement the local emergency response plan.
- Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.
- Know the state emergency response plan.
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.
- Understand in-depth hazard and risk techniques.
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and PPE available.
- Be able to determine and implement decontamination procedures.
- Have the ability to develop a site safety and control plan.
- Understand chemical, radiological, and toxicological terminology and behavior.

4.1.10 **On Scene Incident Commander,** who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas:

- Know and be able to implement the employer's incident command system.
- Know how to implement the employer's emergency response plan.
- Know and understand the hazards and risks associated with employees working in chemical protective clothing.
- Know how to implement the local emergency response plan.
- Know the state emergency response plan and of the Federal Regional Response Team.
- Know and understand the importance of decontamination procedures.

4.1.11 **Skilled Support Personnel** who are skilled in the operation of certain equipment (such as mechanized earth moving or digging equipment or crane and hoisting equipment), who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by AECOM's employees, and who will be or may be exposed to the hazards at an emergency response scene are not required to meet the training required. However, these Skilled Support Personnel shall be provided an initial briefing at the site prior to their participation in the emergency response. At a minimum, the initial briefing shall include instruction in the wearing of appropriate PPE, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to AECOM's own employees shall also be provided to any Skilled Support Personnel.

4.1.12 **Specialist Employees** are AECOM employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge shall receive training or demonstrate competency in the area of their specialization annually.

4.2 Emergency Response Plan

4.2.1 An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to performing emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, and OSHA personnel. The plan shall be reviewed and approved by the Regional SH&E Manager prior to issue.

4.2.2 If contract does not require AECOM to provide emergency response services, then AECOM'S SH&E Procedures *S3NA-101-PR Emergency Response Planning, Offices* and *S3NA-203-PR Emergency*

Response Planning, Field shall apply and employees shall evacuate from the danger area whenever an emergency occurs.

4.2.3 Upon completion of the emergency response, all followup remediation work shall be done in accordance with AECOM SH&E Procedure *S3NA-509-PR Hazardous Waste Operations and Emergency Response.*

4.2.4 At a minimum, the emergency response plan shall address the following:

- Pre-emergency planning and coordination with outside parties
- Personnel roles, lines of authority, training, and communication
- Emergency recognition and prevention
- Safe distances and places of refuge
- Site security and control
- Evacuation routes and procedures
- Decontamination
- Emergency medical treatment and first aid
- Emergency alerting and response procedures
- Critique of response and follow-up
- PPE and emergency equipment

4.2.5 (Note: Local and state emergency response plans may need to be review and incorporated into the plan.)

4.3 Training

4.3.1 Training for responders shall be provided by AECOM's Regional SH&E Manager or by individuals who have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach. Employees who receive responder training shall also receive annual refresher training if their responding responsibilities continue.

4.3.2 Employees receiving initial and refresher responder training shall be issued a certificate indicating training competency. Copies of all training records shall be maintained by the Site Safety Officer.

4.4 Medical Surveillance

4.4.1 All employees participating in an emergency response shall participate in AECOM'S *S3NA-605-PR Medical Surveillance Program*.

4.5 Chemical Protective Clothing

4.5.1 Chemical protective clothing shall be worn in accordance with AECOM'S *S3NA-208-PR Personal Protective Equipment Program*.

4.6 Spill Response Equipment

4.6.1 All AECOM offices that store chemicals at their facility shall have the appropriate spill response equipment. Such equipment may include the following:

- Overpack containers of varying capacities
- Absorbent material such as vermiculite or commercially prepared, absorbent containing pillows, rolls, sheets, or booms
- Acid and base neutralizing agents
- Chemically resistant gloves for solvents, alcohols, and acids
- Polycoated Tyvek coveralls
- Safety goggles
- Respiratory protection

4.6.2 Spill response equipment shall be placed adjacent to areas where chemicals are routinely handled, stored, and/or where shipments are received. Similar types of spill response equipment shall also be

available in any AECOM vehicle or rented vehicle in which chemicals are being transported. Access to the spill response equipment shall be designed to avoid likely spill locations.

4.7 Spill Response Equipment for Field Programs

4.7.1 The amount of chemicals being used during a field program will dictate the types and quantity of spill response equipment that is brought to the site. If several squirt bottles of decontamination solutions are all that is being brought to a site, a few spill pillows and a one-gallon bucket may be sufficient to respond to a spill of these materials. If gallons of chemicals are being delivered to the site in drums or bulk tanks, a greater variety of spill response equipment will be needed. As indicated previously, during these types of field programs, a separate spill plan will be incorporated into the project health and safety plan (HASP) and will provide a greater level of detail regarding the specific spill response effort for that field program.

4.8 Immediate Response

4.8.1 Evacuate all personnel that will not be involved in the clean up from the immediate area of the spill or release.

4.8.2 Take all reasonable measures to confine, repair, and remedy the effects of the spill; cleanup must be done by knowledgeable personnel and is in accordance with the product label and MSDS.

4.8.3 Use the appropriate equipment and PPE so that you do not expose yourself to any chemicals or hazardous substances.

4.8.4 Clean up teams shall be organized outside the spill area and re-enter for cleanup activities.

4.8.5 If it is not practicable to maintain the airborne concentration of a flammable gas or vapour below the applicable exposure limit, for example, in a temporary situation or an emergency,

- Only the minimum number of workers necessary for the work may be exposed,
- Every worker exposed must be adequately trained and equipped to safely perform the required duties,
- The concentration of the flammable gas or vapor must not exceed 20% of the lower explosive limit (LEL), and
- In a life-threatening emergency only, exposure of emergency response workers is permitted above 20% of the LEL, provided that only those qualified and properly trained and equipped workers necessary to correct the unsafe condition are exposed to the hazard and every possible effort is made to control the hazard while this is being done.

4.9 First Aid

4.9.1 In the event of an incident, refer to the MSDS labels to ensure proper first aid is administered for the hazardous material and call the nearest Poison Centre or 911.

4.9.2 The American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-1998) recommends that the affected body part must be flushed immediately and thoroughly for at least 15 minutes using a large supply of clean fluid under low pressure. However, other references recommend a minimum 20-minute flushing period if the nature of the contaminant is not known. The flushing or rinsing time can be modified if the identity and properties of the chemical are known. For example, at least

- 5 minutes flushing time for mild irritants.
- 20 minutes for moderate to severe irritants.
- 20 minutes for nonpenetrating corrosives.
- 60 minutes for penetrating corrosives.
- If irritation persists, repeat the flushing procedure.

4.9.3 It is important to note that ingestion of any chemical is not likely to occur in the workplace. If ingestion does occur, evidence indicates that inducing vomiting is not necessary in most situations where there has been an occupational chemical ingestion. Induction of vomiting should only be recommended if the chemical has very high, short-term (acute) toxicity, and medical follow-up is not readily available. In these cases, first aiders should receive special training on how to safely and effectively induce vomiting in the appropriate circumstances.

4.9.4 In the unlikely event that there is an on-site release of a hazardous substance (e.g., H2S):

- Get out of the area (in an upwind direction).
- Sound an alarm.
- Assess situation.
- Put on a breathing apparatus.
- Rescue victim(s).
- Revive victim(s).
- Get medical aid.

4.10 Reporting

4.10.1 Should there be a spill or leak involving a hazardous product, employees shall immediately notify the Supervisor and SH&E Incident Reporting Line.

4.10.2 “Dangerous occurrences” must be reported immediately to the police, employer, vehicle owner/leaser and the dangerous goods owner. Such events would include spills, bulk container damage, fire, explosion, and transportation accidents involving dangerous goods.

4.10.3 Confirm and seek direction on external reporting requirements.

- A major release of a hazardous substance must be reported to the appropriate provincial or territorial governing body for Occupational Health and Safety.
- All spills and releases must be reported to the governing regulatory body. Each jurisdiction has regulations governing the minimum quantities for reporting based on the type of product spilled or released.

4.10.4 If you have knowledge of spill, release, or unlawful discharge, notify authorities immediately. Reporting does not imply guilt or assign blame. You will need to report the following details.

- Location and time of spill.
- Description of circumstances leading to spill.
- Type and quantity of material or substance spilled.
- Details of any action taken at the site of the spill.
- Description of location of spill and immediately surrounding the area.
- Any additional information in respect of the spill that the Minister, environmental protection officer or person designated by regulations requires.

5.0 Records

5.1 None

6.0 References

6.1 40 CFR 302.8

6.2 40 CFR 350-372

6.3 40 CFR 112

6.4 S3NA-101-PR Emergency Response Planning, Office

6.5 S3NA-203-PR Emergency Response Planning, Field

6.6 S3NA-208-PR Personal Protective Equipment Program

6.7 S3NA-509-PR Hazardous Waste Operations and Emergency Response

6.8 S3NA-605-PR Medical Surveillance Program

Jurisdiction	Name	Phone
Alberta	Environmental Service Response Centre	1-800-222-6514
British Columbia	Provincial Emergency Program	1-800-663-3456
Manitoba	Conservation Emergency Response Program	1-204-944-4888

New Brunswick	Canadian Coast Guard	1-800-565-1633
Newfoundland & Labrador	Canadian Coast Guard	1-800-563-9089
NWT & Nunavut	Spill Report Line	1-867-920-8130
Nova Scotia	Canadian Coast Guard	1-800-565-1633
Ontario	Spill Action Centre	1-800-268-6060
Prince Edward Island	Canadian Coast Guard	1-800-565-1633
Quebec	Environmental Emergency Response	1-866-694-5454
Saskatchewan	Spill Report Centre	1-800-667-7525
Yukon Territory	Spill Report Centre	1-867-667-7244

S3NA-521-PR Decontamination

1.0 Purpose and Scope

1.1 To define appropriate procedures to decontaminate both equipment and personnel when exposure to hazardous chemicals or physical agents has occurred.

1.2 This procedure applies to all AECOM North America based operations and employees.

2.0 Terms and Definitions

2.1 **Contamination Reduction Zone (CRZ):** the transition area between the contaminated area and the clean area where decontamination activities occur.

2.2 **Decontamination:** the process of removing or neutralizing contaminants that have accumulated on personnel or equipment.

2.3 **Exclusion Zone (EZ):** the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc.

2.4 **Support Zone (SZ):** an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **Project Managers** will be responsible for the following:

- Authorizing the procurement of the necessary decontamination supplies
- Verifying that the applicable decontamination steps are clearly defined in the approved work plan
- Verifying staff are appropriately trained to execute the defined decontamination procedures
- Verifying that adequate staffing is available to safely conduct the applicable decontamination steps

4.1.2 **Supervisor** will be responsible for the following:

- Establishing the designated site work zones (i.e., EZ, CRZ, SP, etc.)
- Conduct site-specific training on the applicable decontamination steps/procedures, as required
- Procuring the necessary decontamination supplies and establishing the decon line
- Enforcing the applicable decontamination steps as defined in the approved work plan

4.1.3 **Employees** will be responsible for the following:

- Following the defined decontamination steps as stated in the approved work plan

4.1.4 **Region SH&E Manager**

- Advise project managers and site supervisors as to the necessary decontamination procedures based on the known or reasonably anticipated chemical hazards and physical agents associated with the planned scope of work
- Support the project team to verify that adequate supplied-air respiratory protection measures are in-place, as applicable

4.2 General Requirements

4.2.1 When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).

4.2.2 All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.

4.2.3 All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

4.2.4 Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The MSDS must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

4.2.5 All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements identified in the approved work plan.

4.2.6 For all Level B and A ensembles, adequate supplied air must be available to allow the employee to safely complete all necessary decontamination steps.

4.2.7 Where decontamination procedures involving radioactive materials are required, the removable limits for both personnel and equipment will be specified by a Certified Health Physicist in the project's approved Radiation Protection Plan or approved safety planning document.

4.3 Materials Needed to Decontaminate Personnel and/or Equipment

4.3.1 The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids;
- Paper or cloth towels for drying protective clothing and equipment; and
- Poly or plastic sheeting to lay down and form the base for the CRZ, as well as to contain contaminants and decontamination fluids.

4.4 Personal Decontamination Steps: Level D Ensemble

4.4.1 Remove residual or caked on soil from boots using a dry method (i.e., soft-bristle scrub brush to knock off the soil)

4.4.2 Wash exposed skin with soap and water, as applicable.

4.5 Personal Decontamination Steps: Modified Level D Ensemble

4.5.1 In the Exclusion Zone

- Equipment drop on plastic sheet
- Remove the majority of gross contamination
- Wash boot covers and outer gloves
- Rinse boot covers and outer gloves
- Remove tape
- Remove boot covers and outer gloves

4.5.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)

- Wash protective suits and safety boots
- Rinse protective suits and safety boots
- Safety boot removal
- Remove protective suit
- Wash inner gloves
- Rinse inner gloves
- Remove inner gloves.
- Remove inner clothing (if necessary)

4.5.3 In the Support Zone

- Finish with personal decon/hygiene wash procedures
- Redress (if necessary).

