DRAFT
Safe Work Plan

Emergency Drought Barrier Project

Prepared for:

California Department of Water Resources

AECOM

May 2015

DRAFT
Safe Work Plan

Emergency Drought Barrier Project

Safe Work Plan Expiration Date: [insert date 1 year from final approval date]

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May 2015

Safe Work Plan

California Department of Water Resources
2015 Emergency Drought Barrier Project

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Executive Summary

The purpose of this Safe Work Plan (SWP) is to address health and safety concerns related to project activities at the 2015 Emergency Drought Barrier (EDB) Project (the project) site, located in the Sacramento–San Joaquin Delta (Delta) near Antioch, California. The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees and the scope of services are discussed herein. This document is intended to identify known potential hazards and facilitate communication and control measures to prevent injury or harm. In addition, provisions to control potential environmental impacts from these activities are included where applicable.

The purpose of EDB is to control saltwater intrusion into the Delta with reduced reservoir releases while continuing to meet federal and state regulatory requirements. Work is being undertaken as an emergency, pursuant to Executive Order B-29-15.

The installation of the rock barrier will require close coordination with AECOM, the California Department of Water Resources, and the contractor. Multiple staff from each of these entities will work in and around the project site, for rock installation and monitoring.

The primary physical hazards that may be encountered include:

- Thermal Stress
- Ultraviolet Hazards
- Slips, Trips, and Falls
- Exertion/Repetitive Motion Injury
- Hand Tool and Equipment Hazards
- Line of Fire Hazards
- Back Injury
- Water and Boating Hazards
- Traffic Hazards
- Hand Tool and Equipment Hazards
- Inclement Weather/Cold Stress
- Biological Hazards
- Utility Hazards
- Rigging Hazards
- High River Flows and Flooding
- High Winds

Hazardous substances that may be brought on-site include:

- Gasoline/Diesel/Petroleum Hydrocarbons
- Compressed Gas
- Lead Acid Batteries

All staff members are bound by the provisions of this SWP and are required to participate in a preliminary project safety meeting, to familiarize themselves with the anticipated hazards and respective on-site controls. The

discussion will cover all the SWP subject matter, with emphasis on critical elements of the plan, such as emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, tailgate safety meetings will be held daily and when work conditions change, to discuss the anticipated scope of work, required controls, incident reporting, and any lessons learned or concerns from previous work; to identify new hazards and controls; and to review the results of inspections.

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A Task Hazard Analyses
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C AECOM Stretching Exercises
D Safety Data Sheets
E Emergency Response Site Plan
F Project Contact Information
G Tailgate Safety Briefing Attendance Form
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I Fieldwork Line of Fire Training

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Acronyms and Other Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
BTEX	benzene, toluene, ethylbenzene, and xylene
CFR	Code of Federal Regulations
CPR	cardio-pulmonary resuscitation
ASHEM	Area SH&E Manager
DWR	California Department of Water Resources
EC	electrical conductivity
EDB	emergency drought barrier
GFCI	ground fault circuit interrupter
HAZWOPER	hazardous waste operations or emergency response
kV	kilovolt
LMA	Local Maintaining Agency
MSDS	material safety data sheet
MTBE	methyl tertiary butyl ether
OH&S	occupational health and safety
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PFD	personal flotation device
PM	Project Manager
PPE	personal protective equipment
ppm	part per million
project	Emergency Drought Barrier Project
PSHC	Project Safety and Health Coordinator
PTT	Push-To-Talk
SDS	safety data sheets
SH&E	Safety, Health, and Environmental
SOP	standard operating procedure
SSO	Site Safety Officer
SWP	Safe Work Plan
THA	Task Hazard Analysis
TWA	time-weighted average
USCG	U.S. Coast Guard

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1 INTRODUCTION

This Safe Work Plan (SWP) addresses the requirements for AECOM and California Department of Water Resources (DWR) personnel to conduct field activities, including biological, noise and turbidity monitoring, to support the Emergency Drought Barrier (EDB) Project (the project) in the Sacramento–San Joaquin River Delta (Delta) near Antioch, California. No change to this SWP that can 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

- The work activities addressed in this SWP do not meet the requirements for characterization as hazardous waste operations or emergency response (HAZWOPER) activities as defined in Code of Federal Regulations Title 29, Part 1910 (29 CFR Part 1910), Hazardous Waste Operations and Emergency Response.

1.2 REGULATORY REQUIREMENTS

This SWP meets the requirements and follows the occupational health and safety (OH&S) legislative requirements in California and the guidelines established by the federal Occupational Safety and Health Administration (OSHA):

- Code of Federal Regulations Title 29, Part 1910 (29 CFR Part 1910), Occupational Safety and Health Standards
- Code of Federal Regulations Title 29, Part 1926 (29 CFR Part 1926), Safety and Health Regulations for Construction
- Title 8 of the California Code of Regulations (8 CCR), with special attention to:
  - Subchapter 4, Sections 1500–1938 Construction Safety Orders
  - Subchapter 7, Sections 3200–6184 General Industry Safety Orders

A Task Hazard Analysis is provided in **Attachment A**. 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 project activities are provided in **Attachment B**.

1.3 PROJECT SAFETY AND HEALTH RESPONSIBILITIES AND AUTHORITY

1.3.1 PROJECT MANAGERS

The AECOM and DWR PMs have overall management authority and responsibility for all site operations except construction, including safety for the project team. Construction safety is the joint responsibility of construction office, Sacramento Project Headquarter, and the constructor, San Rafael Rock Quarries. The PM's specific responsibilities include:

- Assuring that all personnel to whom this SWP applies have reviewed it;
- Providing the AECOM Project Safety and Health Coordinator (PSHC) with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site Site Safety Officer (SSO) for each organization, to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSOs for each organization and PSHC;
- Maintaining regular communications with the SSOs for each organization and, if necessary, the PSHC;
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for the project; and
- Providing project scheduling and planning activities.

1.3.2 PROJECT SAFETY AND HEALTH COORDINATOR

The AECOM PSHC is responsible for the review, approval, and modification of this SWP. Modifications to this SWP that may result in less stringent precautions cannot be undertaken by the PM or the SSO without approval from the PSHC or AECOM's SH&E Director. Specific duties of the PSHC include:

- Reviewing and amending the SWP as necessary for this project;
- Advising the AECOM and DWR PMs and SSOs for each organization on matters relating to health and safety;
- Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation; and,
- Maintaining regular contact with the AECOM and DWR PMs and SSOs for each organization, to evaluate the conditions at the project site and new information that may require modifications to the SWP.

1.3.3 SITE SAFETY OFFICERS

All project field staff members are responsible for implementing the safety requirements specified in this SWP. However, one individual from DWR will serve as the SSO. An alternate SSO for each organization also will be designated, in the event that the SSO is not available. The SSO and Alternate SSO (if applicable) will be identified on staff schedules. The identified SSO will be on-site during all activities covered by this SWP. The SSO will be responsible for enforcing the requirements of this SWP after project work begins. The SSO has the authority and the responsibility to immediately correct all situations where noncompliance with this SWP is noted, and to immediately stop work when an immediate danger is perceived. This includes the ability to temporarily suspend individuals from field activities for infractions against the SWP, pending consideration by the PSHC and the AECOM and DWR PMs.

The SSO's specific responsibilities include:

- Protecting the life, safety, and health of his/her employees, including training in safety practices;
- Controlling access at each work site and ensuring that all employees or visitors on-site have gone through proper site orientation;
- Assuring that all personnel to whom this SWP and Fieldwork Line of Fire training applies have submitted a completed copy of the SWP sign-off form and Fieldwork Line of Fire attendance sheet (Attachments H & I respectively);
- Assuring that all personnel to whom this SWP applies have attended a pre-entry briefing before entering the project site;
- Maintaining a high level of health and safety consciousness among employees at the project site;
- Verifying that all PPE and health and safety equipment are in good working order;
- Discussing deviations from the work plan with SSOs from other organizations, as well as with the AECOM and DWR PMs;
- Discussing safety issues with the AECOM and DWR PMs, SSOs from other organizations, and field personnel;
- Developing and implementing corrective actions for site safety deficiencies;
- Implementing this SWP and ensuring compliance;
- Assisting with inspections of the site for compliance with this SWP and applicable SOPs;
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established restricted areas, so that required safety and health procedures are followed, and correcting any deficiencies;
- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting safety tailgate meetings as required;
- Initiating emergency response procedures as needed; and
- Providing the AECOM PSHC with copies of safety data sheets (SDS) for all hazardous materials brought on-site by his/her organization.

1.3.4 FIELD STAFF MEMBERS

All project staff members are responsible for following the health and safety procedures specified in this SWP and for performing their work in a safe and responsible manner. The specific responsibilities of the field personnel are as follows:

- Reading the SWP in its entirety before the start of on-site work;
- Submitting a completed SWP Acceptance Form and documentation of required training to the SSO before the start of work, as applicable;
- Bringing forth any questions or concerns regarding the content of the SWP to the PM or the SSO before the start of work;
- Attending the general safety meeting and site orientations before the start of on-site work;
- Completing daily check-in and check-out when traveling to and from the project site;
- Accounting for traveling staff, as specified under check-in and check-out procedures;
- Signing-in each day at the site work trailer;
- Properly using safety devices and equipment provided;
- Ensuring, via daily inspections, that equipment is in good working order;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the SSO; and
- Complying with the requirements of this SWP and the requests of the SSOs.

1.3.5 COORDINATION WITH OTHER DWR CONTRACTOR ACTIVITIES

As part of the project implementation, DWR will be directing other contractor activities including but not limited to the physical barrier construction contractor, Dutra. Dutra will be developing and implementing their own SWP and have their own respective designated SSOs on site at all times when they are conducting work-related activities. It is important that activities being carried out by DWR, all DWR contractors, and other government agencies are well coordinated with one another. For purposes of coordination, all entities will provide copies of SWPs to one another. Primary communication regarding related work activities will go through DWR's construction manager, in conjunction with DWR's SSO and AECOM's PSHC. DWR will be responsible for informing project team members of the construction schedule for activities that may affect field implementation, such as in-channel construction and maintenance.

1.3.6 BIOLOGICAL, NOISE AND TURBIDITY MONITORS

Monitoring will be conducted from sunrise to sunset in two shifts. The first shift monitor will attend the morning Tailgate Safety Briefing led by Dutra and sign the attendance form. In the meeting the monitor will provide a description of the proposed activities for the day, including the area they will be conducting work.

The second shift monitor will arrive onsite at 1300 and will be briefed by the SSO on the scope and potential hazards for the shift and will sign the Tailgate Safety Briefing Attendance Form. They will spend approximately 1 hour with the first shift monitor for a debrief of the daily activities and safety observations/concerns. The monitors will complete work by sunset and not conduct any night work.

1.3.7 VISITORS

Authorized visitors (e.g., project team management staff, agency representatives, regulators) requiring entry to any work location on the site will be briefed by the SSO on the hazards present at that location and emergency response procedures. They will sign the Tailgate Safety Briefing Attendance Form, which will serve as a visitor log. Visitors will be escorted at all times and will be responsible for compliance with their employer's health and safety policies. In addition, this SWP 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.

1.4 STOP WORK AUTHORITY AND RIGHT TO REFUSE UNSAFE WORK WITHOUT RETALIATION

All project employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions. 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 without retaliation (including agencies, 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 without retaliation, when the safety procedures specified in this SWP or other safety policies are not being followed.
- The right to contact any SSO or the AECOM or DWR PM at any time to discuss potential concerns without retaliation. If staff members do not feel comfortable with reporting concerns to members within their organization, they may discuss them anonymously with any organizational SSO, the PSHC, or the AECOM or DWR PM.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions.

Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor is to be sought. If the supervisor is unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which will be immediately binding for all affected project team members.

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

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2 PROJECT DESCRIPTION

2.1 GENERAL DESIGN AND INSTALLATION CONCEPTS

The temporary rock barrier will be installed by a DWR contractor, Dutra, at West False River, Contra Costa County, California. The project site may include a DWR boat and project work trailer. The general location of the site is shown in **Figure 2-1** and the specific location is shown in **Figure 2-2**.

The project site is approximately 0.4 mile east of the confluence with the San Joaquin River, between Jersey and Bradford Islands in Contra Costa County, and is about 4.8 miles northeast of Oakley. The banks of the project site are existing rock-lined levees.

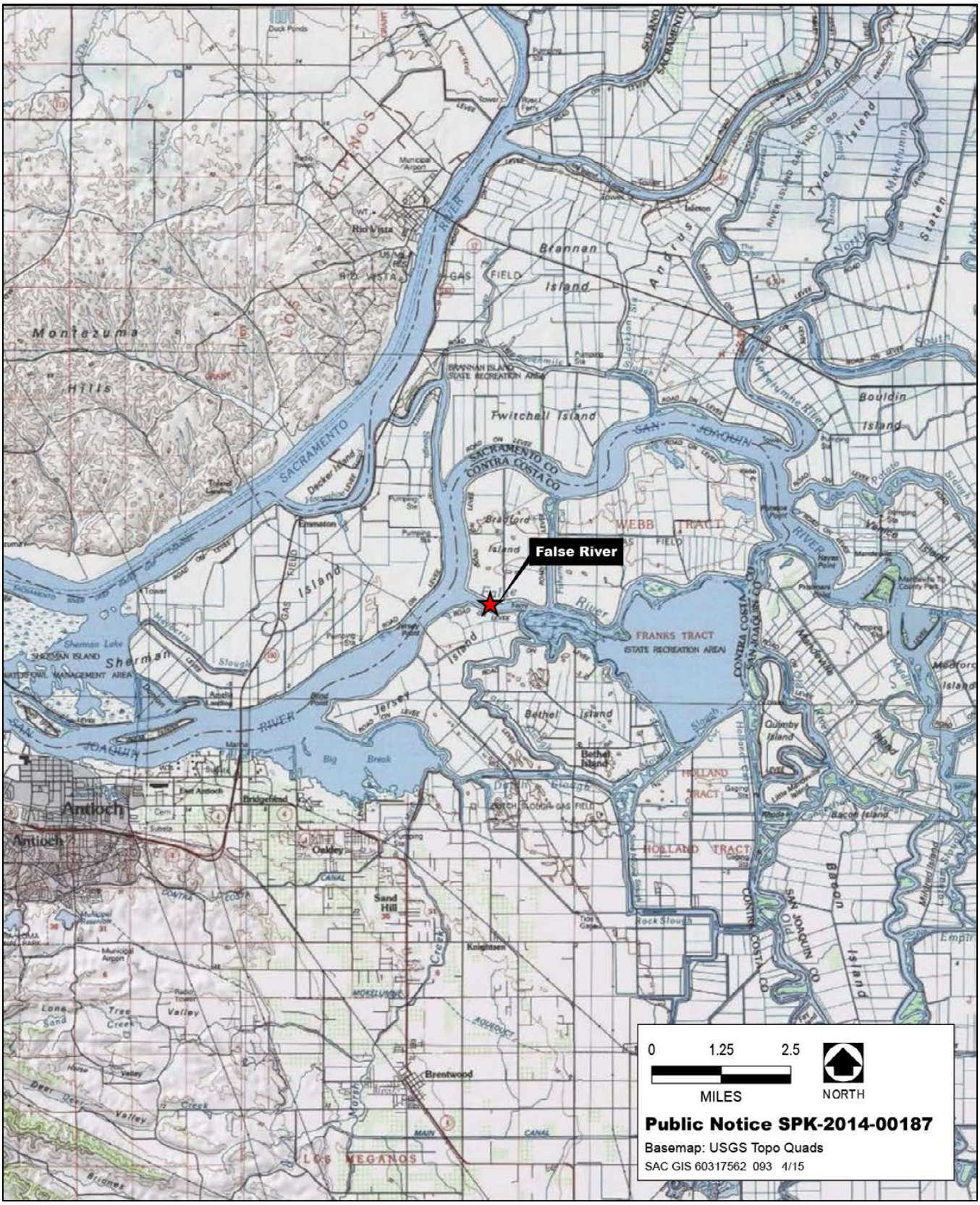
A rock (riprap) barrier weir structure will be installed at the West False River site. The structure is a trapezoid-shaped rock barrier with a wide base tapering up to a 12-foot-wide top width set perpendicular to the channel alignment. It will have transitions to the levees with 75-foot-long sheet pile walls supported by king piles and buttressed with rock, because the levees are weak because of peat soil foundations. To address existing erosion of the waterside levee toe on both Jersey and Bradford islands, DWR will place rock fill, approximately 0.25 acres and approximately 4,500 cubic yards, along the levee toe for a distance of 225 feet upstream and downstream from the center line of the barrier (approximately 125 feet from the ends of the barrier rock placement). This fill must be placed before installing the sheet pile wall to prevent sloughing of the levee when the piles are driven. Because this fill is necessary for levee stability, the rock will remain in place. Construction of the barrier may include land-based staging of equipment and materials. Temporary rights for construction of the barrier may be obtained before securing the necessary permanent easement rights required for those portions of the piping preventers, sheet pile walls, king piles, and rock abutments that will be permanent installations.

Tidal flows are the main factor influencing water quality conditions at the West False River barrier. Fish movement can occur through the adjacent San Joaquin River and through other channels, including Fisherman's Cut, East False River, and Dutch Slough during the West False River closure.

Vessel traffic will be blocked at the barrier site, but alternative routes are available via the Stockton Deep Water Ship Channel in the San Joaquin River between Antioch and eastern Delta locations, or via Fisherman's Cut or East False River to South Delta destinations.

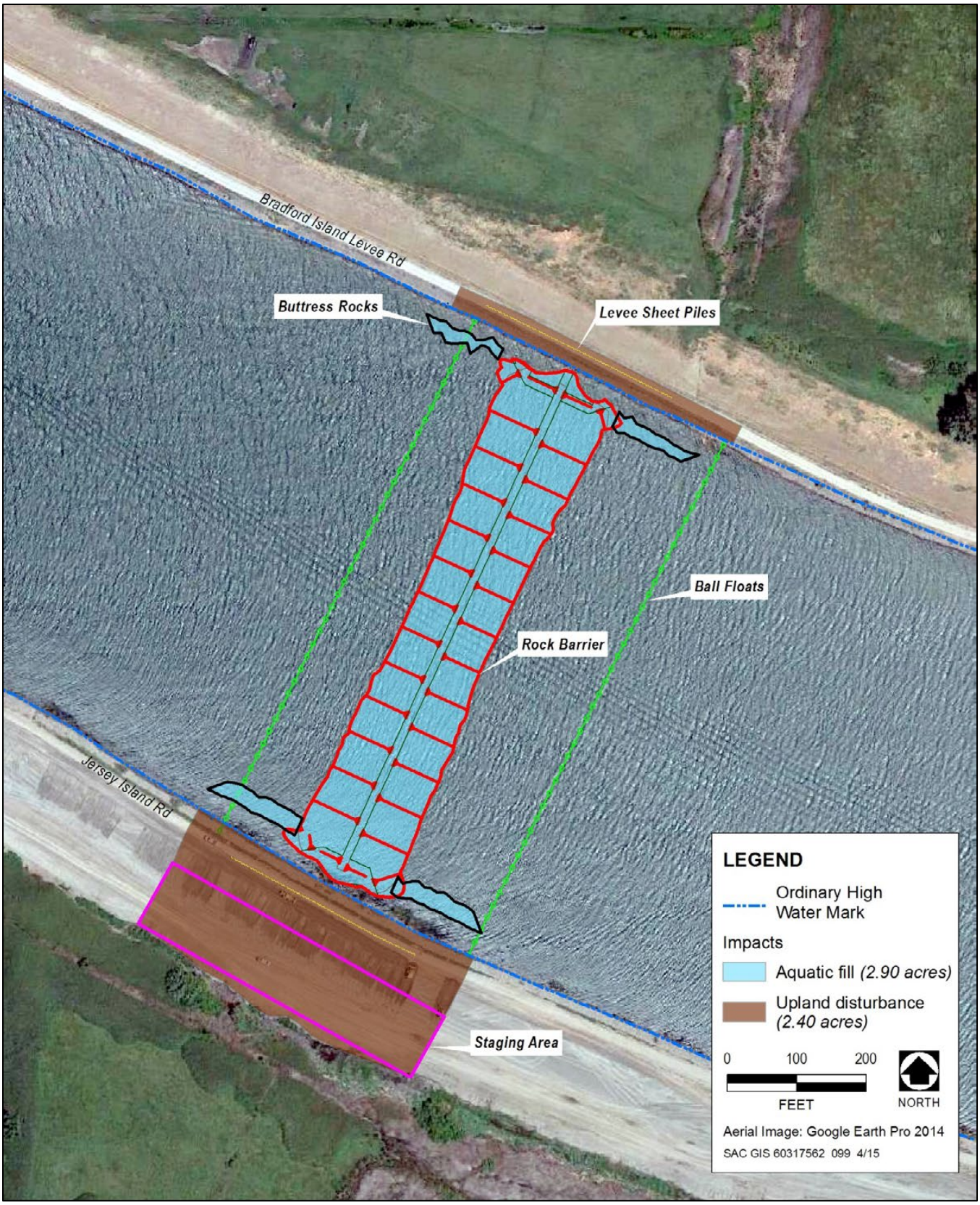
Solar-powered monitoring instruments will be placed at appropriate locations upstream and downstream from the project site and will monitor parameters including dissolved oxygen, turbidity, salinity as measured by electrical conductivity (EC), river stage, and flow velocity.

Appropriate navigation signage will be installed at the emergency drought barrier site and will comply with navigation requirements established by the U.S. Aids to Navigation System and the California Waterway Marker system, as appropriate. Signs will be posted at upstream and downstream entrances to each waterway or other key locations, informing boaters of the restricted access. A Notice to Mariners will include information on the location, date, and duration of channel closure. Signs will be posted on each side of each barrier, float lines with orange ball floats will be located across the width of the channels to deter boaters from approaching the barrier, and solar-powered warning buoys with flashing lights will be present on the barrier crest to prevent accidents during nighttime hours.



Source: Data provided by California Department of Water Resources and adapted by AECOM in 2011

Figure 2-1. Location of Proposed Emergency Drought Barrier



Source: Data provided by California Department of Water Resources and adapted by AECOM in 2011

Figure 2-2. Aerial View of the Project Site

2.2 STRUCTURAL COMPONENTS

The emergency drought barrier located at West False River will be approximately 800 feet long and up to 200 feet wide at the base (in water) and 12 feet wide at the top (above water) (**Figure 2-2**). The top of the structure will be at an elevation of 7 feet above sea level across the entire crest. The barrier will include two king pile-supported sheet pile walls extending out from each levee into the channel for a distance of 75 feet. The sheet piles/king piles are required because the levees are weak at this location as they are on peat soils and placing a large volume of rock directly on the levees will cause stress. The walls will be buttressed on both sides with rock that will not be removed this year. After removal of the temporary rock structure, the sheet pile abutments and associated rock placed to achieve smooth transitions around the sheet pile abutments will remain in place for possible future use during the declared drought. Removal of the abutments and rock associated with the emergency drought barrier will occur no later than at the end of the term of the CDFW Lake and Streambed Alteration Agreement issued for this project. The permanent rock placed to stabilize the toe of the levee will remain. Inspection of the rock will compare actual conditions with as-constructed plans and/or bathymetric survey data. The results of the inspections and any bathymetric survey data collected will be made available to the Local Maintaining Agency (LMA). Any necessary repairs of the rock will be made using land or water-based construction equipment during summer and fall (July through October) when special-status species are less likely to be affected. DWR will assure that this rock is maintained and either contract with the LMA or use DWR resources or contractors to repair and or replace the transition rock as needed.

In addition to the temporary barrier installation, repair of the undercut toe of the levee is required for a distance of 225 feet from the center line of the barrier upstream and downstream (approximately 125 feet from the ends of the barrier rock placement). The repair includes placement of rockfill within the undercut toe of the levee and this rock will remain in place as a permanent repair.

The piles to be installed will include in total:

- Eight 36-inch-diameter king piles (barrier abutments)
- Approximately 70 sheet piles (barrier abutments), or about 35 pairs of sheet piles totaling approximately 160 wall feet (including approximately 5 feet on either side that will be in the levee)
- Four 24-inch steel pipe piles (float line attachment, i.e., two piles upstream and downstream of the barrier)
- Twelve permanent 12-inch steel pipe piles (monitoring equipment)

In addition to river sheet piles, approximately 300 feet of sheet piles will be installed through the levee to a depth of approximately 35 feet and parallel to the channel to prevent water piping from the river. These piping preventer sheet piles will be set into the tops of the levees on each side of the barrier and will remain in place for possible future use. The 12-inch steel pipe piles proposed for monitoring equipment will remain in place for future use. The coordinates of the proposed 12-inch steel pipe piles are listed in **Table 1-1** and shown in **Figure 2-3**.

Table 1-1. Coordinates of the Proposed 12-inch-diameter Steel Pipe Piles			
No.	Station Name	Latitude	Longitude
1	Fisherman's Cut near Franks Tract	38.065600°	-121.647900°
2	Franks Tract (Mid Tract)	38.046417°	-121.598100°
3	Steamboat Slough	38.184550°	-121.648067°
4	Sacramento River near Steamboat Slough	38.172167°	-121.647350°
5	San Joaquin River at Twitchell Island	38.096900°	-121.669100°
6	Miner Slough near Cache Slough	38.236033°	-121.666072°
7	Liberty Island	38.243183°	-121.684600°
8	Sacramento River near Sherman Lake[1]	38.068933°	-121.770250°
9	Old River	37.968600°	-121.574236°
10	Middle River	37.942967°	-121.532266°
11a	Cutoff Slough near Ryer Island[2]	38.085783°	-121.995833°
11b	Grizzly Bay[2]	38.124250°	-122.038117°
12	Honker Bay	38.072400°	-121.939200°

Notes:
[1] This location is an approximation and may be moved slightly.
[2] DWR will need only one station at either Cutoff Slough near Ryer Island or Grizzly Bay but not both.

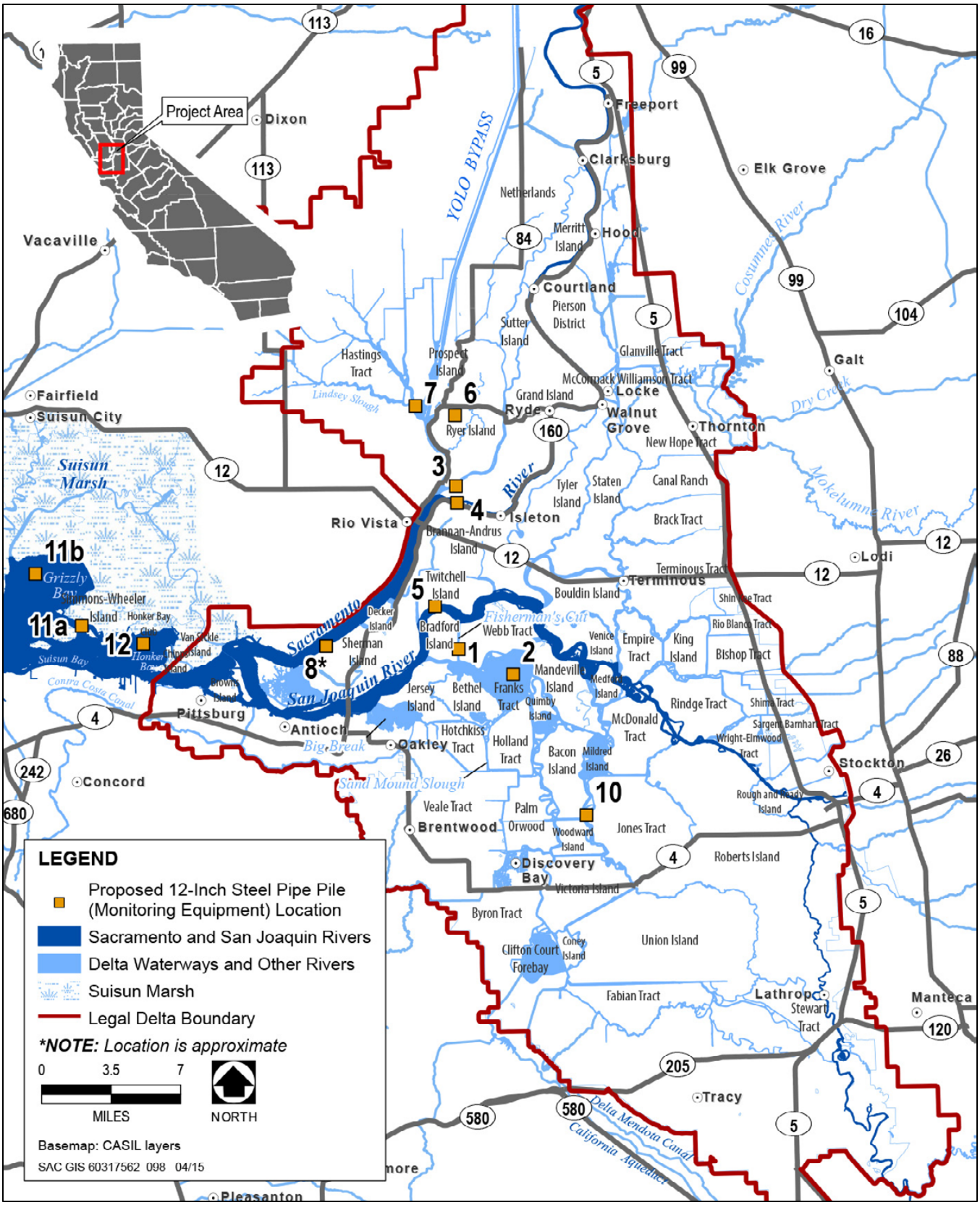
No boat passage is provided around the barrier because of safety concerns and because alternative routes (Fisherman's Cut or False River east for vessel traffic between the South Delta to the San Joaquin River; and the Main San Joaquin River for vessel traffic between the Antioch and the eastern Delta) are available. No fish passage is provided because migrating fish will use the adjacent San Joaquin River, Fisherman's Cut, or Dutch Slough, where their access is not restricted.

2.3 CONSTRUCTION SCHEDULE

In-water construction will begin no sooner than May 4, with full barrier closure on or near approximately 30 to 60 days after starting work. Landside work will begin no sooner than May 1. Removal will take approximately 45 to 60 days, with full removal by November 15. Removal activities will begin before October 1. Construction will require approximately 10 to 30 workers. DWR assumes that the contractor can conduct daytime and nighttime construction activities for installation of the rock barrier and will conduct daytime and nighttime construction activities for removal of the barrier.

2.4 CONSTRUCTION PRACTICES

Notices of construction will be posted at local marinas and in the Local Notice to Mariners. Navigational markers will be used to prevent boaters from entering the immediate construction area, and speed limits will be posted by the Contractor. Safe vessel passage procedures will be coordinated with the U.S. Coast Guard District 11 and California Department of Parks and Recreation Division of Boating and Waterways. An educational program will be implemented to inform boaters of the purpose of the proposed project and the expected duration of installation activities. The program will include notices in local newspapers and boater publications as appropriate; notices also will be posted at local marinas and boat launches and on the project website (http://www.water.ca.gov/water conditions/emergencybarriers.cfm).



Source: DWR, adapted by AECOM 2015

Figure 2-3. Locations of the Proposed 12-inch-diameter Steel Pipe Piles

Approximately 95,000 cubic yards of rock will be required to construct the emergency drought barrier located at West False River (including approximately 25,200 cubic yards that will remain around the sheet piles and on the adjacent levee). Clean, unwashed rock will be used. The rock source will likely be one or more existing quarries, near San Rafael. All rock, gravel, and structures will be transported to and constructed at the project site in May and June of 2015. The methodology described herein is general. Although construction activities will primarily be situated on land, the contractors also will work on the water. Vehicle access to the site will be via Jersey Island Road.

The contractors will mobilize construction equipment and crew. DWR will use multiple barges with excavators and work boats which will be transported on water to the project site. An excavator or other small earthwork equipment will be needed on each side of the levees to aid with the installation of the sheet pile walls. The contractors will install construction trailers on the levee nearby.

Barges powered by tugs will be used to transport rock from quarries and/or other loading bulkheads or material transfer points to the barrier site. The barge will be appropriately sized based on the depth of the channel where the rock will be placed. The contractors will use excavators, dozers, and loaders to move/push the rock from transportation barges into the channel. The contractors will shape/contour the rock barrier by using a barge-mounted crane with a clamshell or barge-mounted excavator from material barges. The contractors may use a dump scow to transport the rock and place it in the channel. Some of the existing rock slope protection will need to be temporarily removed to construct the abutments; however, no channel dredging or excavation in the levee profiles will be required. To prevent riverbed scour, the contractor will be required to place rock in horizontal layers and to prevent levee scour and the final lifts of rock will be placed on the barrier starting from the levees toward the center of the channel. During final rock placements and closure, excavators will be place rock from the top of the barrier.

Minimal vegetation and clearing will be required on the levees before installing sheet piles. This will be accomplished by a dozer or backhoe and hand clearing.

Any levee access roads that are damaged as a result of construction equipment or truck use will be restored to pre-construction conditions or better after construction is completed.

The sheet and king piles are anticipated to be installed by an appropriately-sized vibratory hammer, which appears to be feasible given the anticipated ground conditions and modest pile penetration of 20 feet to 50 feet in the ground. Vibratory penetration rates are normally limited to 20 inches per minute (per North American Sheet Piling Associations–Best Practices, online at www.nasspa.com), which will result in the following vibration times per pile assuming normal driving conditions:

- 20-foot ground penetration: 12 minutes
- 50-foot ground penetration: 30 minutes

Due to uncertainties of the ground conditions and the possibility of encountering dense soil layers and/or obstructions such as left-in-place riprap on the existing levee side slopes, a larger impact hammer will be available as a contingency measure, in the event unexpected difficult driving is encountered. The impact hammer will be used only if the vibratory hammer cannot reach design tip elevation of the pilings. In the absence of detailed geotechnical information, it is not known whether an impact hammer will be required, and the exact location and

timing of its use. If piles are driven by impact hammers in water deeper than 3.3 feet, a bubble curtain will be used if underwater noise exceeds pre-established levels (peak pressure levels or cumulative sound exposure level) that indicates potential injury to fish.

Construction equipment will be placed within the staging area (approximately 1.03 acres) adjacent to Jersey Island Road (i.e., left bank). A complete list of construction equipment anticipated to be used is shown in **Table 2-1**.

Table 2-1. Anticipated Construction Equipment

Type of Equipment	Maximum Number	Type of Equipment	Maximum Number	Type of Equipment	Maximum Number
Place Rock					
Tug/barge	8	Dozer	1	Rock haul/dump truck	4
Crane	2	Loader	4	Conveyor	3
Work boat	2				
Drive Piles					
Tug/barge	2	Skid steer loader	1	Crane	1
Crane	2	Off-road crane	1	Pickup	4
Work boat	2	Service truck	1	Air compressor	1
Grader	1	Off-road fork lift	2	Power generator	1
Compactor	1				
Removal					
Tug/barge	8	Excavator	3	Front-end loader	2
Long-reach excavator	3	Dump truck	4	Grader	1
Work boat	2	Dozer	1		

2.4.1 FACILITIES REMOVAL

All rock, gravel, and structures will be removed from the project site in fall, with the exception of the sheet pile abutments. The methodology described herein is general. Although removal activities will primarily be situated in water, the contractors also will work from the levees.

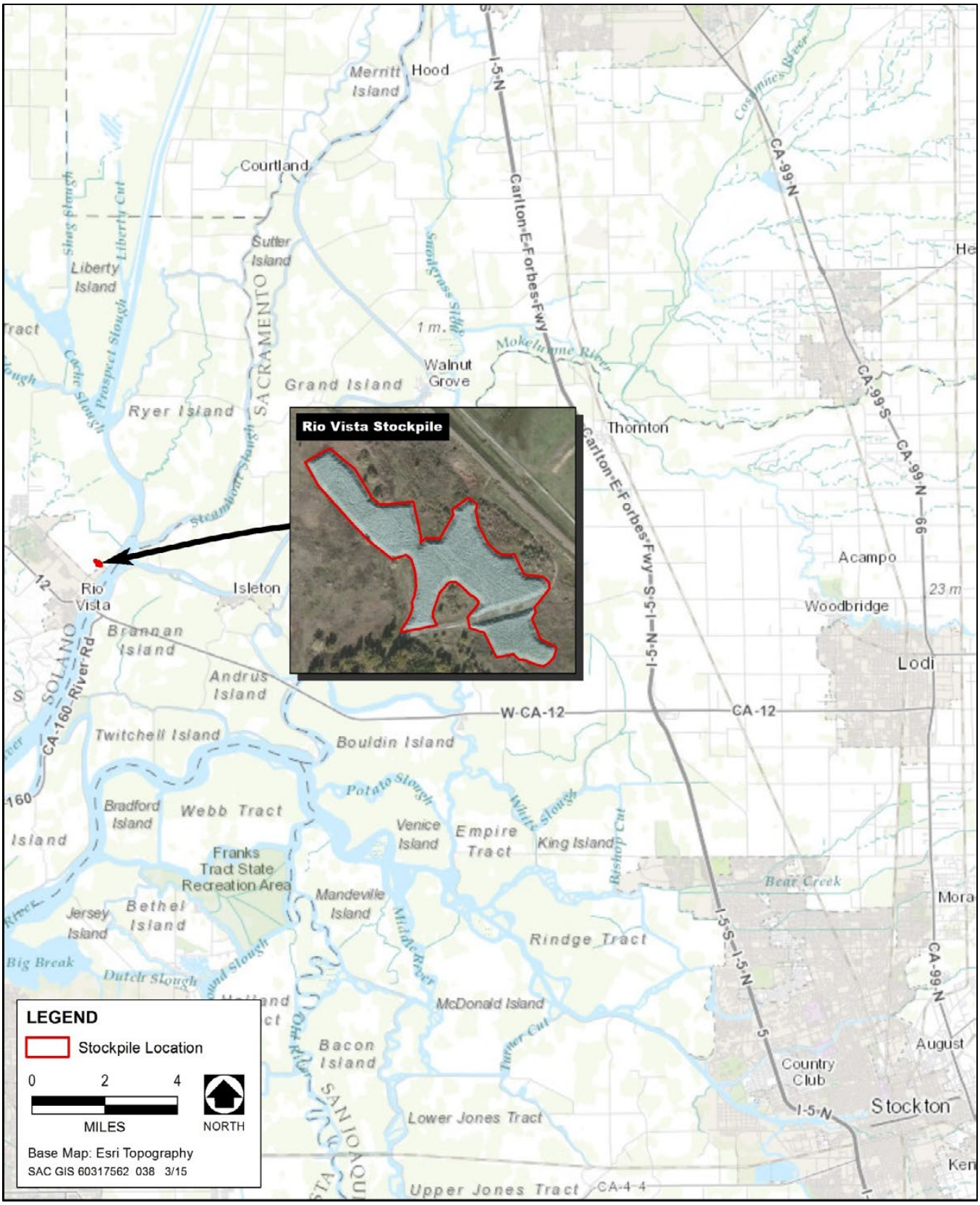
First, the contractors will mobilize construction equipment and crew. DWR will use multiple barges with excavators and work boats, which will be transported on water to the barrier site. In water, work will occur on one side of the barrier–either upstream or downstream from the barrier–in the direction of where the contractors will ship the rock.