4.6 Personal Decontamination Steps: Level C Ensemble

4.6.1 In the Exclusion Zone

- Equipment drop on plastic sheet
- Remove the majority of gross contamination
- Wash boot covers and outer gloves
- Rinse boot covers and outer gloves
- Remove tape
- Remove boot covers and outer gloves

4.6.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)

- Wash protective suits and safety boots
- Rinse protective suits and safety boots
- Change out (if required): Filter/mask change and redress (boot covers and outer gloves)
- Safety boot removal
- Remove protective suit
- Wash inner gloves
- Rinse inner gloves
- Remove respirator/mask
- Remove inner gloves
- Remove inner clothing (if necessary)

4.6.3 In the Support Zone

- Finish with personal decon/hygiene wash procedures
- Redress (if necessary)

4.7 Personal Decontamination Steps: Level B Ensemble

4.7.1 In the Exclusion Zone

- Equipment drop on plastic sheet
- Remove the majority of gross contamination
- Wash boot covers and outer gloves
- Rinse boot covers and outer gloves
- Remove tape
- Remove boot covers and outer gloves

4.7.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)

- Wash SCBA/airline equipment, protective suits and safety boots

- Rinse SCBA/airline equipment, protective suits and safety boots
- Change out (if required): Tank change and redress (boot covers and outer gloves)
- Safety boot removal
- SCBA backpack or airline equipment removal
- Remove protective suit and/or splash suit
- Wash inner gloves
- Rinse inner gloves
- Remove face piece/mask
- Remove inner gloves
- Remove inner clothing (if necessary)

4.7.3 In the Support Zone

- Finish with personal decon/hygiene wash procedures
- Redress (if necessary)

4.8 Personal Decontamination Steps: Level A Ensemble

4.8.1 In the Exclusion Zone

- Equipment drop on plastic sheet
- Remove the majority of gross contamination
- Wash boot covers and outer gloves (if applicable to ensemble)
- Rinse boot covers and outer gloves (if applicable to ensemble)
- Remove tape (if applicable to ensemble)
- Remove boot covers and outer gloves (if applicable to ensemble)

4.8.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)

- Wash protective suite and safety boots
- Rinse protective suits and safety boots
- Change out (if required): Tank change and redress (boot covers and outer gloves)
- Safety boot removal
- Remove fully encapsulating suit and hard hat
- Remove SCBA backpack
- Wash inner gloves
- Rinse inner gloves
- Remove face piece/mask
- Remove inner gloves
- Remove inner clothing (if necessary)

4.8.3 In the Support Zone

- Finish with personal decon/hygiene wash procedures
- Redress (if necessary)

4.9 Decontamination Steps during a Medical Emergency

4.9.1 If decontamination can be done:

- Wash, rinse and/or cut off protective clothing and equipment

4.9.2 If decontamination cannot be done:

- Wrap the victim in blankets, plastic sheeting, or rubber to reduce contamination of other personnel
- Alert emergency and offsite medical personnel to potential contamination
- Instruct them about specific decontamination procedures if necessary

4.10 Equipment Decontamination Steps

4.10.1 All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools.

4.10.2 All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of protection required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

4.10.3 For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

4.10.4 For smaller equipment, use the following steps for decontamination:

1. Remove majority of visible gross contamination in EZ.
2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
3. Rinse equipment.
4. Visually inspect for remaining contamination.
5. Follow appropriate personal decontamination steps outlined above.

4.10.5 All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ. Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

5.0 Records

5.1 None

6.0 References

6.1 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute of Occupational Safety and Health (NIOSH) 85-115, 1985.

S3NA-603-PR Incident Investigation and Review

1.0 Purpose and Scope

1.1 Provide that all SH&E incidents are investigated in a timely and thorough manner. For all recordable, serious and fatalities, provide a formal incident investigation process.

1.2 Additionally, ensure that appropriate Lessons Learned are gathered from all SH&E incidents and that information is shared regarding lessons learned throughout the organization.

1.3 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 **Responsible Lead Investigator (RLI):** Manager responsible for the incident investigation, as established by the *S3NA-603-FM1 Responsible Lead Investigator Table.*

2.2 **SRI:** Supervisor's Report of Incident .

2.3 **SH&E Incidents**: A potientially work-related event which is unplanned, possibly harmful or damaging, and which may result in personal injury, environmental impact, or loss or may impact the reputation of AECOM or its clients or may result in an investigation by a regulatory agency or insurer. *S3NA004 – Incident Reporting.*

3.0 Attachments

3.1 S3NA-603-TP Sample Incident Investigation Report

3.2 S3NA-603-WI1 Responsible Lead Investigator Table

3.3 S3NA-603-WI2 Root Cause Worksheet

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Office Managers, Project Managers, Field Task Managers** are responsible to:

- Lead/participate in the formal Incident Investigation process as required by this procedure. **Managers** should consult with the appropriate **AECOM America's Chief Counsel** before conducting any formal investigation of a serious SH&E incident or engaging in any discussion outside of AECOM.
- Schedule and conduct Incident Review calls as required by this procedure.

4.1.2 **Supervisors** are responsible for the following:

- Lead/Participate in formal Incident Investigation as required by this procedure.

4.1.3 **Region SH&E Managers** are responsible for the following:

- Provide training on incident investigation techniques and tools to selected investigation teams.
- Initiate an investigation for all Category 3 and higher incidents as defined in the Responsible Lead Investigator Table by contacting the **RLI** and establishing the team, report format, and deadlines.
- Participate (following consultation with AECOM in-house counsel) on investigation teams and Incident Review Calls when requested by the **RLI.**

- Track and report on the status of all action items identified within final Incident Investigation Reports.
- Provide final Incident Investigation Report to the NA SH&E Incident Reporting Stafffor inclusion in permanent incident files.

4.1.4 **Employees** involved in an SH&E incident must assist **supervisor** in completing/ conducting appropriate incident investigations.

4.2 Initial post-incident response procedure by office/project team as it relates to an incident investigation and review

4.2.1 Immediate steps to be taken by local field/office personnel:

- Confirm corrective actions that have been put in place to eliminate or control identified hazards at the scene.

4.2.2 Secure the area. Do not disturb the scene until relevant facts are obtained unless an immediate hazard exists.

4.2.3 Prepare appropriate sketches and or obtain photographs of the incident scene and gather relevant information from the scene (Who, What, Where, When and other "environmental factors" that may have had an influence on the incident).

4.2.4 Interview witnesses and document responses as soon as possible at the scene of the incident.

4.3 Follow–up Investigation

4.3.1 **Identify Responsible Lead Investigator and Formation of Team.**

- The Responsible Lead Investigator Table (*S3NA-603-FM1 Responsible Lead Investigator Table*) will be used to identify the management representative responsible for conducting the appropriate incident investigation.
- The **RLI** shall contact **AECOM Americas Chief Counsel** to ask if an in-house counsel representative will participate in the investigation. If so, the incident investigation report will be marked as "Attorney Privileged Communication."
- The **RLI** will appoint an appropriate team to conduct and document the required investigation.

4.3.2 **Investigation Team Procedures**

- The team will follow an appropriate investigation technique (as agreed to by the **RLI**, **Region SH&E Manager** and **AECOM in-house counsel**) to determine the following:
  - Sequence of events leading up to the incident and steps followed immediately following the incident that may have had an impact on the final outcome.
  - Identification of the People, Parts/Equipment, Position and Paper/Documentation factors involved in the incident.
  - Determination of direct cause(s) and root causes using techniques agreed to by the **RLI** and **SH&E Manager**. (Note: Example root cause investigation tools include "5 Why's", TapRoot, Fishbone Diagram, etc.).
- The Investigation Team will prepare a preliminary report, signed by the **RLI**, documenting all findings and recommended corrective actions within 10 business days following the incident. The report shall be prepared at the direction of **AECOM Americas Chief Counsel** and shall be marked "Attorney Privileged Communication".
- Such preliminary investigation report format for all incidents classified as Incident Classification 3 or higher in *S3NA-603-FM1 Responsible Lead Investigator Table* will follow the sample template provided in *S3NA-603-FM2 Sample Incident Investigation Report*. All other reports will be at the discretion of the responsible **Region SH&E Manager**.

- Where required by the RLI Table, an Investigation Review Call will be held to review the preliminary investigation report. Required participants for the call will include:
    - The direct supervisor of the **RLI.**
    - Responsible **Supervisor** or **Project Manager** of the injured/involved employee.
    - **AECOM Americas Chief Counsel**, when required.
- For example, if the RLI is a **Region or District Manager**, then the **Office** or **Project Manager** and **direct supervisor** of the **employee** will be required participants. If the **RLI** is the **Project Manager**, the **Location Manager** and **Field Supervisor** would be required participants.
- Note: Incident Review Calls are designed to summarize the preliminary investigation findings and come to agreement on contributing factors, root causes and appropriate corrective actions. Direct participation by the employee(s) involved in the incident is not necessary and requires prior approval from the **Senior Manager** assigned to the incident review committee. Other members of the incident review committee will be at the discretion of the most **Senior Manager** involved in the committee and legal counsel.
- The **RLI** will extend an invitation to the **Corporate VP** and **Americas SH&E Director** at least 5 days prior to the scheduled review date. The **Corporate VP SH&E Director** will extend an invitation to other senior and executive management members based on a preliminary assessment of the incident:
    - Final investigation reports (following incident review call where required) are to be forwarded to the responsible **Americas SH&E Director, Americas Chief Counsel, Region SH&E Manager, Business Line SH&E Manager,** and **Americas SH&E Administration Manager** for inclusion in the permanent incident files.

4.3.3 **Communication of Investigation Results**

- Any and all written investigation reports must first be reviewed by **AECOM's Americas Chief Counsel**, or the **Chief Counsel's designee**. All drafts shall include "Attorney-Client Work-Product Privilege" at the top of such reports.
- Where appropriate based on the type, severity and/or scope of the incident, a formal Alert will be prepared by the **RLI** and responsible **Region SH&E Manager**. The Alert will be communicated to the most appropriate audience (i.e. region, national, business line only, etc.).
- Action items and corrective actions identified by the **RLI** and investigation teams will be tracked to completion by the responsible **Region SH&E Manager**. Additionally, the results will be utilized by the **SH&E department** to develop appropriate region, national and business line level reports and to improve existing procedures.

5.0 Records

5.1 None.

6.0 References

6.1 S3NA-004-PR Incident Reporting

S3NA-603-TP Sample Incident Investigation Report

Executive Summary

Brief Summary:

Provide a summary of the incident that includes all critical elements of the investigation

What issues led to the incident?

Provide a bulleted list of the most critical elements in the incident sequence that "failed" or were overlooked

What steps were taken to address safety issues?

Provide a list of the most important elements of the incident sequence, including post-incident elements that went well

Critical Factors and Root Causes:

CRITICAL FACTORS

Based on the interviews, site investigations and other evidence gathered, identify the events, conditions, and/or actions (Critical Factors) that were directly responsible for the incident

CAUSAL FACTORS

Using an appropriate tool, identify the causes of the incident

Action Items:

Identify the action items from the investigation.

Lessons Learned:

Provide any information that the investigation team believes will assist other operations, projects, offices, and/or employees avoid this type of incident.

REPORT

I. General Background

Provide basic contract information as well as pertinent site information

II. Incident Description

Complete and detailed description of all aspects leading up to the incident, the incident itself, and any applicable post-incident measures that either lessened, controlled, and/or exacerbated the final outcome of the incident

III. Incident Timeline

Provide a chronological description of the events leading up to the incident and any actions following the incident that may have had an impact on the outcome

IV. Investigation Results

A. People Factors

Describe and evaluate all personnel involved including their roles, responsibilities, experience, and training

B. Parts/Equipment Factors

Describe and evaluate (using pictures or drawings where necessary) all equipment and/or parts involved. Include information relative gauge levels, meter readings, physical condition, etc.

C. Position Factors

Describe and evaluate the layout of the incident area noting the location of all people, equipment, structures, etc.

D. Paper/Documentation Factors

Describe and evaluate compliance with the procedures, programs, plans, specifications, etc. applicable to the task being performed and the people performing the task. For example, Task Hazard Analysis, project safety plan, corporate and/or project procedures, training requirements, etc.

V. Incident Analysis

For each Critical Factor identified during the investigation, identify each applicable root cause in the table below. Use a separate table for each Critical Factor.

CRITICAL FACTOR 1

Identified Root Cause	Cause Type	Cause No.	Cause Description

CRITICAL FACTOR 2

Identified Root Cause	Cause Type	Cause No.	Cause Description

VI. Action Plan

Based on the investigation and root cause analysis, the following actions have been planned:

Actions to be Taken	Responsible Party	Required Completion Date

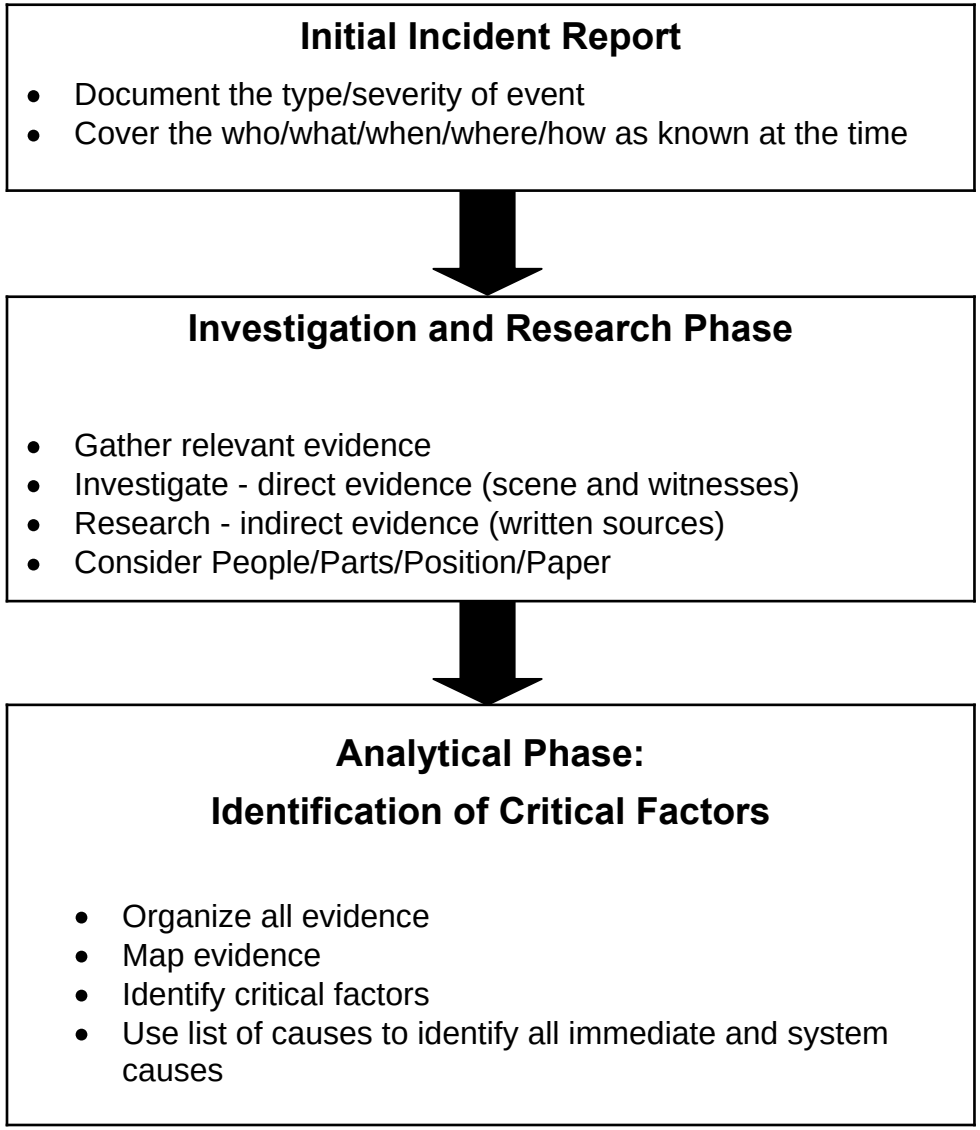
S3NA-603-WI1 Responsible Lead Investigator Table

Responsible Lead Investigator Table						
	Incident Classification	Project Manager/ Employee Supervisor	Responsible Location Manager	District Business Line Manager	Regional Business Line Manager	Formal Report and Review Call[1] Required
• Unsafe Condition/Action • Near Miss Incident	1	X				
• Property Damage (less than $5,000) • First Aid Only Case • Any Environmental Release (less than Reportable Quantity)	2	X				
• Significant Learning Experience • Recordable Injury/Illness • Property Damage over $5,000 • Regulatory NOV (i.e. OSHA Citation, EPA NOV, etc.)	3		X			X
• Serious SH&E Incident • Property Damage over $100,000	4			X		X
• Fatality	5				X	X

[1] Review calls must include, at a minimum, the individual listed above and below the Responsible Lead Investigator (RLI).

**For certain recordable injuries and illnesses, AECOM in-house Counsel involvement may not be required.

S3NA-603-WI2 Root Cause Worksheet



Immediate Causes

1	**Following Procedures**
1-1	Violation by individual
1-2	Violation by group
1-3	Violation by supervisor
1-4	Operation of equipment without authority
1-5	Improper position or posture for the task
1-6	Overexertion of physical capability
1-7	Work or motion at improper speed
1-8	Improper lifting
1-9	Improper loading
1-10	Shortcuts
1-11	Other
2	**Use of Tools or Equipment**
2-1	Improper use of equipment
2-2	Improper use of tools
2-3	Use of defective equipment (aware)
2-4	Use of defective tools (aware)
2-5	Improper placement of tools, equipment or materials
2-6	Operation of equipment at improper speed
2-7	Servicing of equipment in operation
2-8	Other
3	**Use of Protective Methods**
3-1	Lack of knowledge of hazards present
3-2	Personal protective equipment not used
3-3	Improper use of proper personal protective equipment
3-4	Servicing of energized equipment
3-5	Equipment or materials not secured
3-6	Disabled guards, warning systems or safety devices
3-7	Removal of guards, warning systems or safety devices
3-8	Personal protective equipment not available
3-9	Other

4	**Inattention/Lack of Awareness**
4-1	Improper decision making or lack of judgment
4-2	Distracted by other concerns
4-3	Inattention to footing and surroundings
4-4	Horseplay
4-5	Acts of violence
4-6	Failure to warn
4-7	Use of drugs or alcohol
4-8	Routine activity without thought
4-9	Other
5	**Protective Systems**
5-1	Inadequate guards or protective devices
5-2	Defective guards or protective devices
5-3	Inadequate personal protective equipment
5-4	Defective personal protective equipment
5-5	Inadequate warning systems
5-6	Defective warning systems
5-7	Inadequate isolation of process or equipment
5-8	Inadequate safety devices
5-9	Defective safety devices
5-10	Other
6	**Tools, Equipment & Vehicles**
6-1	Defective equipment
6-2	Inadequate equipment
6-3	Improperly prepared equipment
6-4	Defective tools
6-5	Inadequate tools
6-6	Improperly prepared tools
6-7	Defective vehicle
6-8	Inadequate vehicle for the purpose
6-9	Improperly prepared vehicle
6-10	Other

7	**Work Exposures to**
7-1	Fire or explosive
7-2	Noise
7-3	Energized electrical systems
7-4	Energized systems, other than electrical
7-5	Radiation
7-6	Temperature extremes
7-7	Hazardous chemicals
7-8	Mechanical hazards
7-9	Clutter or debris
7-10	Storms or acts of nature
7-11	Slippery floors or walkways
7-12	Other
8	**Work Place Environmental/Layout**
8-1	Congestion or restricted motion
8-2	Inadequate or excessive illumination
8-3	Inadequate ventilation
8-4	Unprotected height
8-5	Inadequate work place layout
	- controls less than adequate
	- displays less than adequate
	- labels less than adequate
	- locations out of reach or sight
	- conflicting information is presented
8-6	Other

System Causes
Personal Factors

1	Physical Capability
1-1	Vision deficiency
1-2	Hearing deficiency
1-3	Other sensory deficiency
1-4	Reduced respiratory capacity
1-5	Other permanent physical disability
1-6	Temporary disabilities
1-7	Inability to sustain body positions
1-8	Restricted range of body movement
1-9	Substance sensitivities or allergies
1-10	Inadequate size or strength
1-11	Diminished capacity due to medication
1-12	Other ~ not applicable

2	Physical Condition
2-1	Previous injury or illness
2-2	Fatigue • due to workload • due to lack of rest • due to sensory overload
2-3	Diminished performance • due to temperature extremes • due to oxygen deficiency • due to atmospheric pressure variation
2-4	Blood sugar insufficiency
2-5	Impairment due to drug or alcohol
2-6	Other ~ not applicable

3	Mental State
3-1	Poor judgment
3-2	Memory failure
3-3	Poor coordination or reaction time
3-4	Emotional disturbance
3-5	Fears or phobias
3-6	Low mechanical aptitude
3-7	Low learning aptitude
3-8	Influenced by medication
3-9	Other ~ Not applicable

4	Mental Stress
4-1	Preoccupation with problems
4-2	Frustration
4-3	Confusing directions/ demands
4-4	Conflicting directions/ demands
4-5	Meaningless or degrading activities
4-6	Emotional overload
4-7	Extreme judgment/ decision demands
4-8	Extreme concentration/ perception demands
4-9	Extreme boredom
4-10	Other ~ not applicable

5	Behavior
5-1	Improper performance is rewarded • saves time or effort • avoids discomfort • gains attention
5-2	Improper supervisory example
5-3	Inadequate identification of critical safe behaviors
5-4	Inadequate reinforcement of critical safe behaviors • proper performance is criticized • inappropriate peer pressure • inadequate performance feedback • inadequate disciplinary process
5-5	Inappropriate aggression
5-6	Improper use of production incentives
5-7	Supervisor implied haste
5-8	Employee perceived haste
5-9	Other ~ not applicable

6	Skill Level
6-1	Inadequate assessment of required skills
6-2	Inadequate practice of skill
6-3	Infrequent performance of skill
6-4	Lack of coaching on skill
6-5	Insufficient review of instruction to establish skill
6-6	Other ~ not applicable

System Causes
Job Factors

	7 Training/ Knowledge Transfer
7-1	Inadequate knowledge transfer: • inability to comprehend • inadequate instruction qualifications • inadequate training equipment • misunderstood instructions
7-2	Inadequate recall of training material • training not reinforced on the job • inadequate refresher training frequency
7-3	Inadequate training effort • inadequate training program design • inadequate training goals/objectives • inadequate new employee orientation • inadequate initial training •inadequate means to determine if qualified for job
7-4	No training provided • need for training not identified • training records incorrect or out of date • new work methods introduced without training • decision made not to train
7-5	Other ~ not applicable

	8 Management/ Supervision / Employee Leadership
8-1	Conflicting roles/ responsibilities • unclear reporting relationships • conflicting reporting relationship • unclear assignment of responsibility • improper or insufficient delegation of authority
8-2	Inadequate leadership • standards of performance missing or not enforced • inadequate accountability • inadequate or incorrect performance feedback • inadequate work site walk-through • inadequate safety promotion
8-3	Inadequate correction of prior hazard/incident
8-4	Inadequate identification of worksite/job hazards
8-5	Inadequate management of change system
8-6	Inadequate incident reporting/investigation system
8-7	Inadequate or lack of safety meetings
8-8	Inadequate performance measurement & assessment
8-9	Other ~ not applicable

	9 Contractor Selection & Design
9-1	Lack of contractor pre-qualifications
9-2	Inadequate contractor pre-qualifications
9-3	Inadequate contractor selection
9-4	Use of non-approved contractor
9-5	Lack of job oversight
9-6	Inadequate oversight
9-7	Other ~ not applicable

	10 Engineering/ Design
10-1	Inadequate technical design • design input obsolete • design input not correct • design input not available • design output inadequate • design input unfeasible • design output unclear • design output not correct • design output inconsistent • no independent design review
10-2	Inadequate standards, specifications, and/or design criteria
10-3	Inadequate assessment of potential failure
10-4	Inadequate ergonomic design
10-5	Inadequate monitoring of construction
10-6	Inadequate assessment of operational readiness
10-7	Inadequate monitoring of initial operation
10-8	Inadequate evaluation and/or documentation of change
10-9	Other ~ not applicable

	11 Work Planning
11-1	Inadequate work planning
11-2	Inadequate preventive maintenance • assessment of needs • lubrication/ servicing • adjustment/ assembly • cleaning/ resurfacing
11-3	Inadequate repair • communication of needed repair • scheduling of work • examination of parts • parts substitution
11-4	Excessive wear and tear • inadequate planning for use • extension of service life • improper loading • use by untrained people • use for wrong purpose
11-5	Inadequate reference materials or publications
11-6	Inadequate audit/ inspection/ monitoring • no documentation • no correction responsibility assigned • no accountability for corrective action
11-7	Inadequate job placement • appropriate personnel not identified • appropriate personnel not available • appropriate personnel not provided
11-8	Other ~ not applicable

System Causes
Job Factors

12	Purchasing, Material Handling & Material Control
12-1	Incorrect item received • inadequate specifications to vendor • inadequate specifications on requisition • inadequate control on changes to orders • unauthorized substitution • inadequate product acceptance requirements • no acceptance verification performed
12-2	Inadequate research on materials/ equipment
12-3	Inadequate mode or route of shipment
12-4	Improper handling of materials
12-5	Improper storage of materials or spare parts
12-6	Inadequate material packaging
12-7	Material shelf life exceeded
12-8	Improper identification of hazardous materials
12-9	Improper salvage and/or waste disposal
12-10	Inadequate use of safety and health data
12-11	Other ~ not applicable

13	Tools & Equipment
13-1	Inadequate assessment of needs and risks
13-2	Inadequate human factors/ ergonomics considerations
13-3	Inadequate standards or specifications
13-4	Inadequate availability
13-5	Inadequate adjustment/ repair/ maintenance
13-6	Inadequate salvage and reclamation
13-7	Inadequate removal/ replacement of unsuitable items
13-8	No equipment record history
13-9	Inadequate equipment record history
13-10	Other ~ not applicable

14	Work Rules/ Policies/ Standards / Procedures (PSP)
14-1	Lack of PSP for the task • lack of defined responsibility for PSP • lack of job safety analysis • inadequate job safety analysis
14-2	Inadequate development of PSP • inadequate coordination with process/ equipment design • inadequate employee involvement in the development • inadequate definition of corrective actions • inadequate format for easy use
14-3	Inadequate implementation of PSP, due to deficiencies • contradictory requirements • confusing format • more than one action per step • no check-off spaces provided • inaccurate sequence of steps • confusing instructions • technical error/ missing steps • excessive references • potential situations not covered
14-4	Inadequate enforcement of PSP • inadequate monitoring of work • inadequate supervisory knowledge • inadequate reinforcement • non-compliance not corrected
14-5	Inadequate communication of PSP • incomplete distribution to work groups • inadequate translation to appropriate languages • incomplete integration with training • out of date revisions still in use
14-6	Other ~ not applicable

15	Communication
15-1	Inadequate horizontal communication between peers
15-2	Inadequate vertical communication between supervisor and person
15-3	Inadequate communication between different organizations
15-4	Inadequate communication between work groups
15-5	Inadequate communication between shifts
15-6	Inadequate communication methods
15-7	No communication method available
15-8	Incorrect instructions
15-9	Inadequate communication due to job turnover
15-10	Inadequate communication of safety and health data, regulations or guidelines
15-11	Standard terminology not used
15-12	Verification/ repeat back techniques not used
15-13	Messages too long
15-14	Speech interference
15-15	Other ~ not applicable

S3NA-605-PR Medical Surveillance Program

1.0 Purpose and Scope

1.1 The Medical Surveillance Program provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable OSHA and/or provincial/territorial regulations.