Next, the contractors will strategically place the barges adjacent to the barrier to excavate the rock. Rock will be excavated using cranes with clam-shell buckets, and/or excavators from one barge and placed onto another barge, where it will be transported to an approved off-loading site. Given the volume of rock, DWR anticipates that excavation will occur continuously (i.e., 24 hours per day, 7 days per week). To prevent levee scour, rock removal

will start from the center of the channel and work outward. Excavation will occur from the top of the barrier down to the streambed to approximate pre-project contours. DWR will restore the levee geometry to ensure compliance with any local maintaining agency, Central Valley Flood Protection Board, or USACE requirements.

Lastly, the rock will be shipped on a barge from the project site to be off-loaded onto dump trucks using excavators and loaders. The contractors will haul the rock to the Rio Vista stockpile location (outside waters of the U.S.), which is shown in Figure 2-4.

DWR will monitor downstream water quality for parameters, including turbidity, identified in the Emergency Drought Barriers Water Quality Monitoring Plan, during the excavation process. Bathymetric surveys will be completed after emergency drought barrier removal to confirm that the rock is removed.



Source: DWR, adapted by AECOM 2014

Figure 2-4. Stockpile Location

3 PLANNED WORK OPERATIONS

This section provides a description of the proposed scope of work to be completed by AECOM and/or DWR.

3.1 BIOLOGICAL MONITORING DURING INSTALLATION AND REMOVAL

Qualified AECOM and DWR biologists approved by the permitting agencies will be onsite when daytime construction occurs to:

- Conduct compliance inspections during barrier installation and removal and monitor pile driving activities.

3.2 NOISE MONITORING DURING INSTALLATION AND REMOVAL

DWR's contractor, Dutra, will conduct pile driving using a vibratory hammer to minimize to the extent possible the noise generated from pile-driving activities. Compared to the standard impact driving method, vibratory driving substantially reduces the distance that noise exceeds NMFS thresholds, thereby substantially reducing or avoiding the potential to cause take of listed species. However, in certain circumstances (e.g., vibratory driving is not capable of reaching required embedment), impact pile driving may be necessary. Monitoring of underwater sound generated by the vibratory hammer during pile driving in the vicinity of the West False River barrier will be conducted by AECOM and their contractor to verify that sound level criteria are not being exceeded as calculated in the effects analysis (i.e., 214 decibels cumulative sound exposure level at approximately 33 feet [10 meters], for each day of pile driving). If levels are exceeded, the permitting fish agencies will be notified and work halted until corrective actions are instituted to achieve sound level criteria.

3.3 IMPLEMENT TURBIDITY MONITORING DURING CONSTRUCTION

DWR will monitor turbidity levels in West False River during ground-disturbing activities, including placement of rock fill material and any major maintenance. Monitoring will be conducted by measuring upstream and downstream of the disturbance area to ensure compliance with the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. For Delta waters, the general objectives for turbidity apply except during periods of stormwater runoff; the turbidity of Delta waters will not exceed 150 Nephelometric Turbidity Units. Exceptions to the Delta specific objectives are considered when a dredging operation can cause an increase in turbidity. In this case, an allowable zone of dilution within which turbidity in excess of limits can be tolerated will be defined for the operation and prescribed in a discharge permit.

DWR contractors will slow or adjust work to ensure that turbidity levels do not exceed those conditions described in the 401 certification issued by the SWRCB. If slowing or adjusting work to lower turbidity levels is not practical or if thresholds cannot be met, DWR will consult with the State Water Resources Control Board and permitting fish agencies to determine the most appropriate BMPs to minimize turbidity impacts to the maximum extent feasible.

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4 HAZARD ASSESSMENT

4.1 PHYSICAL HAZARDS

4.1.1 THERMAL STRESS

COLD STRESS

Types of Cold Stress

Cold injury is either localized, as in frostbite, frostnip, or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness, and inadequate clothing. The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30 degrees Fahrenheit (°F). Fluids around the cells of the body tissue freeze, causing the skin to turn white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite occurs more rapidly.

Symptoms of Cold Stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging, or aching feeling in the affected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers, and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens, and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95°F. This must be taken as a sign of danger and exposure to cold must be immediately terminated. Productive physical and mental work is limited when severe shivering occurs.

Methods to Prevent Cold Stress

When the ambient temperature, or a wind chill equivalent, falls to below 40°F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners, and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene, or a similar type

of synthetic material that wick away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on. Field personnel should be responsible for maintaining spare clothing.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20°F.

Dehydration occurs in the cold and increases the susceptibility of workers to cold injury due to changes in blood flow to the extremities. Drink plenty of fluids and limit caffeine intake.

HEAT STRESS *(S3SNA-511-PR & CAL OSHA HEAT ILLNESS PREVENTION REGULATION - CCR, TITLE 8, SECTION 3395))*

Heat related problems include **heat rash, fainting, heat cramps, heat exhaustion, and heat stroke**. **Heat rash** can occur when sweat is not allowed to evaporate; leaving the skin wet most of the time and making it subject to irritation. **Fainting** may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat-related fainting often occurs during activities which require standing erect and immobile in the heat for long periods of time. **Heat cramps** are painful spasms of the muscles because of excessive salt loss associated with profuse sweating.

Heat exhaustion results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea, and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red, and spotted. The affected person may be mentally confused and delirious. Convulsions can occur. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH. A person exhibiting signs of heat stroke will be removed from the work area to a shaded area. The person will be soaked with water to promote evaporation. Fan the person's body to increase cooling.

EARLY SYMPTOMS OF HEAT-RELATED HEALTH PROBLEMS:

- Decline in task performance
- Excessive fatigue
- Poor coordination
- Reduced vigilance
- Decline in alertness
- Muscle cramps
- Unsteady walk
- Dizziness

SUSCEPTIBILITY TO HEAT STRESS INCREASES BECAUSE OF:

- Lack of physical fitness
- Obesity
- Lack of acclimation

- Drug or alcohol use
- Increased age
- Sunburn
- Dehydration
- Infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

THE EFFECT OF PERSONAL PROTECTIVE EQUIPMENT

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain PPE reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

MEASURES TO AVOID HEAT STRESS

The following guidelines will be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom);
- Identify a shaded, cool rest area;
- Rotate personnel, alternative job functions;
- Water intake will be equal to the sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst. DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK. For an 8-hour day, 50 ounces of fluids should be drunk;
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt;
- Save most strenuous tasks for non-peak heat hours such as early morning or at night;
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration; and
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above-mentioned measures will be the joint responsibility of the PM and SSO. Potable water and sports drinks will be made available each day for the field team.

HEAT STRESS MONITORING TECHNIQUES

Site personnel will regularly monitor their heart rate as an indicator of heat strain by the following method:

- Check radial pulse rates using fore-and middle fingers and applying light pressure top the pulse in the wrist for 1 minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats per minute, shorten the next work cycle by one-third and the rest period will be kept the same. If, after the next rest period, the pulse rate still exceeds 110 beats per minute, the work cycle will be shortened again by one-third.

4.1.2 SLIP, TRIP, AND FALL HAZARDS

Slip, trip, and fall hazards are common at any job site because of uneven work surfaces, especially the rip rap levees; boarding and unloading the skiff and climbing on and off of the barge; open excavations or tank graves; the presence of water, snow, or ice; the accumulation of surface debris; and the presence of tools and equipment that are temporarily placed or stored on the ground surface.

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip, and fall hazards at construction sites. Essential elements of good housekeeping include:

- Orderly placement of materials, tools, and equipment;
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- there is also a hazard boarding and unloading the skiff and climbing onto the barge;
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand;
- Awareness on the part of all employees to walk around, not over or on, equipment that may have be stored in the work area; and
- Identify or create a path that is clear of any obstructions.

4.1.3 EXERTION AND REPETITIVE MOTIONS

Field crew members are expected to perform duties that will require continuous standing, bending and lifting, and other repetitive motions. These activities will increase risk for injuries related to feet/ankles, knees, shoulders, hands, and over exertion. Common types of injuries from these activities are:

- **Tendonitis:** inflammation of the tendons that join muscles to bones caused by an injury or overuse.
- **Muscle strain:** small tears caused by too much force through the muscle fibers.
- **Blisters:** A blister is a small pocket of fluid within the upper layers of the skin. A blister usually forms because the outer layer of the skin has become damaged. Fluid collects under the damaged layer of skin, cushioning the tissue underneath, protecting it from further damage and allowing it to heal.

4.1.4 INJURY PREVENTION

- **Personal Conditioning:** Survey Team members will have a variety of experiences with physical activities, both personally and professionally. Employees who are well conditioned for the project activities will limit themselves to what is required for the project, taking on additional activities, working at a faster pace is not of value to the project because it increases risk for overexertion injuries.

  Survey Team members who are not capable of meeting the daily requirements for the project either will be removed from the project or will be placed on a schedule by the Survey Team Leader and SSO to become acclimated to conditions.

- **Stretching:** As with any strenuous activities, stretching will be done before, during and after activity to prevent sore muscles and injuries. Stretching exercises are provided in **Attachment C**.

- **Resting:** A rest work cycle will be established to prevent exhaustion, but at a minimum10-minute break will be taken each hour when performing strenuous tasks. During rest breaks employees will stretch, drink water, sit and relax indoors. The purpose of resting is to allow the body to recover from strenuous activity; engaging in other activities does not constitute rest.

- **Staff Rotation:** When feasible, a staff task rotation schedule will be established to minimize the potential for repetitive motion injuries associated with specific tasks like fish surgeries, fish capture and netting, and fish-transfer activities.

- **PPE:** Field crew members will wear all appropriate Personal Protective Equipment, as specified in Section 6.8. All boots will be in good condition and the right size for the user. New boots will be broken in; it may be necessary to limit wear of new boots to avoid blisters or other conditions from breaking-in boots. Alternating boots (new/old) throughout the day may also help to avoid injury. Socks will be made from a breathable material such as cotton or wool, or a synthetic product with the equivalent function. When putting boots on, it is important to keep socks smooth so that blisters don't form where wrinkles and seams may be. Socks should stay dry; it may be necessary to have a second or third pair of socks available to keep dry. During rest breaks, check socks to ensure they are dry and smooth. Knee pads will be sized appropriately.

4.1.5 BACK SAFETY

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. The following precautions will be implemented when lifting or moving heavy objects:

- Use mechanical devices to move objects that are too heavy to be moved manually;

- If mechanical devices are not available, ask another person to assist you;

- 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.

4.1.6 TRAFFIC (*S3NA-005-PR)*

All project employees must practice defensive driving to reduce the risk of driving by anticipating dangerous situations, despite adverse conditions or the mistakes of others. All drivers must apply this practice to prevent accidents in spite of the actions of other drivers or the presence of adverse driving conditions. A defensive driver must be able to accurately predict the outcome of traffic situations to apply the defense in time to prevent an accident.

When working in high-traffic areas, the following precautions will be implemented:

- Wear an orange safety vest. If work is being performed at dawn, dusk, or evening, the vests must have reflective tape.
- If possible, set up traffic cones in front of the work area.
- When working on a roadway, work vehicles must use vehicle hazard lights and a safety light mounted to the roof of the vehicle.
- Traffic cones should be set out at least 30 feet behind and in front of vehicles parked on or adjacent to roadways.

4.1.7 LAND *(S3SNA-306-PR)*

Work will include driving to and from the site and may involve exposure to traffic when work occurs on narrow levee roadways or within or adjacent to parking areas. When working in traffic areas, the following precautions will be implemented:

- Observance to safe work practices specified in *S3NA-001-PR*.
- Wear an orange safety vest if surveying alongside roadways or in urban areas. If work is being performed at dawn, dusk, or evening the vests must be Class III with 2-inch reflective tape.
- When working on a roadway, work vehicles must use vehicle hazard lights and a safety light mounted to the roof of the vehicle.
- Traffic cones should be set out at least 30 feet behind and in front of vehicles parked on or adjacent to roadways.
- If possible, set up traffic cones in front of the work area.
- Be cautious around vehicular traffic and heavy equipment. Obey all traffic controls and project warning signs.

4.1.8 BOAT *(S3NA-419-PR)*

Work will require the operation of motorized watercraft. Hazards associated with boating activities may include collision with other boats or objects, fire, swamping, engine malfunction, drowning, or other injury. When operating watercraft, the following precautions will be implemented:

- All boating activities will be conducted in accordance with *S3NA-419-PR*.
- Only qualified and Project Manager-approved field personnel will operate watercraft.
- It is recommended that all personnel that will be operating boats or passengers in boats be able to swim 100 yards and tread water for at least 5 minutes.

- Every person on board a watercraft must wear a U.S. Coast Guard (USCG) approved (type III or V) personal flotation device (PFD) at all times.
- Observance of “Rules of the Road” when travelling in any waterway.
- Check-in and check-out procedures for all water work will be implemented.
- Fuel will be managed such that the tank will always be one-third full.
- All watercraft will have proper emergency equipment (as listed in Section 8). The boat operator will brief passengers on the location and use of all emergency equipment on the watercraft including PFDs.
- The boat operator will routinely conduct weather checks, aborting activity anytime weather or sea conditions affect the operator’s ability to pilot the watercraft in a safe manner.
- The boat operator has absolute final authority over operation of the watercraft.
- The boat operator will not operate a watercraft continuously for more than 2 hours without a 10-minute break.

For additional information regarding safe boating practices, please refer to *S3NA-419-PR*.

4.1.9 UTILITY HAZARDS *(S3NA-406- PR AND S3NA-417-PR)*

UNDERGROUND UTILITIES

It is the responsibility of Dutra to assure that the appropriate agency (Underground Services Alert) is contacted before pile installation activities. The AECOM PSHC will verify that this has occurred.

OVERHEAD UTILITIES

Be particularly aware of overhead power lines in the work area. Any vehicle or mechanical equipment capable of having parts of its structure elevated (e.g., drill rig, crane) near energized overhead lines will be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50 kilovolts (kV), the clearance will be increased 4 inches for every 10kV over that voltage.

4.1.10 WORKING IN CLOSE PROXIMITY TO HEAVY EQUIPMENT *(S3NA-309-PR)*

AECOM employees may need to work in close proximity to barge-mounted cranes or other heavy equipment, including generators and air compressors. When working around heavy equipment, employees will:

- Make sure that the equipment operator is aware of your presence/activities. Develop a communication system prior to commencement of field activities, high visibility safety vest is required;
- Stay in the operator's line of sight, do not work in his/her blind spot, discuss with operator during tailgate meeting where you can stand/work;
- Approach areas where equipment is operating from a direction visible to the operator;

- Be aware of the swing radius of equipment that rotates such as cranes and excavators;
- Beware of the line of fire hazards (Attachment I), including the fall radius of piles being driven;
- Develop a series of hand signals to facilitate communication with the operator; and

4.1.11 RIGGING HAZARDS *(S3NA-310-PR)*

AECOM and DWR personnel are to remain clear of any rigged equipment (i.e., movement of large equipment and cables) until the material has been set on the ground or in the water and securely blocked to prevent rolling. Under no circumstances are personnel to pass under suspended materials while they are being rigged out of the work area, or in the swing radius, or stand down slope from these operations.

4.1.12 NOISE *(S3NA-510-PR)*

AECOM and DWR employees may be exposed to noise levels that exceed the OSHA Permissible Exposure Limit (PEL) during construction and excavation activities. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period,
- Interference with speech communication and the perception of auditory signals,
- Interference with the performance of complicated tasks, and
- Permanent hearing loss because of repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not normally be conducted during the proposed activities, employees must follow this general rule of thumb:

If the noise levels are so loud that you must shout at someone who is 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable ear plugs or ear muffs but all hearing protection must have a minimum noise reduction rating of 27 decibels. Ear plugs coupled with ear muffs should be used when in proximity to pile driving activities.

4.1.13 FLAMMABILITY HAZARDS

Gasoline is a flammable liquid with a flash point of -450 degrees Fahrenheit. The lower explosive limit of gasoline is 1.4 percent; the upper limit is 7.6 percent. Field staff will not introduce any ignition sources into an area where flammable materials are stored. In addition, staff will not expose flammable materials to ignition sources. When transferring gasoline containers through the DWR boat, field staff will turn off any potential ignition sources like propane or portable electric heaters. Propane tanks and compressed O_2 will not be stored near gasoline tank storage areas.

4.1.14 WATER HAZARDS FROM WORKING ON OR NEAR A WATER BODY *(S3SNA-315-PR)*

During field activities, work on boats, along steep slopes or banks where there is a danger or falling into the water, and transport on ferries may be required. The following precautions will be implemented when:

- When working on or near water bodies on boats, docks, river banks or levees, where a potential exists to fall and enter water bodies, a USCG-approved PFD (type III or V) must be worn at all times.
- Use caution when traveling overland near rivers with steep cut banks as the ground can give way causing injury. Sand channels can washout leaving unseen holes. Use wading rod or other methods to probe the bottom to assure good footing. Submerged logs and snags can trap a foot or leg.
- Be aware of uneven ground surface, and ropes and cables that may be lying on the ground.
- Be aware of loose gravel and slippery surface when walking down embankments or boat ramps.
- When working from boats during hydrophone deployment, it may be necessary to reach out over the water to an extent where a crew member can fall into the water if footing or balance was lost. In these instances, fall restraint system may be used. An evaluation of fall protection will be performed on a task by task basis by the AECOM and DWR PMs and other project safety personnel. In the event Fall Protection is required, work will be stopped and the Area SH&E Manager will be contacted.

4.1.15 DANGEROUS OR CONFRONTATIONAL PERSONS

Work within the project area can expose field personnel to dangerous persons. Hazards from dangerous persons include mugging, bodily injury, diseases, and other physical conditions that may put personnel at risk. Dangerous persons may directly attack personnel with the use of weapons (e.g., guns, knives) or may just harass and otherwise be a nuisance (e.g., affecting activities by removing markings, damaging sampling equipment, vandalizing materials).

All AECOM and DWR employees and subcontractors must be aware of the dangers of this working environment. A summary of general procedures for working around dangerous persons is provided below:

1. Personal safety is always the first priority. In the event of a life threatened situation, cease work activity and remove yourself from the threat, then call 911
2. Always perform work as a buddy system (i.e., two people minimum). Monitors should remain in visual and verbal communications with the field team, not necessarily from the same organization.
3. Always be aware of the site conditions and be alert. Use visual and auditory cues at all times.
4. Avoid confrontation if possible by avoiding high-risk areas.
5. Carry a cell phone or means of communication.
6. Avoid carrying visible flashy/valuable items.

7. Do not initiate or provoke confrontational situations.

4.1.16 TALKING POINTS WITH THE PUBLIC

If approached by the public during field activities, field crews must use the following talking points:

1. We are conducting environmental compliance work for construction of the emergency salinity barrier.

2. We are contractors working for the California Department of Water Resources.

3. We will be at this site through June for install November for removal.

Field personnel will also have business cards available.

4.1.17 WILDLIFE, PLANT, AND INSECT HAZARDS *(S3SNA-313-PR)*

Biological hazards can present risks to workers while conducting activities in the field. The following sections summarize potential biological hazards that employees may be exposed to during project activities.

MARINE ANIMALS

Sea lions, otters, or other marine animals may be present at the barrier site location either on land or in the water. If marine animals are interfering with operations, staff should back away and wait for marine life to move before continuing work. Do not approach sea lions or attempt to make them leave the area. When possible, keep a minimum distance of 100 yards from encountered marine life.

If approached while boating, put the engine in neutral and allow the animal to continue uninterrupted. Avoid sudden alterations in speed or direction and never steer toward marine mammals.

POISONOUS PLANTS

Poison Oak

When working at sites that are heavily vegetated or located near wetlands, employees should be aware of the possible presence of poisonous plants and insects.

Poison oak occurs primarily in the southeast and western United States. The poison oak of the southeastern United States, *Rhus quercifolia*, has its leaves divided into three leaflets; the leaflets are densely haired and generally have three to seven distinct lobes. The white, berry-like fruits are also somewhat hairy. The poison oak of the U.S. Pacific coast, *R. diversiloba*, is a shrubby or sometimes climbing plant that grows to 2.4 meters (8 feet) high; its three-leaflet leaves are toothed or lobed and are hairless.

Poison Oak

The leaves, roots, stems, and fruit of poison oak contain an oil called “urushiol.” Contact with the irritating oil causes an intensely itching skin rash and characteristic blister-like lesions. The oil can be transmitted on soot

particles when burned and may be carried on the fur of animals, equipment, and apparel. Proper identification of these plants is the key to preventing contact and subsequent dermatitis. Wear long sleeves and pants when working in wooded areas. In areas of known infestation, wear Tyvek coveralls and gloves. Oils are easily transferred from one surface to another. Wash all contaminated clothing and equipment promptly.

If you come in contact with these poisonous plants, wash all exposed areas immediately with cool water to remove the oils. Some commercial products such as Tecnu's Poison Oak-n-Ivy Cleanser claim to further help with the removal of oils.

Stinging Nettle

Stinging nettle has fine hairs on the leaves and stems that contain irritating chemicals that are released when the plant comes in contact with the skin. The hairs, or spines, of the stinging nettle are normally very painful to the touch.

The stinging nettle grows to a height of 2 to 4 feet. The slender stems are four-sided. It has a creeping, stretching root from which new shoots emerge.

Cover the stings with baking soda as soon as possible after coming in contact with the nettle hairs. Baking soda helps neutralize the acidic chemicals released from the hairs.

Gently rinse the affected area with clean cold water and pat the area with a clean, dry towel. Do not rub or press on the affected area to avoid pushing the hairs deeper into the skin or releasing more chemicals into the skin.

Apply adhesive tape to the affected area and quickly remove the tape to pull out any remaining nettle hairs. Then apply a first aid or an antihistamine cream to the affected skin.

Farm and Domestic Animals

When working on land, farm or domestic animals may be encountered. To minimize the potential for grazing animal encounters, team members should always be aware of their surroundings. Farm animals should be allowed to move out of the area before approaching. If cornered by a cow or bull, it is best not to move too fast, but to back away from the animal's flight zone, which is about 20 feet in range. When moving away from the flight zone, the cornered team member should watch the animal at all times until a fence, crawl space, or other safe retreat is reached. Turning and running invites being chased.

Aggressive dogs can also present a hazard to field crews. Field crews should learn to be aware of warning signs. Growling, snarling, or aggressive barking is a warning sign that a dog is feeling threatened or defensive. Shyness or fear, such as when a dog crouches or has his tail between his legs can also be visual signs. Fearful dogs can be just as dangerous as aggressive dogs. Other signs include raised fur, stiff body, or an unnaturally still or unresponsive dog.

If approached by an aggressive dog, do not make eye contact or move suddenly. This can challenge a dog and cause him to attack. Back off slowly and non-threateningly, but do not turn and run.

RABID ANIMALS

Rabies is a viral disease of the brain and spinal cord that affects warm-blooded animals, such as dogs, cats, horses, cattle, and wild animals like deer, raccoons, and skunks. It is also possible for marine animals to contract rabies. Raccoons remain the most frequently reported rabid animal in the United States especially in the northeastern, mid-Atlantic, and southeastern states.

The rabies virus causes the affected animal to become very aggressive and fearless. Behaviors exhibited by rabid animals include:

- Daytime activity in animals normally active only at night.
- Aimless roaming during which the animal becomes very irritable, often biting at anything that moves.
- Excessive saliva around the mouth that looks like it is foaming around the mouth.
- Staggering, weakness, and paralysis.

Do not approach a rabid animal. Walk away quickly from the animal and go to a protected place where you can contact the local animal control officer. Do not try to trap the animal yourself.

SNAKES

Several poisonous snakes are found in different parts of the United States. The only poisonous snake typically encountered in the western states is the rattlesnake. Several different species of rattlesnake exist. It is important to be able to recognize snakes indigenous to the site location; however, it is wise to avoid any snake encountered.

Snakes typically are found in underbrush and areas with tall grass. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area.

If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. DO NOT apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

BITING AND STINGING INSECTS

Many insects bite and sting. It is important to know what is found in the area that you will be working in. Advise the Project Manager and SSO if you have allergies to any insects before engaging in any field activities and keep prescribed medication (Epipen) in close proximity to your work area.

Mosquitoes

Different types of mosquitoes exist, including fresh water and saltwater mosquitoes. Saltwater mosquitoes tend to be out and bite during the daylight hours. Freshwater mosquitoes are typically out at dawn and dusk. Freshwater mosquitoes are known to carry and transfer West Nile Virus. Protecting personnel from mosquito bites requires appropriate PPE (i.e., long sleeves and pants) and use of insecticides as appropriate. Potential diseases from mosquitoes are summarized below.

Eastern Equine Encephalitis

Eastern equine encephalitis is a rare disease that is spread to horses and humans by infected mosquitoes. It is among the most serious of a group of mosquito-borne virus diseases that can affect the central nervous system and cause severe complications and even death. Although relatively small outbreaks of human disease have occurred in the United States, the frequency of this disease is increasing with most cases reported from the eastern seaboard states, the Gulf Coast, and some inland mid-western areas.

After infection, the virus invades the central nervous system, including the spinal cord and brain. Most people have no symptoms; others get only a mild flu-like illness with fever, headache, and sore throat. For people with infection of the central nervous system, a sudden fever and severe headache can be followed quickly by seizures and coma. About half of these patients die from the disease. Of those who survive, many suffer permanent brain damage and require lifetime institutional care. Symptoms usually appear 4 to 10 days after the bite of an infected mosquito. Confirming diagnosis is based on tests of blood or spinal fluid.

West Nile Virus

West Nile encephalitis is an infection of the brain caused by the West Nile virus, which is transmitted by infected mosquitoes. Following transmission from an infected mosquito, West Nile virus multiplies in the person's blood system and crosses the blood-brain barrier to reach the brain. The virus interferes with normal central nervous system functioning and causes inflammation of the brain tissue. However, most infections are mild and symptoms include fever, headache, and body aches. More severe infections may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis and rarely, death. Persons over the age of 50 have the highest risk of severe disease. °

Prevention centers on public health action to control mosquitoes and on individual action to avoid mosquito bites. To avoid being bitten by the mosquitoes that cause the disease, use the following control measures:

- If possible, stay inside between dusk and dark. This is when mosquitoes are most active.
- When outside between dusk and dark, wear long pants and long-sleeved shirts.
- Spray exposed skin with an insect repellent, preferably containing DEET.

If an employee starts to feel sick after a field activity during which they were bitten by mosquitoes, that employee should report the symptoms to their project manager or supervisor and seek appropriate treatment by a physician.

Ticks

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. One characteristic symptom of Lyme disease is a bulls-eye rash that develops around the bite site. The rash appears in about 60 to 80 percent of all Lyme disease cases. Contact your supervisor, PSHC, or other safety personnel immediately if you develop such a rash.

Personnel should carefully inspect themselves throughout the day and when they return home 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 because of a neurotoxin which the tick apparently injects while engorging. This neurotoxin acts on the spinal cord causing poor coordination, weakness, and paralysis.

Tick season lasts from April through October; peak season is May through July. 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. Permanone® is another repellent. However, it can only be directly applied to clothing. Tick bites should be reported to your supervisor immediately.

Spiders and Scorpions

Several poisonous insects live in the areas in which we may work, including the brown recluse spider, the black widow spider, Hobo spider, various scorpions, and the puss caterpillar. Bites or stings from these insects result in toxic reactions and require treatment by a professional.

Black widows are found throughout the United States and southern Canada. Only the female black widow is poisonous. Female black widows are long-legged, shiny, coal-black spiders with an orange, red, or yellow shape on their underside that usually looks like an hourglass but may be another shape. Female black widows are usually about 2 inches across but may be smaller. Black widow spiders tend to bite defensively when their webs are disturbed. Old stumps or wood piles are favorite hiding places of black widow spiders. Most bites occur in rural and suburban areas and occur between the months of April and October. In most cases of a black widow spider bite, symptoms consist only of minimal to sharp pain followed by swelling and redness at the site of the bite. In addition, two small fang marks like tiny red spots may be visible. In some cases, severe symptoms appear within 30 to 60 minutes. These include:

- Muscle cramps and spasms that start near the bite and then spread and increase in severity for 6 to 12 hours.
- Chills, fever, nausea, or vomiting.
- Severe abdominal pain.
- Seizures.
- Stupor, restlessness, or shock.
- Severe high blood pressure.

If you believe you have been bitten by one of these poisonous insects, GET MEDICAL HELP IMMEDIATELY. Call your health professional, hospital, or poison information center and follow the procedures:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood.
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite.
- Do not apply a tourniquet. It may cause more harm than benefit.
- Try to positively identify the spider or catch it to confirm its type.

Bees and Wasps

Wasps (i.e., hornets and yellow-jackets) and bees (i.e., 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.

To avoid bees and wasps when working outdoors:

- Avoid the use of heavily scented soaps, shampoos, perfumes, colognes, after-shaves, and cosmetics.
- Avoid shiny buckles and jewelry.
- Cover exposed skin and wear gray, white or tan rather than bright colors. Flowery prints and black especially attract insects.
- Remove food sources from site that may attract bees. Social wasps thrive where humans discard food.
- Check for new nests during the warmer hours of the day during July, August, and September. Bees are very active then.

Bees are generally more mild-mannered than wasps and are less likely to sting. Bees can only sting once although wasps sting multiple times because their stinger is barbless. Wasps and bees will sting in defense of itself or its nest. To avoid being stung:

- Slowly raise your hands to protect your face, remaining calm and stationary for a while and then move very slowly away.
- Never swing, strike, or run rapidly away since quick movement often provokes attack and painful stings.
- Restrain from throwing rocks or spraying nests with water.
- Avoid creating loud noises and disturbance near the nest.

When a wasp or bee stings, it injects a venomous fluid under the skin. The venom causes a painful swelling that may last for several days. If the stinger is still present, carefully remove it with tweezers. Then:

- Wash the area carefully with soap and water. This should be continued several times a day until the skin is healed.

- Apply a cold or ice pack, wrapped in cloth for a few minutes.
- Apply a paste of baking soda and water and leave it on for 15 to 20 minutes.
- Take acetaminophen for pain.

Wasp stings can be life-threatening to persons who are allergic to their venom. If you develop hives, difficulty breathing or swallowing, wheezing, or similar symptoms of allergic reaction, SEEK MEDICAL ATTENTION IMMEDIATELY. People with known allergies to insect stings should NEVER work alone.

Others

Other biting insects include chiggers (i.e., redbugs), horseflies, and deer flies. Use of appropriate clothing (i.e., long sleeves and pants) and insect repellants can reduce the potential to be bitten.

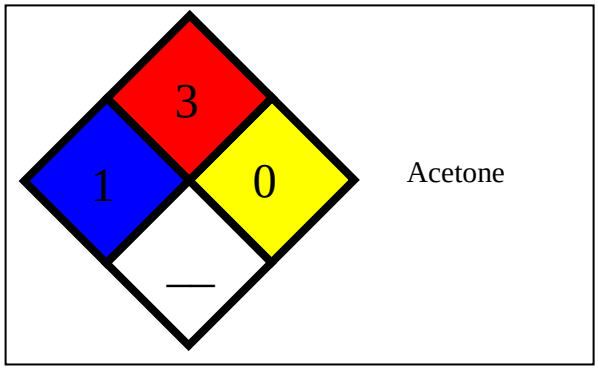
4.1.18 WATERBORNE DISEASES

Contamination of water reserves by either chemical agents or infectious pathogens may affect the health of workers. Water, particularly storm water and wastewater, can carry bacteria, viruses, and pathogens that are known to cause illnesses in humans including hepatitis, giardiasis, cholera, Legionnaires ‘ disease, cryptosporidiosis, shigellosis, gastroenteritis, and typhoid fever. Proper protection of workers engaged in activities around storm water and wastewater is critical to minimizing the potential for acquiring an illness and potentially life-threatening disease. When working around water, gloves, safety glasses, and appropriate protective gear must be worn to minimize the potential for contact with infectious diseases.

4.2 CHEMICAL HAZARDS

4.2.1 HAZARDOUS SUBSTANCES BROUGHT ON-SITE

A material safety data sheet (MSDS) must be available for each hazardous substance that AECOM or DWR brings onto the property. This includes solutions/chemicals that will be used to decontaminate sampling equipment, field test kits, calibration gases, or dye solutions. MSDSs should be attached as required.



In addition, all containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard. Either the original manufacturer’s label or an NFPA 704M label specific for the material (as shown at the right) is considered to be an acceptable label.

The following types of chemicals have been identified that may be present during field activities:

- ☒ Gasoline/Diesel/Petroleum Hydrocarbons
- ☒ Compressed Gas Cylinders
- ☒ Lead Acid Batteries

PETROLEUM HYDROCARBONS/GASOLINE/DIESEL

During boat surveys and DWR boat operation, it may be necessary to fill, carry, and store gasoline or diesel containers within boats and at worksites depending on the type of boat and activity. Maintenance on equipment may require the use of petroleum based lubricants or solvents.

Gasoline is a highly complex mixture of aliphatic and aromatic hydrocarbons. Benzene, toluene, ethylbenzene, and xylene (BTEX) are natural but minor components of fuel oils, kerosene, and diesel fuels. Gasoline contains higher quantities of these aromatic hydrocarbons. Exposure to the vapors of BTEX above their respective OSHA PELs, as an 8-hour time-weighted average (TWA), may produce irritation of the mucous membranes of the upper respiratory tract, nose, and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue, and drunken-like behaviors. Chronic and prolonged overexposure to the vapors of benzene may cause damage to the blood-forming organs and is known to cause leukemia in humans.

The PEL for benzene is 1 part per million (ppm). The PEL for ethylbenzene and xylene is 100 ppm and the PEL for toluene is 200 ppm, as 8-hour TWAs. The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended a TLV of 50 ppm for toluene and 0.5 ppm for benzene.

Methyl tertiary butyl ether (MTBE) is an additive used to increase the octane ratings of gasoline. Direct contact with the liquid may cause minor skin and eye irritation. Prolonged or repeated inhalation of MTBE vapor may cause irritation of the respiratory tract as well as depression of the central nervous system. OSHA has not established a PEL for MTBE. However, the ACGIH recommends a TLV of 50 ppm, as an 8-hr TWA.

COMPRESSED GAS CYLINDERS

Compressed gasses may be used during field activities. Skin or eye contact with the rapidly evaporating liquid can result in freezing of the tissues or frostbite. Rapid release of high pressure gas can cause an injection or puncture type wound. Rapidly released gasses also can propel the cylinder and/or valve to become injurious projectiles. All cylinders should be properly secured while in storage or transit to prevent accidental damage and release.

LEAD ACID BATTERIES

Lead-acid batteries include lead and sulfuric acid. Skin and eye contact with battery acid can cause severe irritation, burns, ulcerations of the skin, and cornea damage on contact. In rare circumstances, acid mist spray can cause inhalation hazard and respiratory irritation.

4.2.2 CHEMICAL EXPOSURE AND CONTROL

CHEMICAL ROUTE OF EXPOSURE

The potential routes of exposure based on the proposed activities include:

- Dermal contact or ingestion of potentially contaminated water during water work; and
- Dermal and inhalation or ingestion of hazardous materials (i.e., petroleum hydrocarbons, gasoline, diesel) brought on the project site.

CHEMICAL HAZARD CONTROL

Hazards can be controlled in several ways:

- To reduce the potential for contact with hazardous materials, PPE, as described in Section 8 of this SWP, will be worn.
- To reduce the potential for accidental ingestion, the general site safety practices, as described in Section 4.0 of this SWP will be implemented.
- Avoid inhaling vapors during fueling by staying upwind of containers.
- Compressed gas cylinders will be inspected and stored properly in accordance with SH&E 618.
- Portable gas containers and lead acid batteries will be handled and stored properly. Proper techniques are further described below.

PROPER HANDLING OF PORTABLE GASOLINE/DIESEL CONTAINERS

The following safety precautions for filling and handling portable gasoline containers will be implemented:

- Portable containers should be carried outside the passenger compartment if possible.
- Do not smoke while refueling.
- Shut off the engine using the gasoline along with any engines in the immediate vicinity.
- Only store gasoline in containers with approved labels. Never store gasoline in glass or unapproved containers.
- Portable containers must be placed on the ground, and the nozzle must stay in contact with the container when filling, to prevent buildup and discharge of static electricity.
- Fill the container at a slow rate. This will decrease the chance of static ignition buildup and minimize incidents of spillage or splattering.
- Keep your face away from the nozzle or container opening.
- Never siphon gasoline by mouth. Do not put gasoline in your mouth—gasoline can be harmful or fatal if swallowed. If someone swallows gasoline, do not induce vomiting. Call for medical assistance immediately.
- Keep gasoline away from your eyes and skin, because it may cause irritation. Wear safety glasses while filling tanks.
- Use gasoline only in open areas that get plenty of fresh air.
- Never use gasoline to wash your hands.
- Remove gasoline-soaked clothing immediately.

- Fill container to no more than 95 percent full to allow for expansion.
- Place cap tightly on the container after filling. Do not use containers that do not seal properly.

Proper Battery Handling

The following safety precautions for handling batteries will be implemented:

- Handle batteries carefully to avoid leaks and spills.
- Be sure to secure batteries upright in vehicles.
- Use proper lifting techniques when carrying batteries.
- Potential fire or in rare circumstances, acid mist spray, or explosion of lead acid batteries can occur because of equipment short circuits or the introduction of sparks. All potential ignition sources will be removed from the work area.
- During use, batteries will be placed in a well-ventilated area and out of direct sun, where possible.
- Batteries will be stored in cool and ventilated area when not in use. Batteries with any signs of damage will not be used.
- Field crews will follow all general site safety work practices including washing hands and face before eating, drinking, or any other activities.
- Chemical resistant gloves and safety glasses will be worn when handling batteries with visible corrosion or leaks.
- All field vehicles and boats used to transport batteries should carry baking soda and water to neutralize any spills in any field location or on any person.

Potential Spills or Release of Hazardous Chemicals

During field activities, the potential for accidental spills during refueling of boats or filling of fuel storage containers is possible. Leaks of fuel and oils from boats or sewage from the DWR boats also can occur. The DWR boat and fuel storage containers will be continuously monitored for potential leaks.

In the event of a spill during refueling activities at a commercial site (e.g., marina), field staff will immediately contact the commercial management.

In the event of other small spills (less than 5 gallons), field crews will respond to a spill or release of a hazardous substance, if the substance can be absorbed, neutralized, or otherwise controlled at the time of release in the immediate release area using equipment and materials available to them at the time or the spill or release. A spill kit will be available at the release site. Field personnel responding to the spill will wear appropriate PPE (i.e., chemical resistant coveralls, safety goggles, and Nitrile gloves). Additional procedures described in S3NA-520-PR, Incidental Spill Response, also will be followed.

All other spills or releases that cannot be properly managed with the personnel, materials, and equipment at the site or will be considered an Emergency Response and appropriate notification procedures will be implemented.