1.2 The program is also designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs.

1.3 This procedure applies to all AECOM North America based operations and employees whose work assignments involve potential exposure to harmful chemical and/or physical agents.

2.0 Terms and Definitions

2.1 **Modified Duty:** Modified duty (or temporary transitional duty) work is defined as a temporary job task adjustment or alternate job assignment other than the employee's normal essential duties, in response to physical activity restrictions or limitations established by AECOM's Contracted Medical Director, a designated clinical physician, or the employee's medical doctor.

2.2 **Medical Director:** The Medical Director is a physician, board-certified in occupational medicine, employed by the Medical Services Contractor. The Medical Director manages the services provided by the Medical Services Contractor and provides to AECOM guidance on medical matters.

2.3 **Medical Services Contractor:** The Medical Services Contractor manages all occupational medical services, including medical surveillance programs, substance abuse prevention programs, and care for workers with occupational injuries or illness.

2.4 **PEL:** OSHA Permissible Exposure Limit.

2.5 **OEL:** Occupational Exposure Limit.

2.6 **Physical Activity Restriction:** To prevent aggravation of an existing condition, the Medical Doctor recommends a physical activity restriction to limit exposure to a chemical or class of chemicals (such as benzene), a physical agent (such as noise or radiation), or an activity (such as lifting more than 40 pounds).

2.7 **PPE:** Personal Protective Equipment.

2.8 **Safety Sensitive:** A task or position is designated as safety sensitive when the task or position is such that an action would endanger the lives of others. Examples, but not a complete list, of positions that have been designated "safety-critical" by regulations include:

2.8.1 Drivers of commercial vehicles

2.8.2 Workers on pipelines carrying fuels or toxic or corrosive substances

2.8.3 Workers at nuclear power plants

2.8.4 Employees that operate Nuclear Regulatory Commission (NRC)-regulated devices (nuclear density gauges)

2.8.5 Operators of industrial mobile equipment, including: cranes of more than 6,000-pound capacity, forklifts, loaders, etc.

2.8.6 Operators of drill/boring rigs

2.8.7 Laboratory technicians

3.0 Attachments

3.1 S3NA-605-FM Scheduling Request Form

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees** – **Mandatory Participation** are responsible for the following:

- All **employees** designated to participate in the medical surveillance program as a condition of employment or participate voluntarily. Will be notified in advance if they will be assigned to a location, project or client which requires a Medical Surveillance Program. **Employees** whose duties fall within the categories listed will be included in the medical surveillance program. Each **employee** is individually responsible for ensuring that he/she maintains a current medical clearance as required for the performance of assigned work duties.

4.1.2 **District, Office and Project Managers** are responsible for the following:

- **Operations managers** and **employee supervisors** must evaluate the duties of each **employee** and prospective **employee** reporting to him or her. If the **employee's** position meets the criteria for required participation in the medical surveillance program, the **manager** is responsible for ensuring that the **employee** is enrolled in the program.
- Candidates for positions that require medical surveillance in order to meet their job description may not be on site until they have satisfactorily completed the baseline or pre-employment medical examination.

4.1.3 **Safety, Health, & Environment (SH&E) Administrators** are responsible for the following administrative activities for the medical surveillance program relative to the employees they support**:**

- Serves as the primary point of contact between the employee, employee's manager, the Medical Services Contractor, and the SH&E Department.
- Provides information regarding medical surveillance documentation, forms, and scheduling of services.
- Maintains a medical surveillance database and other associated documents.
- Assists employees with scheduling of exams with the Medical Surveillance Contractor.
- Participates in initial SH&E Administrator training and subsequent reviews and updates that will provide guidance on exam protocols.

4.1.4 **Region SH&E Manager** is responsible for the following:

- Reviews **employee** assignments with **managers** to ensure that all **employees** who should be participating in the medical surveillance program have been enrolled.
- Provides all assistance necessary to ensure all required information is provided to the Medical Director.
- Report any change in requirements, protocols or concerns with the contracted Medical Provider to the Manager, NA SH&E Administration.

4.1.5 **AECOM SH&E Director** is responsible for the following:

- The **AECOM Americas SH&E Director** is responsible for the issuance, revision, and maintenance of this procedure. To ensure the appropriate medical examination and testing protocol, the **Director** will provide the Medical Services Contractor with appropriate references (e.g., a copy of AECOM's Medical Surveillance Policy, OSHA/state regulations, etc.). After consultation with the Medical Director, the **AECOM Americas SH&E Director** may also designate other employees to participate in certain parameters of the medical surveillance program.

4.2 All AECOM **employees** whose work assignments involve potential exposure to harmful chemical and/or physical agents should participate in the medical surveillance program.

4.3 In addition, **employees** may be requested to participate in the medical surveillance program if they perform a task that requires an assessment for fitness for duty (e.g. lifting, climbing, etc.). The **Office/Project Manager** and **Region SH&E Manager** will identify activities/tasks that will require fit-for-duty assessments.

4.4 The medical surveillance program consists of the following types of examinations:

4.4.1 Baseline (initial)

4.4.2 Periodic (annual or biennial)

4.4.3 Special exposure-specific

4.4.4 Contractual requirement

4.4.5 Exit/termination

4.4.6 Fit-for-duty

4.4.7 Client specific

4.5 Types of Medical Examinations

4.5.1 Baseline/Pre-Placement/Pre-Employment

- The baseline medical examination is used to identify physical capabilities and medical limitations that may have an impact on the candidate's ability to perform in the position for which he/she is being considered and to provide a baseline against which periodic or project-specific monitoring can be compared. The baseline medical examination is used to determine the suitability of an existing **employee** for a new assignment (pre-placement) or a candidate's suitability to be hired (pre-employment) for a particular position.

4.5.2 Periodic/Annual/Biennial

- The periodic medical examination is used to evaluate an **employee's** continued fitness for duty and to assess any impact occupational exposures may have on his/her health status. The periodic examination includes an update to the medical and work history, results of any occupational exposure assessments and a detailed medical examination tailored to the job description.
- The **Region SH&E Manager** determines the frequency of the periodic medical examinations based on regulatory requirements, the position held by the **employee**, and the level of exposure to physical, chemical, and biological agents.

4.5.3 Exposure/Activity/Project-Specific

- The exposure-specific examination consists of medical tests to assess the impact of occupational exposures associated with a particular activity or project. The Medical Director or **Region SH&E Manager** will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an **employee**.

4.5.4 Client Specific

- Clients may recommend exposure-specific examinations for persons working on their projects. A client recommendation for an exposure-specific examination will be forwarded to the **Region SH&E Manager** who will evaluate the request, and if appropriate, forward the recommendation to the Medical Director, who will determine the frequency of the exposure-specific medical examinations for each employee designated to participate based on sound medical practice and regulatory requirements.

4.5.5 Exit from the Program

- An exit medical examination is given when an **employee** leaves the medical surveillance program, either because of termination of employment with AECOM or because of reassignment to a position

not designated to participate in the medical surveillance program. The exit examination assesses any impact occupational exposures may have had on the employee's health status.

4.6 Participating Employees

4.6.1 Required Participation

- Participation in the medical surveillance program is required for **employees** who are or may be:
  - Exposed to substances at or above the PEL/OEL.
  - Required to participate by regulatory provisions (e.g., asbestos, lead OSHA standards).
  - Fit-tested for or wearing a respirator in the field.
  - Exposed above PELs OELs in accidents or emergency situations.
  - Working on sites/projects with specific state, provincial/territorial or federal medical surveillance requirements.
  - Driving a commercial motor vehicle.
  - Performing safety sensitive tasks.
- **Employees** may be required to participate in a fit-for-duty examination under the following scenarios:
  - Perform extensive physical activities (e.g. bending, lifting, climbing, pulling/pushing, etc.).
  - Experience a non-work related injury or illness.
  - Return to work after extended absence.
- Those **employees** required to participate will be identified by the **Region or District Business Manager** and **Region SH&E Manager**.

4.6.2 **Employee**

- When designated to participate in the medical surveillance program, the **employee** completes and signs the following documents:
  - Medical and Work History Questionnaire.
  - Medical records release authorizing Medical Services Contractor to receive the medical clearance certificate.

4.6.3 The **SH&E Administrator** is responsible for providing the Medical Services Contractor with the following services:

- Facilitate the management and exchange of documentation regarding the medical surveillance program between AECOM (typically **employee's line manager)** and the Medical Services Contractor using the *S3NA-605-FM Scheduling Request form*.
- Schedule the initial exam for newly hired or re-assigned employees.
- Assist employees with scheduling examinations as necessary.
- Coordinate medical surveillance program information exchange between **Human Resources** and the Medical Resource Contractor as necessary.
- Provide information from previous examinations that may not be readily available.

4.7 Scheduling Pre-Employment Medical Examination

4.7.1 **SH&E Administrator**

- The **SH&E Administrator** coordinating a medical examination will:

- Provide the candidate or **Human Resource Representative** with a baseline medical and work history questionnaire to include in the job offer package. The Medical Resource Contractor and **SH&E Administrator** may also provide the questionnaire to the candidate.
- Work with the candidate to identify the clinic location that is convenient for the candidate's medical examination.
- Contact the Medical Services Contractor to obtain the name, address, telephone number, and contact person for the contract medical clinic in that geographical location.
- Coordinate the scheduling of the examination and ensure the scheduling information is provided to the Medical Services Contractor.
- Notify the candidate's manager and **Human Resources Representative** upon receipt of the medical clearance certificate from the Medical Services Contractor.

4.7.2 **Hiring Manager**

- When necessary based on the position being filled, the **Hiring Manager/Human Resources Representative** informs the candidate that the offer of employment is contingent on the candidate being physically and medically qualified to perform the duties of the position for which he/she is being hired. The Hiring Manager/Human Resources Representative may not allow the candidate to begin employment until the conditions of the offer letter have been satisfied.

4.7.3 **Region SH&E Manager**

- The **Region SH&E Manager** provides such assistance as is requested by the **Hiring Manager** to ensure the job description for the position being filled adequately describes the physical, chemical, and biological stresses of the position, and the PPE used or which may be used, including respiratory protection. The **Region SH&E Manager** provides all necessary assistance to ensure that required and appropriate information is provided with the request and authorization for medical examination.
- The **Region SH&E Manager** provides assistance to the **Hiring Manager** to interpret physical activity restrictions if such restrictions are noted on the medical clearance certificate.

4.8 Scheduling Periodic and Exposure Specific Medical Examinations

4.8.1 Medical Services Contractor

- After the initial baseline is complete, the Medical Services Contractor provides notification to the **SH&E Administrator** approximately 30 days before subsequent periodic or exposure-specific medical examination is due. The Medical Services Contractor will also notify the **employee** 30 days before the periodic or exposure-specific medical examination is due.
- The Medical Services Contractor provides notification of delinquent medical examinations to the **SH&E Administrator**, who ensures the notification of examination due is forwarded to the employee.
- Any **employee** that has not completed the required medical evaluation within 30 days of an expiration date will be issued a non-qualified statement. The employee is not permitted to perform the associated task and/or work until the required medical evaluation is completed and a qualified statement is issued by the Medical Director.

4.8.2 **Employee's Manager**

- The **employee's manager** arranges work assignments so that the **employee** is available to take the medical examination before the medical clearance certificate expires. In the event that an **employee** has not completed the medical examination before the medical clearance certificate expires, the manager shall remove the employee from the work assignment until the medical evaluation is completed and a qualified statement is issued by the Medical Director.

4.8.3 **Region SH&E Manager**

- The **Region SH&E Manager** will confirm that all relevant exposure assessments have been appropriately annotated to show the applicability to the **employee** and forwarded to the Medical

Services Contractor. The **Region SH&E Manager** also confirms that **employees** on the delinquent medical examination list have been removed from designated assignments.

4.9 Scheduling Exit Medical Examinations

4.9.1 **Human Resources Representative/SH&E Administrator**

- Upon notification of termination or impending termination, the **employee's manager** working with the **Human Resources Representative** notifies the **SH&E Administrator** to arrange for exit medical examination. If the **employee** declines the opportunity to take the exit examination the **SH&E Administrator** will send a waiver memorandum to the **employee** on behalf of the **employee's manager**. Once the **employee** signs the waiver the **SH&E Administrator** will place the original in the **employee's Human Resources personnel** file and copy the Medical Services Contractor.

4.9.2 Manager

- Upon notification of termination or reassignment, the manager contacts the **Human Resources Representative.**
- The **manager** releases the terminating or reassigned employee from duties as necessary to complete the exit medical examination.

4.9.3 **Region SH&E Manager**

- The **Region SH&E Manager** provides assistance to ensure that terminating and reassigned **employees** are offered the opportunity to take an exit medical examination.

4.10 Reports

4.10.1 Report of Examination

- The Medical Services Contractor provides the **employee** with a confidential report of findings of the examination and a medical clearance certificate. AECOM requires the **employee** to preserve the medical clearance certificate in a safe place and provide copies of it to **project managers** and clients.
- The Medical Services Contractor provides the **SH&E Administrator** with a copy of the medical clearance certificate.

4.10.2 Examinations Due Report

- The Medical Services Contractor produces a list by organization code of **employees** due to be examined 30 days before the expiration of their medical clearance certificate. This list is provided to **SH&E Administrators**, who ensures each **manager** is notified of the **employees** in his/her charge who are due examinations so they may be scheduled appropriately.
- The Medical Services Contractor notifies each **employee** via email or phone to the office of record 30 to 60 days before the periodic or exposure-specific medical examination is due.

4.10.3 Delinquent Examinations Report

- The Medical Services Contractor distributes a report of delinquent medical examinations to the **SH&E Administrator**.
- When an **employee's** name appears on the delinquent examination report for two consecutive months, the **SH&E Administrator** must notify the **Region SH&E Manager**, who will bring this to the attention of the **employee's direct supervisor** for resolution. If the delinquency issue is not resolved, the **employee's District** or **Business Line Manager** will be notified for final resolution.

4.10.4 Physical Activity Restriction Report

- The **SH&E Administrator** maintains a list of **employees** who have physical activity restrictions. The **SH&E Administrator** provides each **manager** in his/her area of responsibility with a list of the **employees** with physical activity restrictions who are assigned to their project/location.
- The **Region SH&E Manager** shall audit locations and projects periodically to ensure **employees** with physical activity restrictions are not exceeding their limitations. Concerns of an **employee**

exceeding his/her physical activity restriction is brought to the attention of the **employee's manager/ supervisor** for resolution.

4.10.5 Annual Reports

- The Medical Services Contractor provides annual reports of utilization, medical trends, and statistical analyses. These reports are prepared to improve the service, manage trends, and reduce the cost of the medical surveillance program.

4.10.6 Cost Accounting

- The Medical Services Contractor submits invoices directly to the **SH&E Administrator**. Each examination and service invoiced includes the organization code of the **employee** examined or receiving the service. Departments with **employees** who participate in the medical surveillance program are responsible for the cost of administering the program. In addition, if special monitoring (e.g., for lead exposure) is to be conducted for a project, the **Project Manager** must inform the **SH&E Administrator** of that project's charge code.

5.0 Records

5.1 Medical Records

5.1.1 Medical records must be preserved and protected in accordance with applicable legislative requirements for the duration of employment plus 30 years. Medical records contain information that is protected by the Privacy Act. To meet the obligations of preserving the medical records and protecting the information they contain, AECOM has arranged for the Medical Services Contractor to manage the medical records.

5.2 Access to Records

5.2.1 An employee or designated representative may request to review his/her medical and exposure records. Such a request must be in writing, signed and dated, and include the employee's Social Security/Insurance Number. The Regional SH&E Manager or the SH&E Administrator will forward the request to the Medical Services Contractor, who will provide the employee with a copy of the medical record.

5.2.2 The Medical Services Contractor provides employees with a copy of their results after each physical. If employee would like a copy of their historical records.

5.2.3 The Medical Services Contractor will supply the copy within 15 days after the request has been submitted by the employee or designated representative.

5.3 Quality Control and Quality Assurance

5.3.1 The Medical Services Contractor performs quality control checks on all medical records to ensure examining physicians appropriately record the findings of the examination and tests.

5.3.2 The Medical Services Contractor has access to all medical records to perform quality assurance checks to ensure proper recording and preservation.

6.0 References

6.1 29 CFR 1910 Medical Surveillance Guidelines

6.2 OSHA Publication 3162 Screening and Surveillance

S3NA-605-FM Scheduling Request Form

Submit to: WORKCARE
300 S. Harbor Blvd, Suite 600 Anaheim, CA 92805

Phone: 714-978-7488 / 800-455-6155 Fax: 714-456-2154

Email: ana.martinez@workcare.com

REQUEST INFORMATION:			**Date:**	
1.	**Requested By:**		**Email:**	
	Phone #:		**Locator:**	
	Office Location Address:		**Business Line:**	
EMPLOYEE INFORMATION:			**Billing Charge No.:**	
2.	**Employee Name:**		**Email (if applicable):**	
	Social Security No.:		**Work Phone #:**	
	Home Phone #:		**Cell Phone #:**	
	City, State, Zip for the Exam:			
3.	**New Hire/Transfer?**	☐ **Yes** ☐ **No**		
	Rehire?	☐ **Yes** ☐ **No**		
	Existing Employee?	☐ **Yes** ☐ **No**		
REQUEST DETAILS:				
4.	**Schedule by (date):**		**Rush**: (check one of these)	☐ **Yes** ☐ **No**
	Social Security No.:		**Work Phone #:**	
	Home Phone #:		**Cell Phone #:**	
	Please list three dates of availability:			
5.	**Drug Screen Needed:**	☐ **Yes** ☐ **No (If No, skip to #6)**		
	Reason for Drug Screen:	☐ **DOT Clearance** ☐ **Client/Contract Requirement** ☐ **FRA**	☐ **Post Accident** ☐ **For Cause**	
	Drug Screen Type:	☐ **Non-DOT Type** ☐ **Federal DOT Type (Required for DOT Clearance)**		
6.	**Employee working in remote locations in high stress conditions** (subject to temperature/weather extremes) and limited access to emergency services?		☐ **Yes** ☐ **No**	
7.	**Medical Protocol(s)?**	☐ **Yes** ☐ **No**		
	A. Commercial Motor Vehicles (>10,000 lbs but < 26,001 lbs) (CMV-01)	☐ Baseline ☐ Renewal		
	B. Commercial Motor Vehicles (over 26,000 lbs.) (DOT-01)	☐ Baseline ☐ Renewal (plus enrollment in random drug pool)		
	C. HAZWOPER	☐ Baseline ☐ Annual ☐ Biennial ☐ Exit		

	D. Laboratory Technician	☐ Baseline ☐ 3 Year Protocol ☐ Exit
	D. BOTH Commercial Motor Vehicles (over 26,000 lbs.) AND Hazardous Waste Site Work (COM-01)	☐ Baseline ☐ Renewal ☐ Exit
	E. Respiratory Protection Clearance – (Questionnaire Only) (RES-01)	☐ Questionnaire (Initial) ☐ Annual
	F. Respiratory Protection Clearance (Requiring Examination) (RES-02)	☐ Baseline ☐ Annual
	G. Fit-for-Duty	☐ Pre-employment (FFD-01) ☐ Admin/Office Worker **(**Back fit test not required) ☐ Post-Incident/Illness (FFD-02) ☐ Back Fit Test ☐ Stress Test
	H. Hearing Conservation (HC-01)	☐ Baseline ☐ Annual
	I. Immunizations/vaccinations	☐ Hepatitis A Vaccination (only) (2 shot series) ☐ Hepatitis B Vaccination (only) (3 shot series) ☐ Twinrix (combination Hep A & B) (3 shot series) ☐ Other
	J. Lead ZPP	☐ Baseline ☐ Annual
	K. Asbestos	☐ Baseline ☐ Annual
	L. Diver	☐ Baseline ☐ Annual
	M. Travel	☐ Location and duration of visit?
	N. Records Review	☐ Change Frequency of Physicals ☐ Other (specify in item 8)
8.	**Other (ex. Stand Alone Tests/Exams:**	

S3NA-607-PR Post-Incident Medical Management

1.0 Purpose and Scope

1.1 Provide the requirements for timely and appropriate medical care and management for employees that incur work-related injuries or illnesses.

1.2 Applies to all AECOM North America employees and operations.

2.0 Terms and Definitions

2.1 AECOM Contracted Medical Provider - Third Party Medical Services Contractor that can provide first aid support and services for Non-Critical Injuries and Illnesses. Can be contacted directly through Incident Reporting line (1-800-348-5046).

2.2 **Critical Injuries/Illnesses:** Include, but be limited to, any work-related injury and/or illness which involve the following:

2.2.1 Unexplained chest pain

2.2.2 Breathing difficulty

2.2.3 Uncontrollable bleeding

2.2.4 Suspected internal injuries

2.2.5 Suspected exposure to chemical/biological hazard

2.2.6 Second or third degree thermal or chemical burns (i.e. any blistering)

2.2.7 Electrocution

2.2.8 **Unexplained change in mental state following an injury (may indicate shock or other internal injuries)**

2.3 **Non-Critical Injuries/Illnesses**: Any work-related injury and/or illness that are not a critical injury/illness and does not require immediate professional medical attention. Examples include, but are not limited to, the following:

2.3.1 Mild sprains/strains

2.3.2 Mild bruising

2.3.3 Minor cuts and scrapes

2.3.4 Muscle/joint pain or soreness

2.3.5 Minor insect bites

3.0 Attachments

3.1 S3NA-607-WI Post Incident Medical Management Flowchart

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employee** shall report all suspected work-related injuries and/or illnesses to their supervisor as soon as practical and before the end of the current work shift during which the incident occurred, in accordance with *S3NA-004-PR Incident Reporting*.

4.1.2 **Supervisor/Project Management** shall assist the employee in receiving timely and appropriate first aid treatment and/or consultation via:

- Qualified first aid provider

- Qualified first aid provider followed by consultation with the AECOM Contracted Medical Provider
- Immediate assistance by a locally selected and approved medical care provider

4.1.3 **Region SH&E Manager** (RSHEM) shall provide guidance to the employee and supervisor in identifying the appropriate actions for post incident medical management.

4.1.4 **NA SH&E Incident Report Support Staff** shall provide assistance in the event the **RSHEM** is not available and forward the Supervisors Report of Incident to AECOM **Human Resource** staff to allow timely filing of Workers Compensation claims to appropriate agencies (e.g. H&W/WCB).

4.1.5 **The Human Resource/Benefits Group i**s responsible for the following:

- Filing the Workers Compensation claim.
- Working with the **employee** and supervisor to confirm that any medical follow up care or restrictions are being adhered to.
- Managing the Workers Compensation Claim till closure.
- Informing **SH&E Incident Reporting Support Staff** of claim information to support recordkeeping requirements (i.e., lost time, restricted work, medication, etc).

4.2 Reporting

4.2.1 For all critical injuries and illnesses, **employees** must seek immediate medical attention.

4.2.2 For work related non-critical injuries and illnesses, **employees** must follow procedures outlined in *S3NA-004-PR Incident Reporting*. Contact shall be made with their **supervisor** or **Region SH&E Manager** prior to seeking any medical services for non-critical injuries/illnesses. If an **employee** is unable to contact their supervisor or **Region SH&E Manager** prior to treatment, they must complete these notifications the next business day.

4.2.3 When **employees** are unable to complete this notification prior to being treated (i.e. onset of symptoms during non-work hours, working in remote locations, etc.) they may contact the AECOM Contracted Medical Provider directly for guidance, through the Incident Reporting Line (1-800-348-5046). Please note that the AECOM Contracted Medical Provider is instructed to attempt contact with the responsible **Region SH&E Manager** prior to referring an **employee** professional medical care by a treating physician.

4.2.4 It is the **employee's** responsibility to provide a "return to work" slip (sample: *S3NA_606_FM1 Modified Work Letter and Physicians Return to Work Form*) to their **supervisor** and/or **Human Resources**, from the treating physician regardless of the extent of treatment. Under no circumstances will individuals be permitted to return to full or modified duty status without appropriate medical clearance.

4.3 Transportation

4.3.1 When **employees** require immediate medical attention as the result of a work-related injury/illness, transportation will be provided to the doctor's office, clinic, or hospital.

4.3.2 For critical injuries and illnesses, transportation will be obtained from Emergency Services (such as an ambulance, paramedics, etc.). **Employees** should not drive themselves to obtain treatment for critical injuries and illnesses.

4.3.3 For non-critical injuries and illnesses, the employee may drive themselves to obtain treatment based on the medical advice provided by the AECOM Medical provider or based on the judgment of the employee.

4.3.4 If working alone, **Employees** should reference *S3NA-314-PR Working Alone* for additional information.

5.0 Records

5.1 None

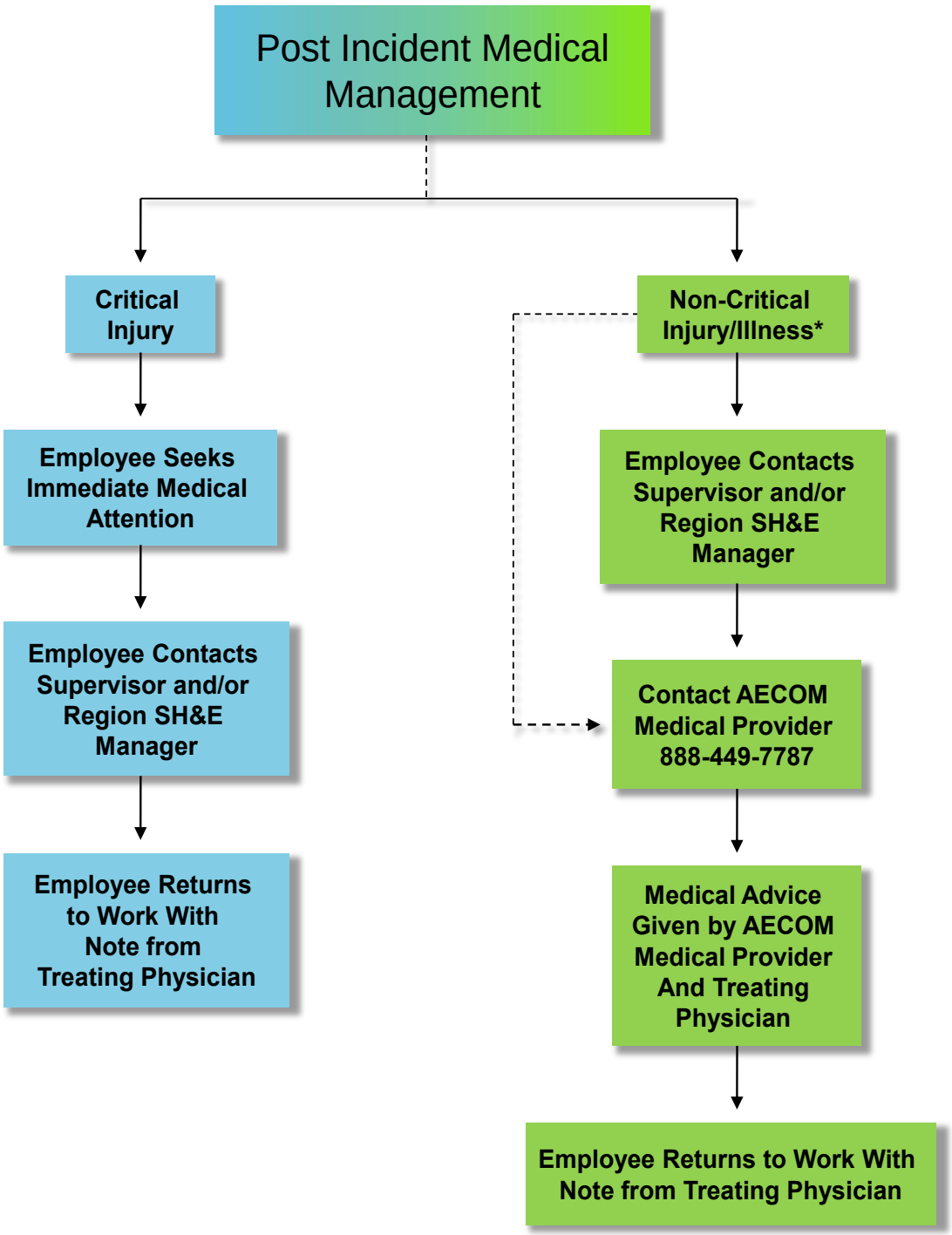
6.0 References

6.1 S3NA-004-PR Incident Reporting

6.2 S3NA-314-PR Working Alone

6.3 S3NA-606-FM1 Modified Work Letter and Physicians Return to Work Form

S3NA-607-WI Post Incident Medical Management Flowchart



* If employee can not reach supervisor or Region SH&E Manager, employee may contact AECOM Medical Provider directly.