In the event of a hazardous material emergency response, the site safety officer will report the release to the PSHC or the AECOM or DWR PM. The release will then be reported to the following agencies:

U.S. Coast Guard National Response Center:	1-800-424-8802
California Emergency Management Agency:	1-800-OILS 911

4.2.3 ULTRAVIOLET HAZARDS

Employees are encouraged to liberally apply sunscreen, with a minimum sun protection factor of 30, when working outdoors to avoid sunburn and potential skin cancer, which is associated with excessive sun exposure to unprotected skin. In addition, employees should wear head covering and safety glasses that offer protection from UVA/UVB rays.

4.2.4 WEATHER HAZARDS

The SSO 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 will 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. A weather radio will be on-site at these project locations for the duration of the project to monitor severe weather. If severe weather warnings are issued for the site location or surrounding county, employees must remain alert for approaching storms and review the procedures for seeking refuge in the event that a warning is issued. The site will be secured to the extent possible and employees will seek immediate refuge as directed by the SSO.

4.2.5 HIGH RIVER FLOWS AND FLOODING

High river flows can bring debris into the project area and the flows are expected to be sustained for several days before receding. During high-flow events, staff should be on the lookout for debris, checking ropes, and notifying NPB operators of increased debris moving downstream.

During storm events, field crew members will monitor rising river elevations. If water levels reach the 12-foot trigger point elevation (Watch Stage), field staff will be required to monitor water levels every 30 minutes until the water levels recede below the 12 feet NAV88 mark for a full tidal cycle. At 15 feet water elevation (Warning Stage), staff is required to contact DWR immediately. Trigger point elevations will be clearly marked during project activities.

DWR managers will then make a determination based on predicted weather, releases, flows, and tides if initiating site evacuation is appropriate. Staff then will follow additional direction from DWR on evacuation procedures for staff and equipment at the work trailer and barrier site.

4.2.6 HIGH WINDS

- High winds are common at this site, so during periods of high winds, safe boat navigation must be monitored. If there is ever a question regarding safety on the water, either don't go out on the water or, if already on the water, please return to the dock immediately.

- Also, the high winds can obstruct vision and result in eye irritation. Safety glasses must be worn at all times. Shelter should be sought during windy periods with airborne dusts.

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5 HAZARD ANALYSIS

Task Hazard Analyses have been completed for all tasks identified in the Scope of Work (**Attachment A**):

- Driving to and From the Project Site
- Boat Operation
- Noise Monitoring
- Sound Field Measurements
- Pile Driving
- Data Collection
- Field Equipment Operation & Maintenance
- Physical Barrier Operation

5.1 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.

5.2 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 000 and 200 to 500** of the North America SH&E SOPs (**Attachment B**). Applicable SOPs are shown in **Table 5-1**.

Table 5-1. Applicable Standard Operating Procedures

	SOP#	TITLE		SOP#	TITLE
000 Series – SH&E Essentials					
☐	S3NA-000-PR	SH&E Manual	☐	S4NA(US)-414-PR	Railway Sites
☒	S3NA-001-PR	Safe Work Standards and Rules	☐	S4NA(US)-415-PR	RCRA Regulated Facilities
☒	S3NA-002-PR	Stop Work Authority for Unsafe Work	☐	S3NA-416-PR	Tunnel and Underground Work
☒	S3NA-003-PR	SH&E Training	☐	S3NA-417-PR	Utilities, Underground
☒	S3NA-004-PR	Incident Reporting	☐	S3NA-418-PR	Welding, Cutting and Other Hot Work
☒	S3NA-005-PR	Vehicle and Driver Safety Program	☒	S3NA-419-PR	Water, Marine Operations, Boating
☐	S3NA-006-PR	Safety Moment	☐	S3-NA420-PR	Water, Underwater Diving
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

Table 5-1. Applicable Standard Operating Procedures

	SOP#	TITLE		SOP#	TITLE
☒	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-PR	Process Safety Management			

6 HEALTH AND SAFETY REQUIREMENTS

6.1 SITE-SPECIFIC SAFETY TRAINING

All AECOM and DWR personnel performing activities at the site will be trained in accordance with S3NA-003-PR, SH&E Training. 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. All personnel are required to remain current in all of their required training and evaluate their need for additional training. Any additional required training that is completed will be documented and tracked in the project files.

6.1.1 FIRST AID AND CPR

At least one staff member per field team will be trained in first aid and cardio-pulmonary resuscitation (CPR).

6.1.2 BOATING SAFETY COURSE

All personnel operating boats without demonstrated boating skill and experience are required to attend a boating safety course. At least one qualified boat operator will be on-site at all times.

6.2 SITE ORIENTATION AND SAFETY MEETINGS

Before the start of project activities, a general safety meeting will be conducted for project staff to review the specific requirements of this SWP and applicable THA.

A site orientation will be required for all field staff working at the work trailer before the start of work. The orientation will cover site-specific hazards, site operation procedures, and emergency procedures. The site orientation will be provided by a SSO and documented on a sign-in sheet for the site. Daily sign-in on the daily tailgate safety meeting form will be mandatory for all employees covered by this SWP. During project implementation, site orientation is also required for all official agency visitors or other DWR contractors at either site. The SSO will be responsible for any on-site visitors or contractors during this time. No person will be allowed onsite without the proper PPE, as discussed in Section 6.8.

In addition, tailgate safety meetings will be held every shift change with the contractor, construction supervisor, and monitoring staff or when work conditions change to discuss the anticipated scope of work, required controls, incident reporting, and any lessons learned or concerns from previous work; to identify new hazards and controls; and to review the results of inspections. Tailgate meetings will be documented on the attendance form (**Attachment G**). All safety training documentation is to be maintained in the project file by the SSO.

6.3 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 SDS to the SSO for review and filing (the SSO will maintain copies of all MSDS on site). SDS 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 will be briefed on the hazards of any chemical product they use, and will be aware of and have access to all SDS.

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

Attachment D provides copies of SDS 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.

6.4 CONFINED SPACE ENTRY

The SSO/site supervisor will 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. It is not anticipated that confined spaces will be encountered during project activities.

6.5 HAZARDOUS, SOLID, OR MUNICIPAL WASTE

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste will be accumulated, labeled, and disposed in accordance with applicable federal, state, and local regulations. Hazardous wastes are not anticipated to be generated during project activities.

6.6 GENERAL SAFETY RULES

All site personnel will 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*. To prevent injuries and adverse health effects, the following general safe work practices are to be followed when conducting work involving known and unknown site hazards. These safe work practices establish a pattern of general precautions and measures for reducing risks associated with field activities. This list is not inclusive and may be amended as necessary.

Field personnel will follow general site safety plan practices during the length of the project:

- The "buddy system" will be used at all times by all field personnel. No one is to perform field work out of visual and/or verbal contact with at least one other field personnel.. At least one staff member per field team will be trained in first aid and CPR

- It is recommended that all field staff performing water work be able to swim 100 yards and tread water for at least 5 minutes.

- Field crews will not work more than a maximum of 12 hours to avoid exhaustion.
- Field crews will hard hats, gloves, sunscreen, sunglasses, and appropriate clothing and shoes/boots based on weather conditions. High visibility vests and/or high visibility PFDs (when necessary) will be worn at all times. Ear plugs will also be worn during high noise activities. Spare clothing also should be kept in field vehicle or worksite.
- Field personnel will carry plenty of food and water and additional water will be kept in field vehicles or worksite at all times.
- The use of alcohol or illicit drugs is prohibited during the conduct of field operations. No alcohol is permitted on worksites.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in these areas.
- Hands and face must be thoroughly washed on leaving the work area and before eating, drinking, or any other activities. A hand washing station will be at the contractor staging area.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with specific survey protocols.
- Monitor work areas 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) before disposal.
- Notify coworkers of any allergies or any major health conditions that are important knowledge in case of emergency medical treatment.
- Observe coworkers for signs of exhaustion and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO or PSHC.

6.7 RESPONDING TO HEAT AND COLD-RELATED ILLNESS

Heat and cold stress may vary based on 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. The guidance below will be used in identifying and treating heat-related illness. Table 6-1 summarizes identification and treatment for heat-related illnesses.

Table 6-1. Identification and Treatment of Heat-Related Illnesses

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. • After 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.

6.8 PERSONAL PROTECTIVE EQUIPMENT

The purpose of 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 6-2** 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.

6.9 PERSONAL HYGIENE

The following personal hygiene requirements will be observed:

- Water Supply: A water supply meeting the following requirements will be used:
  - *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 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 five 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 hand soap) 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, before breaks, and at the end of daily work activities.

6.10 PROJECT-SPECIFIC SAFETY REQUIREMENTS: CHECK-IN/CHECK-OUT PROCEDURES

Check-in and check-out procedures have been developed so that staff members are accounted while conducting project fieldwork. An organization may adopt their own procedures for accounting for their own staff, following approval from the project PMs and the PSHC.

Table 6-2. Personal Protective Equipment Specifications		
Type	Material	Additional Information
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides
Personal Floatation Device	US Coast Guard Approved Type III or higher	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:		
Hearing Protection	Ear plugs and/ or muffs, Ear muffs coupled with ear plugs should be worn around pile driving operations	In hazardous noise areas
ANSI Cut Resistant Level 2 or Greater Gloves		If working with sharp objects or powered equipment
Protective Chemical Gloves	Inner: Nitrile Outer: Nitrile	If working with chemicals
Sunscreen	SPF 30 or higher	
Cold Weather Gear	Hard hat liner, hand warmers, insulated gloves, coveralls	

PPE Item	Barrier Installation and Removal Monitoring (On Water- Platforms)	Work on Boats, Docks, Levees, or along Water Banks
Full Body Protective Clothing	☒	☒
Closed-toe Shoes or Boots	☐	☒
Steel-toed Boots	☒	☐
Safety Glasses	☒	☒
Ear Plugs	☒	☒
Hard Hat	☒	☒
Traffic Vest	☒	☒
Type III Personal Floatation Device	☒	☒
Type IV flotation aid with 90 feet of retrieval line	☐	☒
Leather/ Work gloves/ANSI Level 2 cut resistant gloves when cutting	☒	☒
Nitrile/Gloves	☐	☐
Headlamp/ Flashlight	☐	☐
Mobile Phone	☒	☒

6.10.1 DAILY TRAVEL

Check-in and check-out procedures will be implemented to account for all field crew members while traveling to and from the project site. Staff will be required to check-out before departing to their destination (i.e., home or project site) by calling a specific phone number and check-in after arriving at their destination with a return call. When checking-out, staff will indicate their anticipated time of arrival. **Table 6-3** shows who to check-in/check-out with for daily departures and arrivals:

Table 6-3. Daily Travel Check-in/Check-out Procedures

Project Activity	Company	Check-in/Check-out Contact	Check-in/Check-out Contact Information
Daily Mobilization/Demobilization	AECOM	David Bise	(916) 896-9473
Daily Mobilization/Demobilization	DWR	Katherine Marquez	(916) 402-7559

All on-duty staff members are accountable for one another. During full implementation of project activities, it will be the responsibility of on-duty staff to check the project staff or barrier operation schedule to be aware of which staff members will be traveling during their shift. The staff schedule will be kept up to date. Late notice staffing changes must be reported to On Duty Project Team Staff. For staff schedule inquiries, please contact David Bise at (916) 896-9473 and Katherine Marquez at (916) 402-7559.

In the event that the field crew does not check-in by the designated time, it will be the check-in/check-out contact's responsibility to decide what action, if any, will be taken. The following chain-of-communication procedure will be used:

The **Check-in/Check-out Contact** will perform the following:

1. Call Field Staff, if no response; then
2. Contact the scheduling lead for the field staff's organization, if no response; then
3. Contact Cindy Davis (AECOM Project Manager at 916-806-7834) if no response; then
4. Contact Monique Meyer (Project Health and Safety Contact at 916-335-3927), if no response; then
5. Contact appropriate emergency response services (as specified on emergency contact sheet).

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7 EMERGENCY ACTION PROCEDURES

7.1 ACTION PLAN

The SSO is responsible for initiating emergency response. In the event the SSO cannot fulfill this duty, a SSO from another organization will take charge. After initiating emergency response, it is the responsibility of the SSO to inform the PSHC of the emergency. The PSHC will provide assistance and contact SSO's at other worksites and project team members.

7.1.1 ALARM SYSTEM/EMERGENCY 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. 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 (e.g., noise from heavy equipment; drilling rigs, backhoes) and anytime a clear line-of-sight cannot be easily maintained amongst all AECOM personnel because of distance, terrain, or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. A portable phone and cellular reception amplifier will be available at each worksite to the site to ensure that communications with other field team members as well as local emergency responders is maintained, when necessary. In addition, long-range handheld radios will be used for communications between each worksite location. VHF radios will be available in boats for communication with emergency personnel.

VHF Radio General Operation Instructions:

- Refer to the Instruction Manual for detailed instructions for specific models used. The unit you are using may not have all of the options listed below.
- Perform a "**radio check**" at the beginning of each shift.
- The **VOLUME** control knob turns the radio **ON** and **OFF** and controls volume.
- The **SQUELCH** control sets the signal-to-noise ratio at which a signal will become audible.
- The **MEM** key is used to program channels into memory.
- The **SCAN** key is used to put the radio into the All Scan mode or the Memory Scan mode. In this mode, the radio will scan channels and stop on channels receiving transmissions and monitor that channel until the transmission ceases.
- The **SEEK** key puts the radio into the All Seek mode or the Memory Seek mode. In this mode, the radio will seek channels and stop on channels receiving transmissions, monitor briefly, then continue seeking.
- The **PTT** (Push-To-Talk) button puts the radio into the transmit mode. Wait 1-2 seconds after the PTT button is pushed before proceeding to speak, to prevent your transmission from being cut off.

- The **16 PLUS** key is used to select channel 16 immediately. This is the emergency channel.
- The **WX** key puts the radio into the weather channel receiving mode. In this mode, the transmitter is disabled.
- The **MON INT** key puts the radio into the monitor mode, in which channel. 16, a selected working channel, and a weather channel (for the weather alert tone) will be scanned.

7.1.2 ESCAPE ROUTES AND PROCEDURES

During an on-site emergency, AECOM employees will leave the site. Escape routes and procedures for each worksite are presented in a site plan included in **Attachment E**.

For water evacuations associated with high-flow events, on-site project staff will be notified by DWR if evacuation of the site is appropriate. Work trailer staff will follow additional direction from DWR on evacuation procedures for staff and equipment at the work trailer and barrier site.

DWR boat staff should proceed to the closest shoreline, check all lines, and lock down the boat. After the DWR boat is secure, staff should leave the boat.

7.1.3 RESCUE AND MEDICAL DUTY ASSIGNMENTS

The phone numbers of the police and fire departments, ambulance service, local hospital, and AECOM representatives are provided in **Table 7-1** and in the emergency contact reference sheet. This sheet will be posted in each site vehicle, house boat, and construction trailer.

In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site SSO and the PSHC or RSHEM.

If the injured employee can be moved from the accident area, he or she will be brought to the staging area where their PPE will be removed. If the person is suffering from a back or neck injury, the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this not feasible, decontamination (if appropriate) will be performed after the injured person has been stabilized.

7.1.4 DESIGNATION OF RESPONSIBLE PARTIES

The AECOM or DWR SSO is responsible for initiating emergency response. In the event the SSO cannot fulfill this duty, the alternate SSO will take charge.

7.1.5 EMPLOYEE ACCOUNTING METHOD

The AECOM SSO is responsible for identifying all personnel on-site at all times. The DWR SSO and Subcontractor SSO are also responsible for identifying all personnel within their organization in the field at all times. Emergency contact information is shown in **Table 7-1**. Contact information for all project staff members is provided in **Attachment F**.

Table 7-1. Emergency Contact Information

Emergency Coordinators / Key Personnel			
Name	Title/Workstation	Telephone Number	Mobile Phone
Roy Leidy	AECOM Principal-in-Charge	916-414-5855	(916) 502-3213
Cindy Davis	AECOM Project Manager	916-414-5810	(916) 712-2213
Monique Meyer	AECOM PSHC	916-361-6421	(916) 335-3927
Chuck Epstein	AECOM PSHC (alternate)	916-361-6444	(916) 201-3759
Shannon Couch	AECOM Area SH&E Manager	510-874-3139	(510) 277-5369
Incident Reporting	AECOM Incident Reporting Line	1-800-348-5046	N/A
Tom Cobarrubia	DWR Senior Inspector	916-376-9899	916-502-3060
Jacob McQuirk	DWR Project Manager	(916) 653-9883	(916) 524-6645

Organization / Agency	
Name	Telephone Number
Continuous weather information is broadcast on 162.400 MHz VHF-FM	
Normal Field VHF Channel 7	
Emergency Water Assistance: VHF Channel 16	
US Coast Guard Rio Vista Unit	(707) 374-6477
Contra Costa County Sheriff (Emergency)	(925) 933-1313
Contra Costa Marine Patrol	(925) 335-1500
Contra Costa County Sheriff (Nonemergency)	(925) 335-1500
Contra Costa County Fire District (Nonemergency)	(925) 941-3300
Sutter Delta Medical Center 3901 Lone Tree Way, Antioch, CA	(925) 779-7200
Contra Costa Industrial Medical Clinic, 2339 Buchanan Rd, Antioch, CA 94509	(925) 777-9194
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

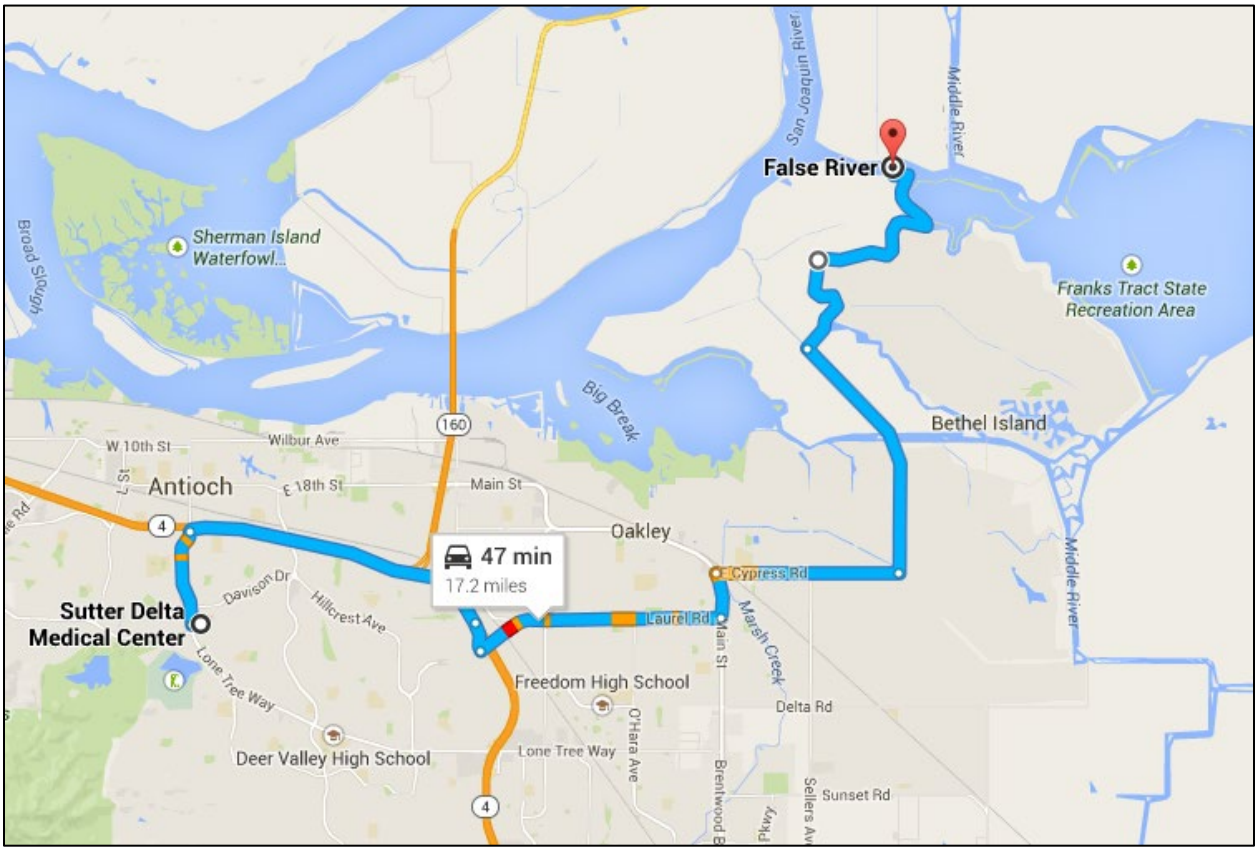
Note:
* Contact information is subject to change.

7.1.6 HOSPITAL ROUTE MAPS

Hospital Name: Sutter Delta Medical Center
Address: 3901 Lone Tree Way, Antioch, CA 94509
Phone Number: (925) 779-7200

Directions:

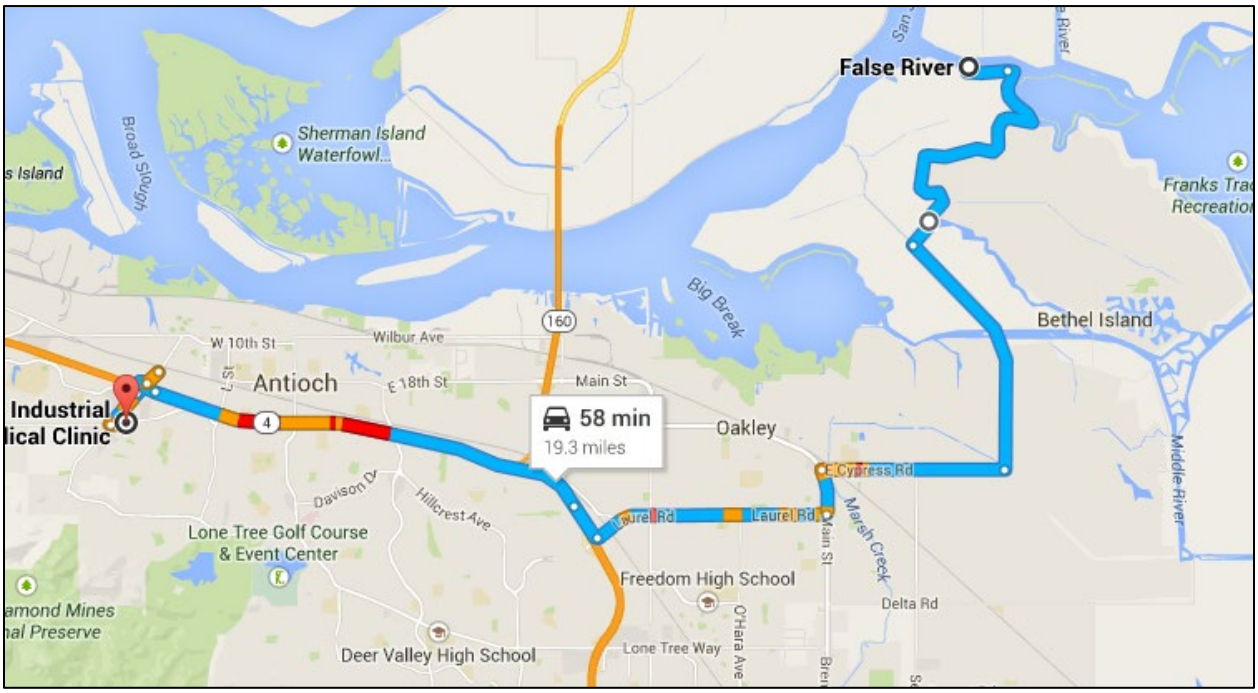
1. Head East on Levee Rd to Ferry Terminal
2. Turn right onto Jersey Island Rd
3. Turn left to follow Jersey Island Rd southeast
4. Turn right onto East Cyprus Rd
5. Turn left onto Main Street
6. Turn right onto Laurel Rd
7. Turn right onto CA-4 ramp to Martinez
8. merge onto CA-4
9. Take the A Street/Lone Tree Way exit
10. Turn left onto Lone Tree Way
11. Destination will be on the left in 0.1 miles
12. Arrive at Sutter Delta Medical Center



Industrial Medical Clinic: Contra Costa Industrial Medical Clinic
Address: 2339 Buchanan Road, Antioch, CA 94509
Phone Number: (925) 777-9194

Directions:

1. Head East on Levee Rd to Ferry Terminal
2. Turn right onto Jersey Island Rd
3. Turn left to follow Jersey Island Rd southeast
4. Turn right onto East Cyprus Rd
5. Turn left onto Rose Ave
6. Turn right onto Laurel Rd
7. Turn right onto CA-4 ramp to Martinez
8. merge onto CA-4
9. Take the Somersville Rd/Auto Center Drive exit
10. Turn left onto Auto Center Drive
11. Make a U-turn at Sycamore Drive
12. Continue onto Somersville Road
13. Sharp left onto Buchanan Road
14. Destination will be on the right
15. Arrive at Contra Costa Industrial Medical Clinic



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8 INCIDENT REPORTING

Incident reporting procedures are in place to facilitate appropriate treatment for our employees and to facilitate corrective actions to prevent injuries and illnesses. The reporting structure is essential to meeting both AECOM and OSHA reporting standards for work in the U.S. ALL employees must report ALL incidents including: near-miss, incidents resulting in injury or illness, and incidents resulting in property damage to the PM, PSHC, and Area SH&E Manager (ASHEM).

Below is a summary of the reporting structure to be applied to ALL projects for which AECOM personnel are involved:

- Each employee involved in an SH&E incident must notify the PM (or PSHC if PM is unavailable) immediately (and no later than the current work shift) 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 the Project Manager AND the ASHEM before obtaining medical treatment.
- In an emergency/life-threatening situation, PM/PSHC use the appropriate local emergency phone numbers and seek immediate medical care for the employee.
- The PM/ PSHC will call and follow the directions provided by the AECOM SH&E Incident Reporting Hotline (**800-348-5046**) by the end of the current work shift.
- PM/ PSHC contact the ASHEM (contact information indicated below) to notify of the situation, and to get immediate procedural assistance if required. Mark messages as URGENT.
- PM/ PSHC, with employee, is to complete the applicable sections of the incident reporting forms (e.g., Supervisor's Report of Incident or Near-Miss Reporting Form) and provide to ASHEM (scan and email as indicated below).
- This form must be completed by the next day.
- The ASHEM will notify the Regional SH&E Manager (RSHEM) of the incident. In instances above where the ASHEM is not available, employees, supervisors, may contact the RSHEM directly. The AHSEM and RSHEM contact information are:

ASHEM	RSHEM
Shannon Couch, Shannon.couch@aecom.com	Odin Ansari, odin.ansari@aecom.com
510-574-3139 (o)	510-622-6623 (o)
510-277-5369 (c)	925-963-4867 (c)

Supervisors/PSHC must always notify the ASHEM (and/or RSH&E Director) of any incident within the current work shift or by the start of the next scheduled workday. Notification needs to be verbal contact.

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ATTACHMENT A

Task Hazard Analyses

AECOM TASK HAZARD ANALYSIS (THA)

Project Name: 2015 Emergency Drought Barrier	Project Number: 60317562	Date: May 2, 2015	New ☒ Revision ☐
Project Location: Sacramento-San Joaquin Delta near Antioch in Contra Costa County	Project Manager: Cindy Davis	Work Duration: 30 days	

Emergency Numbers:

Principal-in-Charge – Roy Leidy (916) 502-3213 (cell)

Project Manager – Cindy Davis (916) 414-5810 (office) and (916) 712-2213 (cell)

AECOM Project Health and Safety –

Monique Meyer (916) 361-6421 (office)

(916) 335-3927 (cell)

AECOM Area Health and Safety –

Shannon Couch (510) 277-5369 (cell)

AECOM Incident Reporting – (800) 348-5046

DWR Safety Contact – John Personeni (916) 539-7726 (cell)

Dutra Safety Contact – Richard Pearl (707) 333-8753 (cell)

Nearest Hospital and Urgent Care:

Sutter Delta Medical Center 3901 Lone Tree Way, Antioch: (925) 779-7200

Contra Costa Industrial Medical Clinic, 2339 Buchanan Rd, Antioch: (925) 777-9194

State Warning Center (CA): (800) 952.7552

National Response Center: (800) 424.8802

CHEMTREC: (800) 424-9300

Poison Control: (800) 222-1222

Emergency Water Assistance: VHF Channel 16 (156.80 MHz)

US Coast Guard Rio Vista Unit: (707) 374-6477

Continuous weather information is broadcast on 162.400 MHz VHF-FM

Contra Costa County Sheriff (Emergency): (925) 933-1313

Contra Costa County Sheriff Marine Enforcement Detail: (925) 335-1500

Contra Costa County Sheriff (Nonemergency): (925) 335-1500

Contra Costa County Fire District (Nonemergency): (925) 941-3300

Chem-Tel: (800) 255-3924

Title 3 Hotline: (800) 424-9346

Refer to project contact information (SWP Attachment F) for additional information

Refer to the SWP for additional traffic control and emergency procedures.

Job Steps	Potential Hazard	Precaution/PPE
All Field Activities		
Driving to/from project site	Automobile problems, other traffic on roadways Vehicular accident Driving on narrow levee roads with limited shoulders will be used for site access Parking may be required along roads with narrow or limited shoulders	Field crews will follow check-in and check-out procedures when travelling to and from the project site. Refer to the SWP for instructions. All vehicles shall be inspected prior to use. Cell phone use (including hands-free devices) are prohibited Ensure all equipment is secure in vehicle. Limit distractions, practice defensive driving techniques. Avoid backing whenever possible, use spotters. Know the route to the site. Field crews will also follow S3NA-005-PR procedures when travelling to and from the project site. Refer to attached SOP. When parking on limited shoulders, traffic cones shall be placed 30 feet in front of and behind the vehicle. Field crews will wear high visibility vests in high traffic areas. When reversing or turning around on narrow levee road or limited shoulders, a vehicle passenger will be a spotter to assist driver with safe vehicle positioning and backing practices. If no spotter is available, the driver shall place traffic cones a safe distance between the vehicle and identified obstacle(s). The driver shall not proceed with positioning/backing unless the traffic cones are visible.
Driving off-road (off pavement)	Automobile problems or damage (e.g., getting a vehicle stuck in the mud, flat tire) and/or accidents	Field crews will follow S3NA-005-PR procedures when driving. Refer to attached SOP. Field personnel are instructed to avoid wet or muddy roads. If a vehicle is stuck in the mud, all field personnel have cell phones to call for assistance (Anytime Tow, 925-625-1299).

Job Steps	Potential Hazard	Precaution/PPE
		A 4-wheel drive vehicle will be used for driving off-road to prevent getting stuck. When reversing or turning around on narrow levee road or limited shoulders, a vehicle passenger will be a spotter to assist driver with safe vehicle positioning and backing practices. If no spotter is available, the driver shall place traffic cones a safe distance between the vehicle and identified obstacle(s). The driver shall not proceed with positioning/backing unless the traffic cones are visible. In case of an accident, employees should call the nearest police department (listed in the attached SWP) or 911.
Driving off-road (off pavement)	Fire hazards while driving in dry grasses and brush	Field crews will reduce driving speeds and use care when driving off-road through areas with dry vegetation. Field crews will check vehicle and remove any dry grass or brush near the exhaust and/or catalytic convertor. Field vehicles shall be equipped with fire extinguishers and employees trained on proper use.
All Field Activities (including biological monitoring and noise and turbidity measurements)	Biological hazards: Potential contact with poisonous or stinging animals or plants, including a sting/bite from a poisonous animal (e.g., rattle snake, black widow, bees and wasps) or contact with a poisonous plant (e.g., poison oak, stinging nettles)	Field crews will wear full body protective clothing and are trained to detect and avoid potentially poisonous animals and plants. Field personnel are trained in first aid and first aid kits are kept in all field vehicles. Field crews will visually inspect objects before picking them up and will not disturb insect nests or agitate insects. Field crews should check for ticks throughout the day and at the end of field activities. In the event of a poisonous bite/sting or contact with poisonous plant, employees are advised to administer first aid, and contact Incident Reporting and Assistance Line: 800.348.5046 or if medical emergency

Job Steps	Potential Hazard	Precaution/PPE
		call 911.
All Field Activities in areas where domestic animals may be encountered including dogs, cats, cattle, and horses (including biological monitoring and noise and turbidity measurements)	Biological hazards: Encounter with threatened or aggressive animal.	Field crews will not approach or touch any animal encountered during surveying. If a potentially aggressive animal is encountered, Field crews will leave the survey area of the animal. In the event of an animal attack, Field crews are advised to administer first aid and seek medical treatment immediately. The nearest animal control department (listed in the attached SWP) should also be contacted
All Field Activities (including biological monitoring and noise and turbidity measurements)	Physical hazards: Exposure to the elements (i.e., sunburn, heat stroke, hypothermia, dehydration)	Field crews will wear hats, sunscreen, sunglasses, and appropriate clothing and shoes/boots based on weather conditions. Field personnel carry plenty of water, and water is kept in field vehicles at all times. Spare clothing should also be kept in field vehicle. Employees shall adhere to Title 8, Section 3395: Cal OSHA Heat Illness Prevention: Shade provided at 80 degrees, designate a shaded or cooled break area; provide 1 quart/person./hour of water cool water in an area as close as practicable to the job site; know the signs and symptoms of heat related illness, monitor new employees closely for 14 days, provide training, acclimate to conditions, know the contact/ directions to nearest emergency services. While on-site, all field personnel have cell phones and/or long-range radios to call for assistance in case of an emergency. Where cell phones or radios are not available or effective due to poor reception, check-in and check-out procedures will be used.

Job Steps	Potential Hazard	Precaution/PPE
All Field Activities (including biological monitoring and noise and turbidity measurements)	Physical hazards: Slips/Trips/Falls	Field crews will pay special attention when surveying in areas with uneven ground, rocks, ditches, and loose or wet soils. Do not walk distracted, if you need to make or receive a call, find a safe place to do so, outside of the work area. Use three points of contact when getting in and out of vehicles. Field crews will follow “good housekeeping” elements: orderly placement of materials, tools and equipment; removal and secure storage of items that are not needed to perform the immediate task at hand; awareness to walk around, not over or on, equipment onsite; and, identify a path that is clear of obstructions.
All Field Activities (including biolgical monitoring and noise and turbidity measurements)	Physical injury: Strenuous and repetitive motions	Field crew members will practice safe moving, lifting, and carrying techniques. No lifting over 49 lbs or any awkward lifts- ask for assistance or use mechanical means, ensure there is a clear path before proceeding Employees must be physically conditioned for strenuous tasks. A rest work cycle will be established to prevent exhaustion, but at a minimum 10-minute break should be taken each hour for all strenuous activities. Stretching will be done before, during and after activity to prevent sore muscles and injuries. Field crew members will wear all appropriate PPE for specific tasks. Pain or soreness associated with specific routine tasks should be reported to the PM and SSO.

Job Steps	Potential Hazard	Precaution/PPE
All Field Activities (including biological monitoring and noise and turbidity measurements)	Physical injury: hand tool and equipment hazards	Keep your fingers, hands, toes, and feet away from pinch points by practicing safe moving and carrying techniques, and giving all tasks your full attention. Wear gloves appropriate for the task, but keep in mind that gloves may cause an additional hazard during some tasks if they get caught in moving parts. Be aware of clearances when working in tight spaces. Identify all hazardous places prior to working Tools will be inspected by the user daily to verify that handles are sound and tight-fitting and equipment is in good working order
All Field Activities (including biological monitoring and noise and turbidity measurements)	Encounter with dangerous persons that may have guns, knives, etc. Hunting activities	Field crews will make personal safety their first priority. In the event of a life threatening situation, field crews will cease work activity and remove themselves from the threat, and then call 911. Field crews will perform work as a buddy system and will carry a cell phone or means of communication. Field crews will always be aware and alert of the site conditions and use visual and auditory cues at all times. Field crews will not initiate or provoke confrontational situations.
All Field Activities (including biological monitoring and noise and turbidity measurements)	Contact with landowners and other persons (transients) that may be confrontational	Properties will not be accessed without prior landowner approval and/or a signed temporary entry agreement or other permissions. When a temporary entry permit is required, DWR will coordinate with DWR real estate personnel to verify access to survey areas. Field crews will not initiate or provoke confrontational situations.

Job Steps	Potential Hazard	Precaution/PPE
All Field Activities (including barrier installation monitoring, biological monitoring, and noise and turbidity measurements)	Pile Driving/Heavy Equipment Operations- struck by, struck against, noise	A hardhat, eye protection(ear muffs coupled with ear plugs), steel toed boots, ear protection, and a high visibility safety vest and/or PFD (within 6 feet of the water) will be worn near pile driving operations on land, water platforms, or barges. For noise monitoring during barrier construction, field crews will stay in the operator's line of sight, don't work in his/her blind spot, and will approach areas where equipment is operating from a direction visible to the operator. Line of Fire - Field crews will be aware of the pile radius. All field personnel should avoid working within that radius in the event a pile should fall since the direction of the fall cannot be readily determined. AECOM/DWR Personnel should not enter any area where pile driving/heavy equipment activities are occurring unless all work has stopped. They shall stay out of the line of fire. Develop a series of hand signals to facilitate communication with the operator.
All Field Activities on Boat (including noise and turbidity measurements)	Use of fixed ladders	Field crews will always face the ladder when ascending or descending. Field crews will always maintain three point contact with the ladder (i.e., two hands and one foot or two feet and one hand). 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. Field crews will 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.

Job Steps	Potential Hazard	Precaution/PPE
Field activities along banks of various water bodies, levees, and steep slopes (including noise and turbidity measurements)	Falling from the bank into the water	While on the banks within 6 feet of the water, a Coast Guard approved (type III or V) personal floatation devices must be worn. A Coast Guard approved throwable lifebuoy with 90 feet of rescue line attached (Type IV flotation aid) will be readily available. Use caution when traveling overland near rivers with steep cut banks as the ground can give way causing injury. Sand channels can wash out leaving unseen holes. Use wading rod or other methods to probe the bottom to assure good footing. Submerged logs and snags can trap a foot or leg. Slopes greater than 30 degree required fall protection, stop work, and contact the Area SH&E Manager if these conditions are observed. Be aware of uneven ground surface, and ropes and cables that may be lying on the ground. Be aware of loose gravel and slippery surface when walking down embankments or boat ramps.
Water-based Activities (including noise and turbidity measurements)	Encounter with marine life (sea lions, otters)	Do not approach marine life or attempt to make them leave the area. When possible, keep a minimum distance of 100 yards from encountered marine life. If approached while boating, put the engine in neutral and allow the animal to continue uninterrupted. Avoid sudden alterations in speed or direction and never steer toward marine mammals. If marine life is interfering with other operations, staff should wait for marine life to move before continuing work.