ATTACHMENT B

AECOM Safety, Health, and Environmental Policy Statement

Safety, Health and Environmental Policy Statement

AECOM

PURPOSE

The purpose of this policy is to:

- Establish and maintain a framework for a safe and healthy workplace for all AECOM employees and minimize our impact on the environment
- Outline expectations relative to compliance with governing occupational safety, health and environmental legislation

COMMITMENT

AECOM is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities. We are also committed to protecting and preserving the natural environment in which we operate. We will actively seek to conserve energy, water and natural resources and to recycle and reduce waste where appropriate during the execution of our business activities. We will be good corporate citizens by striving to ensure that our facilities and operations do not pose unreasonable safety or environmental risks, and by participating in community-related activities that promote excellence in safety, health and environmental practices. In all of our activities we will develop and implement appropriate systems and procedures designed to comply with applicable laws, legislation, licensing requirements and stakeholder expectations. AECOM will plan and design its processes, facilities and projects in a manner that reduces risks and impacts during their entire life cycle, consistent with the direction and objectives of our clients.

OBJECTIVES

Our ultimate goals are simple and are derived from AECOM's Core Values:

- Prevent work-related injuries or illnesses
- Prevent damage to property and/or equipment from our activities
- Prevent adverse impacts to the environment from our ongoing projects or operations

IMPLEMENTATION

In order to guide the implementation efforts required by this policy, the **Group Chief Executives, Business Line Leaders** and **Regional Leaders** will collaborate to establish Safety, Health and Environmental (SH&E) programs that:

- Embrace the AECOM SH&E Guiding Principles and this policy statement
- Comply with all applicable safety, health and environmental rules and regulations at the local, state, provincial and national level
- Meet client requirements
- Where no specific regulation exists, comply with AECOM standards and appropriate industry practices
- Report on performance relative to short- and long-term SH&E metrics designed to help achieve established goals
- Consult with, listen to, and respond to employees, customers and partners in order to continuously improve their SH&E performance. The establishment of formal SH&E committees, with documented charters, is recognized as an effective tool for this purpose
- Recognize those who contribute to their improved SH&E performance

AECOM EMPLOYEE RESPONSIBILITIES

All employees will be responsible for:

- Conducting themselves in accordance with directives, standards and procedures established by the applicable SH&E program
- Temporarily suspending their personal work activities and requesting guidance from their supervisor before continuing a task when they identify a condition or practice that creates a serious safety, health or environmental risk
- Immediately reporting safety, health and/or environmental incidents to their supervisor

POLICY REVIEW

This policy will be formally reviewed annually. However, if substantial changes occur in legislation, organization and/or other business drivers, changes may be made on an interim basis.

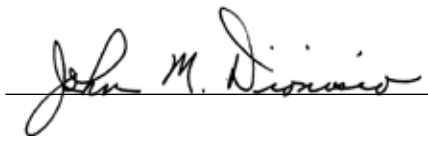
COMMUNICATION

This policy is to be displayed prominently in all permanent and temporary offices of AECOM where employee information is normally communicated. An electronic version will also be posted on the AECOM intranet.

A copy of this policy will be provided to entities working for, or on behalf of, AECOM and will also be made available to other stakeholders upon request.

Signature:

John M. Dionisio
Chairman and CEO



Date: April 13, 2012

ATTACHMENT C

Health and Safety Plan Acknowledgement Form

SIGNATURE PAGE

By signing below, the undersigned acknowledges having read and reviewed the AECOM Health and Safety Plan for the TGRS Construction and Operation at the Montrose Superfund Site Los Angeles, California. The undersigned also acknowledges having been instructed in the contents of this document and an understanding of the information as it pertains to the specified work.

Print Name	Signature	Organization	Date

ATTACHMENT D

Safety Observation Report

AECOM Near Miss* – Safety Observation Report

Please use this form to report an observations (e.g., at-risk behaviors, at-risk conditions or positive observations) you encounters as a part of your work. Observations may include office or field locations.

* Near Misses must be immediately reported to the Incident Reporting Hotline 800-348-5046 & your SH&E Mgr.

Work Activity				
❍ Office	❍ Driving	❍ Field	❍ Lab	❍ Other

Person Identifying _____ Date _____

Region/District _____ Client/Project No. _____

Is client notification needed? If yes, contact your project manager immediately

❍ Near Miss	❍ Observation		
	❍ At-Risk Behavior	❍ Unsafe Condition	❍ Positive

Description of the Observation/Near Miss

Immediate Action Taken

Immediate Potential Causes

❍ Procedures not followed	❍ Protection Systems
❍ Use of tools or equipment	❍ Tools, equipment, vehicles
❍ Use of protective measures	❍ Work exposure to…
❍ Inattention/Lack of awareness	❍ Work place environment/layout

Potential System Cause

❍ Physical Capacity	❍ Contractor Selection
❍ Physical Condition	❍ Engineering Design
❍ Mental State	❍ Work Planning
❍ Behavior	❍ Purchasing, material handling
❍ Skill Level	❍ Tools and Equipment
❍ Training/Knowledge	❍ Work Rules/policies/procedures
❍ Mgmt/Supervision/Employee leadership	❍ Communication
	❍ Other

Correction Action Category (to prevent reoccurrences)

❍ New/Different PPE needed	❍ Additional training/skills
❍ New tool(s)/Equipment needed	❍ Improved housekeeping effort
❍ Additional/Proper PPE	❍ Modified work behaviors
❍ Change in work procedure	❍ Improved work planning
❍ New Stop Work Trigger	❍ Other

Supervisor Signature and Date _____

Date Submitted to SH&E _____

ATTACHMENT E

Job Safety Analysis/Task Hazard Analysis

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

GEOPHYSICAL SURVEY/UTILITY CLEARANCE

TASK DESCRIPTION

A land survey will be conducted to identify lateral and vertical coordinates of physical features at the site. The geophysical survey will be used to determine the locations of underground structures and utilities. The geophysical survey will be completed across the Site using magnetometer, electromagnetic (EM), ground penetrating radar (GPR), or other appropriate methods. GPR would be used to obtain a better resolution for any anomalies identified during the EM survey.

Procedures for the geophysical clearance of a proposed exploratory location are summarized below:

- Review available utility maps (if any), and trace and mark any utilities near the proposed construction locations using geophysical methods.
- Trace any other utilities in the vicinity of the proposed construction locations evident from field observations (cracks in asphalt, manholes, valve boxes, etc.) using geophysical methods.

The utilities and/or underground structures located will be marked on the ground with stakes or surveyor's paint and be recorded on a scaled, hand-drawn site map. In addition to the geophysical survey, all locations will be cleared for underground utilities by hand digging to located them.

Non-intrusive techniques will be used to identify underground utilities and anomalies prior to the initiation of drilling activities. Note any underground utility signs present.

CHEMICAL EXPOSURE HAZARDS

- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)

PPE

Level D Ensemble

- Hard Hat
- Full /Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses
- High visibility reflective safety vest
- Leather gloves while handling sharp edges or operating powered tools/machinery

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- Sunscreen with a SPF of 15

PHYSICAL HAZARDS

- Slips, trips, falls and protruding objects
- Radiofrequency Radiation (RFR) from GPR equipments
- Manual Lifting
- Heat/Cold Strees
- Insect bites
- Vehicle traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA_005_PR_Vehicle and Driver Safety Program
- S3NA 304_PR_Fall Protection
- S3NA 308 PR Manual Lifting- Field

ADDITIONAL SAFETY CONSIDERATIONS

- Personnel operating the Ground Penetrating Radar (GPR) should be aware of potential RFR exposure.
- The GPR should not be operational (emitting) during maintenance or while inverted from its normal operating position.
- Personnel should be aware of Truck and Train traffic.
- Use appropriate PPE as specified in Health and Safety Plan when working on Montrose Site and performing surveying.

MONITORING PROCEDURES

No monitoring procedures required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK HAZARD ANALYSIS

DRIVING

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Driving AECOM field truck or personal or rented vehicle to and from job site.	None anticipated.

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
• None	• First aid Kit • Drinking Water	• Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 005_PR_Vehicle and Driver Safety Program	• Performing perimeter walk around of vehicle for damage or unusual conditions. • Check and adjust seat steering wheel and headrest, mirrors. Check to see that headlamps turn signals, backup lights, hazard lights are working properly, washer/wipers. • Check oil, gas, radiator, brake and washer fluid warning lights and levels • Use turn signal as necessary • Check for coming traffic and pedestrians and make eye contact w/ other drivers or pedestrians. • Obtain assistance from a spotter when necessary • Make sure other motorists /pedestrians see you before crossing in front of them. • Check mirrors when slowing/stopping vehicle and frequently (one mirror every) 5-8 seconds while driving. • **Do not use cell phones or perform other distractive activities driving.** • Follow at a safe distance (3 sec. rule) • Maintain safety cushion around vehicle (front, sides, rear). Adjust vehicle space/speed to avoid intrusion by other drivers and stay out of others' blind spots. • At intersections, stop 10 ft. behind crosswalk or other vehicle to avoid sliding forward if rear ended. • Avoid sudden lane changes, always use signal. • Break early to activate brake lights. • Fasten seat belts. Make sure passenger air bag is turned on. • Turn on headlamps in high traffic areas, at dusk, and in inclement weather.

MONITORING PROCEDURES

No monitoring is required.

Date: November 2012

TASK HAZARD ANALYSIS

GENERAL SITE VISITS

TASK DESCRIPTION

AECOM and subcontractor personnel will periodically visit the site to make observations, take measurements and/or take photographs and other similar activities.

CHEMICAL EXPOSURE HAZARDS

- None anticipated.

PPE

Level D Ensemble

- Hard hat
- Safety glasses
- High-visibility reflective vest (traffic safety vest)
- Short/long- sleeved shirt
- Full-length pants
- Safety-toe boots

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- Sunscreen with a minimum SPF of 15
- Drinking Water

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hot or cold weather
- Manual lifting
- Vehicular traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA_001_PR_Safe Work Standards and Rules
- S3NA_002_PR_Stop Work Authority for Unsafe Work
- S3NA_005_PR_Vehicle and Driver Safety Program
- S3NA_208_PR_Personal Protective Equipment Program
- S3NA 304_PR_Fall Protection
- S3NA_307_PR_Housekeeping Worksite
- S3NA_309_PR_Mobile or Heavy Equipment
- S3NA_310_PR_Rigging, Hoisting, Cranes, and Lifting Devices
  S3NA_505_PR_Cold Stress Prevention
- S3NA_511_PR_Heat Stress Prevention

ADDITIONAL SAFETY CONSIDERATIONS

- Weather conditions
- Field workers observe one another to identify safety concerns, using the buddy system, if applicable.

MONITORING PROCEDURES

No monitoring is required.

TASK HAZARD ANALYSIS

MOBILIZATION AND DEMOBILIZATION

TASK DESCRIPTION

Mobilization and Demobilization, including driving to and from the site, site set-up and breakdown includes but not limited to loading vehicle, driving to and from the site, unloading vehicle, and site cleanup activities.

CHEMICAL EXPOSURE HAZARDS

- None anticipated.