Job Steps	Potential Hazard	Precaution/PPE
Motorized Boating Activities (including noise and turbidity measurements)	Injury or drowning, accident or collisions with floating objects or other boats	All boating activities will be conducted in accordance with S3NA-419 PR (Attachment B). No AECOM employees will operate this boat or watercraft. Buddy systems will be used at all times. All boat operators must attend boat orientation, prior to operations. A float plan will be prepared and filed prior to any motorized boating activities and check-in and check-out procedures will be followed for all boating activities. DWR will develop and communicate the Float Plan Prior to departure, a boat operation checklist will be reviewed and discussed with all boat crew. AECOM/DWR will review boat maintenance records prior to operation. A Coast Guard approved personal floatation devices must be worn at all times for any work on or near water. A type III or V life jacket is required. Boat operators will adhere to the “Rules of the Road” as specified in S3NA-419 PR (Attachment B). Fuel will be managed such that the tank will always be one-third full. All watercraft will have proper emergency equipment (as listed in Section 8 of the SWP). The boat operator will brief passengers on the location and use of all emergency equipment on the watercraft including PFDs. The boat operator will routinely conduct weather checks, aborting activity anytime weather or river conditions affect the operator’s ability

Job Steps	Potential Hazard	Precaution/PPE
		to pilot the watercraft in a safe manner. The boat operator has absolute final authority over operation of the watercraft. The boat operator will not operate a watercraft continuously for more than 2 hours without a 10-minute break.
Motorized Boating Activities (including noise and turbidity measurements)	Injury or damage from accident or collisions while docking and mooring or improper mooring	Before approaching dock or shore, determine which personnel will be in charge of mooring lines. If necessary, secure fenders to the side of the boat next to the dock prior to landing. Notify line tenders not to “pull” the boat in by the line while docking; this may cause the operator to lose control of the boat. When the boat has stopped its forward motion and is sitting alongside the dock, have the mooring personnel step off the boat to secure the lines; jumping any open water gap between the boat and dock is strongly discouraged as this may lead to a person in the water between the boat and dock which can cause serious injury. Once the lines have been secured, the engine can be secured. All field personnel will be trained on proper cleating techniques.
Motorized Boating Activities (including noise and turbidity measurements)	Engine fires, flammable hazards	Field personnel are required to carry a fire extinguisher during motorized boat activities Field personnel will keep fuel lines and portable gas tanks free from impediments Caution will be used during refueling of portable gasoline containers. Refer to SWP for safety precautions. Only approved gas containers will be used.
Shore- and boat-based noise and turbidity measurements	Shocks from damaged or poorly maintained equipment	All staff operating or assisting with the noise and turbidity units will be training in the use and testing of the equipment.

Job Steps	Potential Hazard	Precaution/PPE
		Boat operations will be conducted in accordance with safe boating procedures found in the attached SOPs(S3NA-315-PR and S3NA-419-PR) Jewelry will be removed and no clothing shall be worn over PPE. Monitoring equipment will be used in accordance with manufacturer's recommendations and an equipment inspection will be performed prior to operati0n. Damaged equipment will not be used.
Monitoring and Equipment Maintenance		
Equipment Maintenance	Physical hazards: Injury during lifting and carrying heavy equipment	Field crews will use proper lifting techniques and will use the assistance of another person when carrying heavy loads. Field crews will make sure that the path taken while carrying heavy objects is free of obstructions and slip, trip and fall hazards. Field crews will inspect carrying straps on equipment to ensure they are in good condition or will otherwise use alternative means to carry equipment. Batteries will not be carried by terminals.
Equipment Maintenance	Exposure to chemical hazards including lead and sulfuric acid from lead-acid batteries	Field crews will wear nitrile gloves and safety glasses when touching or cleaning battery terminals or during battery handling if any damage, corrosion, or other liquid is visible. Potential fire or in rare circumstances, acid mist spray, or explosion of lead acid batteries could occur due to equipment short circuits or the introduction of sparks. Field crews will follow established equipment set-up and breakdown procedures to avoid a short circuit and arcing between battery terminals. All potential ignition sources will be removed from the work area. As necessary, field crews will remove wrist watches or other jewelry which might make electrical contact and create sparks.

Job Steps	Potential Hazard	Precaution/PPE
		During use, batteries will be placed in a well ventilated area and out of direct sun, where possible. Batteries will be stored in cool and ventilated area when not in use. Batteries with any signs of damage will not be used. Batteries with any signs of damage will not be used. Field crews will follow all general site safety work practices including washing hands and face before eating, drinking, or any other activities. In the event of chemical exposure during battery use, follow first aid instructions on the attached MSDS and seek medical treatment as necessary. In the event of a chemical spill refer to work precautions and procedures in the SWP.
Barrier Operations and Monitoring		
Barrier installation monitoring	Boating and water hazards	See above under all field activities
Barrier installation monitoring	Biological hazards	See above under all field activities
Barrier installation monitoring	Physical hazards	See above under all field activities
Barrier installation monitoring	Bodily injury from flying or sharp objects	A hardhat, appropriate reflective vest, and safety eyewear will be worn in the direct vicinity of construction activities. All hand tools will be kept in safe condition. Tools are inspected by the user daily to verify that handles are sound and tight-fitting. Cutting tools are sharp and properly shaped.
Barrier installation monitoring	Heavy equipment (cranes, barges, air compressors, and generators) accidents and noise	A hardhat, eye protection, steel toed boots, ear protection, and a high visibility PFD will be worn near heavy equipment on water platforms or barges. All field personnel will stand out of the swing radius of equipment/line of fire.

Job Steps	Potential Hazard	Precaution/PPE
		For noise monitoring during barrier construction, field crews will stay in the operator's line of sight, don't work in his/her blind spot, and will approach areas where equipment is operating from a direction visible to the operator. A safe place to perform observations shall be discussed with the operator during the tailgate safety meeting. Develop a series of hand signals to facilitate communication with the operator. Heavy equipment operations shall be stopped in personnel are required to closely examine the work area for biological resources.
Barrier Operations – Day	Physical hazards accessing barrier controls.	Barrier controls will be placed in a manner that will allow for safe land-based access and a clear path will be provided for accessing the controls. A Coast Guard-approved PFD (type III or V) must be worn when checking the status of the barrier from the dock or shore. Field crews will review and follow all manufacturer recommendations for barrier operations. Manuals will be made available and stored in the immediate proximity of the equipment.

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ATTACHMENT B

SH&E Standard Operating Procedures

Americas

Safe Work Standards and Rules

S3NA-001-PR1

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 References

3.1 AECOM Employee Handbook

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers and Supervisors –** 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.

4.1.2 **District, Office, and Project Managers** (Including field task managers, supervisors – Responsible for implementation of, and compliance with, this procedure.

4.1.3 **Region and District SH&E Managers –** Provide guidance as to safe work standards, rules, requirements and guidelines.

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

4.1.5 **Employees –** Responsible for adhering to all AECOM safe work standards, rules, requirements and instructions and to provide input as appropriate.

4.2 Standard Operating Procedures (SOPs)

4.2.1 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.

4.2.2 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.

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

4.3 Inspections and Audits

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

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

5.0 Records

None

6.0 Attachments

6.1 S3NA-001-ST Safety Rules

Americas

Safety Rules

S3NA-001-ST

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 Rules for 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.

Americas

Stop Work Authority for Unsafe Work

S3NA-002-PR1

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 Americas-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 References

None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees –** 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 **Region SH&E Manager** – Provide technical guidance for the development and implementation of corrective actions.

4.1.3 **Project Manager**

- 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.

4.2 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.

4.3 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 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.
- "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.

4.5 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 stop work notification.

4.6 Management-Issued Stop Work Orders

4.6.1 **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.

4.7 Resuming Work

4.7.1 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.

4.7.2 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 Attachments

6.1 S3NA-002-FM1 Stop Work Order (Form)

AECOM

Americas

Stop Work Order

S3NA-002-FM1

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):		

SH&E Training

S3NA-003-PR1

1.0 Purpose and Scope

1.1 AECOM's Safety For Life (SFL) Training Program is designed to provide job specific training to all Employees.

1.2 Establish procedures and standards to develop, deliver, and record training activities.

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

1.4 Major objectives of the SFL Training Program include:

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

2.0 Terms and Definitions

2.1 **Awareness Training –** Training designed to make an employee aware of a particular hazard, but does not authorize the employee to engage with the hazard.

2.2 **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.

2.3 **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.

2.4 **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.

2.5 **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.

2.6 **Performance Training –** Training designed to make an employee aware of a particular hazard, and provides training to prepare the employee to engage with the hazard.

2.7 **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 References

3.1 S3NA-202-PR1 Competent Person Designation

3.2 S3NA-509-PR1 Hazardous Waste Operations and Emergency Response Activities Procedure

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region Executives** and **District Managers**

Responsible for establishing adequate resources (budget, training staff, etc.) to implement this procedure.

4.1.2 **Office Managers (Operations)**

Responsible for identifying and providing resources to support local administration in implementing this procedure, including:

- Assignment of database management duties
- Development of training schedules

4.1.3 **Supervisors** and **Project Managers**

Responsible for the following:

- Assisting the employee in completing the TNA
- 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.
- Provide time and resources to allow employee to complete training identified in the TNA.
- 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.
- Determine who is defined as competent person(s) per the *S3NA-202-PR1 Competent Person Designation*.
- Determine what is required for training per the *S3NA-509-PR1 Hazardous Waste Operations and Emergency Response Activities.*

4.1.4 **Americas SH&E Director**

Responsible for the following:

- Establishing and maintaining this procedure.
- Providing the necessary tools, support, and staff for on-going development and support of the training program.
- Reporting/communicating training status to senior management.

4.1.5 **Region SH&E Manager**

Responsible for the following:

- Ensuring Region and Business Line management understand the function of the LMS and provide training, access and resources.
- Working with office managers and project managers to develop schedules, develop skills of local employees assigned with training and recordkeeping duties, and providing training classes as requested.
- Reviewing and approving qualifications of safety training providers.
- Approving training lesson plans and course agendas for training courses.
- Offering all training participants the opportunity to evaluate training events.
- Reporting compliance with training program requirements to line management.

4.1.6 **Employees**

Responsible for the following:

- Completing a TNA.
- Coordinating with their supervisor to complete training identified in the TNA.
- Monitoring their own training expiration dates and coordinating refresher training to prevent expiration of any required training certifications.
- Maintaining a personal record of all training certifications.
- Supplying copies of training completion certificates 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 aid employees in identifying applicable training.

4.2.2 **Employees** shall complete the TNA:

- Upon employment;
- When an employee is assigned a significantly different job with new hazards;
- When an employee is assigned to a new project or work location; and/or
- For employee's whose job duties do not frequently change, the TNA may be updated on an annual basis.

4.2.3 The employee's **supervisor** will review, modify and/or confirm training assignments in the TNA, and support enrolment into the required training programs. Details for completing a TNA may be found in *S3NA-003-WI1 Training Needs Assessment Process.* Refer to the TNA required training, *S3NA-003-FM2 Training Needs Assessment.*

4.2.4 An electronic training record will be maintained in LMS by the employee and supervisor.

4.3 Training Delivery

4.3.1 SFL Training may be delivered in several methods to meet AECOM's wide diversity of staff, office, and project locations.

4.3.2 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 is performed by AECOM's internal resources and may include intranet and classroom-based training.

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. Refer to *S3NA-003-TP1 SH&E Training Syllabus Template* and *S3NA-003-TP2 SH&E Training Certificate Template*. 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 should be approved by the **SH&E Department** prior to any employee participating in training.

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 do not have current training.

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.

4.6.3 **Employees** must complete training identified in the TNA prior to conducting the associated work activity. Completion is determined by the instructor and may include: active participation, passing quizzes, examinations or other form of assessment.

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 with through the use of *S3NA-003-FM8 SH&E Training Course and Instructor Evaluation* or the online version of the form.

4.7.2 Training instructors will review evaluations at the conclusion of training and to request assistance addressing consistently noted deficiencies when appropriate.

4.8 Training Tracking

4.8.1 Records documenting employee participation safety training will be maintained in accordance with applicable regulatory requirements and according to the following:

- Each employee is responsible for maintaining a personal file that contains their history of training certifications.
- Sign In Sheets can be used to record attendance of training, *S3NA-003-FM1 SH&E Training Sign In* Sheet.
- Records shall be retained in accordance with *S3NA-003-WI3 Training Documentation.*

4.8.2 Each region/district is responsible for maintaining documentation of course completion by each individual employee in AECOM's LMS.

4.8.3 Training Expiration

- Training will expire in accordance with requirements specified on syllabus.
- Expiration of training will be tracked electronically using the AECOM LMS.
- Employees tracking training outside of the AECOM LMS are responsible for tracking their individual training expiration dates.
- If training expires for an employee, they will be disqualified from performing tasks associated with the training when training is required by AECOM defined requirements or legislation/regulation to perform the tasks. Once training has been renewed, the employee will be qualified to perform associated tasks.

5.0 Records

None

6.0 Attachments

6.1 S3NA-003-WI1 Training Needs Assessment Process

6.2 S3NA-003-WI2 Training Delivery

6.3 S3NA-003-WI3 Training Documentation

6.4	S3NA-003-FM1	SH&E Training Sign In Sheet
6.5	S3NA-003-FM2	Training Needs Assessment
6.6	S3NA-003-FM3	Training Needs Assessment – Administrative Employees
6.7	S3NA-003-FM4	Training Needs Assessment – Technical Employees
6.8	S3NA-003-FM5	Training Needs Assessment – Employee Supervisors & Project Managers
6.9	S3NA-003-FM6	Training Needs Assessment – On-site Project Supervisors
6.10	S3NA-003-FM7	Training Needs Assessment – Line Managers
6.11	S3NA-003-FM8	SH&E Training Course and Instructor Evaluation
6.12	S3NA-003-TP1	SH&E Training Syllabus Template
6.13	S3NA-003-TP2	SH&E Training Certificate Template

Americas

Training Needs Assessment Process

S3NA-003-WI1

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 Safety Health & Environment (SH&E) Training Needs Assessment (TNA).

2.0 References

None

3.0 Process

3.1 Employees will complete a SH&E TNA:

- Upon employment
- When an employee is assigned a significantly different job with new hazards
- When an employee is assigned to a new project or work location

3.2 Supervisors will verify that their direct reports have completed a TNA through one of the processes defined below. 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 task assignments and client needs.

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

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

4.0 Records

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

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 **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 **Region SH&E Manager**, or their designee, and communicated to all Authorized Instructors for use and application.

2.0 Authorized Instructors

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

2.2 The **Region SH&E Managers** 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.

Training instructors will review evaluations at the conclusion of training and to request assistance addressing consistently noted deficiencies when appropriate.

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 stored in the LMS.

4.0 Certification Levels

4.1 **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.

4.2 **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.

4.3 **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.

4.4 **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 *S3NA-202-PR1 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.

Training Documentation

1.0 Employee Training File

1.1 Minimum Requirements

1.1.1 Supervisor-approved personal training requirements is defined in a Training Needs Assessment (TNA).

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 Department updating training expiration dates when entering/updating training certificates.

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SH&E Training Sign-In Sheet

S3NA-003-FM1

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.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					

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 _____

Americas

Training Needs Assessment

S3NA-003-FM2

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 Region 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 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
	Do you work in the State of California	Injury Ilness Prevention Plan	3	108	California	0.5
	Are you in the Environment Business Line?	Behavior Based Safety (all three modules)	Initial - Training does not require renewal		US, Canada	2.0

* 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	Office Ergonomics - Awareness Training	3	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	3	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*	3	102	Canada	0.5
	Are you assigned to an AECOM Office?	Emergency Evacuation	1	101	US, 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)?	MANDATORY 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	0.75
	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	5.0
	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	0.75

* 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	2	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*	Initial - Training does not require renewal	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	Initial - Training does not require renewal	201	US, Canada	8

* 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						
	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
		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

* 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						
	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 respiratory protection PPE by AECOM, and/or do you wear a respirator inside an Exclusion Zone for more than 30 days in any yea	Hearing Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	207	US, Canada	0.75
		Respiratory Protection - Awareness Training*. Consult your RSH&EM about the need for Medical Surveillance.	Annual	519	US, Canada	0.75
	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

* 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 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
		First Aid - Performance Training*	2	101, 207	US	2
	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	0.75
	Do you work in close proximity to heavy equipment (i.e. skid steers, back hoes, excavators, bulldozers and other yellow iron)?	Mobile and Heavy Equipment Operations 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	0.75

* 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 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 sampling/salvaging with the use of an electro-fisher?	AED - Performance Training	2	203, 207	Canada	0.5
		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	0.75
	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, Canada	0.75

* 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 work in a location with exposure to a fall of 6ft/2m or greater?	Fall Protection - Awareness Training*	3	304	US, Canada	0.75
	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	0.75
	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
	Do you perform activities involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities when the corresponding Heat Index is >91 F/33 C?	Heat Stress Prevention - Awareness Training	3	511	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	0.75
	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	5
	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	24
	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

* 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						
	Do you sign HzM/HzW manifests or bills of lading while acting as an Authorized Agent on Behalf of a Client?	Level 1 Shipper - HzM(US)/TDG(CDN) - Performance Training*	3	508	US, Canada	5
		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
	CA Title 22 - Performance Training	Are you involved with the shipment of HzM/HzW in California, or do you provide HzW waste management services on a project site in California?	Annual	415, 508	US	0.5

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

* 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 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
	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	0.75
	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? Testing of potentially live electrical equipment is considered live electrical work.	Arc-FLASH (NFPA 70E) Training*	Initial - Training does not require renewal	302, 410	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
CONSTRUCTION, ENGINEERING & INSPECTION OVERSIGHT, MANAGEMENT AND PERFORMANCE						
		Electrical Safety - Awareness Training*	2	302, 410	US	0.75
	Do you have the potential to access scaffolding?	Scaffolding Safety - Awareness Training*	3	311	US, Canada	0.75
	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	0.75
	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

* 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 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 products, etc.	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	0.75
	Do you have potential to be exposed to Asbestos?	Asbestos - Awareness Training*	Annual	501	US, Canada	0.75
	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

* 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 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
	Do you work in an analytical laboratory space?	Laboratory Safety – Awareness Training*	Annual	209, 512	US, Canada	1.0

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, Canada	1
	Do you perform any of the following roles during a Confined Space Entry operation: Entrant, Attendant, Entry Supervisor?	Confined Space Entry – Entrant & Attendant Performance Training*. Consult your project Safety Plan and Region SH&E Manager to determine training required per your job role and function.	3	301	US	8
	Do you perform any of the following roles during a Confined Space Entry operation: Entrant, Attendant, Supervisor?	Confined Space - Performance Training*	3	301	Canada	8

* Indicates training required by legislation/regulation

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

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?	Boating Safety Course – Performance Training	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 Course – Performance Training. Consult your project Safety Plan and Region 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

* 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 on frozen water bodies infrequently?	Working Around 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 Performance 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 Performance Training	Initial - Training does not require renewal		Canada	
	Do you perform electo-fishing sampling operations?	Electrofishing Performance Training*	Initial - Training does not require renewal	407	US, Canada	16

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	3
	Do you operate a soil density/moisture gauge?	Nuclear Density Gauge Operator - Performance Training*	Annual	516	US, Canada	8

* 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						
	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 Safety - 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?	Powered Industrial Truck (Forklift) Safety - 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 mobile equipment, heavy equipment or Yellow Iron?	Mobile and Heavy Equipment Performance Training - Coordinate training with Region 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 General Roadway Worker Protection (FRA) - Awareness Training (or client equivalent)*	Annual	201	US	1.5
		Railroad General Roadway Worker Protection (FRA) - Awareness Training (or client equivalent)*	Annual	201	Canada	1.5

* 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 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	
	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

* 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						
	Asbestos	Competent Person (Asbestos) - Designation made by Project Manager in consultation with RSH&EM.*	2	202, 501, 514	US, Canada	
	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	

* 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						
	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	
	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	

* 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						
	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	
	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	

* 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						
	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.						

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

Americas

Training Needs Assessment – Administrative Employees S3NA-003-FM3

1.0 Scope and Purpose

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

1.2 Administrative employees will only work in an AECOM office and do not travel to project sites, client 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

Americas

Training Needs Assessment –Technical Employees

S3NA-003-FM4

1.0 Scope and Purpose

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

1.2 These employee perform work in AECOM offices 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	2	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	2	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	2	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
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

Americas

Training Needs Assessment – Employee Supervisors & Project Managers

S3NA-003-FM5

1.0 Scope and Purpose

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

1.2 These employee perform work in AECOM offices 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	2	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	2	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 - Awareness Training*	0.8	304	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**
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	2	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
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

Americas

Training Needs Assessment – On-site Project Supervisors

S3NA-003-FM6

1.0 Scope and Purpose

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

1.2 These employee perform work in AECOM officesas 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	2	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	2	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	2	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 - 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

Training * Indicates training is required by applicable regulation/legislation.	**Hours to Complete Training**	**Related SOP**	**Training Frequency (Years)**	**Applies to US/Canada Employees**
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

Americas

Training Needs Assessment – Line Managers

S3NA-003-FM7

1.0 Scope and Purpose

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

1.2 These employees primarly perform work in AECOM offices 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
SH&E Fundamentals - Awareness Training	2.0	003, 209	Annual	Canada
SH&E Fundamentals - Awareness Training	2.0	003, 209	3	US

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)	**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

AECOM

Americas

SH&E Training Course & Instructor Evaluation

S3NA-003-FM8

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.

Americas

Training Syllabus – [COURSE TITLE]

S3NA-003-TP1

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]

Americas

Incident Reporting

S3NA-004-PR1

1.0 Purpose and Scope

1.1 To provide direction for timely reporting SH&E incidents.

1.2 This procedure applies to all AECOM Americas based employees and operations, as required per the *S2-001-PR1 Incident Reporting (Global Implementing Procedures).*

2.0 Terms and Definitions

2.1 **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.

2.2 **General Liability –** Incidents where AECOM could potentially be held liable.

2.3 **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.

2.4 **Recordable Injury –** A work-related injury or illness that results in the following. (See *S3NA-601-PR1 Recordkeeping* for definitions).

- Fatality;
- Medical Treatment beyond first aid;
- Days away from work;
- Restricted work or transfer to another job;
- Loss of Consciousness; and/or
- A Significant injury or illness diagnosed by a medical professional.

2.5 **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).

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

- 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.
- Any potentially work related abnormal condition to include pain and soreness shall be reported.
- Fire, explosion, or flash that is not an intended result of a remediation process, laboratory procedure, or other planned event.
- Any incident involving company-owned, rented, or leased vehicles (including personal vehicles used for company business).
- Any breach of a numeric limit attached to a governmental permit or consent.
- Any failure to perform the requirements of a non-numeric requirement contained in a government permit or consent.
- Any failure to obtain a government permit or consent when required (including failure to obtain revisions before an existing permit or consent expires).

- Any notice of violation or notice of non-compliance received from a regulatory authority with enforcement powers.
- Property damage resulting from any AECOM or subcontractor activity. This would include Motor Vehicle Accidents (MVA), buildings, equipment, and near miss events.
- Unexpected release or imminent release of a hazardous material.
- Unexpected chemical exposures to workers or the public.
- A safety, health or environmental related injury, damage, incident or complaint associated with the public as it relates to an AECOM activity.
- SH&E-related incidents that could result in adverse public media interest concerning AECOM or an AECOM project.
- Any inspection by a Federal, Provincial, or local safety, health, & environmental enforcement agency.

2.6.1 **Major SH&E Incident –** Any SH&E Incident that meets/involves the following criteria:

- Fatality;
- Amputation;
- Hospitalization for treatment for more than 24 hours (Admission);
- Absence from work for more than 30 calendar days due to work-related injury/illness;
- Any single event resulting in more than one employee requiring medical treatment or more than one employee being away from work more than three days;
- Any SH&E-related Consent Agreement/Order/Lawsuit or enforcement action seeking more than $10,000 or alleging criminal activity;
- Any spill or release of a hazardous material that is reportable to a regulatory agency;
- Any Notices of Violation resultant of not operating within a government permit/license or consent;
- Any incident resulting in property damage expected to exceed $2,500 US dollars;
- Any security related incident that could have caused harm to an AECOM employee; and/or
- Near Miss incidents that may have resulted in any of the above but because of “luck” did not happen.

2.6.2 **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:

- A crane drops a 454 kilogram (1,000 pound) beam during a lift – and nobody is hurt, no equipment or property is damaged.
- A work crew is conducting a survey along the highway. A vehicle leaves the roadway and the vehicle enters the survey area at 80 kilmeters per hour (50 miles per hour). The vehicle misses an employee by 1 metre (3 feet); the driver recovers control of the vehicle and leaves the area.
- Awareness of a verified equipment recall or incident that occurs at another similar worksite.
- Unsafe conditions should not be reported as Near Misses but should be identified in Inspection and Observation Programs (such as LifeGuard and Office Inspections) and tracked until resolved/closed.

2.6.3 **Security Incident –** Any security related incident that could cause harm to or is associated with an AECOM employee in the course of duty.

2.7 **SH&E Incident Report (IR) –** Form used to document incidents which shall be completed when there is no internet access to IndustrySafe. Within 4 hours for a Major Incident and 24 hours for all others. IR's should be submitted to the **Supervisor** and **Region SH&E Manager**.

2.8 **SH&E Incident Reporting and Assistance Line –** 1-800-348-5046

- Email – sri@aecom.com (for locations that cannot access IndustrySafe)
- IndustrySafe on-line reporting link – https://www.industrysafe.com/AECOM

2.9 **WC Carrier/Claims –** Workers Compensation Third-Party Insurance Partner.

2.10 **Workers Compensation –** Analyst manages all Americas-based injury and illness claims.

2.11 **Workers Compensation Board** (Canada) – Known provincially by variations such as WCB, WSIB, CSST, WSCC, etc.).

3.0 References

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

3.2 S3NA-601-PR1 Recordkeeping

3.3 S3NA-603-PR1 Incident Investigation and Review

3.4 S3NA-606-PR1 Modified Duty Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employee**

- Contact the SH&E Incident Line at 1-800-348-5046 for work related non-emergency medical advice by Work Care and/or to obtain AECOM contact information.
- 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**, **District SH&E Manager**, and/or project SH&E Professional prior to obtaining medical treatment.
- Complete Industry Safe on-line reporting within four hours of incident. If injury/illness prevents input, **Supervisor** will be responsible for initial input. If employees lack internet access to IndustrySafe, a hardcopy Incident Report form shall be completed and submitted to the **Region** or **District SH&E Manager**. If incident is not major as defined above, IndustrySafe input by the end of workday (24 hours maximum) is required.

4.1.2 **Supervisor**

- 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 required to make the scene safe. Consult with the **Region SH&E Manager** and leadership if guidance is required.
- For Major Incidents immediately contact leadership up to the **Regional Executive** and **Region SH&E Manager** by phone once the situation has stabilized.
- Complete an initial incident notification in the IndustrySafe on-line report if employee is not capable/incapacitated and any other applicable documentation .pdf and attach to the on-line report such as:

  a. Police Report

b. Photographs of incident scene

c. Witness statements

d. Federal/State/Province Specific Forms

e. Timeline

f. Root cause analysis

- As appropriate, initiate an Incident Investigation and Review per the requirements of *S3NA-603-PR1 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.
- Where there is potential for criminal, civil or regulatory action against AECOM or any of its employees or subcontractors, a representative of AECOM Americas legal team (typically regional legal 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. The Office of Risk Management and Region Counsel should also be notified if the public is involved or a claim is anticipated.

4.1.3 Region SH&E Manager

- Monitor phone, messaging, and IndustrySafe for first report of incident and contact those involved for support as necessary.
- Upon receipt of an Incident Notification, contact the **Supervisor** to discuss the incident as well as short term and long term corrective actions.
- Coordinate case management with the AECOM **Workers Compensation Analyst**.
- Notify and coordinate with appropriate **Operations Manager** of the incident.
- As appropriate, assist an Incident Investigation and Review.
- Report all fatalities and/or Major SH&E incidents to the **Americas SH&E Director**, **Business Line Executive** and **Regional Executive** immediately by phone if not already notified by the **Supervisor**.

4.1.4 District SH&E Managers

- Inform appropriate personnel that have not already been notified of incidents that may affect them.
- Review electronic entry of incident information in IndustrySafe and coach **Supervisors** and **Employees** on completing investigations. Be responsible to manage open incidents until closure.
- Coordinate with **Region SH&E Manager** for management of medical support.
- Assist with Incident Investigation and Review per the requirements of *S3NA-603-PR1 Incident Investigation and Review*.
- Forward incident data as needed to SH&E Department, Legal, Human Resources and others as necessary for insurance claims.
- Enter Corrective Actions as a result of Incident Investigation and Executive Incident Review into IndustrySafe to monitor completion.

4.1.5 Workers Compensation Analyst

- Contact the employee and work with the Supervisor as needed to resolve a request for Workers Compensation coverage.
- Obtain from the employee medical clearance to return to work.

- Work with Human Resource or other third parties as needed to facilitate the requirements for the locality are met.

4.2 Workers Compensation Program

If an employee potentially requires support under Worker's Compensation, the employee will be contacted by the **Workers Compensation Analyst.** The employee's **Supervisor** shall also work with the **Workers Compensation Analyst** as needed in support of the employee. Prior to the employee returning to work after any treatment provided by a medical provider, a medical clearance is to be provided by the employee to the **Workers Compensation Analyst** and their **Supervisor**. The medical clearance will be scanned and added to the IndustrySafe incident by the **Employee** or **Supervisor**.

4.3 Modified Work Program

Every attempt will be made to accommodate reasonable restricted and modified duties to facilitate a safe return to work of the injured employee. The return to work program is based on the specific needs and circumstances to each case, refer to *S3NA-606-PR1 Modified Duty Program*. Each instance will be evaluated on a case-by-case basis. The resulting modified work program will be specific to the injured employee. In Canada, a third-party administrator works with the **Workers Compensation Analyst** or other designated Human Resource staff. The third-party administrator is familiar with the reporting requirements by province, which vary slightly between jurisdictions across Canada and completes filings and maintains correspondence with the appropriate board on the company's behalf.

4.4 Refer to the *S3NA-004-WI1 SH&E Reporting Flowchart* and *S3NA-004-WI2 Incident Response and Reporting Instructions* for specifics on the process and work flow for incident reporting.

5.0 Records

5.1 Incident reports and supporting documentation are maintained in the IndustrySafe database.

5.2 If a hardcopy Incident Report is generated it should ultimately be scanned and kept in the IndustrySafe database. All incident information 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 Attachments

6.1 S3NA-004-WI1 SH&E Reporting Flowchart

6.2 S3NA-004-WI2 Incident Response and Reporting Instructions

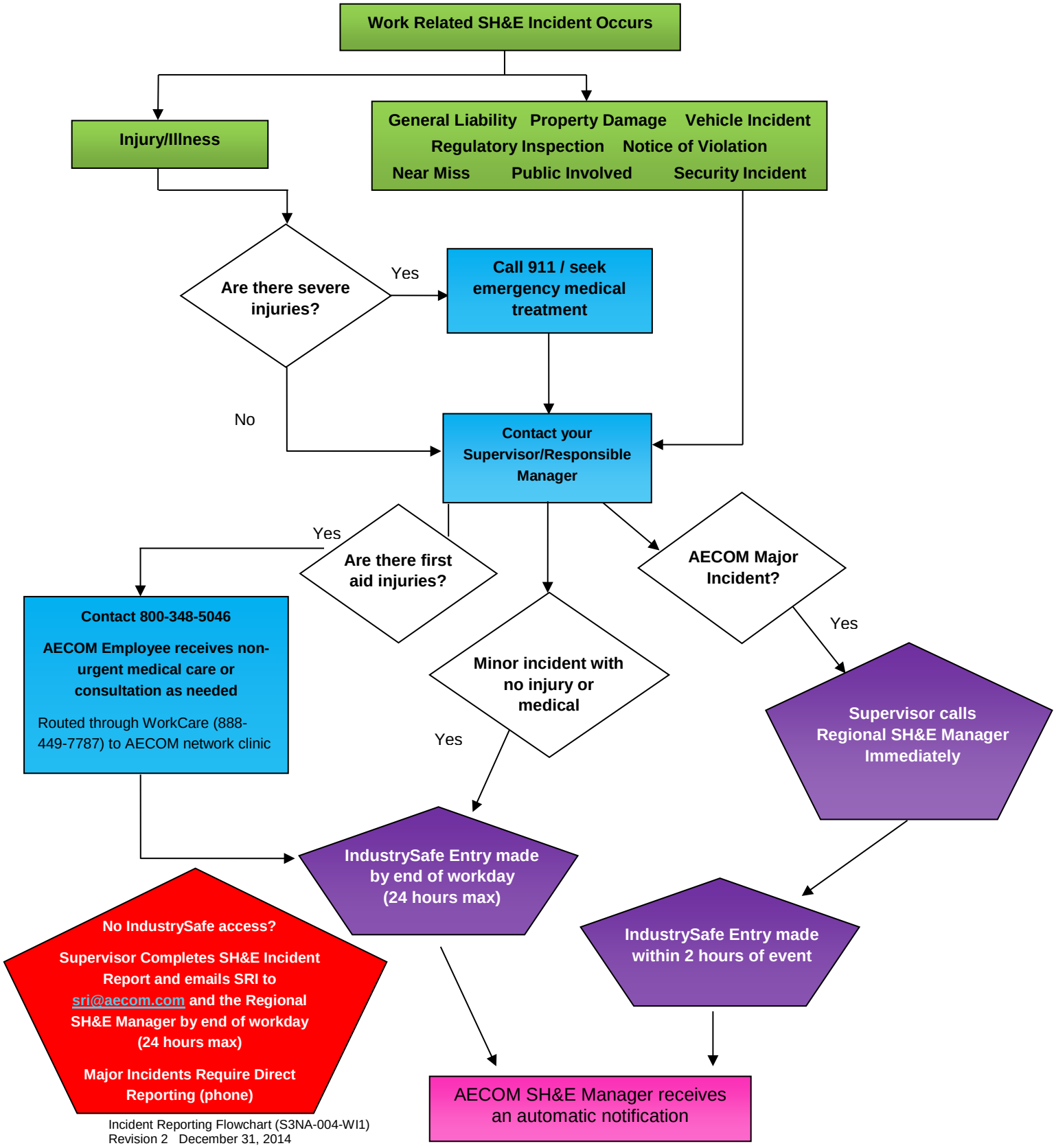
6.3 S3NA-004-FM1 SH&E Incident Report (IR)

6.4 S3NA-004-FM2 Near-Miss Incident Report

Americas

Incident Reporting Flowchart

S3NA-004-WI1



Americas

Incident Response and Reporting Instructions

S3NA-004-WI2

1.0 Steps for Initial Response

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

1.2 If necessary call for emergency services and provide first aid/CPR if individual(s) maintains current certification.

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

1.4 Identify and preserve sources of evidence and 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).

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

1.6 Responsible employee/supervisor is to follow SHE Incident Reporting Procedure to initiate internal reporting and obtain guidance, as necessary. If a manager or supervisor is not available, any AECOM employee can initiate the reporting or make the call.

1.7 The employee / supervisor completes the entry into IndustrySafe.

2.0 Fatality or Serious SH&E Incident Notification

2.1 Any fatality or serious SH&E incident is to be directly reported via a verbal dialog 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 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 manager (i.e. supervisor/office/branch/business line/project manager).

3.0 Internal Reporting Procedures

3.1 The call (from the scene of the incident, if possible) or entry into IndustrySafe initiates the reporting procedures.

3.2 For Emergency Injuries and Incidents

- Call Emergency Services e.g. 911
- **Managers** call their appropriate supervision and their Regional SH&E Manager immediately once the situation is safe and stabilized.
- The responsible manager, or delegate, must make initial notification into IndustrySafe within 4 hours of the event.

3.3 Non-emergency injuries or medical conditions

- Notify your responsible manager, supervisor/project manager.
- Call the Incident Reporting and Assistance Line at 1.800.348.5046 for connection with Work Care medical support

3.4 The **employee** or responsible manager must make initial notification into IndustrySafe within 4 hours of the event.

3.5 Property damage, environmental releases, and non-medical incidents

3.5.1 Immediate assistance circumstances

Contact your responsible manager, supervisor/project manager.

Call the Incident Reporting and Assistance Line at 1.800.348.5046 for situations that require immediate assistance (property damage estimated above $2,500, utility strikes, incidents involving the public, security-related incidents, etc.). The Assistance Line will connect you to the proper authorities within AECOM.

The employee or responsible manager must make initial notification into **IndustrySafe** within four hours of the event.

3.5.2 Non-critical and no-injury incidents

Examples include: Property damage less than $2,500, all near misses, etc.

Contact your responsible manager, supervisor/project manager.

The employee or responsible manager must make case entry into IndustrySafe within 24 hours of the event.

3.5.3 The employee involved in an incident shall complete incident reporting in IndustrySafe, or delegate to their responsible manager, within the required timeline for the category of event from 3.3 through 3.4 above.

- If the employee is unable to complete the report because of the severity of the injuries, the responsible manager, should start the IndustrySafe entry and notification process.

3.6 The **Project Manager/Supervisor** will:

- 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
- Conduct Executive Incident Review and implement at the project/office level corrective actions; dissmenate lessons learned.

3.7 The **Regional SH&E Manager** must:

- Support as requested an internal or external investigation of the incident (Regional Counsel may request/oversee an external investigation).
- Work with regional/business line leadership, Human Resources, and Regional Counsel or Media Communications, as requested.

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-PR1 Recordkeeping.*

4.2 The **Project Manager**, 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 the Americas, 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
- If required by OSHA (such as 1 or more hospitalized, etc.)

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, 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 AECOM's Workers Compensation Analyst 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. Injured U.S. based employees will be referred to the Workers Compensation Analyst for potential claims processing. Workers Compensation regulations vary by State. The Workers Compensation Analyst and the RSH&E Manager will ensure that appropriate State reporting has been completed, as applicable. For property damage incidents with any potential resulting liability to the company will be referred to the Insurance group and liability carrier for claims processing.

AECOM

Americas

SH&E Incident Report

S3NA-004-FM1

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: CANADA NORTH South	DISTRICT:
	PROJECT NUMBER:
BUSINESS LINE: AECOM CORP GROUP SERVICES CONSTRUCTION SERVICES (CS) ENERGY & POWER ENVIRONMENT B+P 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:

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**

Property Damage

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

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, EMPLOYEE Number, AND PHONE	SIGNATURE AND DATE

MANAGER COMMENTS:

MANAGER PRINTED NAME AND PHONE	SIGNATURE AND DATE

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**

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:

FOR MINOR INCIDENTS, THIS FORM MUST BE COMPLETED AND EMAILED TO SRI@AECOM.COM OR FORWARDED TO THE REGIONAL SH&E MANAGER BY THE END OF THE WORKDAY IN WHICH THE INCIDENT OCCURRED, OR A MAXIMUIM OF 24 HOURS FOLLOWING THE OCCURRENCE OF THE INCIDENT. MAJOR INCIDENTS MUST BE REPORTED IMMEDIATELY.