PPE

Level D Ensemble

- Hard hat
- Safety glasses
- High-visibility reflective vest (traffic safety vest)
- Short/long- sleeved shirt
- Full-length pants
- Safety-toe boots
- Ear Plugs

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- Sunscreen with a minimum SPF of 15
- Pop-up Shade
- Drinking Water

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hot or cold weather
- Manual lifting
- Vehicular traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 001_PR_Safe Work Standards and Rules
- S3NA 002_PR_Stop Work Authority for Unsafe Work
- S3NA 005_PR_Vehicle and Driver Safety Program
- S3NA 208_PR_Personal Protective Equipment Program
- S3NA 205_PR_Equipment Inspections & Maintenance
- S3NA 304_PR_Fall Protection
- S3NA 306_PR_Highway and Road Work
- S3NA 307_PR_Housekeeping Worksite
- S3NA 309_PR_Mobile or Heavy Equipment

ADDITIONAL SAFETY CONSIDERATIONS

- Review vehicle/tool/load inspection checklist
- Review field work-order and Make a load plan and ensure correct type of vehicle for expected conditions and load.
- During offloading stage equipment on an even surface, tall equipment should be laid down to prevent tipping
- Always use a buddy for heavy or large pieces of equipment. Use proper lifting techniques
- Locate potential pinch points and guard as needed. Verbally warn others when closing doors and tailgates
- Do not load items in a manner which will obstruct the driver's view
- Secure all loads with a cargo net, straps or other mechanical device. **Do Not Rely On Size, Shape Or Weight** of objects
- Verify that tailgate is closed, and locked into place
- Secure all loads inside of vehicle, do not place unsecured items on seats
- Wear PPE including gloves, and hardhat when overhead hazards are present
- Refer to site plan with ingress, parking/laydown, and egress locations
- Avoid backing, use spotter if available
- Use buddy system for placing traffic control
- Do not work facing back to traffic
- When staging vehicles and equipment on-site looks for overhead hazards such as utilities, trees etc
- Use appropriate lifting techniques for all equipments
- Stage vehicle in area near work site, to avoid needless carrying of materials
- Use carts, hand trucks and other devices to facilitate moving large or heavy pieces of equipment

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK HAZARD ANALYSIS

SAWCUT, PAVEMENT BREAKOUT AND REMOVAL

TASK DESCRIPTION

Saw cutting, breakout and removal of pavement in the street or on Montrose Property.

CHEMICAL EXPOSURE HAZARDS

- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)

PPE

Level D Ensemble

- Hard hat
- Safety glasses
- High-visibility reflective vest (traffic safety vest)
- Long- sleeved shirt
- Full-length pants
- Safety-toe boots
- Ear Plugs
- Appropriate Respirator

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- Sunscreen with a minimum SPF of 15

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hot or cold weather
- Manual lifting
- Vehicular traffic
- Flying Debris
- Electrical
- Moving Parts/Sharp Parts

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 001_PR_Safe Work Standards and Rules
- S3NA_002_PR_Stop Work Authority for Unsafe Work
- S3NA_005_PR_Vehicle and Driver Safety Program
- S3NA_208_PR_Personal Protective Equipment Program
- S3NA 304_PR_Fall Protection
- S3NA_307_PR_Housekeeping Worksite
- S3NA_309_PR_Mobile or Heavy Equipment
- S3NA_417_PR_Utilities, underground

ADDITIONAL SAFETY CONSIDERATIONS

- Set up work zone, clearly marked for DDT hazards (if applicable) and use spotter to monitor.
- Use proper PPE and respirator use as specified in the Health and Safety Plan for DDT impacted areas and areas outside.
- Use proper lifting technique, keep loads close to body, bend knees not back, use a buddy or cart as needed.
- Limit exposure to noise by stay away from noisy equipment, wear ear plugs/muffs if it cannot be avoided.
- Inspect all guards, do not use if guard is missing or defective, de-energize equipment when not it use, keep hands and clothing away from moving parts.
- Clean area to remove debris, wear face shield and goggles when operating equipment.
- Use CGFI, inspect all electrical cords and connects. Remove is damaged or defective.
- Maintain steady pace when using tools and take adequate rest periods.
- Equip all heavy equipment on this project with rollover projection systems and backup alarms, as necessary.
- Stay clear of moving equipment unless necessary.
- Decontaminate the equipments used in DDT impacted areas before moving to the areas outside.
- Inspect all equipment daily before use to ensure proper maintenance is being performed.

Instruct heavy equipment operators to give ground personnel right-of- way.

MONITORING PROCEDURES

Perform dust monitoring and suppression activities.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK HAZARD ANALYSIS

HAND AUGER

TASK DESCRIPTION

Hand augering involves the manual placement and insertion (turning) of a small auger blade. Soil is displaced by the blade, creating a hole, which allows personnel to inspect the subsurface ground for underground utilities prior to drilling a borehole or sampling at shallow depths.

CHEMICAL EXPOSURE HAZARDS

- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)

PPE

Level D Ensemble (S3NA 208 PR PPE)

- Hardhat
- Long/Short Sleeve Shirt
- Tyvex Coveralls (if applicable)
- Traffic Safety Vest
- Full-length Pants
- Safety-toe Boots
- Face Shield & Safety Glasses

OTHER SAFETY EQUIPMENT

- PID
- Benzene Dräger tubes
- Portable eyewash (filled, setup and located in vehicle, ready for use)
- Fire extinguisher (inspected and located in vehicle ready for operation.

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Vehicle Traffic
- Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 508 PR Hazardous Materials Handling and Shipping
- S3NA 521 PR Decontamination Procedures
- S3NA 306 PR Highway and Roadwork
- S3NA 520 PR Spill Response- Incidental
- S3NA 308 PR Manual Lifting- Field
- S3NA 307 PR Housekeeping- Worksite
- S3NA_405_PR_Drilling Boring and Direct Push Probing

ADDITIONAL SAFETY CONSIDERATIONS

- Evaluate surrounding work area for additional hazards that may be present.
- Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book.

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

HOLLOW STEM AUGER DRILLING

TASK DESCRIPTION

Hollow stem auger drilling methods may be used to install shallow DNAPL or groundwater monitoring wells.

CHEMICAL EXPOSURE HAZARDS

- Chlorobenzene (dermal, ingestion, inhalation)
- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)
- Benzene
- Chloroform
- PCE
- TCE
- 1,1-DCE

PPE

Level D Ensemble (S3NA 208 PR PPE)

- Hard Hat
- Tyvek coveralls/booties
- Traffic Safety Vest
- Nitrile gloves
- Safety glasses/Face Shield
- Safety-toe Boots
- Leather gloves
- Hearing Protection (muffs/plugs)

OTHER SAFETY EQUIPMENT

- PID
- Mini-RAM
- Benzene Dräger tubes
- Portable eyewash (filled, setup and located in vehicle, ready for use)
- Fire extinguisher (inspected and located in vehicle ready for use).
- Air-purifying Respirator (if needed).

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Heavy equipment
- Vehicle Traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 306 PR Highway and Roadwork
- S3NA 405-PR Drilling, Boring and Direct Push Probing.
- S3NA 406 PR Electrical Lines Overhead
- S3NA 521 PR Decontamination Procedures
- S3NA 508 PR Hazardous Materials Handling and Shipping

ADDITIONAL SAFETY CONSIDERATIONS

- Evaluate surrounding work area for additional hazards that may be present.
- Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book.

MONITORING PROCEDURES

See Health and Safety Plan for Monitoring Requirements

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

MUD ROTARY DRILLING

TASK DESCRIPTION

Mud Rotary drilling methods may be used to install deep injection or extraction wells.

CHEMICAL EXPOSURE HAZARDS

- Chlorobenzene (dermal, ingestion, inhalation)
- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)
- Benzene
- Chloroform
- PCE
- TCE
- 1,1-DCE

PPE

Level D Ensemble (S3NA 208 PR PPE)

- Hard Hat
- Tyvek coveralls/booties
- Traffic Safety Vest
- Nitrile gloves
- Safety glasses/Face Shield
- Safety-toe Boots
- Leather gloves
- Hearing Protection (muffs/plugs)

OTHER SAFETY EQUIPMENT

- PID
- Mini-RAM
- Benzene Dräger tubes
- Portable eyewash (filled, setup and located in vehicle, ready for use)
- Fire extinguisher (inspected and located in vehicle ready for use).
- Air-purifying Respirator (if needed).

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Heavy equipment
- Vehicle Traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 306 PR Highway and Roadwork
- S3NA 405 PR Drilling, Boring and Direct Push Probing.
- S3NA 521 PR Decontamination Procedures
- S3NA 508 PR Hazardous Materials Handling and Shipping
- S3NA 406 PR Electrical Lines Overhead

ADDITIONAL SAFETY CONSIDERATIONS

- Evaluate surrounding work area for additional hazards that may be present.
- Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book.

MONITORING PROCEDURES

See Health and Safety Plan for Monitoring Guidelines

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

GROUNDWATER WELL DEVELOPMENT

TASK DESCRIPTION

Well development will be accomplished using both mechanical methods (surging and bailing) and chemical methods using acids and bio-dispersant.

For a chemical method Johnson Products Nu-Well 120 Liquid acid and Nu-Well 310 Bioacid dispersant will be mixed with a one well volume of groundwater. First add groundwater will be extracted into a poly vinyl tank where it will be mixed with Nu-well 120. Once it is mixed, add Nu-Well 310. Solution is then injected into the well.

CHEMICAL EXPOSURE HAZARDS

- Chlorobenzene (dermal, ingestion, inhalation)
- DDT (dermal and ingestion)
- Benzene
- Chloroform
- PCE
- TCE
- 1,1-DCE
- Food-grade phosphoric acid
- Proprietary blend of Organic carboxylic acids.

PPE

Level D Ensemble (S3NA 208 PR PPE)

- Hard Hat
- Tyvex Coveralls
- Traffic Safety Vest
- Safety-toe Boots
- Safety Glasses/Face Shield
- Nitrile Gloves/Acid Protection Gloves
- Hearing Protectin (Muffs/Plugs)

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- PID
- Air-purifying Respirator (if needed).

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Vehicle Traffic
- Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 306 PR Highway and Roadwork
- S3NA 308 PR Manual Lifting- Field
- S3NA 307 PR Housekeeping- Worksite
- S3NA 409 PR Forklifts
- S3NA 508 PR Hazardous Materials Handling and Shipping
- S3NA 521 PR Decontamination Procedures
- S3NA 520 PR Spill Response- Incidental

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book.
3. Review all Chemical MSDS prior to use

MONITORING PROCEDURES

Contaminants have the potential to build up in any closed well. Accordingly, any well, which has been sealed for longer than 6 hours, will be allowed to ventilate for a minimum of 5 minutes upon opening, then monitored for VOC concentration using a PID. A reading in excess of 100 ppm will require additional ventilation, followed by re-monitoring. If an acceptable VOC concentration cannot be reached within 30 minutes of opening a well, reseal it and contact the EH&SP for guidance.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

GROUNDWATER WELL EXTRACTION/INJECTION WELL TESTING

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Well capacity testing may be conducted by either conducting water extraction step rate tests or injection tests. Injection and/or extraction testing of groundwater wells will be conducted for a short duration of time. Depending on groundwater chemistry; well water may be amended with acids or sequestering agents. Amend Task Hazardous Analysis as situation dictates.	• Chlorobenzene (dermal, ingestion, inhalation) • DDT (dermal and ingestion) • Benzene • Chloroform • PCE • TCE • 1,1-DCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvex Coveralls • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves/Acid Protection Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 306 PR Highway and Roadwork • S3NA 308 PR Manual Lifting- Field • S3NA 307 PR Housekeeping- Worksite • S3NA 409 PR Forklifts • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 520 PR Spill Response- Incidental • S3NA 521 PR Decontamination Procedures	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Review all Chemical MSDS prior to use 4. Make sure lifters are screwed in all the way. Never attach lifter to main line winch or other winch that would exceed capacity of lifter.

MONITORING PROCEDURES

Periodically monitor the setup to ensure all equipments are operational. Collect data as directed by the project manager.

Inspect all wire cables daily and replace damaged or worn cables immediately. Properly wind cable on spool to avoid damaging cable. Inspect lifters or supports for cracks and fatigue. Inspect shackles and clevises for wear and tightness. Inspect fuel level for the generator (if used). Inspect chemical levels during the active test.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

TRENCH AND PIPE INSTALLATION

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Trenching and installation of below ground pipe and conduits.	• Chlorobenzene (dermal, ingestion, inhalation) • DDT (dermal and ingestion) • Benzene • Chloroform • PCE • TCE • 1,1-DCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvek Coveralls (if needed) • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 306 PR Highway and Roadwork • S3NA 520 PR Spill Response- Incidental • S3NA 409 PR Forklifts • S3NA 308 PR Manual Lifting- Field • S3NA 307 PR Housekeeping- Worksite • S3NA 505_PR_Cold Stress Prevention • S3NA 417_PR_Utilities, underground • S3NA 507_PR_Hazardous Materials Communication - WHMIS • S3NA 303_PR_Excavation and Trenching • S3NA 304_PR_Fall Protection • S3NA 406_PR_Electrical Lines, Overhead	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Identify and mark all utilities prior to beginning excavation 4. Use of snow fencing, portable panels, barricades, and caution tape around open trenches. 5. Make an eye contact with equipment operator and look for changing traffic conditions 6. Wear PPE as listed in the Health and Safety plan for potential areas including DDT and VOC impacted soils. 7. Clean or keep stockpile excavated soils 24-inches minimum from edge of trench 8. Use proper lifting techniques, lift with your legs holding heavy objects close to your body, ask for help if needed. 9. Cover all material with plastic, or store in drums or soil bins. 10. Cover drains with geotextile fabric and protect with hay wattles to prevent run off from stored materials. 11. Watch other traffic during trenching and pipe installation activities.