Submit Form

MOTOR VEHICLE ACCIDENT (MVA) REPORT

ONLY COMPLETE THIS PAGE FOR VEHICLE INCIDENTS

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/Employee Number	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:		

MOTOR VEHICLE ACCIDENT (MVA) REPORT

ONLY COMPLETE THIS PAGE FOR VEHICLE INCIDENTS

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 A SUPERVISOR'S REPORT OF INCIDENT BEEN COMPLETED? YES NO	
COMPLETED BY:	SIGNATURE:

DRIVER

AECOM

Americas

Near Miss Report

S3NA-004-FM2

If unable to access IndustrySafe. Please use this form to report any 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:**
EMPLOYEE TYPE: ☐ AECOM EMPLOYEE ☐ CONTRACTOR ☐ SUBCONTRACTOR ☐ JV PARTNER ☐ 3RD PARTY/PUBLIC	**SUPERVISOR:**
HOME OFFICE:	**DEPARTMENT NUMBER:**
JOB NUMBER/PROJECT LOCATION/PROJECT DESCRIPTION:	
DATE AND TIME OF NEAR MISS:	**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
POTENTIAL SEVERITY: ☐ NEGLIGABLE ☐ MARGINAL ☐ CRITICAL ☐ CATASTROPHIC
PROBABILITY: ☐ FREQUENT ☐ IMPROBABLE ☐ OCCASIONAL ☐ PROBABLE ☐ REMOTE
DESCRIPTION OF NEAR MISS:

If unable to access IndustrySafe. Please use this form to report any near-misses, you encounter as a part of your work. This may include office or field locations.

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?

FOR SH&E DEPARTMENT USE ONLY:

CORRECTIVE ACTIONS REQUIRING IMPLEMENTATION:	**RATIONALE:**
COMMUNICATED BACK TO EMPLOYEE: ☐	**COMMUNICATED BACK TO MANAGER:** ☐
COMPLETED BY:	**DATE:**

Americas

Vehicle and Driver Safety Program

S3NA-005-PR1

1.0 Purpose and Scope

1.1 This procedure applies to employees who operate motor vehicles that are owned, rented, or leased by AECOM and to employees who use personal, client or government-supplied vehicles while conducting AECOM business. This Vehicle and Driver Safety Program applies to AECOM Americas operations. Policies and procedures related to the operation of commercial motor vehicles are in addition to this procedure, see *S3NA-404-PR1 Commercial Motor Vehicles.* Operational procedures related to the use of AECOM owned vehicles are addressed in the *Americas Fleet Vehicle Operations Policy*.

1.2 Vehicle and transportation related death is among the leading causes of death in the United States. In the occupational setting, motor vehicle crashes are the number one cause of death.

1.3 Vehicle damage and damage to property by vehicles are generally avoidable incidents that can result in injuries and added costs for repairs and replacements.

2.0 Terms and Definitions

2.1 **Americas Fleet Vehicle Managemen**t – The team of AECOM employees who oversee the operations, safety, and performance of the Americas Fleet.

2.2 **Authorized Driver** – AECOM employees who have provided proof of a current driver's license, proof of insurance and completed AECOM Driver & Vehicle Safety Training. Employees authorized to operate an AECOM Fleet Vehicle must receive additional approval by Region Fleet Vehicle Coordinators. Refer to *Americas Fleet Vehicle Operations Policy*.

2.3 **Commercial Motor Vehicle (CMV)** – For AECOM operations, a CMV is defined as a vehicle used for AECOM business that:

- ≥10,001 lbs gross vehicle weight rating (GVWR); and/or
- Carries a quantity of hazardous material (quantities ≥ 1001 lbs. combined total weight) at any time beyond the criteria in 49 CFR 173.6 (Materials of Trade).

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

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

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

2.8 **Fleet Vehicle** – A motorized vehicle owned or leased by AECOM. These vehicles may be assigned to a specific driver or may be part of an office vehicle pool.

2.9 **IndustrySafe** – AECOM's internal database for the management of safety, health and environmental incidents. IndustrySafe is accessible to all AECOM employees, and maintains confidentiality for protected information.

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

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

2.12 **Managers/Management** – All AECOM company personnel with supervisory responsibilities or direct reports.

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

- Mobile/Cellular phones
- Personal Data Assistant (PDA)
- iPads, iPods, or other tablet models
- Computers
- Global Positioning System receivers

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

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

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

2.17 **Task Hazard Analysis (THA)** – A process for planning and evaluating tasks, such as driving, for hazards and control measures to reduce and eliminate the risk of a harmful event.

2.18 **Vehicle Incident** – An incident, for the purposes of this procedure, is a vehicle collision or other vehicle related event where personal injury or property damage occurs. This includes theft, vandalism, and criminal mischief. Citations are considered incidents when the citation is received during the course of business and results in a restricted or suspended license, a governmental motor vehicle agency assigning points to the employee's license, or the employee provides AECOM's insurance as proof of insurance at the time of incident.

3.0 References

3.1 AECOM US, Canada and South America Employee Handbook (HR Department)

3.2 Americas Fleet Vehicle Operations Policy

3.3 AECOM Global Travel Policy

3.4 National Safety Council

3.5 Smith Systems

3.6 WP-001-PR Firearms Standard

3.7 S2-032-PR1 Weapons Safety

3.8 S3NA-003-PR1 SH&E Training

3.9 S3NA-004-PR1 Incident Reporting

3.10 S3NA-209-PR1 Project Hazard Assessment and Planning

3.11 S3NA-404-PR1 Commercial Motor Vehicles

3.12 S3NA-603-PR1 Incident Investigation and Review

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Regional Executive**

- Supports the implementation of the *Americas Fleet Vehicle Operations Policy*, including preventative maintenance, vehicle disposition and insurance.
- Providing necessary resources to manage vehicles and drivers to the extent their operation requires.

4.1.2 **Supervisor**

- Confirming employees are informed of the provisions of this procedure and related vehicle procedures.
- Providing a copy of this procedure to an employee who will be driving an AECOM owned, leased or personal vehicle for company business.
- Verifying that each employee has completed *S3NA-005-FM1 Driver's Authorization* per the instructions on the form.
- Allowing employees to designate time to complete required driving safety training, vehicle inspections and related activities.
- Assigning driving tasks to authorized employees only.
- Selecting and providing vehicles for use by authorized employees that are appropriate for the planned working conditions and environment.
- Supporting employees in the reporting of vehicle incidents per *S3NA-004-PR1 Incident Reporting,* including the entry of the incident into IndustrySafe.

4.1.3 **Employee**

- Following this procedure and applicable laws while operating a vehicle.
- Completing required training consistent with the training needs assessment and requirements per the *S3NA-003-PR1 SH&E Training*.
- Reporting to their supervisor if the vehicle selected is not appropriate for working conditions and environment.
- Reporting to their supervisor if they are inexperienced in operating the type of vehicle they are assigned.
- Reporting to their supervisor if they are inexperienced driving in the type of working conditions and environment they are assigned.
- Review the Driving THA and prepare a Journey Management Plan by completing the *S3NA-005-TP1 Journey Management Plan.*
- Immediately reporting vehicle incidents per *S3NA-004-PR1 Incident Reporting*, including the entry of the incident into IndustrySafe.
- Notifying their Supervisor, Region SH&E Manager, and Region Counsel upon receipt of a legal summons associated with a moving violation related to the use of a company vehicle.
- Immediately reporting a change or limitation(s) to his or her Driver's License to his or her Supervisor.
- Conducting a pre-operational inspection of the vehicle for damage or deficiencies and reporting discovered deficiencies affecting the safe operation of the motor vehicle to the appropriate authority (Region Fleet Vehicle Coordinator, Rental Car Agency or other).

4.1.4 Region SH&E Manager / SH&E Department

- Maintaining and updating resources for Driver Safety Training
- 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.
- Participating in the incident investigation and review process.

4.1.5 Region Fleet Vehicle Coordinator (in their assigned regions)

- Escalating safety issues related to fleet vehicles for resolution through the Fleet Management Company.
- Disposing of fleet vehicles per the guidance in the *Americas Fleet Vehicle Operations Policy*.
- Refer to the Region SH&E Manager for Fleet Vehicle driver training verification and risk assessment.

4.1.6 Region Human Resources Manager

- Responsible for verifying license and proof of personal vehicle insurance at the time of hire and upon verification of the Driver Authorization Form.

4.2 General Procedures and Practices

- Only Authorized Drivers are to operate a motor vehicle (rental, personal, or AECOM owned/leased) while on AECOM business, refer to *S3NA-005-WI1 Authorized Driver Safety Practices*.
- Drivers must comply with *AECOM's Global Travel Policy*, *Americas Fleet Vehicle Operations Policy*, and the applicable laws. (NOTE: *Individual state, provincial, and local laws vary*.)
- AECOM Fleet Vehicles and Rentals Cars should not be operated if the age or mileage on that vehicle exceeds the following:
  - Light/Medium Duty Trucks: 72 months/150,000 miles
  - Sedans: 36 months/80,000
  - Sport Utility Vehicles/Vans: 60 months/100,000 miles
- Seat belts are to be worn by the occupants. The number of passengers shall not exceed the manufacturer's specifications for the vehicle.
- Motorcycles may not be operated on company business unless:
  - Specific approval is provided by the **Supervisor** with concurrence from the **Region SH&E Manager.**
  - A hazard analysis is completed.
  - Required training and license is in place.
  - Headlights or daytime running lights will be used when the vehicle is in operation. Class 2 or 3 safety vest worn while operating a motorcycle.
- Fire arms and weapons are not permitted in AECOM Fleet Vehicles or rental vehicles insured by AECOM. Firearms and weapons in personal vehicles are subject to the laws and regulations of the respective local, provincial, state, territory, federal and region and/or country. In accordance with the Global Safety Department standards, no firearms or weapons are allowed to be used without express permission by the **Region Executive** and **Chief Security Officer**, refer to the *WP-001-PR Global Firearms Standard*. Exceptions can be made in writing from the **Region Executive** and **Chief Security Officer** if knives or weapons are required as part of the work activity or for third party protection and planned for appropriate hazard control measures and training, refer to the *S2-032-PR1 Weapons Safety*. Vehicles are to be selected based on the nature of planned use. In some working conditions, four-wheel drive and higher clearance vehicles may be required to ensure safe travel. Vehicle requirements/specifications must be identified in the project specific safety plan or THA.

- Vehicles are to be outfitted with the appropriate support equipment based on the THA or client vehicle specifications. Support equipment may include cones, rotating waning lights, warning flags, vehicle identification (magnetic door signs or similar,), wheel chocks, cargo nets, rollover protection.
- Drivers are to operate vehicles in a manner that avoids situations where backing is necessary. Reverse parking of all vehicles while on business is required. Backing of trucks and heavy equipment requires then a spotter to assist the driver in avoiding collisions.
- Non-AECOM drivers (subcontractors, joint venture partners, clients) are prohibited from operating an AECOM leased or owned vehicle unless the activity is specifically agreed to in the applicable contract and only if the use of the vehicle is consistent with the terms of the contract.

4.3 Distracted Driving

The use of all mobile communication devices (MCDs) while driving is strictly prohibited. MCDs include all hand-held or hands-free devices, including all mobile phones and other portable electronic devices that cause driver distraction such as tablets (e.g., iPads), PDAs, pagers, iPods, MP3s, GPS, DVD players, laptops, etc. Employees shall not use a personal or company MCD while driving a company vehicle; use a company MCD while driving a personal vehicle; or use a personal MCD while driving a personal vehicle on company business. Driving includes the time spent in traffic or while stopped at red lights or stop signs.

GPS units and GPS units on smart phones may only be used if factory installed or secured to the vehicle with a bracket that allows the driver to view the image without having to take their eyes off the road. Electronic devices shall be setup for operation prior to commencing driving activities.

4.4 Impairment

- Impairment can take many forms ranging from fatigue, to the use of prescription medication or alcohol (even small amounts), to the abuse use of illegal and legal drugs and alcohol. AECOM **Employees** are not to drive in an impaired condition.
- AECOM **employees** are prohibited from being under the influence of alcohol or drugs or improperly using medication in a way that could diminish, or raise questions concerning, an employee's ability to perform at his or her best while performing services for or on behalf of AECOM.
- AECOM **Employees** are prohibited from operating a vehicle if they are experiencing signs and symptoms of fatigue. **Employees** should stop work and rest before driving. No **Employee** should operate a vehicle if they have worked 14 consecutive hours within a 24 hour period.

4.5 Task Hazard Analysis (THA)

All **Employees** are to review a Driving THA prior to driving for company business, refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.6 Journey Management

Journey Management is a process for planning and executing necessary journeys safely. Journey Management includes the following steps:

- Determining if the trip is necessary;
- Evaluating alternative safer modes of transport;
- Evaluating the potential to combine journeys with others.

Trips in excess of 100 miles (160 kms) (each way), or into remote or hazardous areas, or when otherwise deemed necessary, shall have a Journey Management Plan (JMP). This plan typically includes the route, location of route hazards, timing, rest periods and locations, communications, emergency response and security arrangements.

A sample Journey Management Plan has been provided in *S3NA-005-TP1 Journey Management Plan.*

Drivers are responsible for developing the Journey Management Plan in coordination with their **Supervisor**, **Project Manage**r and **Region SH&E Manager** (as appropriate).

4.7 Driver Safety Training

- Driver safety training is to be assigned based on the risks posed with the work environment and vehicle type, using the training needs assessment process, refer to *S3NA-003-PR1 SH&E Training*. A determination of training type is at the discretion of the **Supervisor**, the following guidance will be applied:
- Driver Safety Awareness – is appropriate for Authorized Drivers who periodically use their personal vehicle, AECOM Fleet Vehicle or rental car for AECOM business. Driver Safety Awareness training is an eLearning module approximately 1 Hour in length.
- Defensive Driver (online) – is appropriate for authorized drivers who are assigned an AECOM Fleet Vehicle or rental vehicle for a significant period of time with the expectation that the **Employee** utilizes the vehicle on a regular basis for AECOM business. Defensive Driver training is provided online through one of the following AECOM-approved training resources:
  - The National Safety Council
  - Alert Driving
- Defensive Driver (hands-on) – is appropriate for Authorized Drivers who drive in remote locations, hazardous environments (such as refineries, ports, terminals etc.), at-risk drivers, and as required by clients. Defensive Driver hands-on training is provided through one of the following AECOM-approved training resources such as Smith Systems. Hands on defensive driver training may also be required as a result of an incident or negative Motor Vehicle Report.
- Driver Retraining – Drivers involved in repeated motor vehicle incidents, incidents of sufficient severity or concern, or drivers identified as at-risk through AECOM's Motor Vehicle Report/Driver Abstract process shall be subject to a driver retraining program that may include any of the above programs or other training programs appropriate for the type of driving the employees performs. Retraining programs will be implemented at the discretion of the **Supervisor** and **Region SH&E Manager** Depending on the severity of the incident, the **Employee** may be subject to disciplinary and refused the right to drive on behalf of AECOM.
- Special Vehicles and Driving Conditions – Vehicles such as All-Terrain Vehicles (ATVs), four wheel drive vehicles, motorized carts, box vans and trailers (towing) require specialized training and supervision. Use of these types of vehicles is limited to AECOM projects, therefore training and qualification programs for drivers will be project specific. The **Project Manager** shall work with the **Region SH&E Manager** to tailor training to the specific needs of the project.

4.8 AECOM Fleet Vehicles (additional requirements)

- The requirements of this procedure apply to the use of AECOM Owned or Leased Vehicle, and additional requirements are set forth in the Americas Fleet Vehicle Operations Policy.
- Fleet Vehicles are to be parked on project sites in a manner that prevents the driver from backing (reversing) upon departure. For example, the vehicle should be backed into a parking spot or drivers should select a parking spot that allows them to "pull" through" so that the vehicle is facing the direction of departure.
- Fleet Vehicles are to have a "Safety Kit" that contains a first-aid kit, portable fire extinguisher, safety triangle, and two reflective safety vests. If not available, contact the **Region Fleet Vehicle Coordinator** about how to obtain one through the procurement system.

4.9 Personal Vehicles (additional requirements)

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

4.10 Rental Vehicles (additional requirements)

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

4.11 Requirements for Authorized Drivers

- Review the *S3NA-005-WI1 Authorized Driver Safety Practices* for more specifics.
- Perform pre-operation vehicle inspections, a sample vehicle inspection checklist is provided in *S3NA-005-FM2 Vehicle Inspection Checklist*.
- Arrange for preventive maintenance services for the vehicle and maintain it in sound mechanical condition, per manufacturer's recommendations.
- Drivers are not to permit unauthorized persons to operate an AECOM owned/leased/rented vehicle.
- Do not operate the vehicle if unsafe maintenance conditions exist that would likely result in vehicle damage or personal injury. This applies to vehicles owned or leased by AECOM and to personally-owned vehicles used for company business. Escalate other maintenance issues for correction to appropriate authority (**Region Fleet Vehicle Coordinator**, Rental Car Agency, **Supervisor** etc.).
- Use AECOM owned or leased vehicles for business only. Exceptions to use the vehicle as transportation to and from work, parking at residences overnight, may be permitted only if written approval is obtained from the **Regional Executive**.
- Transport only persons on AECOM related business or those persons receiving transportation as a prescribed service. Only drive vehicles in conditions for which the driver has the appropriate training and experience.
- No smoking by the driver or passengers in the vehicle.
- Drivers are responsible for damage caused by abuse of the vehicle.
- Secure the vehicle when left unattended.
- Securing loads in the inside and outside compartments of the vehicle. Do not rely on weight/shape of load alone. Always use a cargo net, straps, containers or other mechanical device when necessary to ensure load is secure. Mark loads that extend the beyond the end of truck, trailer or similar edge with a red warning flag of at least 16 square inches.
- Refrain from modifying existing equipment (warning sounds, backing alarms etc.) and from installing aftermarket equipment including toolboxes, truck caps, specialty lights, or towing equipment) without approval from the **Regional Executive, Region Fleet Vehicle Coordinator**, and AECOM Procurement Department.
- Shut the engine off when refuelling the vehicle.

4.12 Emergency Preparedness

- The following suggested items should be kept in vehicles used for company business in remote project locations:
  - First Aid kit, appropriate to the work and crew size, or per regulations.
  - Fire extinguisher, safety triangle, and safety vest
  - Emergency equipment (e.g., flares, flashlight, blanket, drinking water, etc.) based on conditions.
  - Means of communication (cell phone, radio or satellite phone), extra batteries or a charger.
- To the extent possible, **Employees** should refrain from changing tires or making repairs to vehicles in the field. A road side assistance service should be identified for vehicles used for company business in advance travel.
- Specific emergency procedures are to be identified in the Journey Management Plan or the THA.

4.13 Vehicle Incidents

- Vehicle incidents are to be managed consistent with *S3NA-004-PR1 Incident Reporting*.
- For vehicle incidents that involve non-emergency injuries or potential injuries, **Employees** must call the Incident Reporting and Assistance Line at 1.800.348.5046 for connection with Work Care medical support. The **Employee** or **Supervisor** is responsible for making the initial notification into IndustrySafe within 4 hours of the event.
- For vehicle incidents that involve property damage greater than $2,500, **Employees** are to call the Incident Reporting and Assistance Line at 1.800.348.5046 for connection with appropriate resources within AECOM, The **Employee** or **Supervisor** is responsible for making the initial notification into IndustrySafe within 4 business hours of the event.
- Non-critical and no-injury incidents (property damage less than $2,500, near misses, etc.), the **Employee** or **Supervisor** is responsible for making the case entry into IndustrySafe by the end of the work shift (at least within 24 hours of the event).
- For Fleet Vehicles, employees must contact the AECOM Fleet Management Company (Wheels: 800-477-2211) to report the incident. Refer to the Americas Fleet Vehicle Operations Policy for further information. Vehicle incidents that result in property damage or loss greater than $2,500 or cause injuries to AECOM **Employees** that result in medical treatment are to be investigated using the AECOM Incident Investigation Process in *S3NA-603-PR1 Incident Investigation and Review*.
- The **Employee(s)** involved in the incident are advised to:
  - Provide (if requested) to police and the other driver(s) 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.
  - Cooperate with **Region Counsel** if the incident results in unresolved risks or third party claims, or if the **Employee** receives a Summons, Complaint or other legal documents relating to a traffic incident.
  - NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW. Statements made in haste or anger may be legally damaging.
  - **Employees** must report the incident to AECOM's Global Travel Department. If the incident involved a third party, the driver is responsible for obtaining a copy of the police report and providing to global travel

4.14 Drug and Alcohol Testing

- Testing for Alcohol and/or Drugs procedures are specified in the *US and Canadian Employee Handbook* and administered through the AECOM **Human Resources 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.

4.15 Citations and Violations

- Citations and violations which occur while driving for company business are to be reported as a Vehicle incident, using *S3NA-004-PR1 Incident Reporting* within 24-hours.
- The **Employee** is personally responsible for payment of fines for moving violations and parking citations incurred while driving a vehicle on AECOM business and for reporting such Incidents to his/her **Supervisor**, **Region SH&E Manager**, and **Region Counsel**.
- If an Authorized Driver receives a citation for DUI/DWI/Operating Under the Influence, is suspended from driving or has his/her driver's license revoked, he/she is required to notify his/her **Supervisor** and

Region Fleet Vehicle Coordinator within 8 hours of the action. Failure to do this may result in disciplinary action up to and including termination.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-005-WI1 Authorized Driver Safety Practices

6.2 S3NA-005-FM1 Driver Authorization

6.3 S3NA-005-FM2 Vehicle Inspection Checklist

6.4 S3NA-005-TP1 Journey Management Plan

Authorized Driver Safety Practices

1.0 Before Vehicle Operation

1.1 Conduct a Pre-Trip *Vehicle Inspection, S3NA-005-FM2*.

1.2 Be familiar with applicable client rules and regulations when on the client's sites. The employee may, for example, be required to leave their keys in the ignition with the vehicle turned off or to display a vehicle pass. When parking, it is recommended that employees back the vehicle into the parkingspace.

1.3 Plan your travel to avoid being in a rush, traveling during peak traffic hours, and traveling through high traffic volume areas. Utilize the *S3NA-005-TP1 Journey Management Plan* as appropriate.

2.0 During Vehicle Operation

2.1 The Driver and all passengers must wear seatbelts at all times.

2.2 Maintain a safe distance when travelling behind other vehicles.

2.3 Confirm the area behind your vehicle is clear prior to and while reversing a vehicle.

2.4 When parking the vehicle on the edge of a roadway, turn on the four-way indicators (hazard lights) prior to leaving the vehicle. Use cones or other warning devices, and wear a high visibility traffic vest.

2.5 Observe extra caution in and around emergency and construction zones.

2.6 Avoid unattended rest areas, when possible, and especially at night.

2.7 If the vehicle breaks down, attempt to get to a secured location. Call police or roadside assistance as appropriate. Do not leave the vehicle.

2.8 Contact the police to help those with car trouble instead of stopping to assist.When possible, staff should have a car mechanic or roadside assistance change or repair a flat tire. If the Driver or passenger must change a tire, the Driver and passenger must adhere to the manufacturer's specifications and observe the proper lifting technique and safety procedures. Proper lifing is addressed in *S3NA-308-PR1 Manual Lifting, Field*.

3.0 24 – Hour Roadside Assistance, AECOM Fleet Vehicles only: Wheels: 800-477-2211

3.1 Authorized Drivers are to park Vehicles are to on project sites in a manner that prevents the driver from backing (reversing) upon departure. For example, the vehicle should be backed into a parking spot or the driver should select a parking spot that allows them to "pull" through" so that the vehicle is facing the direction of departure.

3.2 Authorized Drivers should use the "Get Out And Look" (GOAL) method before placing a vehicle in motion. Drivers are to make a 360-degree (360°) walk around of the vehicle immediately before placing vehicle into motionin order to determinewhether there are hazards or possible obstructions in the proposed path of travel. Drivers are to clear the area of people and objects before placing the vehicle in motion. A check will also be performed to ensure overhead and side clearances are adequate. The following are recommended best practices:

- Placement of cones on the right side of the front and rear of vehicle upon parking and retrieved during the 360° GOAL walk-around.
- In lieu of cones, place GOAL magnets on the right side of the hood and truck/tailgate of the vehicle upon parking. The GOAL magnets should then be retrieved during the 360° GOAL walk around just prior to moving the vehicle again.

- Place a GOAL sticker on the driver side door window as a reminder to get out and look.

4.0 If Vehicle is to be Left Unattended

4.1 Turn the ignition off, remove the key and set the emergency brake (if parked on an incline).

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 Look aheadtaking at least 15 seconds to visually identify if there is slowing traffic or another type of road hazard ahead or to your side. Don't drive behind vehicles that block your view.

5.2 Get the big pictureand look for hazards (other motorists, pedestrians, cyclists, road debris, etc.)

5.3 Scan your mirrorsevery 5 – 8 seconds to look for hazards. Don't stare or fix your eyes on any one item for too long.

5.4 Leave yourself an outby monitoring your space in front, behind and to each side of the vehicle, leaving enough are as a cushion so that you can take evasive action if needed.

5.5 Be seen by all other drivers, pedestrians, cyclists and others using or crossing the road. Use your headlights and avoid driving in the blind spot of other vehicles. Make sure your horn works and use it to warn others.

6.0 Road Rage

6.1 Road rage is a dangerous driving situation that can occur and should be avoided whenever possible, but NEVER instigated. Do not get drawn into a confrontation. Avoid any confrontational eye contact or gestures.

6.2 The driver should be aware of the vehicles around them, paying frequent attention to the vehicle's mirrors.

6.3 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.

6.4 Unless it is necessary to use the horn as an alert, do so sparingly.

6.5 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.

6.6 Attempt to note the offender's license plate number and write it down as soon as it is safe to do so and the vehicle is not in motion.

6.7 Report any aggressive driving to the police immediately. This action may aid in preventing further occurrences by the same driver.

7.0 Work Trucks

7.1 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 (i.e., avoid jumping off the tailgate).

7.2 Be vigilant of differences between trucks and small cars related to blind spots, turning radius, and required overhead and undercarriage clearances.

8.0 Winter Driving

8.1 Clear snow from exterior vehicle surfaces.

8.2 Avoid using cruise control on icy roads.

8.3 Accelerate and brake gently to reduce skids or spinouts.

8.4 Wear winter clothing that does not restrict movement, vision or hearing.

8.5 Where required, have snow chains for the vehicle and be familiar with their installation.

8.6 Use extra caution while driving during hazardous winter conditions.

8.7 Avoid sudden changes of speed or direction to reduce possibility of skidding.

8.8 Drivers should 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.

8.9 Carry suitable warm clothing and emergency equipment during the winter months. Temperatures can plunge rapidly.

8.10 Be aware of icy patches on the road bridges and intersections that are especially prone to ice patches.

8.11 Be familiar with the skid control procedures for the type of vehicle being driven (i.e., front, rear or four-wheel drive).

9.0 Gravel Roads and Remote Locations

9.1 Prior to driving on a road with an assigned radio frequency, the passenger will test the two-way radio to confirm that the proper radio frequency is set, and that the transmission is being received clearly by other traffic. The passenger will operate the two-way radio.

9.2 Drivers will maintain appropriate speed for the road conditions.

9.3 Headlights will be used when operating the vehicle.

9.4 Drivers will respect the understood road protocol, drive defensively and respect intersections.

9.5 4WD options will be utilized at the discretion and comfort level of the driver. If road conditions are questionable even for 4WD use, the road will not be traveled and either another route found or the job postponed until road conditions improve.

10.0 Off-road

10.1 If inexperienced, seek supervisory advice and training.

10.2 Vehicles should only be driven off roads after other available options (e.g., use of ATV's, etc.) have been considered.

10.3 Prior to driving off-road, check to see that the vehicle is in good operating condition and your tires are properly inflated.

10.4 Realize the limitations of your vehicle and do not become over confident.

10.5 Seat belts should be kept fastened and loose objects in the vehicle securely fastened to prevent them from becoming projectiles in the event of a sudden stop.

10.6 Drive according to the ground conditions.

10.7 Speed and power are normally not required in rough off-road driving.

10.8 Learn to read the surrounding terrain. Monitor the ground conditions ahead of the vehicle -- it is essential to know what to expect in light of the road conditions.

10.9 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 the vehicle 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 (e.g., wooden planks, mats, branches, etc.) under the wheel to improve traction.

10.10 Before driving over rough terrain, the terrain should be inspected on foot first.

10.11 When climbing hills in the vehicle 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 appropriate gear, and do not disengage the clutch to allow the vehicle to coast. If the vehicle is equipped with an automatic transmission, use low range and the lowest drive setting. DO NOT drive a hill at an angle this increases the risk for a roll-over incident. If the hill is very steep and you do not feel confident that your vehicle can make it up, then do not attempt it.

10.12 When driving through water, consider the maximum wading depth of the vehicle. The air intake must always be kept clear of water. Driving through water should always be done slowly to keep the bow wave low. In addition, slow speed prevents a hot engine from suffering tension cracks by sudden contact with cold water. Check the brakes after leaving the water.

10.13 Prior to returning to the road, do a vehicle inspection to confirm the vehicle is road worthy.

AECOM

Americas

Driver Authorization

S3NA-005-FM1

Employee Name :	**Employee Number:**	**Office or Project Location:**	**Date:**

NOTE: It is not a requirement to provide copies of your driver license or proof of insurance as an attachment to this form. Supervisors are responsible for validating these documents are accurately represented in this form.

Employee

Driver's License Expirations Date	
Driver's License Number	
Proof of valid automobile insurance (for personal vehicle use only)	Check if Confirmed ☐

I acknowledge that I have read S3NA-005-Driver and Vehicle Safety and understand that it contains important information about AECOM's procedures regarding employee use of AECOM fleet, rental and personal vehicles. I agree to adhere to the requirements of the Procedure. _____ (Initial)

As a condition of driving a vehicle on AECOM business I will present my driver's license and proof of insurance (personal vehicle only) for validation by my Supervisor. _____ (Initial)

I understand 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. _____ (Initial)

I understand I must notify supervisor immediately of any change to the status of my Driver's License, any citation or violation I receive driving for company business, and any incident that occurs while driving for company business. _____ (Initial)

I understand that AECOM reserves the right to terminate my driving privileges and associated benefits at any time, for any reason, in its sole discretion. _____ (Initial)

I understand that I am required to participate in a defensive driving course at AECOM's expense and may be required to participate in more advance training. _____ (Initial)

This procedure and my signed acknowledgement supplement the terms of my employment relationship with AECOM. _____ (Initial)

Date:	**Signature:**

Supervisor

I confirm that the Driver's License Number, Expiration Date and Proof of Insurance designated above are consistent with the employee's Driver's License and Proof on Insurance.

Date:	**Signature:**

Distribution

When the *Authorization* is completed email a copy to hrrecords@aecom.com (for inclusion in the employee's file). Additional copies must be provided to the following:

1) The employee
2) The supervisor (if the employee is assigned to an office location)
3) Project record (if the employee is assigned to a project location)

AECOM

Americas

Vehicle Inspection Checklist

S3NA-005-FM2

Vehicle Tag No :	Date:	Time:	Mileage:	Driver Name:	Location:

Inspection Checklist: This Pre-Trip Vehicle Inspection Checklist is intended to be completed by the vehicle driver prior to departing on a trip. Checking boxes means that item is present and functioning. Deficiencies increase risk of an incident and should be repaired or corrected prior to departure. This checklist should only be used in addition to an on-going vehicle maintenance program. For AECOM Fleet Vehicles, report defiencies to: 800-477-2211 (Wheels)

Item	Yes	No	N/A
1. General			
1-1. Proof of insurance and registration available and current?	☐	☐	☐
1-2. Is the date of the last regular maintenance known, or is the mileage/date of next scheduled maintenance known?	☐	☐	☐
1-3. Have any safety recalls issued for this vehicle been addressed?	☐	☐	☐
1-4. Is the overall condition of the vehicle good (no leaks , body damage, unusual sounds when started)?	☐	☐	☐
2. Tires			
2-1. Do all four tires have sufficient tread for driving conditions? Legal limit: 2/32" (for rain/snow: > 4/32")	☐	☐	☐
2-2. Are tires sufficiently inflated for driving conditions?	☐	☐	☐
2-3. Are the lug nuts and stem capspresent and tight for each tire?	☐	☐	☐
2-4. Is the spare tire and jack present and in good condition?	☐	☐	☐
3. Driver's and Passenger's Seat			
3-1. Are the pedal pads in good condition?	☐	☐	☐
3-2. Are the floor mats in good condition and not interfering with the pedals?	☐	☐	☐
3-3. Is the seat properly adjusted (including the headrest)?	☐	☐	☐
3-4. Is the seatbelt in good condition?	☐	☐	☐
3-5. Are the mirrors is good condition (not broken, dirty)?	☐	☐	☐
3-6. Is the dashboard free of warning lights and do the gauges appear to work when the car is started?	☐	☐	☐
3-7. Does the horn work?	☐	☐	☐
3-8. Are distractions such as cell phones and gps units secured so they do not encourage?	☐	☐	☐
4. Lights and Signals			
4 -1. Do the headlights and high beams work?	☐	☐	☐
4-2. Do the turn signals work (front and rear)?	☐	☐	☐
4-3. Do the brake lights work, including the high light in the rear window?	☐	☐	☐
4-4. Do the hazard lights (emergency flashers) work?	☐	☐	☐
4-5. Do backing lights work?	☐	☐	☐
5. Windows and Windshield			
5-1. Is the windshield clean and unbroken?	☐	☐	☐
5-2. Are the wiper blades in good condition (front and rear)?	☐	☐	☐
5-3. Are all the windows clean and unbroken and windshield fluid available and operational?	☐	☐	☐
6. Emergency Equipment (as needed per conditions/project requirements)			
6-1. Is there a "Safety Kit" (fire extinguisher, first aid, safety triangle and 2 reflective vests)?	☐	☐	☐
6-2. Is there a first aid kit, has it been inspected recently?	☐	☐	☐
6-3. Is a means for emergency communication available?	☐	☐	☐

7. Other Equipment (as needed per conditions/project requirements)			
7-1. Is there a means to secured loads (cargo next, container)?	☐	☐	☐
7-2. Are cones or other warning devices available?	☐	☐	☐
7-3. Is weather specific equipment (snow chains, tired etc.)?	☐	☐	☐

Americas

Journey Management Plan

S3NA-005-TP1

Journey Management Plan – required for trips > 100 miles (one way)
1. Driver and Passenger Information
Driver Name:
Driver Training Completed:
Passengers:
2. Vehicle Information
Vehicle Type/Description:
3. Trip Information
What is the purpose of the trip?
Single Trip: ☐ Reoccurring Trip: ☐ / / to / /
Is traveling for this purpose necessary?
Have alternate modes of travel (telepresence, public transportation, air,) been evaluated? ☐ YES ☐ NO
Departure Location:
Departure Date: Time:
Arrival Location:
Arrival Date: Estimated Time:
What is the weather forecast:
What is the route of travel: (okay to insert map)
4. Special Conditions
Check all that may apply:
☐ Night Driving ☐ Rugged Terrain (4 x 4)
☐ Weather ☐ Large Vehicles/Farm Equipment
☐ Long Driving (Over 2 hours) ☐ Animals
☐ Fatigue ☐ Rush Hour/Heavy Traffic
☐ Potential for distraction ☐ Towing
☐ Other _____ ☐ Other _____
☐ Other _____ ☐ Other _____

5. Site Arrival/Departure Procedure
1) Notify supervisor of safe arrival.
6. Site Arrival/Departure Procedure
1) Notify supervisor of safe arrival.
7. Emergency Planning
AECOM Supervisor (Name and Phone):
AECOM Project Manager (Name and Phone):
Roadside Service: For AECOM Fleet Vehicles Use: 800-477-2211 (Wheels)
AECOM Incident Reporting Line: 800-348-5046
AECOM Fleet Management: 800-477-2211
8. Approvals: all JMPs shall be reviewed and acknowledged by the driver and the driver's supervisor. A copy of the form shall remain with the driver and the supervisor for the duration of the journey. (Electronic copies are acceptable).
Driver's Signature:
Project Manager or Supervisor Name and Signature:

Americas

Fall Protection / Working at Heights

S3NA-304-PR1

1.0 Purpose and Scope

1.1 Provides the AECOM requirements for employees who perform work at heights of 4 feet (1.2 meters) or more above grade or other work surfaces for fall prevention and protection.

1.2 This procedure applies to AECOM Americas-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 static load required for the type of fall protection being provided.

2.2 **Base Surface** – The area immediately beneath an elevated structure or sburface (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 (where allowed by legislation) 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 (1.8meters).

2.8 **Grade** – (see Base Surface).

2.9 **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.

2.10 **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.

2.11 **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.

2.12 **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 (where allowed by legislation) within the cage of a man or scissor lift without the prior approval of the **Project Manager** and the **Regional SH&E Manager**.

2.13 **Safety Line** – A rope or cable secured to one or more an anchor points to which lanyards may be attached to limit fall distance.

2.14 **Standard Railing** – Railing provided to enclose open-sided work platforms and consisting of a top rail, intermediate rail, toe board, and posts. The top rail has a vertical height of 42 inches (1 meter) above the platform surface and the intermediate rail is approximately halfway between the top rail and the platform surface.

2.15 **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 6 feet (1.8 meters). When necessary, the deviation from normal fall protection approaches should be approved by the **Regional SH&E Manager**.

3.0 References

3.1 S3NA-202-PR1 Competent Person Designation

3.2 S3NA-205-PR1 Equipment Inspections and Maintenance

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA-209-PR1 Project Hazard Assessment and Planning

3.5 S3NA-311-PR1 Scaffolding

3.6 S3NA-314-PR1 Working Alone and Remote Travel

3.7 S3NA-408-PR1 Elevated Work Platforms and Aerial Lifts

The following standards apply to personal fall protection equipment:

Association	Standard
American National Standards Institute (ANSI)	ANSI Z359.1 American National Standard Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components. ANSI A10.32-2004 Fall Protection Systems for Construction and Demolition Operations
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

Association	Standard
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

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager** (including **Supervisor**)

The **Project 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 all work at height is conducted in accordance with applicable legislation.
- Assuring that personnel who perform work at heights are familiar with this procedure.
- Designating a **Competent Person** to monitor the safety of other employees.
- Assuring that personnel are apprised of any site-specific hazards prior to performing work more than 6 feet (1.8 meters) 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 **District SH&E Manager**, as necessary.

4.1.2 **Competent Person**

A **Competent Person** *(see S3NA-202-PR1 Competent Person)* will be designated to:

- Recognize fall hazards.
- Prepare rescue plans, as required by local legislation.
- 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 **Competed Person's** attention from the monitoring function.

4.1.3 District SH&E Manager

The **District SH&E Manager** is the individual responsible for the interpretation and, with the concurrence of the **Regional SH&E 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 **District SH&E Manager**. Specific duties of the **District SH&E Manager** include:

- Advising supervisors and site personnel on matters relating to climbing safety or other work to be performed more than 6 feet (1.8 meters) above ground or base surface level according to local legislation.
- Recommending appropriate PPE and climbing safety equipment to protect personnel.
- Working with the **Project Manager** and **Supervisor** 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 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 performing the 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.
- Be familiar with local legislation.
- Ensure their Working at Heights training is up to date.
- Using appropriate fall protection systems as required.
- Bringing forth any questions or concerns regarding fall protection or this procedure to the **Project Manager**, **Supervisor** or **District SH&E Manager**.
- Complying with this procedure, client or work location requirements and local legislation.

4.2 General / Restrictions

4.2.1 Applicable fall protection regulations must be reviewed prior to work commencing.

4.2.2 Fall arrest equipment must bear the required standards (CSA, ANSI, CE) label and confirmation of annual inspection.

4.2.3 Workers must visually inspect fall arrest equipment according to manufacturer's recommendations prior to each use.

4.2.4 A written Rescue Procedure must be available on project sites and shall be provided to staff prior to commencing any work at elevation.

4.2.5 Use PPE in accordance with manufacturers' specifications and as specified in the *S3NA-208-PR1 Personal Protective Equipment Program* procedure.

4.2.6 Do not attempt to repair or modify equipment unless you are properly trained and certified to do so.

4.2.7 If there is a question of unacceptable risk in working at any elevated work location, the work shall not be done until such questions are dealt with. Alternatives to climbing (elevators, aerial lifts, etc.) shall be used when practical. Refer to the *S3NA-408-PR1 Elevated Work Platforms and Aerial Lifts* procedure for more specifics.

4.3 Working at Heights

4.3.1 A task hazard analysis is required for work at height tasks as explained in *S3NA-209-PR1 Project Hazard Assessment and Planning*. 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.

4.3.2 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.
- 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. Refer to *S3NA-311-PR1 Scaffolding* procedure for more specifics.
- The final mitigation control method is the use of personal fall arrest system.

4.3.3 Training required for **employees** working at height is identified below. Only properly trained personnel shall be permitted to perform work at height tasks. At a minimum, the program must detail the regulatory requirements and the training required to perform the following functions:

- Local regulatory requirements for working at heights.
- Work on scaffolds erected by others.
- Select, inspect, wear and use personal fall arrest systems (refer to PPE procedure).
- Selection of anchor points.
- 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.
- Rescue requirements.

4.3.4 Fall arrest systems shall limit the shock force on the employee to regulations of the jurisdiction. The anchorage point shall be capable of supporting a total weight that conforms to the applicable regulations of the jurisdiction, or 2,268 kilograms (5,000 pounds) if not specifically identified. Refer to the *S3NA-304-FM3 Fall Arrest Life Line Inspection, S3NA-304-FM4 Fall Arrest Rope Grab Inspection, S3NA-304-FM5 Fall Arrest Cable Sling Inspection* and *S3NA-304-FM6 Fall Arrest Carabiner Inspection* checklists for verification of the line and anchorage system prior to use.

4.3.5 Where personal fall arrest systems are required, site-specific procedures shall be developed to ensure that 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, systems and rescue requirements 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.
- Confirm any engineered anchor point documentation and inspection data are available.
- 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 Rescue Plan

4.5.1 A rescue plan must be developed for each specific project where **employees** will be working at height. The plan must incorporate procedures that will ensure prompt rescue in the event that an employee falls. As a minimum, the rescue plan should address:

- 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.
- 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.
- Procedures for familiarizing the proposed rescues services with the potential rescue conditions.

4.6 Fall protection systems can be either:

4.6.1 A fall RESTRAINT system (physically stops a worker from getting too close to a fall hazard), or

4.6.2 A fall ARREST system (stops a fall already occurring and limits arresting forces to local regulatory requirements or less).

4.6.3 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 6.5 feet (2 meters) from an elevated work area edge); and
- A control zone with a safety monitor.

4.7 Personal Fall Protection Equipment

4.7.1 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.

4.7.2 A fall-arrest system consists of a full body harness, a lanyard, and a shock absorber.

4.7.3 You can connect the lanyard directly to adequate anchor point or to a rope grab mounted on a vertical lifeline.

4.7.4 Confirm that only one employee is attached to any one vertical safety line.

4.7.5 Horizontal life lines must be installed and used according to an engineered design.

4.7.6 Lifelines must be adequately anchored.

4.7.7 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.

4.7.8 Visually inspect 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. Refer to the *S3NA-205-PR1 Equipment Inspections and Maintenance procedure*, *S3-304-FM1 Fall Arrest Harness Inspection, S3NA-304-FM2 Fall Arrest Lanyard Inspection, S3NA-304-FM3 Fall Arrest Life Line Inspection, S3NA-304-FM4 Fall Arrest Rope Grab Inspection, S3NA-304-FM5 Fall Arrest Cable Sling Inspection* and *S3NA-304-FM6 Fall Arrest Carabiner Inspection* checklists to verify equipment is fit for use.

4.7.9 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. Tie restraint lines independently of other lines and to an adequate anchor point only.

4.7.10 Check the restraint line length to confirm the limits of approach.

4.7.11 On fall protection equipment, 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. Maintain manufacturer's specifications of total dynamic load capability of lifelines on site.

4.7.12 Any fall arrest components which have been involved in a fall must be tagged out and removed from service.

4.7.13 Fall arrest equipment must be formally inspected and certified annually according to the manufacturer's specifications. Refer to the Equipment section for specific regarding the requirements.

4.7.14 The Full Body Harness must meet the standards requirements suitably sized for the body mass and shape of the worker.

4.7.15 The shock-absorbing lanyard must meet the standards requirements and local regulatory requirements.

4.7.16 Thorough, annual inspections of fall protection equipment must be performed, documented, and initialled on the equipment tags per manufactures instructions.

4.7.17 Any damaged equipment or any equipment used in a fall, must be removed from service, repaired, and recertified prior to future use.

4.8 Towers

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.

4.9 Other Elevated Working Surfaces

Other work at heights (i.e., work at elevation greater than 6 feet [1.8 meters] above the base surface) 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 including activities conducted on:

- Tank tops;
- Roof Tops;
- Temporary Staging;

- Bridges;
- Catwalks; or
- Other Work Platforms.

4.10 Guardrails

4.10.1 Work areas under the control of AECOM that expose an **employee** or visitor to a wall opening, open-sided floor, or platform greater than 6 feet (1.8 meters) 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 42 inches (1 meter). The guardrail system shall be of sufficient strength to withstand a load of at least 90 kilograms (200 pounds) applied in any direction at any point on the top rail. Where **employees** may be exposed to a wall opening, open-sided floor, or platform greater than 6 feet (1.8 meters) above the adjacent floor or ground level that is not protected as specified above, the use of a fall protection system shall be utilized.

4.10.2 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.

4.10.3 Guardrails—especially wooden guardrails—must be inspected regularly.

4.10.4 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).

4.10.5 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.

4.11 Personal Lifeline Systems

4.12 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 harness, a lanyard, and an anchorage point. Any equipment used for fall protection systems must meet the applicable Standards and legislation requirements for that equipment. Personnel Qualifications/Training

4.12.1 **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.

4.12.2 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.

4.12.3 Prior to using personal fall protection equipment, staff must be trained in Fall Protection – Performance Training and must be provided detailed instructions on the hazards, regulations, inspection, use of the equipment, work procedures and on-site rescue.

4.12.4 **Employees** who regularly climb towers or stacks to heights in excess of 20 feet (6.09 meters) shall be active participants in the Medical Surveillance Program. Refer to the *S3NA-606-PR1 Medical Surveillance Program*.

4.12.5 Records of training and medical surveillance exams will be maintained by the AECOM Americas Learning Management System. Proof of training must be carried while in the field and presented upon request.

4.12.6 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.

4.13 Equipment Inspection

4.13.1 Employee shall use the *S3NA-304-FM1 Fall Harness Inspection* checklist and remove any harnesses that don't pass inspection from use. Inspecting harnesses before each use should include:

4.13.1.1 Inspecting label:

- Labels must be attached to equipment; any equipment without a label must be removed from service immediately.
- Label must include appropriate Standards identification.
- Label must include inspection verification per manufactures instructions.

4.13.1.2 Inspecting webbing:

- 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 (150 to 200 millimeters) apart.
- Watch for frayed edges, broken fibers, pulled or broken stitches, cuts, or chemical damage. Broken webbing strands generally appear as tufts on the webbing surface.
- Inspect under any removable padding.
- Inspect load indicators per manufactures instructions.
- Replace according to manufacturers' guidelines.

4.13.1.3 Inspecting buckles and hardware:

- Several types of buckles are used on fall protection equipment. Common ones are mating buckles, tonge & grommet buckles and quick connect (seat belt) buckles.
- Inspect the buckle for distortion, sharp edges, discoloration from bending, rusting, chemical damage or burns. Components must be straight and compare to others for consistent appearance. 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.
- Inspect the belt for loose, distorted, or broken grommets.
- 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.
- Inspect hardware for cracks or other defects. Replace the belt if the "D" ring is not at a 90 degree angle and does not move vertically independent of the body pad or "D" saddle.
- 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.

4.13.2 Inspecting lanyards before each use:

- Inspect shock-absorbing lanyard per the style, manufactures instructions and webbing inspection above.
- Inspect snap hooks and connection points for signs of damage or wear, free movement, self-closing/self-locking gates, excessive gate play per the manufactures instructions.

4.13.3 Inspecting the rope before each use:

- Inspect hardware or snap hooks as described in Harness or Lanyard inspection above.
- Rotate the rope and inspect from end to end for fuzzy, worn, broken, cut fibers or hackling (twisting of the strands). Weakened areas have noticeable changes in the original rope diameter.
- Replace when the rope diameter is not uniform throughout or does not meet any of the criteria above.

4.13.4 Inspecting the safety or anchor adaptor straps before each use:

- 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 buckles for slippage and sharp buckle edges.
- Check connection points or D rings for signs of damage or misuse.
- Remove from service any strap that does not pass inspection criteria.

4.13.5 Inspecting retractable lifelines before each use:

- Refer to Manufactures instructions on annual inspection criteria.
- 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. Slowly pull entire cable out and inspect for damage. Pull rapidly to check inertia latch.
- Inspect load indicator.
- Remove from service any retractable lifeline that does not pass inspection criteria.

4.13.6 Inspect hardware and anchorage points before each use:

- Inspect rope grabs, carabiners and other hardware for signs of damage, and free movement of pivot points and self-closing/self-locking components.
- Ensure rope grab is properly sized for application and vertical lifeline.
- The anchorage point is the position on an independent structure to which the lanyard, lifeline or anchor adaptor is attached. It should be capable of supporting a minimum static load per the local regulatory requirements.
- Confirm any engineered anchorage has the appropriate documentation.
- If there are any concerns about hardware or anchorage points refer the matter to the site **Supervisor** or **Competent Person** for further review.

4.13.7 Visual inspection of tower before each use:

- 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.

4.14 Cleaning Equipment

4.14.1 Basic care prolongs the life of the unit and contributes to its performance. Refer to the *S3NA-205-PR1 Equipment Inspections and Maintenance* procedure.

4.15 Working Alone

Climbing or work at heights shall be carried out only in the presence of a co-worker, contractor or client who will be in visual and auditory range at all times during the critical phases of the work and is knowledgeable on or able to execute the site rescue plan. This standby observer shall be able to make immediate contact with emergency services. Refer to the *S3NA- 314-PR1 Working Alone and Remote Travel* procedure for more specifics when working alone.

4.16 Environmental Conditions

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.

4.17 Other Protective Equipment

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; safety glasses or goggles, rugged safety shoes with heels should be worn to provide protection as well as adequate support; and gloves should be worn as needed.

4.18 Emergency References

Prior to commencement of work to be conducted more than 6 feet (1.8 meters) 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.

No **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 Records from this procedure that must be retained should be kept by each project and/or office location includes:

- Training Records
- Group/Region Work at Height Program
- Hazard Assessments

6.0 Attachments

6.1 S3NA-304-FM1 Fall Arrest Harness Inspection

6.2 S3NA-304-FM2 Fall Arrest Lanyard Inspection

6.3 S3NA-304-FM3 Fall Arrest Life Line Inspection

6.4 S3NA-304-FM4 Fall Arrest Rope Grab Inspection

6.5 S3NA-304-FM5 Fall Arrest Cable Sling Inspection

6.6 S3NA-304-FM6 Fall Arrest Carabiner Inspection

AECOM

Americas

Fall Arrest Harness Inspection

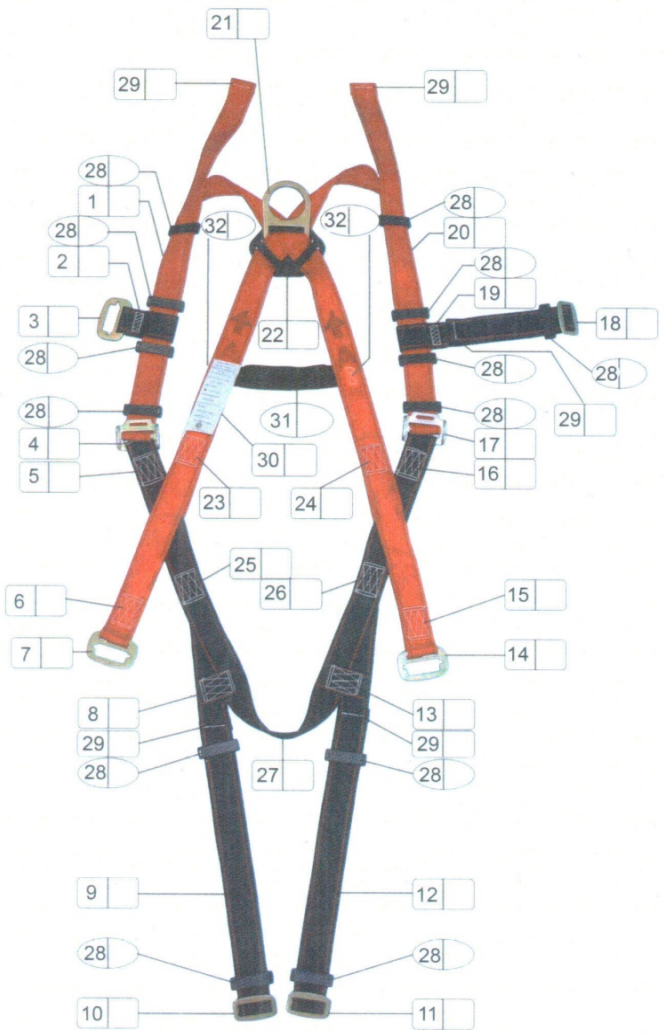
S3NA-304-FM1

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 **District SH&E Manager** 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	☐	☐

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 **District SH&E Manager** 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 ☐
Comments:			

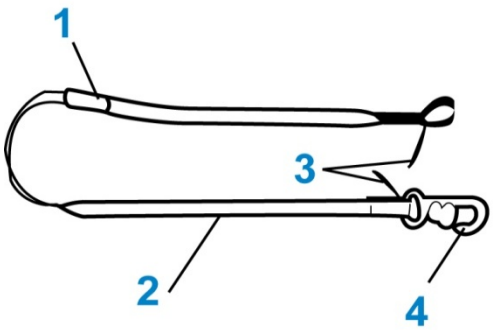
AECOM

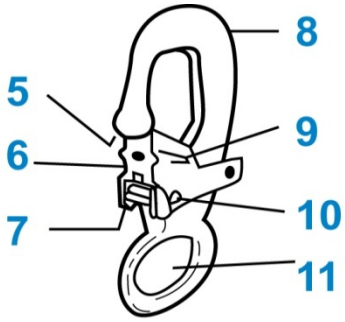
Americas

Fall Arrest Lanyard Inspection

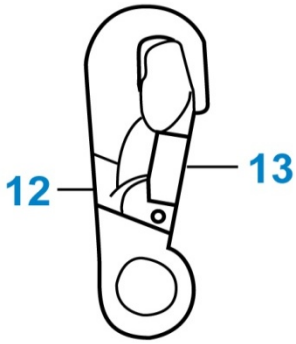
S3NA-304-FM2

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	Pass	Fail	Comments
1	Flag indicator	☐	☐	
2	Outside Core/Webbing	☐	☐	
	Core/absorber	☐	☐	
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 (style B)	☐	☐	
13	Gate (style B)	☐	☐	

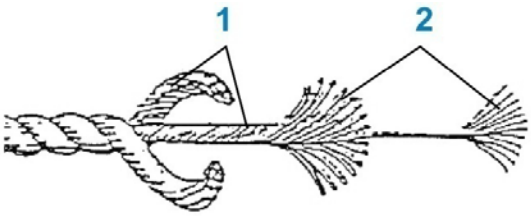
Comments:

Americas

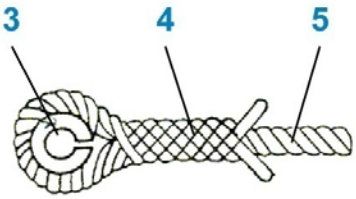
Fall Arrest Life Line Inspection

S3NA-304-FM3

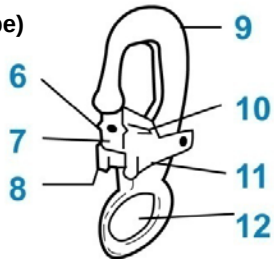
Inspection			
Life Line Manufacturer:		**Inspector's Name:**	
Serial Number:		**Inspector's Signature:**	
Date of Manufacture:		**Date of Inspection:**	
Office/site:		**Inspection Result:**	Pass ☐ / Fail ☐



Synthetic Rope Composition (Three-Strand Laid Rope)



Spliced Eye



Snaphook, Self-locking

Item #	Description - Lanyard	Pass	Fail	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	☐	☐	

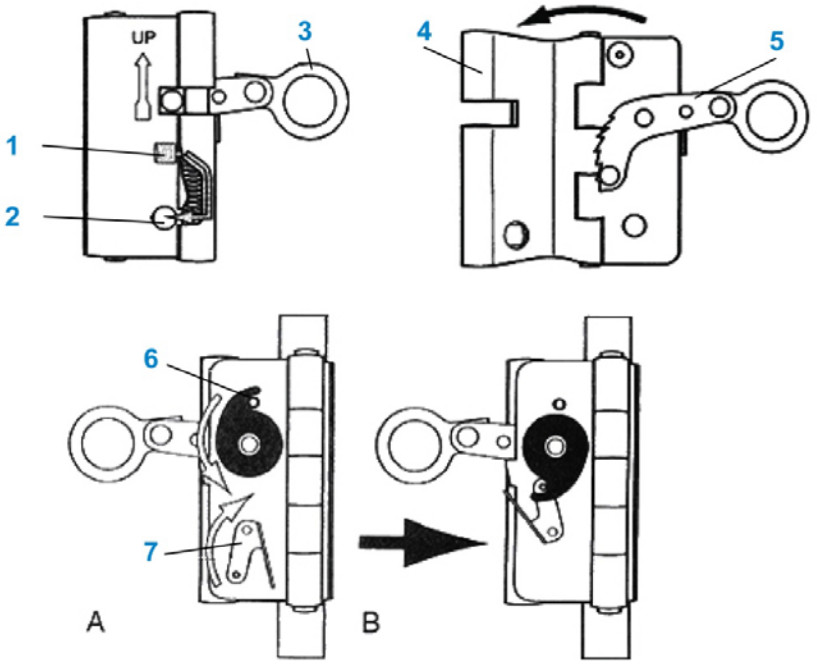
Comments:

Americas

Fall Arrest Rope Grap Inspection

S3NA-304-FM4

Inspection			
Lifeline Manufacturer:		**Inspector's Name:**	
Model/Serial Number:		**Inspector's**	
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	☐	☐	
		☐	☐	

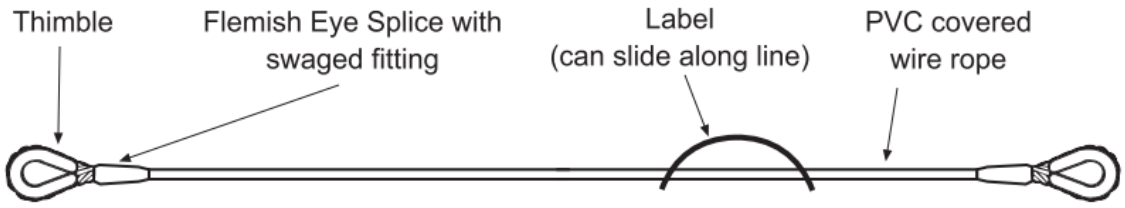
Comments:

Americas

Fall Arrest Cable Sling Inspection

S3NA-304-FM5

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	Pass	Fail	Comments
1	Thimble	☐	☐	
2	Eye Splice	☐	☐	
3	Label	☐	☐	
4	Cable Casing	☐	☐	
5	Cable	☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

Comments:

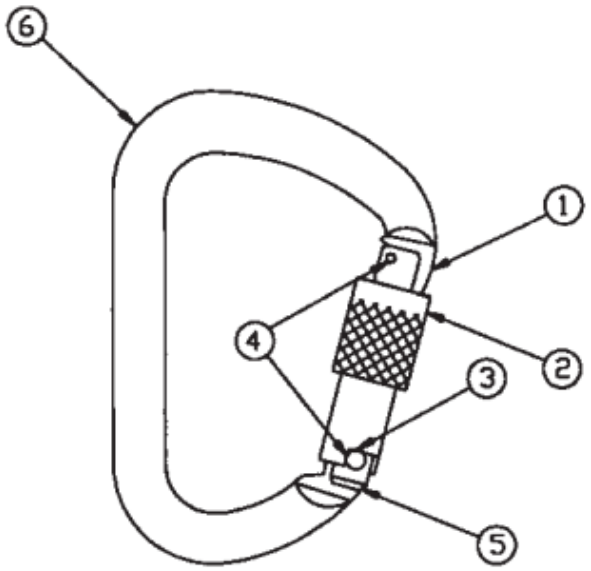
AECOM

Americas

Fall Arrest Carabiner Inspection

S3NA-304-FM6

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	Pass	Fail	Comments
1	Nose	☐	☐	
2	Gate/Lock	☐	☐	Self close & lock
3	Hinge	☐	☐	
4	Dowel Pins	☐	☐	
5	Inner Sleeve	☐	☐	
6	Carabineer Body	☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	
		☐	☐	

Comments:

Americas

Hand and Power Tools

S3NA-305-PR1

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 Americas-based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-205-PR1 Equipment Inspections & Maintenance

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA-302-PR1 Electrical, General

3.5 S3NA-410-PR1 Hazardous Energy Control

3.6 S3NA-510-PR1 Hearing Conservation Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers/Field Task Managers/Supervisors –** Ensure that all aspects of this procedure are followed and adhered to on all AECOM projects, sites and locations. If a specific tool is not included in the attachments, appropriate guidelines shall be established prior to work associated with that equipment, including following manufacturer's recommendations.

4.1.2 **Region Safety, Health and Environment (SH&E) Manager –** Provide technical guidance and support as to this procedure.

4.1.3 **Employees** – No 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. Refer to the attachments section for specifics and ocncurrence in the employee's Training Needs Assessment (TNA) per the *S3NA-003-PR1 SH&E Training* procedure.

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 and face protection, as required and in accordance with the *S3NA-208-PR1 Personal Protective Equipment Program*.

4.5 Inspections

4.5.1 All tools must be inspected prior to each use. Any tool that is defective or has missing parts must not be used. Every broken or defective tool must be tagged 'out of service'. Tagged tools will be returned to the 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 in accordance with the *S3NA-205-PR1 Equipment Inspections & Maintenance* procedure.

5.0 Records

5.1 None

6.0 Attachments

6.1	S3NA-305-WI1	Chainsaw Safety Card
6.2	S3NA-305-WI2	Circular Saw Safety Card
6.3	S3NA-305-WI3	Cut Off Saw Safety Card
6.4	S3NA-305-WI4	Handheld Grinder Safety Card
6.5	S3NA-305-WI5	Impact Wrench Safety Card
6.6	S3NA-305-WI6	Nail Gun Safety Card
6.7	S3NA-305-WI7	Dustless Vacuum Safety Card
6.8	S3NA-305-WI8	Power Drill Safety Card
6.9	S3NA-305-WI9	Pressure Washer Safety Card
6.10	S3NA-305-WI10	Reciprocating Saw Safety Card
6.11	S3NA-305-WI11	Sander Safety Card
6.12	S3NA-305-WI12	Utility Knife Safety Card
6.13	S3NA-305-WI13	Wood Chipper Safety Card
6.14	S3NA-305-WI14	Clearing and Grubbing Equipment Safety Card
6.15	S3NA-305-WI15	Pneumatic Tools Safety Card
6.16	S3NA-305-WI16	Manual Hand Tools Safety Card
6.17	S3NA-305-WI17	Small Engines Safety Card
6.18	S3NA-305-WI18	Electric and Battery Powered Hand Tools Safety Card
6.19	S3NA-305-GL1	Hand and Power Tools Guide

Americas

Chainsaw Safety Card

S3NA-305-WI1

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 also to surrounding persons. 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

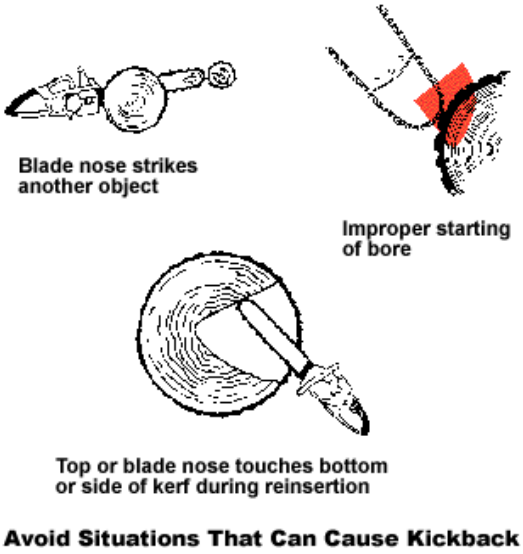
3.1 Kickback – Sudden and violent reverse movement of the saw

3.2 Hand/arm vibration

3.3 Noise

3.4 Flying/falling debris

3.5 Severe cuts



Avoid Situations That Can Cause Kickback

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment (TNA).

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 of 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.

Americas

Circular Saw Safety Card

S3NA-305-WI2

1.0 Objective / Overview

1.1 The circular saw is used in cutting wood products (i.e., plywood, construction lumber, etc.).

1.2 Safe measures for use include proper training, good body mechanics and felling technique, well-maintained equipment, and protective equipment. Potential Hazards

1.3 Kickback – Sudden and violent reverse movement of the saw

1.4 Noise

1.5 Flying debris

1.6 Sharp, moving blade (severe cuts)

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 Secure the work being cut to avoid movement.

2.6 For maximum control, hold the saw firmly with both hands after securing the work piece.

2.7 Keep the upper and retracting lower blade guard and the motor free from dust.

2.8 Do not hold or force the retracting lower guard in the open position.

2.9 Do not over tighten the blade-locking nut.

2.10 Do not twist the saw to change, cut or check alignment.

2.11 Do not use a saw that vibrates or appears unsafe in any way.

2.12 Do not force the saw during cutting.

2.13 Do not cut materials without first checking for obstructions or other objects such as nails and screws.

2.14 Check frequently to be sure clamps remain secure.

2.15 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest.

2.16 Do not overreach. Keep proper footing and balance.

2.17 When you start the saw, allow the blade to reach full speed before contacting the work piece.

3.0 Training Requirements

3.1 Review of training requirements per the Training Needs Assessment (TNA).

3.2 Demonstrated knowledge on the use of a circular saw.

3.3 Review and follow manufacturer's operating guidelines.

4.0 Personal Protective Equipment (Level D PPE)

4.1 Leather Gloves

4.2 Safety glasses

4.3 Hearing Protection

5.0 Other Safety Tips

5.1 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.

5.2 Disconnect power supply before adjusting or changing the blade.

5.3 Do not place hand under or in front of the shoe or guard of the saw when operating.

5.4 Cut at the proper depth (¼ inch/ 0.64 centimeter) below work surface (see picture). Set the depth of the blade prior to use, when the saw is unplugged.

5.5 Circular saw must be double-insulated or protected by a ground fault circuit interrupter.

Americas

Cut off Saw Safety Card

S3NA-305-WI3

1.0 Objective / Overview

1.1 Cut-off saws are high-speed cutting tools and very dangerous to operate. Therefore, it is very important to review the general safety rules, training, Personal Protective Equipment and procedures for working with portable cut off saws.

1.2 Cut off saws are used in a variety of activities (i.e. concrete, piping, metal, etc.).

2.0 Potential Hazards

2.1 Noise

2.2 Flying debris

2.3 Sharp, moving blades (severe cuts)

2.4 Burns from engine

2.5 Fire hazard from sparks and gasoline

2.6 Hand/arm vibration

2.7 Kickback – Sudden and violent reverse movement of the saw

3.0 Safe Operating Guidelines

3.1 **Pre-start checks** - Inspect the abrasive wheel for cracks and chips. If cracked or chip replace wheel before use. Ensure guard is positioned properly prior to start-up (*S3NA-411-PR1 Machine Guarding*). Make sure the fuel cap is properly secured.

3.2 **Starting -** Start the saw on firm ground or other solid surface in an open area. Never attempt to drop-start the engine (see picture). Clear the working area. Avoid operating the saw if the terrain is wet and/or frozen.

3.3 **Handling -** Hold the saw firmly with <u>two hands</u> 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.

3.4 **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.

3.5 **Maintenance -** Shut off the engine and remove the spark plug wire before adjusting or working on the saw.

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment (TNA).

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 Hearing protection: earplugs and/or earmuffs

5.4 Respirator if required (concrete operations)

6.0 Other Safety Tips

6.1 Keep flammable and combustible materials away from saw while cutting metal.

Americas

Handheld Grinder Safety Card

S3NA-305-WI4

1.0 Objective / Overview

1.1 Handheld grinders are high-speed electric- or pneumatic-powered grinding tools used to shape or cut metal, and can be dangerous to operate.

1.2 Grinders are used in a variety of activities (i.e., piping installation/repair, metal, restoring, polishing, sharpening, etc.).

2.0 Potential Hazards

2.1 Kickback – Sudden and violent reverse movement of the grinder

2.2 Flying debris

2.3 Moving parts (severe cuts)

2.4 Fire hazard from sparks igniting nearby debris or objects

2.5 Noise

2.6 Hand/arm vibration

3.0 Safe Operating Guidelines

3.1 Basic safety rules can help prevent hazards associated with the use of handheld 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 of training rquirements per the Trainign Needs Assessment (TNA).

4.2 Demonstrated knowledge on the use of a handheld grinder.

4.3 Follow manufacturers operating guidelines, especially for proper grinding wheel attachment.

5.0 Personal Protective Equipment (PPE)

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 work site/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 handheld grinder in a vice.

Americas

Impact Wrench Safety Card

S3NA-305-WI5

1.0 Objective / Overview

1.1 Impact wrenches are mainly used for tire changing but that does not limit their use. They can be used in all applications when a certain amount of torque is needed to loosen or tighten nuts and bolts.

1.2 The danger comes in to play when employees try to use the wrong sockets with an air wrench. Employees using air wrenches must have a general understanding of how to use them.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Cuts

2.4 Hand/arm vibration

3.0 Safe Operating Guidelines

3.1 Drain water from air compressor tank and condensation from air lines.

3.2 Disconnect the tool from the air supply before lubricating or changing sockets. Impact wrench sockets and accessories must be used with this tool.

3.3 Do not use hand sockets and accessories. Select the required impact socket.

3.4 Connect tool to air hose of recommended size. The use of a quick connect set makes connecting easier.

3.5 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.

3.6 If the proper retaining device on the tool is broken, the tool should be repaired.

3.7 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.

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment (TNA).

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 at heights.

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.

Americas

Nail Gun Safety Card

S3NA-305-WI6

1.0 Objective / Overview

1.1 Nail guns are useful tools, but must be handled with care.

1.2 Nail guns have been shown to be the cause of unnecessary injuries when the design of the gun places emphasis on speed, rather than safety.

2.0 Potential Hazards

2.1 Flying debris/nails

2.2 Imbedded object

2.3 Puncture wounds

2.4 Noise

3.0 Safe Operating Guidelines

3.1 Watch out for other crewmembers working near you.

3.2 Never let an inexperienced crewmember use a nail gun without supervised training.

3.3 Never use bottled gas as a power source for pneumatic tools.

3.4 Disconnect a nail gun before you service it.

3.5 Hold your hand a good 12 inches back from the ends of studs or joists when you are nailing.

3.6 Keep the gun properly aligned with your work both vertically and horizontally.

3.7 Never nail with the gun pointed toward you or anyone else on the job.

3.8 Never try to nail beyond your reach.

4.0 Training Requirements

4.1 Review of training requirements per the Trainign Needs Assessment.

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.

Americas

Dustless Vacuum Safety Card

S3NA-305-WI7

1.0 Objective / Overview

Worker is using the roto-peen (scabbler) attachment; VAC-PAC collection system shown with 55 gal drum.

1.1 Dustless decontamination system (also refered to as Pentek bradn name) removes and packages surface contamination from concrete and steel structures.

1.2 The Pentek integrated suite of manually operated equipment (e.g., squirrel III, corner cutter, roto-peen, and crack chaser) is designed for the safe removal of radioactive materials, lead-based paints, polychlorinated biphenyls, pesticides, chemical residues, and other contaminated coatings.

1.3 The Pentek system incorporates a high-performance vacuum and waste packaging unit, the VAC-PAC, in conjunction with pneumatically operated equipment to remove contaminated material. Dust and debris are captured at the cutting tool surface. Supporting equipment required to operate the unit includes a 60 kilowatt generator and an air compressor (minimum 350 cubic feet capacity), as well as a drum grappler for drum handling activities.

2.0 Potential Hazards

2.1 Hazardous noise

2.2 Vibration

2.3 Tripping hazard from cables and hoses

2.4 Hot surfaces (vacuum unit)

2.5 Electrical (high voltage)

2.6 Pinch hazard

2.7 Back strain

2.8 High pressure air

3.0 Safe Operating Guidelines

3.1 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.

3.2 The vacuum unit should be placed a minimum of 50 feet (15.2 meters) away from the work area.

3.3 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.

3.4 Two workers should be used to maneuver the unit into place.

3.5 A minimum 10 feet (3 meters) clearance will be established around the unit while in operation.

3.6 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.

3.7 A competent person will train each worker in the operation of the unit.

3.8 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY.

4.0 Personal Protective Equipment (Level D PPE ensemble)

4.1 Leather gloves (maintenance)

4.2 Tyvek suit (with hood)

4.3 Anti-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 in agreement with the powered industrial truck standard.

5.3 Review *S3NA-302-PR1 Electrical, General* prior to refueling the electrical generator and/or compressor.

Americas

Power Drill Safety Card

S3NA-305-WI8

1.0 Objective / Overview

1.1 Available in a variety of types and capacities, portable power drills are undoubtedly the most used power tools.

1.2 Because of their handiness and application to a wide range of jobs, drills often receive heavy use. For this reason, you will need to carefully check your drill's capacity limitations and accessory recommendations.

2.0 Potential Hazards

2.1 Electrical shock

2.2 Puncture wounds

2.3 Flying debris

2.4 Severe cuts

2.5 Fire

2.6 Burns (hot bits)

2.7 Manual handling (sprains/strains - wrist)

3.0 Safe Operating Guidelines

3.1 Check carefully for loose power cord connections and frays or damage to the cord. Keep all cords clear of the cutting area during drilling.

3.2 Replace damaged tool and extension cords immediately.

3.3 Always keep drill bits sharp.

3.4 Disconnect the power supply before changing or adjusting bit or attachments,

3.5 Do not use high speed steel (HSS) bits without cooling or using lubrication.

3.6 Be sure the chuck is tightly secured to the spindle. This is especially important on reversible-type drills. Tighten the bit securely as described by the owner/operators manual.

3.7 The chuck key must be removed from the chuck before starting the drill. A flying key can be an injury-inflicting missile.

3.8 Secure workpiece being drilled to prevent movement.

3.9 Check auxiliary handles, if part of the tool. Be sure they are securely installed.

3.10 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.

3.11 Grasp the drill firmly by insulated surfaces.

3.12 Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise -- forward -- direction, brace the drill to prevent a counter-clockwise reaction.

3.13 Do not overreach. Always keep proper footing and balance.

3.14 Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure. Forcing the drill can cause the motor to overheat, damage the bit and reduce operator control.

4.0 Training Requirements

4.1 Review of training needs per the Training Needs Assessment.

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 Safety glasses

5.2 Leather Gloves

6.0 Other Safety Tips

6.1 Electric drills must be double-insulated or plugged into a ground fault circuit interrupter outlet.

6.2 Never carry tool by cord or yank it to disconnect from receptacle.

6.3 Keep cord away from sharp edges.

Americas

Pressure Washer Safety Card

S3NA-305-WI9

1.0 Objective / Overview

1.1 High pressure washers can operate up to pressures of 5,000 pounds per square inch 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 Potential Hazards

2.1 Kickback – Sudden and violent reverse movement of the gun

2.2 Flying debris

2.3 Slips and trips on wet surfaces and hoses

2.4 Noise

2.5 Manual handling

2.6 Exhaust fumes/carbon monoxide (CO) in enclosed spaces

2.7 Severe cuts

3.0 Safe Operating Guidelines

3.1 The gun valve must always be pointed at the work area, NEVER point the gun valve at yourself or another person.

3.2 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.

3.3 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.

3.4 Maintain a distance from the spray contact point to reduce noise exposure and risk of being struck by flying debris. Ensure that you are not overreaching and remain stable.

3.5 Always set the tripper safety lock when the gun valve is not in use.

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment.

4.2 Demonstrated knowledge on the use of a pressure washer.

4.3 Review of manufacturers operating guidelines.

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.

Americas

Reciprocating Saw Safety Card

S3NA-305-WI10

1.0 Objective / Overview

1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.

1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Sharp, moving parts (cuts)

2.4 Hand/arm vibration

3.0 Safe Operating Guidelines

3.1 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.

3.2 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.

3.3 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.

3.4 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.

3.5 Maintain firm contact between the saw's shoe and the material being cut.

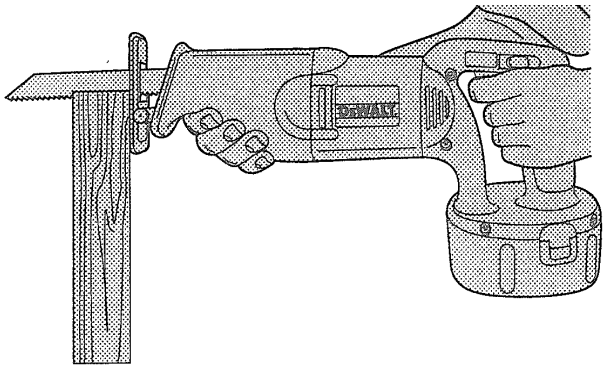
3.6 When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.

3.7 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.

3.8 Water pipes must be drained and capped.

3.9 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.

3.10 Different work surfaces demand different blades.



The correct way to hold the reciprocating saw while operating.

4.0 Training Requirements

4.1 Review of training requirement per the Training Needs Assessment (TNA).

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 Safety glasses

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 Do not wear jewelry on the fingers/wrists during use.

6.6 Always use two hands to operate saw (see picture).

Americas

Sander Safety Card

S3NA-305-WI11

1.0 Objective / Overview

1.1 Sanders are commonly used at project sites for a variety of tasks.

1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and personal protective equipment (PPE) selection.