MONITORING PROCEDURES

VOC monitoring will be required in the VOC impacted areas. Perform dust suppression by periodically wetting trenching areas and stock piles.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

BACKFILL AND COMPACTION

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Backfilling trenches and compacting soil as specified on the plans.	•None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvek Coveralls (if needed) • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 303_PR_Excavation and Trenching • S3NA 304_PR_Fall Protection • S3NA 306 PR Highway and Roadwork • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 406_PR_Electrical Lines, Overhead • S3NA 409 PR Forklifts • S3NA 417_PR_Utilities, underground • S3NA 505_PR_Cold Stress Prevention • S3NA 507_PR_Hazardous Materials Communication - WHMIS • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 520 PR Spill Response- Incidental • S3NA 521 PR Decontamination Procedures	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Make an eye contact with equipment operator and look for changing traffic conditions

MONITORING PROCEDURES

VOC monitoring will be required in the VOC impacted areas.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

ASPHALT WORK

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Application of Asphalt for paving and backfilled excavations: • Application of asphalt emulsion, • Asphalt delivery • Spreading asphalt • Cold planning • Demoblization	• Polycyclic aromatic hydrocarbons (PAHs) • Volatile Organic Compounds • Particulates • Sulfur • Nitrogen Oxides • Carbon Monoxide

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvex Coveralls • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 306 PR Highway and Roadwork • S3NA 520 PR Spill Response- Incidental • S3NA 409 PR Forklifts • S3NA 308 PR Manual Lifting- Field • S3NA 307 PR Housekeeping- Worksite	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Review all Chemical MSDS prior to use 4. Have a guide direct asphalt truck around the area while dumping asphalt 5. Make an eye contact with equipment operator and look for changing traffic conditions 6. Wear PPE as listed, specifically leather gloves when handling asphalt

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

GRADING ACTIVITIES

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Grading activities for construction of treatment pad.	• Chlorobenzene (dermal, ingestion, inhalation) • DDT (dermal and ingestion) • Benzene • Chloroform • PCE • TCE • 1,1-DCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvek Coveralls (if needed) • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 306 PR Highway and Roadwork • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 409 PR Forklifts • S3NA 417_PR_Utilities, underground • S3NA 505_PR_Cold Stress Prevention • S3NA 507_PR_Hazardous Materials Communication - WHMIS • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 520 PR Spill Response- Incidental • S3NA 521 PR Decontamination Procedures	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Identify and mark all utilities prior to beginning excavation 4. Use of snow fencing, portable panels, barricades, and caution tape around open trenches. 5. Make an eye contact with equipment operator and look for changing traffic conditions 6. Wear PPE as listed in the Health and Safety plan for potential areas including DDT and VOC impacted soils. 7. Clean or keep stockpile of excess soils. 8. Use proper lifting techniques, lift with your legs holding heavy objects close to your body, ask for help if needed. 9. Cover all material with plastic, or store in drums or soil bins. 10. Cover drains with geotextile fabric and protect with hay wattles to prevent run off from stored materials. 11. Watch other traffic during trenching and pipe installation activities.

MONITORING PROCEDURES

VOC monitoring will be required in the VOC impacted areas. Perform dust suppression by periodically wetting trenching areas and stock piles.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

CRANE, HOISTING, AND LIFTING ACTIVITIES

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Receiving, offloading, and installing electrical and mechanical equipments and/or piping	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Leather Gloves (if needed)	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment • Fire or Explosion Hazards • Overhead Utilities

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 306 PR Highway and Roadwork • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 309_PR_Mobile or Heavy Equipment • S3NA 310_PR_Rigging, Hoisting, Cranes, and Lifting Devices • S3NA 406_PR_Electrical Lines, Overhead • S3NA 408_PR_Elevated Work Platforms and Aerial Lifts • S3NA 409 PR Forklifts • S3NA 520 PR Spill Response- Incidental	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Inspect site and ground bearing conditions to ensure safe operation and support the equipment 4. Verifying assist crane loads. Loads that will be imposed on the assist crane at each phase will be verified before operations begin. 5. Verify Boom and jib pack points. The attachment points of rigging to a boom/ boom sections, or to jib/jib sections, will be suitable for preventing structural damage and for facilitating safe handling of the components. 6. Ensure that the center of gravity will be identified, if necessary, for the method used for maintaining stability. 7. Appropriate Snagging 8. Ensure stability upon pin removal. 9. Take appropriate measures to prevent unintended dangerous movements for unknown loads or insufficient information.

MONITORING PROCEDURES

No monitoring is required

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

CONCRETE REPLACEMENT

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Breaking out existing concrete structures and replacing with new concrete structures on the Montrose Property as shown on the plans. This task may require operation of Jack Hammer, mixing concrete and site clean up.	• Chlorobenzene (dermal, ingestion, inhalation) • DDT (dermal and ingestion) • Benzene • Chloroform • PCE • TCE • 1,1-DCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvex Coveralls • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle) • PID • Air-purifying Respirator (if needed).	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 306 PR Highway and Roadwork • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 409 PR Forklifts • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 520 PR Spill Response- Incidental	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Stay alert and visually scan area for hoses and tools. Place all unused tools away from the walk way. Sweep/clean up excess debris to avoid slip/trip/fall hazards. 4. Wear ear, eye, and hand protection when handling equipment and removing debris. 5. Use proper lifting techniques (bend at the knees and don'tlift with back) use the buddy systems when lifting heavy objects over 50 lbs.(includes moving Jackhammer from place to place while not in operation. 6. Create a large enough exclusion zone to isolate work area from pedestrians. Wear Face shield while operating Jack Hammer. 7. Make sure hoses are secure before turning on compressor. Keep unauthorized personnel out of the area. Use whip checks if necessary. 8. Wear leather gloves when using equipment. Be aware of hand placement at all times. Communicate with workers to show hands before picking up debris when working with Jack hammer operator. 9. Perform a final walk around of vehicle before leaving. Store and tie equipment properly.

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

FORM AND POUR CONCRETE PAD

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Set form, rebars and pour concrete pads as per the plans involving: Exclusion Zone setup, set forms, tie rebar, pouring concrete from concrete truck and removing forms.	• Chlorobenzene (dermal, ingestion, inhalation) • DDT (dermal and ingestion) • Benzene • Chloroform • PCE • TCE • 1,1-DCE

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Tyvex Coveralls • Traffic Safety Vest • Safety-toe Boots • Safety Glasses/Face Shield • Nitrile Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 306 PR Highway and Roadwork • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 409 PR Forklifts • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 520 PR Spill Response- Incidental	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Use cones, tape, and signs to barricade work area to setup an exclusion zone 4. Maintain clean work area and wear appropriate PPE for changing conditions within your work area (rebar,forms, cords, rain,etc. 5. Use proper lifting techniques (bend at the knees and don'tlift with back) use the buddy systems when lifting heavy objects over 50 lbs 6. Look and feel for stable surface when stepping on rebar below wet concrete. 7. Maintain eye contact with driver, discuss scope of work with driver, escort driver to work zone.

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

ELECTRICAL WORK

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Installing electrical conduit, pulling wire, installing above ground conduit, pulling electrical conductors and making electrical connections.	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Nitrile Gloves/Leather Gloves (if needed)	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment • Fire or Explosion Hazards • Electrocution

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 306 PR Highway and Roadwork • S3NA 520 PR Spill Response- Incidental • S3NA 409 PR Forklifts • S3NA 308 PR Manual Lifting- Field • S3NA 307 PR Housekeeping- Worksite • S3NA 302_PR_Electrical General	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Perform subsurface utility survey, lock out/tag out any known utilities. 4. Use proper lifting techniques (bend at the knees and don'tlift with back) use the buddy systems when lifting heavy objects over 50 lbs 5. Use proper pulling techniques using your arms and not putting to much strain on your back, establish good communication with every body involved with task. 6. Maintain eye contact with driver, discuss scope of work with driver, escort driver to work zone. 7. Lock out / tag out while working on any live equipment

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

STRAIGHT USE LADDER

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Use Step up or extension ladders.	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Leather Gloves • Long Pants • Ear Plugs	• First aid kit (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 308 PR Manual Lifting- Field • S3NA 307 PR Housekeeping- Worksite	• Inspect the ladder for damage, Art Cowburn or Tom Long before each use. • Check treads, clean if needed. • Check that the feet of the ladder are stable and intact • Tie off the bottom and top of the ladder. • Always face the ladder. • Work between the rails. • Do not overreach. • Keep hands on the ladder while climbing. • Use a spotter/holder when necessary. • Anyone under the work area needs to wear a hard hat. • Restrict access to work area (ropes, tape, etc.) to prevent unnecessary entry. • Wear all appropriate PPE.

MONITORING PROCEDURES

No monitoring is required.

Date: November 2012

TASK NAME

SETTING EQUIPMENTS

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
Receiving, offloading, and installing electrical and mechanical equipment. Performing excavation for electrical equipments if needed.	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Nitrile Gloves/Leather Gloves (if needed)	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment • Fire or Explosion Hazards • Electrocution

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA_309_PR_Mobile or Heavy Equipment • S3NA 310_PR_Rigging, Hoisting, Cranes, and Lifting Devices • S3NA 408_PR_Elevated Work Platforms and Aerial Lifts • S3NA 409 PR Forklifts • S3NA 520 PR Spill Response- Incidental	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Guide the driver for equipment delivery onsite or offsite. 4. Perform subsurface utility survey, lock out/tag out any known utilities and connections for startup. 5. Use proper lifting techniques (bend at the knees and don'tlift with back) use the buddy systems when lifting heavy objects over 50 lbs 6. Lock out / tag out while working on any live equipment 7. Work and materials will conform to the latest rules of the National Board of Fire Underwriters' Code, regulations of the State Fire Marshal, and applicable local and state codes. 8. Ensure that the center of gravity will be identified, if necessary, for the method used for maintaining stability. 9. Appropriate Snagging 10. Take appropriate measures to prevent unintended dangerous movements for unknown loads or insufficient information.

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

ABOVE GROUND PIPING

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
This task involves constructing piping support system, installation of unistrut support, and installing manifolds.	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Leather Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment • Fire or Explosion Hazards

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 304_PR_Fall Protection • S3NA 307 PR Housekeeping- Worksite • S3NA 308 PR Manual Lifting- Field • S3NA 409 PR Forklifts • S3NA 508 PR Hazardous Materials Handling and Shipping • S3NA 521 PR Decontamination Procedures • S3NA 520 PR Spill Response- Incidental	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Use proper lifting techniques for piping and supports installation 4. Wear appropriate PPE during pipe lifting and installation.

MONITORING PROCEDURES

No monitoring is required.

Date: November 2012

TASK NAME

ANCHOR BOLT INSTALLATION

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
This task involves anchoring equipments, pipe supports and conduits by using power drills, saws, grinders etc.	None

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
Level D Ensemble (S3NA 208 PR PPE) • Hard Hat • Traffic Safety Vest • Safety-toe Boots • Safety Glasses • Leather Gloves	• First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) • Portable eyewash station (located in vehicle)	• Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Vehicle Traffic • Heavy Equipment • Fire or Explosion Hazards • Electrocution

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
• S3NA 305_PR_Hand and Power Tools • S3NA 307 PR Housekeeping- Worksite	1. Evaluate surrounding work area for additional hazards that may be present. 2. Establish responsibilities and roles of all personnel involved. Document roles/responsibilities in log book. 3. Use proper lifting techniques for piping and supports installation 4. Wear appropriate PPE during pipe lifting and installation. 5. Ensure power cords are intact and not frayed, discontinue use if so, keep work areas clear of people. 6. Ensure drill bits and saw blades are sharp and in good condition, do not force cuts or drilled holes if resistance, discard bits and blades if dull or damaged. 7. Use appropriate tool for drilling. Do not extend from ladder or platform. Make sure of level secure footing and wear protective equipment. 8. Use proper dust control and wear a face mask to prevent the concrete dust from blowing into the face.

MONITORING PROCEDURES

No monitoring is required.

AECOM

TASK HAZARD ANALYSIS (THA)
MONTROSE SUPERFUND SITE

Date: November 2012

TASK NAME

MANAGEMENT AND HANDLING OF DERIVED WASTES

TASK DESCRIPTION

Onsite derived waste may include excavated soil, drill cuttings, purge liquid, waste PPE and decontamination materials. Exposure can occur through skin contact with contaminated water. Inhalation of organic vapors at airborne concentrations may be significant but respiratory protection is not expected. All wastes will be labeled and placed into DOT-approved 55 gallon drums and/or bins.

CHEMICAL EXPOSURE HAZARDS

- Chlorobenzene (dermal, ingestion, inhalation)
- DDT (dermal and ingestion)
- Heavy metals (dermal and ingestion)
- Benzene
- Chloroform
- PCE
- TCE
- 1,1-DCE

PPE

Level D Ensemble (S3NA 208 PR PPE)

- Hard Hat
- Tyvex
- Full-length Pants
- Safety-toe Boots
- Safety Glasses

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)
- Portable eyewash station (located in vehicle)
- Air-purifying Respirator (if needed).

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Heavy equipment
- Vehicle Traffic

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- S3NA 306 PR Highway and Roadwork
- S3NA 308 PR Manual Lifting- Field
- S3NA 409 PR Forklifts
- S3NA 508 PR Hazardous Materials Handling and Shipping
- S3NA 520 PR Spill Response- Incidental
- S3NA 521 PR Decontamination Procedures
- S3NA 521_PR_Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. Use proper tools for the job.

MONITORING PROCEDURES

No monitoring required.

ATTACHMENT F

Management of Change Report

Management of Change Report Form *Attach additional sheets if necessary*

Introduction	Change Owner:	Affected Locations/Operations:
MOC Number:	Type of Change:	Date Submitted:
Reason for change:		
Describe the change and identify potential risks:		

Tasks: List the tasks required to complete the change, and the responsible subject matter experts and due date

MOC Tasks	Subject Matter Expert	Due Date	Completed Date
1.			
2.			
3.			
4.			

Notifications: Who needs to be notified of the change, how and when are they notified

Approvals: Who needs to be notified of the change, how and when are they notified

MOC Initiated by:		Date:	
MOC Approved by:		Date:	