2.0 Potential Hazards

2.1 Kickback – Sudden and violent reverse of the sander

2.2 Noise

2.3 Hand/arm vibration

2.4 Dust exposure

2.5 Flying debris

2.6 Severe abrasive cuts

2.7 Electrocution

2.8 Explosion/fire hazard from the dust

3.0 Safe Operating Guidelines

3.1 Make sure the sander is switched "OFF" before connecting the power supply.

3.2 Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.

3.3 Inspect sanding belts before use. Replace those belts that are worn or frayed.

3.4 Install sanding belts that are the same widths as the pulley drum.

3.5 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.

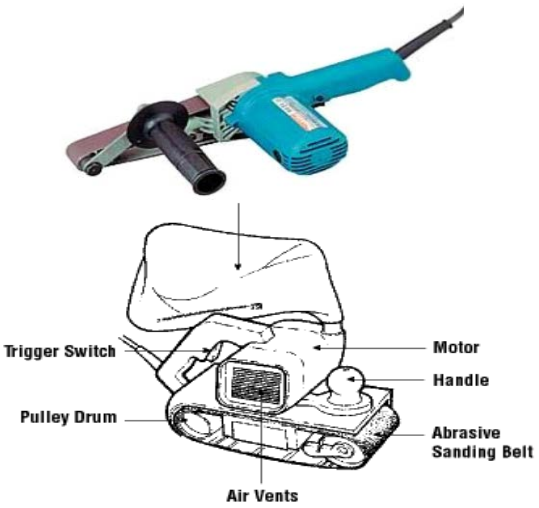
3.6 Secure the sanding belt in the direction shown on the belt and the machine. Keep hands away from the sanding belt.

3.7 Before starting a sander, be sure the power cord and extension cords are out of the belt path and are long enough to freely complete the task. The sander must be either double insulated or connected to a ground fault circuit interrupter.

3.8 Use two hands to operate sanders – one on the trigger and the other on the front handle knob.

3.9 Clean dust from the motor and vents at regular intervals.

3.10 Do not use a sander without an exhaust system or dust collector present that is in good working order. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.



3.11 Empty the collector when ¼ full. Minimise dust disturbance when emptying the collector.

3.12 Do not exert excessive pressure on a moving sander. The weight of the sander provides adequate pressure for the job.

3.13 Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stop into place or use a ‘stop block’ to prevent movement.

3.14 Do not overreach. Always keep proper footing and balance.

3.15 Do not cover air vents of the sander.

3.16 Check often to ensure that guards are in their normal position.

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment (TNA).

4.2 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Hearing protection

5.2 Safety Glasses

5.3 Leather gloves

Americas

Utility Knife Safety Card

S3NA-305-WI12

1.0 Objective / Overview

1.1 Utility knives serve a variety of purposes at work sites, and can be a useful tool, when used safely and correctly.

1.2 Learning proper positioning and 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 the 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 Standard Operating Procedures.

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.).

Americas

Wood Chipper Safety Card

S3NA-305-WI13

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 a 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 branches 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 Exhaust fumes exposure.

3.5 Entanglement in limbs and contact with chipper blades.

4.0 Training Requirements

4.1 Review of Applicable Standard Operating Procedures.

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.

Americas

Clearing and Grubbing Equipment Safety Card

S3NA-305-WI14

The following safety precautions will be followed during site clearing and tree falling

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 Refer to *S3NA-305-WI1 Chainsaw Safety Card.*

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 a 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.

Americas

Pneumatic Tool Safety Card

S3NA-305-WI15

1.0 General Requirements

1.1 Wear safety glasses at all times and face shield if required. (Level “D” Personal Protective Equipment required).

1.2 Use hearing protection, where required.

1.3 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.

1.4 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.

1.5 Use only the attachments that the manufacturer recommends for the tools you are using.

1.6 Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.

1.7 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.

1.8 Use the proper hose and fittings of the correct diameter.

1.9 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.

1.10 Choose air supply hoses that have a minimum working pressure rating of 150 pounds per square inch gauge or 150 percent of the maximum pressure produced in the system, whichever is higher.

1.11 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.

1.12 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.

1.13 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).

1.14 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.

1.15 Do not operate the tool at a pressure above the manufacturer's rating.

1.16 Turn off the air pressure to the hose when not in use or when changing power tools.

1.17 Do not carry a pneumatic tool by its hose.

1.18 Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.

1.19 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.

Americas

Manual Hand Tools Safety Card

S3NA-305-WI16

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 (1.3 centimeters) 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.

2.0 Wrenches

2.1 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).

2.2 Keep pipe wrench teeth clean and sharp.

2.3 Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.

2.4 Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.

2.5 Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.

2.6 Do not use pipe wrenches on nuts and bolts.

2.7 Do not use a pipe extender for extra leverage. Get a larger pipe wrench.

2.8 Replace pipe cutter wheels which are nicked or otherwise damaged.

2.9 Use a three- or four-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.

2.10 Choose a cutting wheel suitable for cutting the type of pipe material required:

2.10.1 Thin wheel for cutting ordinary steel pipe.

2.10.2 Stout wheel for cutting cast iron.

2.10.3 Other wheels for cutting stainless steel, plastic and other materials.

2.11 Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75 percent as deep as the thread on the tap.

2.12 Use a proper tap wrench (with a “T” handle) for turning a tap.

2.13 Use lubricant or machine cutting fluid with metals other than cast iron.

2.14 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.

2.15 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.

2.16 Do not attempt to thread hardened steel. This can chip or damage the die.

2.17 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.

2.18 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

3.0 Pliers and Wire Cutters

3.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.

3.2 Choose pliers or wire cutters that have a grip span of 2½ – 3½ inches (6.4 – 8.9 centimeters) to prevent your palm or fingers from being pinched when the tools are closed.

3.3 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).

3.4 Use tools only if they are in good condition.

3.5 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.

3.6 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.

3.7 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.

3.8 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.

3.9 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.

3.10 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.

3.11 Do not expose pliers or wire cutters to excessive heat.

3.12 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.

3.13 Do not use pliers as a hammer.

3.14 Do not hammer on pliers or wire cutters to cut wires or bolts.

3.15 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.

3.16 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.

3.17 Do not use pliers on nuts and bolts; use a wrench.

4.0 Screwdrivers

4.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.

4.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.

4.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.

4.4 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.

4.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.

4.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.

4.7 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.

4.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).

4.9 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.

4.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.

4.11 Use a screwdriver that incorporates the following features when continuous work is needed:

4.11.1 Use a pistol grip to provide for a straighter wrist and better leverage.

4.11.2 Use a "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.

4.11.3 Use a ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.

4.12 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.

4.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.

4.14 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.

4.15 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.

4.16 Do not hammer screws that cannot be turned.

4.17 Do not grind the tip to fit another size screw head.

4.18 Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-fluted spline screw heads).

4.19 Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).

4.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.

4.21 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.

4.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.

4.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.

4.24 Do not carry screwdrivers in your pockets.

5.0 Snips

5.1 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.

5.2 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.

5.3 Universal snips can cut in both straight and wide curves.

5.4 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.

5.5 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.

5.6 Aviation snips have compound leverage that reduces the effort required for cutting.

5.7 Offset snips have jaws that are set at an angle from the handle.

5.8 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).

5.9 Use only snips that are sharp and in good condition.

5.10 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.

5.11 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.

5.12 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.

5.13 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.

5.14 Keep the nut and the pivot bolt properly adjusted at all times.

5.15 Oil the pivot bolt on the snips occasionally.

5.16 Do not try to cut sharp curves with straight cut snips.

5.17 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.

5.18 Do not hammer or use your foot to exert extra pressure on the cutting edges.

5.19 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.

5.20 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

6.0 Wood Chisels

6.1 Wear safety glasses.

6.2 Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.

6.3 Use the right size of chisel for the job.

6.4 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.

6.5 Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.

6.6 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.

6.7 Clamp stock so it cannot move.

6.8 Adjust your stance so that you do not lose your balance if the tool slips.

6.9 Chip or cut away from yourself.

6.10 Keep your hands and body behind the cutting edge.

6.11 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.

6.12 Make finishing or paring cuts with hand pressure alone.

6.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.

6.14 Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.

6.15 Store chisels in a “storage roll,” a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.

6.16 Replace broken or splintered handles.

6.17 Sharpen cutting edges as often as necessary.

6.18 Do not use a wood chisel as a pry or a wedge.

6.19 Do not use a wood chisel on metal.

6.20 Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.

6.21 Do not use a grinder to redress heat-treated tools. Use a whetstone.

6.22 Do not use a dull chisel.

7.0 Wrenches

7.1 Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.

7.2 Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).

7.3 Select the correct jaw size to avoid slippage.

7.4 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.

7.5 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.

7.6 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.

7.7 Face an adjustable wrench “forward,” adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw.

7.8 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.

7.9 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.

7.10 Support the head of the ratchet wrench when socket extensions are used.

7.11 Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.

7.12 Stand aside when work is done with wrenches overhead.

7.13 Make sure adjustable wrenches do not "slide" open during use.

7.14 Keep tools well maintained (cleaned and oiled).

7.15 Clean and place tools and wrenches in a tool box, rack or tool belt after use.

7.16 Do not push on a wrench - losing your balance is more likely if the wrench slips.

7.17 Do not use a wrench that is bent or damaged.

7.18 Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.

7.19 Do not pull on an adjustable wrench that is loosely adjusted.

7.20 Do not use pipe wrenches on nuts or bolts.

7.21 Do not use pipe wrenches for lifting or bending pipes.

7.22 Do not use a wrench on moving machinery.

7.23 Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.

7.24 Do not use a makeshift wrench.

7.25 Do not insert a shim in a wrench for better fit.

7.26 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.

7.27 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.

7.28 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.

8.0 Files/Rasps

8.1 Do not use a file as a pry bar, hammer, screwdriver, or chisel.

8.2 When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.

8.3 Do not hammer on a file.

9.0 Chisels

9.1 Do not use a chisel that has a dull cutting edge.

9.2 Do not use chisels that have "mushroomed" striking heads.

9.3 Hold a chisel by using a tool holder if possible.

9.4 Clamp small work pieces in the vise and chip towards the stationary jaw when working with a chisel.

10.0 Vises

10.1 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.

10.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.

10.3 Do not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.

10.4 Do not slip a pipe over the handle of a vise to gain extra leverage.

11.0 Clamps

11.1 Do not use the C-clamp for hoisting materials.

11.2 Do not use the C-clamp as a permanent fastening device.

12.0 Jacks

12.1 Do not exceed the jack's rated lifting capacity as noted on the label of the jack.

12.2 Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

Americas

Small Engine Safety Card

S3NA-305-WI17

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 be trained and competent in how to operate and maintain them in a safe manner.

1.3 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 obtained from the manufacturer.

2.0 Potential Hazards

2.1 Flying debris

2.2 Noise

2.3 Moving and sharp parts (cuts)

2.4 Hot surfaces (burns)

3.0 Safe Operating Guidelines

3.1 Do not wear loose or baggy clothing around tools with rotating parts.

3.2 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.

3.3 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.

3.4 Never remove fuel cap or add fuel when engine is running.

3.5 Never start or operate the engine with the fuel fill cap removed.

3.6 Refuelling: allow engine to cool; fill in well-ventilated area; and do not smoke while re-fuelling.

3.7 Use only properly labelled, American National Standards Institute/Canadian Standards Association-approved red gasoline containers to store and dispense fuel.

3.8 Do not pour fuel from engine or siphon fuel by mouth.

3.9 Never leave the engine unattended while it is running.

3.10 Never operate the engine with an unguarded engine shaft.

3.11 Do not modify the engine or tamper with the factory setting of the engine governor.

3.12 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.

3.13 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.

3.14 When working on the equipment, avoid accidental starts by removing the ignition key, turn off all engine switches, disconnect the battery and disconnect the spark plug, keeping it away from metal part.

3.15 Always wear hearing protection when operating an engine.

4.0 Training Requirements

4.1 Review of training requirements per the Training Needs Assessment (TNA).

4.2 Demonstrated knowledge on the use of small engine equipment.

4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Always wear safety glasses with shields

5.2 Leather or cotton gloves

5.3 Long pants and long sleeve shirt

5.4 Safety toe work boots

5.5 Hearing protection (earmuffs or earplugs)

Americas

Electrical and Battery Hand Tools Safety Card

S3NA-305-WI18

All electrical tools and equipment must be operated in accordance with the requirements of *S3NA-302-PR1 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 American National Standards Institute/Canadian Standards Association 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 three-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 three-prong plug has an approved three-wire cord and is grounded. The three-prong plug should be plugged in a properly grounded three-pole outlet. If an adapter must be used to accommodate a two-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 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 three-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 Refer to *S3NA-305-WI11 Sander Safety Card*.

6.0 Drills

6.1 Refer to *S3NA-305-WI8 Power Drill Safety Card.*

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 Refer to *S3NA-305-WI2 Circular Saw Safety Card.*

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.

Americas

Hand and Power Tools Guide

S3NA-305-GL1

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 (PPE) and training.

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 PPE.

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 Hand-arm vibration exposure is associated with the use of hand tools. Consider the need for controls such as limiting your tool use time, adjusting your grip to be loose but stable, and using anti-vibration gloves.

2.16 Noise hazard is associated with pneumatic and many other tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

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 and grinder disc 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.
- 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.
- An upper guard must cover the entire blade of the saw. 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

2 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 electric powered 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 worker to fall off a ladder or other elevated work surface and be injured due to the fall.

6.3 To protect the worker from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low-voltage isolation transformer.

6.4 Three-wire cords contain two current-carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground.

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 double-insulated 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 worker 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 fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

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.

Americas

Housekeeping, Worksite

S3NA-307-PR1

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 Americas-based staff and field worksites.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3NA-103-PR1 Housekeeping, Office

3.2 S3NA-208-PR1 Personal Protective Equipment Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Supervisor (or Project Manager)**

Responsible for the procedure's implementation and the details of addressing housekeeping policy within the worksite.

4.1.2 **SH&E Department**

Monitor, assess, and report on project housekeeping when visiting worksites.

4.1.3 **Employees**

Responsible for reporting any areas of concern to the **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.

4.2.2 Smoking will be permitted only in areas:

- designated in compliance with applicable local laws, regulations, legislation, and ordinances, by the Supervisior
- situated in locations that are not in the immediate vicinity of activities associated with work site activities
- Free of fire hazard
- That will not contaminate indoor areas and HVAC systems. Specifically, there shall be no smoking within 16 feet (5 meters) around doorways, windows, air vents, and HVAC intakes and equipment.

Additionally, **Supervisiors** will designate each smoking area giving primary consideration to those employees who do not smoke.

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

4.2.4 Site **employees** will first wash hands and face after completing work activities and prior to eating or drinking.

4.3 Water Supply

Water supplies will be available for use on site and will comply with the following requirements:

- Potable Water: An adequate supply of drinking water will be available for site staff consumption. Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains. 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 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 staff and visitors. Should subcontractor staff 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 staff, with separate toilets maintained for each sex, except where there are less than five total staff 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.

4.5 Washing Facilities

4.5.1 Hand and Face: Site staff will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.

4.5.2 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.).

4.6 Clothing and Personal Protective Equipment (PPE)

4.6.1 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. Refer to the *S3NA--208-PR1 Personal Protective Equipment Program*.

4.6.2 General Work Areas - At all times work areas will be kept free of dirt and debris that may impact the safety of site staff and visitors. All trash receptacles will be emptied regularly.

4.6.3 Break Areas and Lunchrooms - Site staff will observe the following requirements when using break areas and lunchrooms at AECOM project sites:

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

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

4.6.6 Perishable foods will be refrigerated whenever possible.

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

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

4.6.9 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.

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

4.7 Vermin Control

4.7.1 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.

4.7.2 A continuing and effective extermination program shall be instituted where the presence of rodents, insects, or other vermin is detected.

4.8 General Housekeeping

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

4.8.2 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.

4.8.3 Protruding objects or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Employees will use a reasonable amount of effort to keep slip, trip, and fall hazards to a minimum.

4.8.4 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.

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

4.8.6 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.

4.8.7 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.

4.8.8 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.

4.8.9 Site ice / snow conditions shall be assessed prior to the start of work each day and controls for removal of ice or slip risk mitigation shall be implemented as necessary.

4.8.10 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.

4.8.11 Worksite Offices and Trailers - Worksite offices and trailers will be maintained in accordance with *S3NA-103-PR1 Housekeeping, Office.*

5.0 Records

5.1 None

6.0 Attachments

6.1 None

Americas

Manual Lifting, Field

S3NA-308-PR1

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 Americas-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 References

3.1 OSHA Technical Manual

3.2 National Safety Council

3.3 Canadian Centre for Occupational Health and Safety

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager**

Responsible for administering the procedure and providing resources and direction on proper lifting/handling techniques.

4.1.2 **District SH&E Manager**

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**

Responsible for reviewing and following *S3NA-308-WI1 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.

4.6 All **employees** exposed to manual handling hazards shall be trained on safe lifting and handling of loads.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-308-WI1 Manual Lifting Safe Work Practices

Americas

Manual Lifting Safe Work Practices

S3NA-308-WI1

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 your 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.

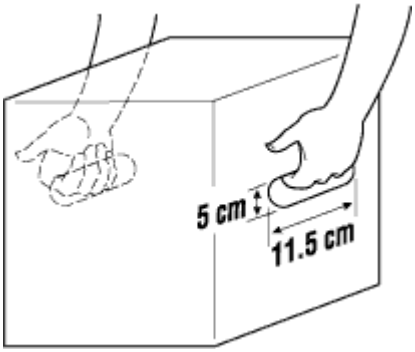
1.3.4 High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.

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 of various types.

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 (1 meter) of the platform.
- Position the forward foot around the cylinder, the back foot about 1 foot (30 centimeters) behind the cylinder.
- Bend knees slightly.
- Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot (30 centimeter) 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 co-worker, remember to:

- Stand close to the platform.
- Place one foot in front of the platform.
- Bend hips and knees.
- Keep the back straight.
- Ease the bag off the shoulder and put it upright on the platform.
- Pull the bag slightly over the edge of the platform.
- Stand close to the platform with the bag touching the chest.
- Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
- Step back.
- Bend hips and knees, keeping back straight.
- Ease the bag onto the floor.

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.

Americas

Mobile or Heavy Equipment

S3NA-309-PR1

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near mobile or heavy equipment and heavy equipment operation.

1.2 This procedure applies to all AECOM Americas-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 is in motion or the engine is running.

2.3 **Ground personnel/workers** – Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 References

3.1 S3NA-202-PR1 Competent Person Designation

3.2 S3NA-205-PR1 Equipment Inspections & Maintenance

3.3 S3NA-406-PR1 Electrical Lines, Overhead

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers/Site Supervisor**

Responsible for ensuring all equipment is in good working order and all equipment operators are qualified on the piece of machinery they are assigned. Ensure that subcontractor machinery and mechanized equipment is certified in accordance with the requirements of *S3NA-309-FM1 Certification of Machinery and Mechanized Equipment*.

4.1.2 **Employees**

Confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.

4.1.3 **Operators** (of mobile equipment)

Operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment. Immediately report defects and conditions affecting the safe operation of the equipment to the site Supervisor.

4.2 Communication

4.2.1 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.

4.2.2 The following points outline the communication requirements during heavy equipment operations:

- **Site Supervisors/Project Managers** shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.

- **Site Supervisors/ Project Managers** shall inform all ground personnel before changes are made in the locations of designated work areas.
- Prior to work initiating on site, the **Site Supervisor/Project Manager** is to confirm all operators and ground personnel are trained on the hand signals that will be used to communicate between operators and ground personnel.
- **Ground Personnel** working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (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 **signlal person** shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.3 Ground Personnel

4.3.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.3.2 The following points outline the clearance requirements during heavy equipment operations:

- **Ground Personnel** shall always yield to heavy equipment.
- **Ground Personnel** shall maintain a suitable “buffer” area of clearance from all active heavy equipment.
- A job-specific hazard analysis that identifies any special precautions shall be completed and communicated to all AECOM personnel.
- **Site Supervisors/Project 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/Project 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.
- **Employees** shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- **Employees** shall not talk on a cell phone while standing or walking on a roadway or other mobile equipment path.

4.3.3 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)
- American National Standards Institute/Canadian Standards Association- (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).

4.4 Prior to work commencing

4.4.1 All mobile equipment will be inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.

4.4.2 The **Operator** will report defects and conditions affecting the safe operation of the equipment to the Site Supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.

4.4.3 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.

4.4.4 An approved 4A40BC fire extinguisher shall be present on all mobile equipment.

4.4.5 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’.

4.4.6 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.

4.4.7 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.

4.5 Operation

4.5.1 The **Operator** of mobile equipment is the only worker permitted to ride the equipment unless the equipment is a worker transportation vehicle.

4.5.2 A person will not operate mobile equipment unless the person has received adequate instruction and training in the safe use of the equipment, and has demonstrated to a qualified supervisor or instructor competency in operating the equipment.

4.5.3 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.

4.5.4 A site **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.

4.5.5 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.

4.5.6 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.

4.5.7 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.

4.5.8 When approaching or crossing the intended path of travel of mobile equipment, **Field Staff** shall establish eye contact with the operator of the mobile equipment and confirm that it is safe to proceed.

4.5.9 Have vehicle headlights on at all times when driving in the area.

4.5.10 Park motor vehicles off the haul roads, or away from the work areas.

4.5.11 Do not wear loose clothing or jewelry where there is a danger of entanglement in rotating equipment.

4.5.12 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.

4.5.13 Stay out of the blind areas around mobile equipment and never assume that the equipment operators have seen you or are aware of your presence.

4.5.14 Maintain a distance of 2 feet (60 centimeters) 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.

4.5.15 Vibration from moving traffic or mobile equipment can cause excavations or spoil piles to become unstable. Be aware of the risk and keep clear.

4.5.16 All heavy equipment shall be operated in a safe manner that will not endanger persons or property. When operating an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating, refer to the *S3NA-309-WI1 Brokk 180 Safety Card* for more specifics.

4.5.17 All heavy equipment shall be operated at safe speeds.

4.5.18 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.

4.5.19 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.

4.5.20 When feasible, **Operators** shall travel with the "load trailing", if the load obstructs the forward view of the operator.

4.5.21 Slow down and sound horn when approaching a blind curve or intersection. Signal people equipped with 2-way radio communications may be required to adequately control traffic.

4.5.22 **Operators** shall remain in cab while heavy equipment is being loaded.

4.5.23 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.

4.5.24 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.

4.5.25 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.

4.5.26 Never exit heavy equipment while it is in motion.

4.5.27 Passengers shall only ride in heavy equipment designed for occupancy of passengers.

4.5.28 Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).

4.5.29 Site vehicles will be parked in a designated parking location away from heavy equipment.

4.5.30 **Operators** shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.

4.5.31 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.

4.5.32 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.

4.5.33 Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.

4.5.34 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not to be exceeded.

4.5.35 Steering or spinner knobs shall not be attached to steering wheels.

4.5.36 High-lift rider industrial trucks shall be equipped with overhead guards.

4.5.37 When ascending or descending grades in excess of 5 percent, loaded trucks shall be driven with the load upgrade.

4.5.38 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.

4.5.39 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.

4.5.40 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

4.5.41 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

4.5.42 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.6 Utilities

4.6.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. Refer to the *S3NA-406-PR1 Electrical Lines, Overhead* procedure for more specifics.

4.6.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities.
- Confirm all equipment (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.

4.7 Training

4.7.1 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.

4.7.2 Only designated, qualified personnel shall operate heavy equipment.

4.7.3 **Operators** shall have all appropriate local, State, or Federal licenses or training to operate a designated piece of heavy equipment.

4.7.4 **Operators** shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is needed. **Operators** shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.8 Inspection and Maintenance

4.8.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel during work hours. Refer to the *S3NA-205-PR1 Equipment Inspections & Maintenance* program.

4.8.2 Maintenance records will be maintained on the site or project for mobile equipment.

4.8.3 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.

4.8.4 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 (refer to *S3NA-309-FM1 Certification of Machinery and Mechanized Equipment*) by a competent person (refer to *S3NA-202-PR1 Competent Person Designation*) seven days prior to on-site operation, and is valid for one year.

4.8.5 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 **Supervisor/Project 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 (*S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist*).

4.8.6 Defective heavy equipment shall be immediately taken out of service until repaired.

4.9 Fueling and batteries

4.9.1 A well-ventilated area shall be used for refueling.

4.9.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.

4.9.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.

4.9.4 No one shall spill fuel on hot surfaces. Any spillage should be cleaned before starting an engine.

4.9.5 Spilled fuel shall be cleaned with cotton rags or cloths; do not use wool or metallic cloth.

4.9.6 Open flames, lighted smoking materials, or sparking equipment shall remain well away from the fueling area.

4.9.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.

4.9.8 Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.

4.9.9 The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.

4.9.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

4.9.11 Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent buildup of a static charge.

4.9.12 Batteries shall be serviced in a ventilated area while wearing appropriate Personal Protective Equipment.

4.9.13 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first.

4.9.14 When installing a battery, the battery shall be connected ground post last.

4.9.15 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.

4.9.16 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.

4.9.17 Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water.

4.9.18 Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention shall be sought immediately.

4.9.19 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 batteries by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least 25 feet (7.6 meters) away from battery-charging stations.

5.0 Records

5.1 Inspection records shall be maintained with the equipment.

6.0 Attachments

6.1 S3NA-309-WI1 Brokk180 Safety Card

6.2 S3NA-309-FM1 Certification of Machinery and Mechanized Equipment

6.3 S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist

Americas

Brokk 180 Safety Card

S3NA-309-WI1

1.0 Objective/Overview

1.1 The Brokk 180 is an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating. This machine includes attachments designed exclusively for demolishing work (e.g., grapple, bucket, hydraulic hammer, etc.). By using the remote control unit, an operator can move the machine and attachments in different directions and speeds from afar.

2.0 Potential Hazards

2.1 Flying debris

2.2 Crush/impact/pinch from extendable boom, tracks, and tipping over

2.3 Electrocution from subsurface utilities (when excavating)

2.4 Noise

3.0 Safe Operating Guidelines

3.1 Prior to use, complete a pre-operation inspection to determine if the unit is in safe working condition.

3.2 Position the unit to safely perform the intended task, then deploy the outriggers to stabilize the unit.

3.3 Confirm that the operator knows what the lifting capacity is; do not exceed the lifting capacity.

3.4 Complete a subsurface utility clearance prior to excavating.

3.5 Establish a minimum 15-foot (4.5-meter) clearance around the unit while operating.

3.6 Do not allow debris to build up around the unit. Maintain good housekeeping practices.

3.7 Prior to removing debris from under the boom, stop, disengage the unit, and position the boom so that the attachment is at rest on the ground.

3.8 Personnel operating the unit with the remote control device will be properly trained and certified by a competent person.

3.9 The operator will be able to maintain line of sight visual contact with the unit at all times to assess hazards and site security.

3.10 Maintenance in excess of preventive maintenance activities (e.g., lubrication, replenishing fluids, etc.) will be performed by manufacturer personnel ONLY.

3.11 All operations will comply with the manufacturer's recommended policies.

4.0 Training Requirements

4.1 Review of applicable Standard Operating Procedures.

4.2 Complete knowledge and understanding of remote control functions.

4.3 Review and follow manufacturers' recommended policies and practices.

5.0 Personal Protective Equipment (Level D ensemble)

5.1 Class II (minimum) American National Standards Institute/Canadian Safety Association 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 Pay close attention to power cords for potential tripping hazard and equipment entanglement.

Americas

Certification of Machinery and Mechanized Equipment S3NA-309-FM1

1.0 General Guidelines

1.1 Subcontractor equipment shall comply with all applicable legislative requirements, local, State, Federal, Provincial, Territorial for motor vehicles and material handling heavy equipment.

1.2 Certification shall be obtained for all subcontractor machinery and mechanized equipment prior to but within seven calendar days in advance of use on the project site.

1.3 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 on-site 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 Standard Operating Procedures.

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:

AECOM

Americas

Heavy Equipment Pre-Operation Checklist

S3NA-309-FM2

Project Name/Location:															
Equipment Number/Name:							**Equipment 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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Project Name/Location:															
Equipment Number/Name:							**Equipment 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**
16. Fuel leaks	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17. Fire extinguisher	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18. Fuel lines secure	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19. Electrical lines	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20. Exhaust components	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Comments:															

Definitions:

SAT = Satisfactory; in working order

UNSAT = Unsatisfactory; not in working order/damaged

N/A = Not Applicable

Americas

Rigging, Hoisting, Cranes, and Lifting Devices

S3NA-310-PR1

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 Americas-based employees and operations.

2.0 Terms and Definitions

2.1 **ASM –** American Society of Mechanical Engineers

2.2 **Assembly/Disassembly (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 non-management or management personnel. A/D 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 **Controlling Entity –** An employer that is a prime contractor, general contractor, construction manager, constructor or any other legal entity that has the overall responsibility for the construction of the project, including planning, quality, safety and completion.

2.4 **Crane –** Any power-operated equipment that can hoist, lower, and horizontally move a suspended load.

2.5 **Critical lifts –** Critical lifts are lifting operations that exceed 70 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,
- 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.

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-202-PR1 Competent Person Designation

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA 209 PR1 Hazard Assessment and Planning

3.5 S3NA-304-PR1 Fall Protection/Working at Heights

3.6 S3NA-309-PR1 Mobile or Heavy Equipment

3.7 S3NA-406-PR1 Electrical Lines, Overhead

3.8 S3NA-408-PR1 Elevated Work Platforms and Aerial Lifts

3.9 29 CFR Part 1926.1400 – Cranes and Derricks in Construction

3.10 Canadian Standard Association, Safety Code for Material Hoists, CSA – Z256 – M87 (1995)

3.11 Canadian Standard Association, Safety Standard for Operation, Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists, and Trolleys, B167 – 96

Jurisdictions	Regulations
United States	
OSHA	29 CFR Part 1926.1400 – Cranes and Derricks in Construction
Canada	
Federal	Canadian Standard Association, *Safety Code for Material Hoists, CSA – Z256 – M87 (1995)* Canadian Standard Association, *Safety Standard for Operation, Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists, and Trolleys, B167 – 96*
Alberta	Occupational Health and Safety Code 2009, Part 6
British Columbia	Occupational Health and Safety Regulation, Part 14
Manitoba	The Workplace Safety and Health Act, Part 23
New Brunswick	O.C. 91-1035 Part 15, Section 207-230.1
Newfoundland/Labrador	Occupational Health and Safety Regulation 5/12. Part 14
Nova Scotia	Occupational Safety General Regulations. Section 82, Part 7
NWT/NU Territories	N/A
Ontario	O. Reg 213/91 S. 150-180
Prince Edward Island	N/A
Quebec	Regulation Respecting Occupational Health and Safety. Chater S2.1, Section223
Saskatchewan	The Occupational Health and Safety Regulations. Part 13
Yukon Territory	Occupational Health and Safety Act. Part 5

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager** (includes **Supervisors**)

- 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.

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

- Approve personnel to operate powered cranes.
- Approve the Critical Lift Plan.

4.1.3 **Crane Operator** and the **Rigging Site Supervisor**

- Approve the Crane Pre-Operation Inspection checklist and the Critical Lift Plan.

4.2 General Requirements

4.2.1 AECOM personnel will not operate powered cranes and/or tuggers without direct approval from the **Project Manager**, **District SH&E Manager**, and **Legal**.

4.2.2 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, **Project Managers** 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 and approved by the **Crane Inspector**, **Site Safety Coordinator** and **Project Manager**.

4.3 Assembly/Disassembly

4.3.1 Prior to assembly of any cranes, all crews will confirm:

- A procedure is in place,
- Their tasks,
- The hazard associated with their tasks,
- Hazardous locations they need to avoid, and
- The hazards associated with working on and around mobile and heavy equipment.

4.3.2 Should a crew member change a task, then that crew member will recertify that the above requirements will be met.

4.3.3 No assembly/disassembly of cranes shall be performed underneath power lines. Refer to *S3NA-309-PR1 Mobile or Heavy Equipment*.

4.4 Addressing Specific Hazards

4.4.1 The **A/D 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 All training shall be in accordance with procedure *S3NA-209-PR1 Project Hazard Assessment and Planning*.

- 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 (PPE)

All AECOM personnel operating lifting or hoisting equipment and/or functioning as riggers or signal persons shall wear reflective equipment. Refer to the *S3NA-208-PR1 Personal Protective Equipment Program*.

4.6.1 The following will be familiar with working around Mobile and Heavy equipment as outlined in *S3NA-309-PR1* Mobile *and Heavy Equipment/Canadian Standards Association* -approved PPE shall be worn at minimum:

- Hard hat
- Steel-toed boots
- Class II high visibility vest, in addition to normal personal protective Power Line Safety gear
- Eye protection
- Hearing protection (when needed)
- Protective Gloves

4.6.2 All cranes shall maintain the following minimal clearance distance from power lines.

Voltage (nominal, kilovolt, alternating current)	Minimum clearance distance feet (metres)
Up to 50	10 (3)
Over 50 to 200	15 (4.5)
Over 200 to 350	20 (6)
Over 350 to 500	25 (7.5)
Over 500 to 750	35 (11)
Over 750 to 1000	45 (14)
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 as applicable in the United States and all territorial and provincial rules in Canada.
- **Fall Protection** – Any AECOM employee will be trained who may be exposed to fall hazards while on or hoisted when exposed to a potential fall of 6 feet (2 meters) or more. Refer to *S3NA-304-PR1 Fall Protection/Working at Heights*.
- **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).

4.7.2 Basic Operator Training

- 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 include:
  - Use of and the ability to calculate (manually or with a calculator) load/capacity information on a variety of configurations of the equipment.
  - Procedure for preventing and responding to power line contact.
- Technical knowledge required:
  - Wire rope;
  - Rigging devices and their use;
  - Technical limitations of protective measure against electrical hazards;
  - Effects of load share and load transfer in multi-crane lifts;
  - Basic crane terms;

- Basics of machine power flow systems;
- Significance of the instruments and gauge reading;
- Effects of thermal expansion and contraction in hydraulic cylinders;
- Background information necessary to understand pre-operation and inspection requirements;
- How to use the safety devices and operation aids required;
- 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 crawlers 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;
- 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;
- Basic rigging procedures;
- How to carry out the shift inspection;
- Proper procedure for load control and the use of handheld tag lines;
- Emergency response site procedures; and
- 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, and
- Multi drum operation.

- Any necessary repairs or adjustments needed for the equipment will be communicated to all affected employees at the beginning of the shift.
- Defective rigging shall be removed from service.

4.7.3 Basic Training for **Signal Person**

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 boom deflection from hoisting load.
- Demonstrate that the signal person meets the training requirements through examination (oral or written), including practical application or in accordance with local regulatory training requirements.
- Be familiar with working around Mobile and Heavy equipment as outlined in *S3NA-309-PR1 Mobile and Heavy Equipment*.

4.7.4 Basic Training for Special Equipment Operators

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 training program for the special equipment.

4.7.5 Rigger Training Programs

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.

Topics in both categories shall include the same basics but the depth of detail shall match the job assignment. Topics shall include (but limited to) 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.
- Restrictions on use of come-along.
- 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.

4.7.6 Crane Inspection Training

All crane inspections must be carried out by a Professional Engineer licensed to practice in the jurisdiction, or where applicable by legislation, by a **competent person** designated by the Engineer. Refer to the *S3NA-202-PR1 Competent Person Designation* procedure for more specifics. Where regulations governing training requirements for inspectors exist, all AECOM personnel tasked with inspection duties shall adhere to the procedures listed below.

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; and
- Special equipment.

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.

4.7.7 Scope of Inspector Training

Inspector training shall include basic inspection techniques and the application of manufacturer-supplied information, Occupational Safety & Health Administration, ASME, and acceptance/rejection criteria.

4.8 Testing and Examination

4.8.1 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.

4.8.2 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.

4.9 Qualification, Requalification, or Disqualification

4.9.1 Training Certificate

After the training, testing, and On the Job Training (if required) is successfully completed, a certificate will be issued to the operator, rigger, or inspector. The operator's certificate shall list the specific equipment the operator is qualified to operate.

4.9.2 Qualification Period

Operator, signal person, rigger, and inspector qualifications may be dependent on state or local regulations.

4.9.3 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 **supervisor** determines that the employee should be disqualified, the **supervisor** 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.

4.10 Critical Lift Procedure

4.10.1 Critical Lift Plan

Prior to commencing any critical lift activity; the **Project Manager** will confirm that a Crane Pre-Operational Inspection Checklist and a Critical Lift Checklist (see attachments) are prepared for all critical lifts. These documents are to be prepared and checked by a qualified person e.g. crane operator, **supervisor**, or rigger or Professional Engineer. Where a crane operator has been engaged they should provide their own checklists providing they are at a standard equal to those provided in attachments. Refer to *S3NA-408-PR1 Elevated Work Platforms and Aerial Lifts* for additional information.

4.10.2 Critical Lift Plan Approval

The **Crane Operator and the Rigging Site Supervisor** will review and approve the Critical Lift Plan; on projects that AECOM controls, the **District SH&E Manager** will also review and approve the Critical Lift Plan.

Revisions to the Critical Lift Plan will be reviewed and approved in the same manner as the original Critical Lift Plan.

4.10.3 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 will be covered, the Critical Lift Plan 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- PR1 Project Safety Meetings*.

4.10.4 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 to include at a minimum, the meeting date and list of attendees.
  - Any additional documentation deemed appropriate by the **District SH&E Manager** or other responsible personnel (e.g., lessons learned).

4.10.5 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, 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 signaler 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.

4.11 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.
- All loads transported by sling must be grounded and/or cables grounded prior to removal. This is to prevent a discharge of the electrical current generated during transport. Refer to *S3NA-406-PR1 Electrical Lines, Overhead procedure*.
- If 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 8 inches (20 centimeters).

5.0 Records

5.1 All training records shall be maintained in accordance with *S3NA-003-PR1 SH&E Training*.

5.2 All inspection records will be maintained on site with the machine. This will include, but not be limited to:

- Equipment inspections;
- Equipment tests; and
- Repairs, modifications and/or maintenance of the lifting device.

6.0 Attachments

6.1 S3NA-310-FM1 Crane Pre-Operation Inspection

6.2 S3NA-310-FM2 Critical Lift Checklist

AECOM

Americas

Crane Pre-Operation Inspection

S3NA-310-FM1

PROJECT INFORMATION	
Project Name:	
Project/Contract Number:	Date:
Site Supervisor:	Crane Operator:
Crane Model No:	Crane Manufacturer:
Crane Number:	Hours:

GENERAL REQUIREMENTS

1. Site Safety Coordinator 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

1. Load lines are capable of supporting 5 times maximum intended load (10 times for rotation-resistant wire rope) ☐ Yes ☐ No
2. Total weight of loaded platform and related rigging does not exceed 50 percent of rated capacity per boom angle and radius ☐ Yes ☐ No
3. 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
4. Crane has a positive acting anti-two-block device that deactivates hoisting action ☐ Yes ☐ No
5. Boom angle indicator is functional and readily visible to the operator ☐ Yes ☐ No

RIGGING REQUIREMENTS

1. Wire rope, shackles, and other rigging hardware are capable of supporting 5 times the maximum intended load ☐ Yes ☐ No
2. Lifting bridles are four legs of equal length connected by common ring ☐ Yes ☐ No
3. All eyes in wire rope slings are fabricated with thimbles ☐ Yes ☐ No
4. Shackle bolts are secured against displacement (pinned or moused) ☐ Yes ☐ No
5. Safety line passes through the eye of each bridle leg and is attached above the headache ball or to the crane hook ☐ Yes ☐ No
6. Hook throat opening has been closed by pinning, bolting, or mousing safety latch ☐ Yes ☐ No
7. Rigging is dedicated for platform use and is not used for any other purpose when not hoisting personnel ☐ Yes ☐ No

PLATFORM REQUIREMENTS

1. Platform is posted with its weight and rated load capacity or maximum intended load ☐ Yes ☐ No
2. A grab rail is installed inside the entire perimeter of the platform ☐ Yes ☐ No
3. Access gates, if installed, do not swing outward and have a device to prevent accidental opening ☐ Yes ☐ No
4. In addition to hard hats, employees are afforded overhead protection by the platform when exposed to falling objects ☐ Yes ☐ No
5. All edges exposed to employee contact are smoothed to prevent injury from punctures or lacerations ☐ Yes ☐ No

PLATFORM LOADING

1. The platform is not loaded in excess of its rated capacity ☐ Yes ☐ No
2. The number of employees does not exceed the number required for the work to be performed ☐ Yes ☐ No
3. The platform is not used to hoist tools or materials except for those necessary for employees to perform the work ☐ Yes ☐ No
4. Personnel, tools, and materials are evenly distributed within the platform ☐ Yes ☐ No

PROOF-TESTING, TRIAL LIFT, AND INSPECTION		
1.	The platform and rigging has been proof tested to 1.25 times the rated capacity (minimum duration, 5 minutes)	☐ Yes ☐ No
2.	After proof testing, the platform has been inspected for deficiencies	☐ Yes ☐ No
3.	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
4.	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		
1.	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
2.	A pre-lift meeting with all affected employees has been conducted	☐ Yes ☐ No
3.	There is no adverse weather condition, winds are less than 15 mph, and there is no electrical storm activity or heavy rain	☐ Yes ☐ No
4.	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
5.	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 Inspector:

Print Name	Signature	Organization	Date

Project Manager:

Print Name	Signature	Organization	Date

AECOM

Americas

Critical Lift Checklist

S3NA-310-FM2

A critical lift is any lift that exceeds 70 percent of the crane's rated capacity, involves more than one crane, involves unusual or severe hazards, or any lift the Project Manager 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:**

Americas

Stairways and Ladders

S3NA-312-PR1

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 Americas-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 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-205-PR1 Equipment Inspections and Maintenance

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA-209-PR1 Project Hazard Assessment and Planning

3.5 S3NA-304-PR1 Fall Protection / Working at Heights

3.6 American National Standards Institute (ANSI) standards ANSI A14.1, ANSI A14.3

3.7 Canadian Standard Association (CSA) CAN/CSA-Z11-M81 (R2005)-Portable Ladders

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Managers, Supervisors** and **Office Managers (Operations)**

Responsible for the implementation of this procedure and compliance with local regulations listed in *S3NA-312-ST Stairways and Ladders* for supervised employees.

4.1.2 **District SH&E Managers**

Provide guidance as to application of the procedure.

4.1.3 **Employees**

Adhere to this procedure, apply appropriate precautions and work practices in their use of ladders and stairways.

4.2 Training

4.2.1 All **Employees** exposed to ladders or construction stairways must take Fall Protection Awareness Training, refer to the *S3NA-003-PR1 SH&E Training* procedure.

4.2.2 All **Employees** who will climb above 6 feet (2 metres) must take Fall Protection Performance Training. Refer to the *S3NA-304-PR1 Fall Protection / Working at Heights* procedure.

4.2.3 All **Employees** will be oriented to the hazards and controls of any ladders and stairs present on the site and be aware of the safety planning and THA in accordance with *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.3 Construction or Industrial Stairs

4.3.1 Verify stairs meet local legislation.

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 86 centimeters) 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 (5 centimeters by 10.2 centimeters), spaced not more than 8 feet (2.4 meters) apart and properly anchored.

4.3.8 The rail cross section will be not less than 2 inches by 4 inches (5 centimeters by 10.2 centimeters) 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 (1.5 meters) 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 [107 centimeters] nominal from upper surface of top rail to

floor, platform, runway, or ramp level). The top rail shall be a 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 [6 meters] or more) in height, stairways, ladders or ramps must be provided to **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 (76 centimeters) in the direction of travel at every 12 feet (3.7 meters) 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 (50 centimeters) beyond the swing of the door.

4.4 Personal Protective Equipment (PPE)

- Personal fall protection equipment must be worn when working above the regulated height in your location. Refer to the *S3NA-208-PR1 Personal Protective Equipment Program* and *S3NA-304-PR1 Fall Protection / Working at Heights* procedures for more specifics.
- PPE must be appropriate for the work location being constructed or industrial work site and/or client requirements.

4.5 Ladders

4.5.1 The following are minimum requirements for the use and care of ladders by AECOM personnel. Compliance with American National Standards Institute (ANSI) standards ANSI A14.1, ANSI A14.3, or Canadian Standard Association (CSA) standard CAN/CSA-Z11-M81 (R2005)-Portable Ladders and applicable State, Provincial or Territorial regulations is also required; refer to the *S3NA-312-ST Stairways and Ladders* for regulations. Additionally consider the following:

- Ladders shall be inspected before use and if defective, removed from use. Inspection must include proper labels and certification is on the ladder. Refer to the *S3NA-312-FM1 Ladder Inspection*.
- 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 (6 meters) 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 and CSA.
  - 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 (6 meters).
  - single ladders – 30 feet (9 meters).
  - extension ladders (2 section) – 49 feet (15 meters)
  - extension ladders (more than 2 sections) – 66 feet (20 meters)

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 horizontal to every four vertical lengths.

4.5.4 Ladder Types

- The Occupational Safety and Health Administration, 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 (170 kg)	Super Heavy Duty
Type IA	300 lbs (136 kg)	Extra Heavy Duty
Type I	250 lbs (113 kg)	Heavy Duty Industrial
Type II	225 lbs (102 kg)	Medium Duty Commercial
Type III	200 lbs (91 kg)	Light Duty Household
Notes: lbs = pounds kg = kilograms		

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 one horizontal to every three to four vertical.
- The top of the ladder should extend 3 feet (1 meter) 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 points of 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 points of 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 (1.8 meters) 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 (1.2 meters).
- 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. Refer to the *S3NA-312-FM1 Ladder Inspection* form and the *S3NA-205-PR1 Equipment Inspections and Maintenance* procedure.
- 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.

4.5.7 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, refer to *S3NA-312-ST Stairways and Ladders*.
- Use only heavy-duty construction grade ladders of an approved standard.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-312-FM1 Ladder Inspection

6.2 S3NA-312-ST Stairways and Ladders

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Ladder Inspection

S3NA-312-FM1

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

LOCATION OF LADDER	NUMBER	DATE INSPECTED	ANSI /CSATYPE 1 OR TYPE 1A CERTIFICATION OR EQUIVALENT on Label	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

AECOM

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																
LOCATION OF LADDER	NUMBER	DATE INSPECTED	ANSI /CSATYPE 1 OR TYPE 1A CERTIFICATION OR EQUIVALENT on Label	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	
COMMENTS (clearly identify if a ladder must be removed from service):																
SIGNATURE:																

Americas

Stairways and Ladders

S3NA-312-ST

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

Americas

Wildlife, Plants and Insects

S3NA-313-PR1

1.0 Purpose and Scope

1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as “biological hazards”.

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

2.0 Terms and Definitions

2.1 **Field Work –** Any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance, biological surveys, and other work that meets the definition of field work.

2.2 **Poisonous** – Capable of harming or killing by or as if by poison; toxic or venomous.

2.3 **Phase I Environmental Site Assessment –** Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of Comprehensive Environmental Response, Compensation, and Liability Act defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called “All Appropriate Inquiry” or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.

2.4 **Phase II Environmental Site Assessment** – Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 References

3.1 WP-001-PR Firearms Standard

3.2 S2-032-PR1 Weapons Safety

3.3 S3NA-004-PR1 Incident Report

3.4 S3NA-208-PR1 Personal Protective Equipment Program

3.5 S3NA-209-PR1 Project Hazard Assessment and Planning

3.6 S3NA-511-PR1 Heat Stress

3.7 Public Health Agency of Canada on Ticks and Lyme Disease in Canada

3.8 Public Health Agency of Canada on West Nile Virus

3.9 United States Center for Disease Control (CDC) on Lyme Disease

3.10 New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents.

3.11 Spectrum Brands, 2007. Personal Insect Repellent Products.

3.12 U.S. Centers for Disease Control and Prevention, 2004. Tick Management Handbook

3.13 U.S. Environmental Protection Agency, 2006. Permethrin Facts: Preregistration Eligibility Decision Fact Sheet

3.14 U.S. National Pesticide Information Center, 1997, National Pesticide Telecommunications Network Fact Sheet for Permethrin

3.15 U.S. Environmental Protection Agency, 2005. New Pesticide Fact Sheet, Picaridin

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Managers / Supervisors

- Responsible for managing field work.
- Work with employees to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- 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 Personal Protective Equipment (PPE) and protective repellents and lotions and ensure that exposed employees have and use these products.
- Approve the costs associated with the PPE and materials necessary to protect employees from the biological hazards covered by this procedure.

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

- Participate in incident reporting and investigations when appropriate.
- Work with Office Manager (Operations), SH&E Department and project Safety Professionals provide training and guidance to employees consistent with this procedure.
- During the performance of project site visits, assess the precautions being taken against the requirements of this procedure.
- Assist project teams in identifying hazards and selecting appropriate control measures.

4.1.3 Office Managers (Operations)

- Assure implementation of this procedure in their regions and offices.
- Participate in incident reporting and investigations when appropriate.

4.1.4 Field Staff / 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 THA, in accordance with the *S3NA-209-PR1 Project Hazard Assessment and Planning,* 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 Employee Sensitivity

4.3.1 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.

4.3.2 Employees / Field Staff also need to consider whether they are sensitive to the use of insect repellents.

4.4 Planning and Hazard Assessment

4.4.1 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 procedure are integrated into the task hazard analysis (THA) planning process and conveyed to AECOM employees conducting the field work (also referred to as field staff). 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.

4.4.2 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-PR1 Heat Stress.*

4.4.3 During the preparation of the project-specific 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.

4.4.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40 degrees Fahrenheit (4.5 degrees Celsius) for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.

4.4.5 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.

4.4.6 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 field

staff shall stop work and not proceed until the THA has been amended and protective measures implemented.

4.4.7 A decision flow chart and table for determining the potential for biological hazards in the U.S. has been provided in *S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (U.S.).*

4.4.8 Restrictions:

- In accordance with the Global Safety Department standards, no firearms or weapons are allowed to be used without express permission by the Region Executive and chief Security Officer, refer to the *WP-001-PR Global Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training, refer to the *S2-032-PR1 Weapons Safety*.
- 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 Habitat Avoidance, Elimination, and/or Control

4.5.1 Ticks, Spiders and other 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.
- Projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the **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 shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile (less than half a kilometer) from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. **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.

4.5.2 Poisonous Plants

- If poisonous plants are identified in the work area, **field staff** will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other **field staff** to avoid the designated area. If **field staff** decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the **Project Manager** (and Client as appropriate) 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 as appropriate) to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.

- **Field staff** 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.

4.5.3 Wildlife Hazards (Wild Animals, Reptiles and Birds)

Staff must not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling must only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics on prevention:

- *S3NA-313-WI11 Large Carnivores*
- *S3NA-313-WI12 Bear Safety*
- *S3NA-313-WI13 Small Mammals*
- *S3NA-313-WI14 Snakes*
- *S3NA-313-WI15 Alligators*

4.5.4 Bird Droppings

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.

4.6 Insects

4.6.1 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.

4.6.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. 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.

4.6.3 Ticks

- 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 a disease.
- Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and, therefore, most related illnesses. The use of permethrin is strongly advised.
- The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in *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.
- 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.
- To remove ticks that are embedded in skin, utilize a tick key. Alternatively use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out.

- Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If you notice this type of pattern or rash resulting from a tick bite, contact AECOM reporting line 1 (800) 348-5046 and asked to be connected to WorkCare for medical support. If this service is unavailable, contact your personal physician or a local medical clinic.
    - 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.
    - U.S. – 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). All tick testing should be coordinated through WorkCare, AECOM's Corporate medical provider using the *S3NA-313-FM1 Tick Test Request Form*.
- 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.

4.6.4 Chiggers

- Chiggers are mite larvae, approximately ½ millimeter in size, and typically invisible to the naked eye. While chiggers are not known to carry infectious diseases, their bites and resulting rashes and itching can lead to dermatitis and a secondary infection.
- Chiggers are typically active from the last hard freeze in the winter or spring to the first hard freeze. They are active all year in the Gulf Coast and tropical areas.

4.6.5 Spiders

- Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the U.S. and others outside the U.S. inject a toxin that causes extensive tissue damage and intense pain.
- Additional information on spider identification can be found in attachment *S3NA-313-WI3 Poisonous Spider Identification*.

4.6.6 Mosquitoes

4.6.6.1 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.

4.6.6.2 CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk to field staff. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:

- Eastern Equine encephalitis
- Western Equine encephalitis
- West Nile Virus
- St. Louis encephalitis
- La Crosse encephalitis

4.6.6.3 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.

4.6.6.4 Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death, so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus. Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3NA-313-WI4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.6.7 Bees and Hornets

- Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground. Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously and if you locate insect back away without disturbing. Avoid reaching into areas where visibility is limited".
- If stung by a wasp, bees, 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.

4.6.8 Fire Ants

- The fire ant (southern and western U.S.) and the European fire ant (northeastern U.S. and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

4.6.9 Poisonous Plants

4.6.10 Plants that field staff should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed[1] (or giant cow parsnip), wild parsnip, devil's club and stinging nettle. Many others are extremely poisonous to eat (e.g., poison hemlock; water parsnip) – do not eat anything that has not been identified. Refer to *S3NA-313-WI5 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- 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.
- 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.

[1] Phytodermatisi producer: keep skin covered and wash well after exposure

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows as ina a variety of forms from a low sprawling shrub, dense ground cover, and or a thick woody vine that grows high into the tree canopy. Poison oak (*Rhus diversiloba*) is typically a low shrub in drier soils. Both of these plants have leaves of three and white berries. Poison sumac (*Rhus vernix*) is a tall shrub that is less prolific in distribution. It grows in wet areas, has a compound leaf with a red leaf stem (rachis), and white berries. All of these plants possess urushiol oils in 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 who have never had a reaction may develop an allergy after years of frequent contact.
- Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the giant hogweed (*Heracleum mantegazzianum*), a plant that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 16 feet (5 meters) in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by meadow parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum lanatum*). Meadow parsnip can be very abundant on disturbed sites.
- Nettles, particularly stinging nettle (*Urtica dioica*) and wood nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.
- Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. These include the cactus (*Opuntia spp.*), devils club (*Oplopanax horridum*), and prickly-ash (*Zanthoxylon americanum*).

4.6.11 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying to not eat any berries or plants if you are unsure of their identity.

4.6.12 Giant hogweed presents the most serious health risk. Field staff should learn to recognize and avoid it if encountered.

4.6.13 Employees / Field Staff 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 Region SH&E Manager.

4.7 Additional Wildlife Hazards (Wild Animals, Reptiles and Birds)

4.7.1 Refer to following for protection and prevention:

- *S3NA-313-WI11 Large Carnivores*
- *S3NA-313-WI12 Bear Safety*
- *S3NA-313-WI13 Small Mammals*
- *S3NA-313-WI14 Snakes*
- *S3NA-313-WI15 Alligators*

4.7.2 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*.

4.8 Personal Protective Equipment (PPE)

4.8.1 The selection of PPE is dependent on the hazard present and a Task Hazard Analysis (THA) should be conducted to determine situation-specific PPE required refer to *S3NA-208-PR1 Personal Protective Equipment Program*.

4.8.2 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.

4.8.3 PPE for insects should include insect repellent, bug nets, bug jackets, or similar deterrents. Socks should be pulled over pant legs where the threat of exposure is anticipated.

4.8.4 Epi-pens[2] or other personal medication should be carried by those staff that is aware that anaphylactic shock is a possibility for them.

4.9 Personal Precautions and Personal Protective Measures

4.9.1 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.

4.9.2 Insects, Spiders, and Ticks

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Use of Permethrin to treat field clothing.
- 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 CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
- Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, **field staff** 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.

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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.*

4.9.3 Poisonous Plants

- **Field staff** conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear either long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. **Field Staff** 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.
- For dermatitis caused by poison ivy, poison oak, or poison sumac, calamine lotion is effective.
- 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 / Field Staff** 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 **Region SH&E Manager**.

4.9.4 PPE Recommendations

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 to **field staff** exposure but reduce the risks once completed. Recommendation – 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.

4.9.5 Selection and Configuration of Field Clothing

4.9.5.1 See *S3NA-313-WI7 Configuration Clothing for Protection* against ticks and insects for illustrations and instructions for configuring, taping, and tucking clothing.

4.9.5.2 At a minimum, field staff 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.

4.9.5.3 Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.

4.9.5.4 Chemical Treatment of Field Clothing

Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.

4.9.5.4.1 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.

4.9.5.4.2 DEET

Note that DEET will reduce the effectiveness of FRC and should not be applied to this clothing. If working in FRC, field staff 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.

4.9.5.4.3 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 Environmental Protection Agency 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) persons treatment of their personal clothing using 0.5 percent Permethrin spray. AECOM strongly recommends the first option (**field staff** 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-PR1 Personal Protective Equipment Program* and with the approval of your **Supervisor** or **Project Manager**. For more information visit the AECOM Americas 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 **field staff** will be considered effective for five wash cycles.
- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that 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 an operational expense. **Supervisor** or **Project Manager** approval is required prior to purchase.
- If the **employee / field staff** 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, or 2) wear full-length clothing consisting of long-legged pants and long-sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an organic alternative to their work clothing.

4.9.5.5 Manual Treatment of Field Clothing

- If clothing pre-treated with Permethrin is not available or not purchased prior to field work, field staff 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 percent Permethrin spray a minimum of 2 to 4 hours prior to field work (boots, trousers, shirt, jackets, rain gear) 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 five wash cycles (check the specific instructions for the product used.) 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 an operational expense. **Supervisor** or **Project 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 Americas SH&E website.

4.10 Personal Hygiene and Body Checks

4.10.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.

4.10.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.

4.10.3 Field Staff 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 4.10 of this Procedure.

4.10.4 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 Region SH&E Manager for follow up.

4.11 Training

4.11.1 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.

4.11.2 Field staff who have severe allergic reactions are strongly recommended to notify their Project Manager, field Supervisor and Employees of the potential for a reaction and demonstrate what medication they might need and how it is administered.

4.12 Remedies / Exposure

4.12.1 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. There is a host of over the counter treatment options available for exposures to various biological hazards.

4.12.2 Report the incident, call WorkCare for advice, or consult a private doctor if necessary, refer to the *S3NA-004-PR1 Incident Report* procedure for more specifics.

5.0 Records

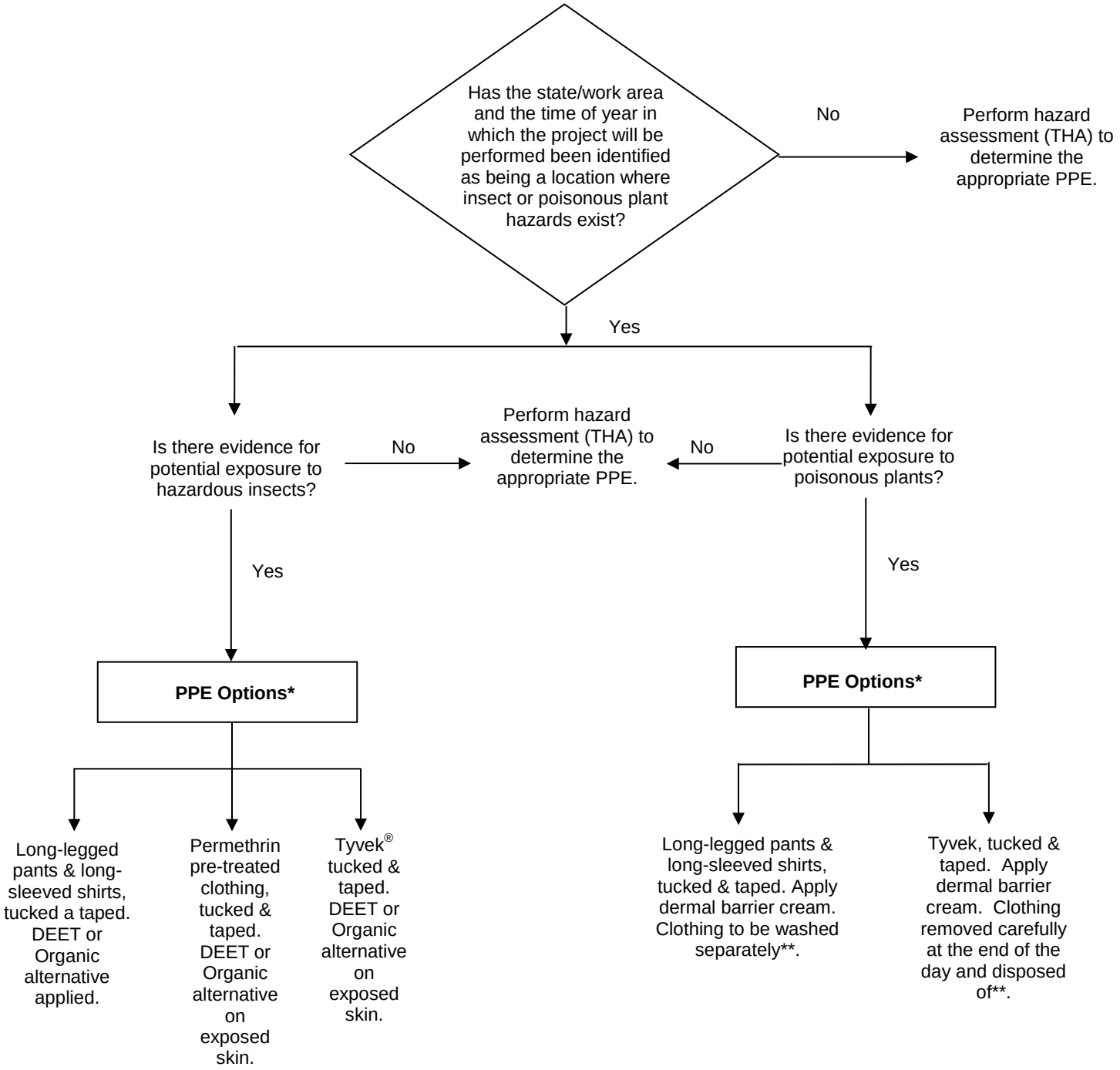
None

6.0 Attachments

6.1	S3NA-313-WI1	Biological Hazard Assessment Decision Flow Chart
6.2	S3NA-313-WI2	Ticks
6.3	S3NA-313-WI3	Poisonous Spider Identification
6.4	S3NA-313-WI4	Mosquito Borne Diseases
6.5	S3NA-313-WI5	Plants of Concern
6.6	S3NA-313-WI6	Wild Parsnip Identification
6.7	S3NA-313-WI7	Configuration Clothing for Protection against ticks and insects
6.8	S3NA-313-WI8	Insect Repellent Active Ingredient Product Information
6.9	S3NA-313-WI9	New York Department of Health Recommendations for Permethrin Application
6.10	S3NA-313-WI10	Bird Droppings Safe Work Practices
6.11	S3NA-313-WI11	Large Carnivores
6.12	S3NA-313-WI12	Bear Safety
6.13	S3NA-313-WI13	Small Mammals
6.14	S3NA-313-WI14	Snakes
6.15	S3NA-313-WI15	Alligators
6.16	S3NA-313-FM1	Tick Test Request Form

Americas

Biological Hazard Assessment Decision Flow Chart (U.S.) S3NA-313-WI1



* 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

States	Tick-Borne Diseases	Mosquito-Borne Diseases	Poisonous Plants
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
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

Ticks

S3NA-313-WI2

1.0 Background

1.1 The Public Health Agency of Canada 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 black-legged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western black-legged tick (*Ixodes pacificus*) are the species known to transmit this disease-causing agent, as well as other less common agents.

1.2 In Quebec, black-legged 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, black-legged 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 black-legged 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.

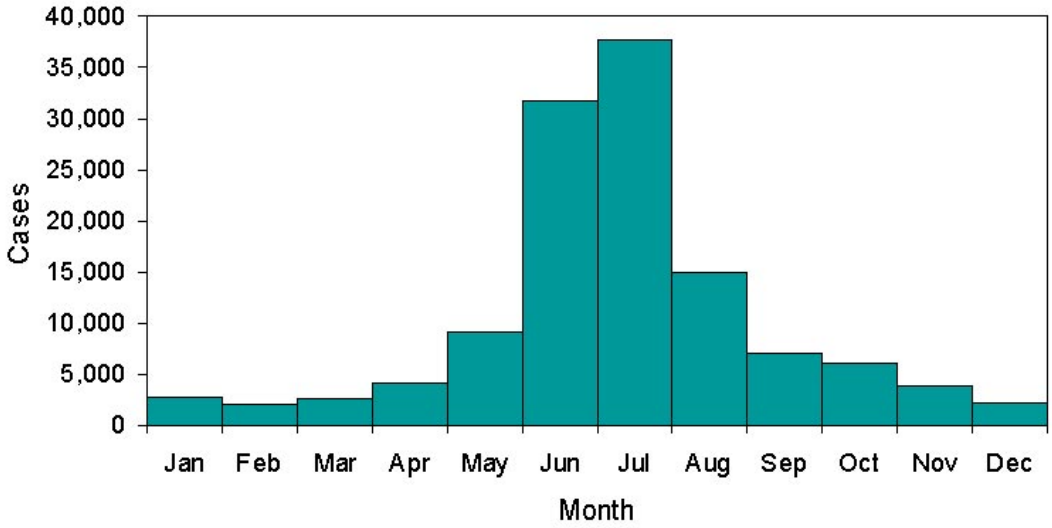
1.3 Although the distribution of black-legged ticks in Canada appears to be limited, surveillance indicates that some of the established populations are spreading within certain areas of southern Canada. The potential expansion of localized tick populations makes it difficult to precisely define the 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 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 black-legged 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 April through November with onset peaking in June, July, or August and less likely to have illness onset from December through March.

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

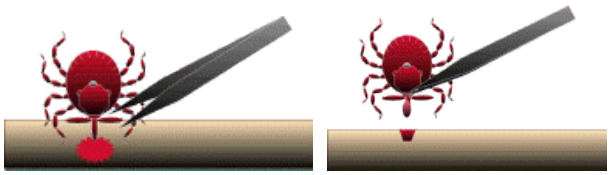
3.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.

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 http://www.tickkey.com/

4.2 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.

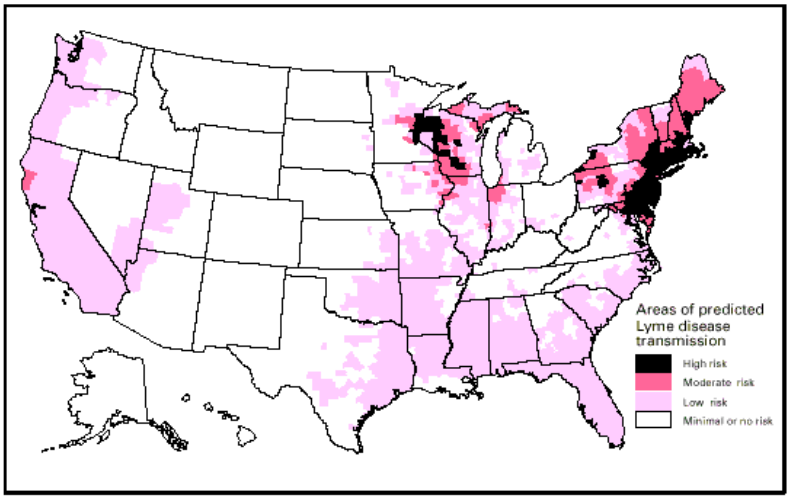
6.0 Information Regarding Common Tick-Borne Diseases

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

7.0 Distribution

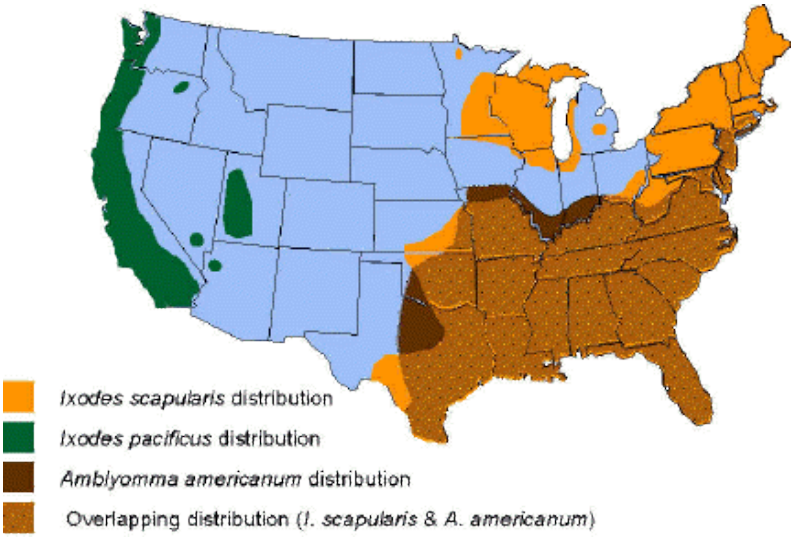
Figure 2 Distribution Map for Lyme Disease Risk, U.S.



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.

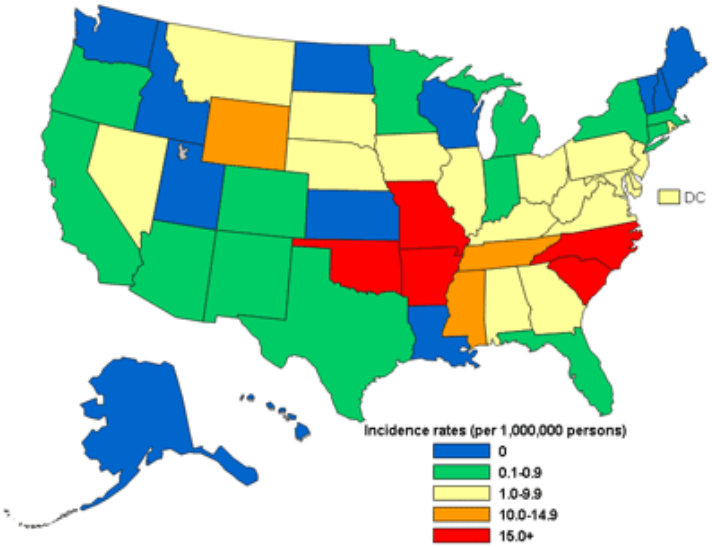
Source: CDC, http://www.cdc.gov/ncidod/dvbid/lyme/riskmap.htm

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

Americas

Poisonous Spider Identification

S3NA-313-WI3

Black Widow Spider

- Abdomen usually shows hourglass marking.
- The female is 1 to 1.5 inches (3-4 centimeters) in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

- Central and South U.S., although in some other areas, as well.
- 0.25-to 0.5-inch (0.6 to 1.3 centimeters)-long body and the size of silver dollar.
- Hides in decaying wood, baseboards, ceilings, cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.

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 U.S. Spider Identification charts are available at http://www.termite.com/spider-identification.html

Americas

Mosquito-Borne Diseases

S3NA-313-WI4

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.

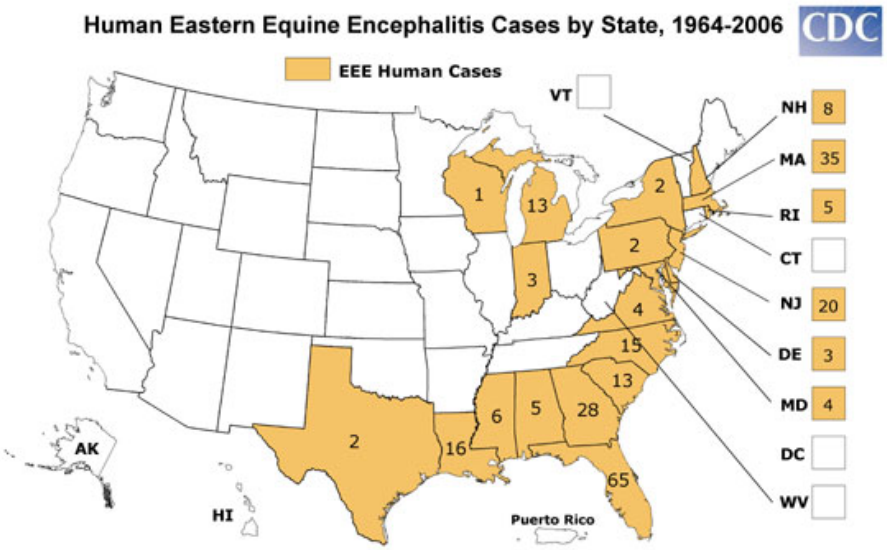
1.3 If other mosquito-borne diseases are identified in the project area, the local Public Health Department and Center for Disease Control and Prevention (CDC) should be consulted to determine what diseases are present and exposure prevention recommendation.

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.

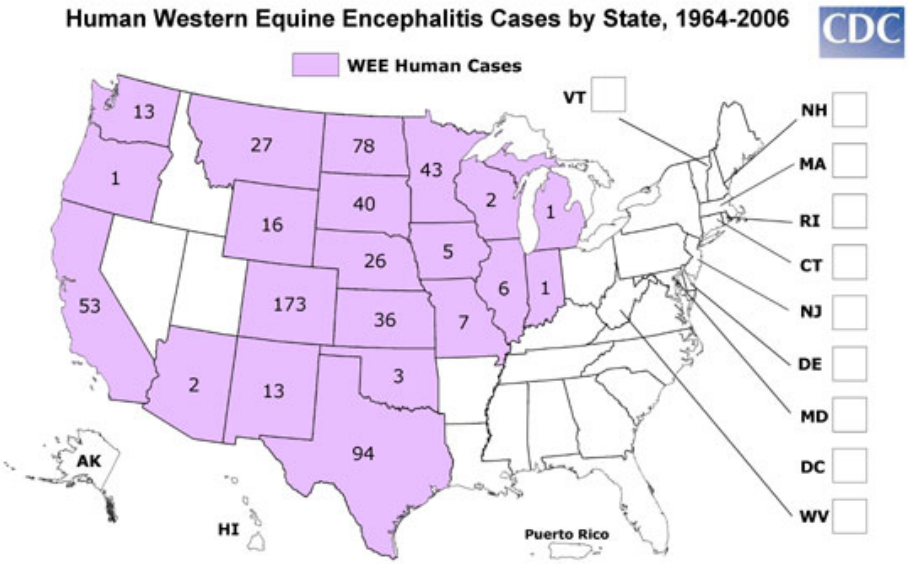
2.0 Distribution

Figure 1 Distribution Map for EEE Cases



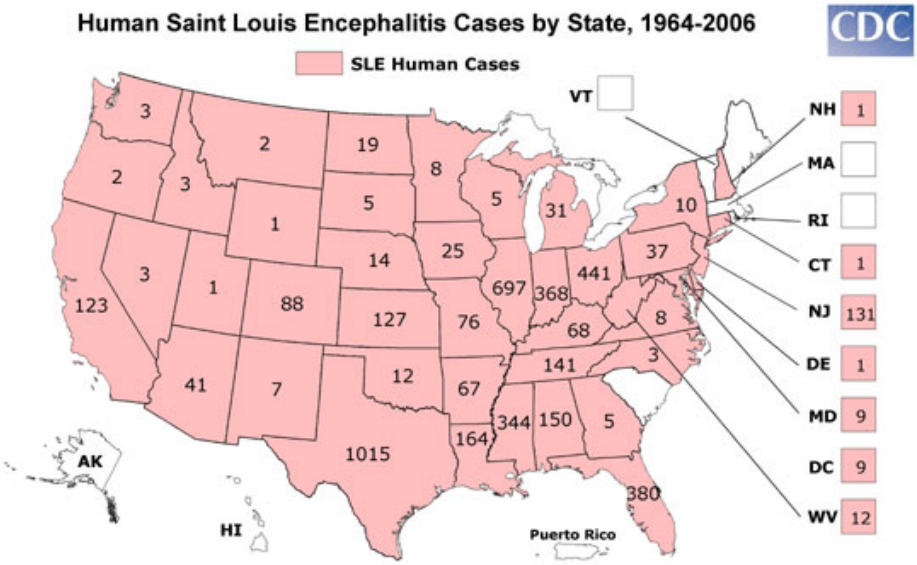
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/EEE_Map.jpg

Figure 2 Distribution Map for WEE Cases



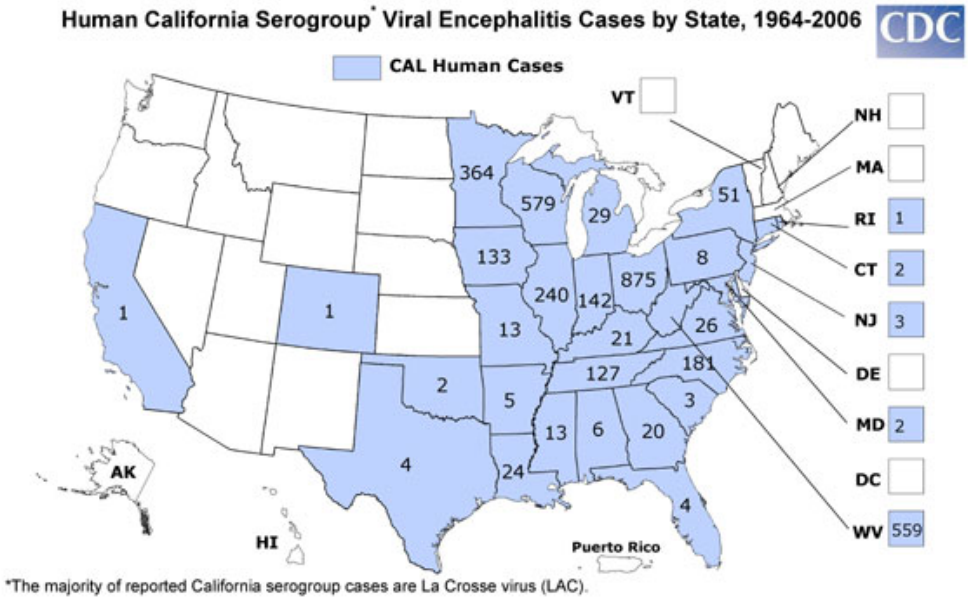
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/WEE_Map.jpg

Figure 3 Distribution Map for SLE Cases



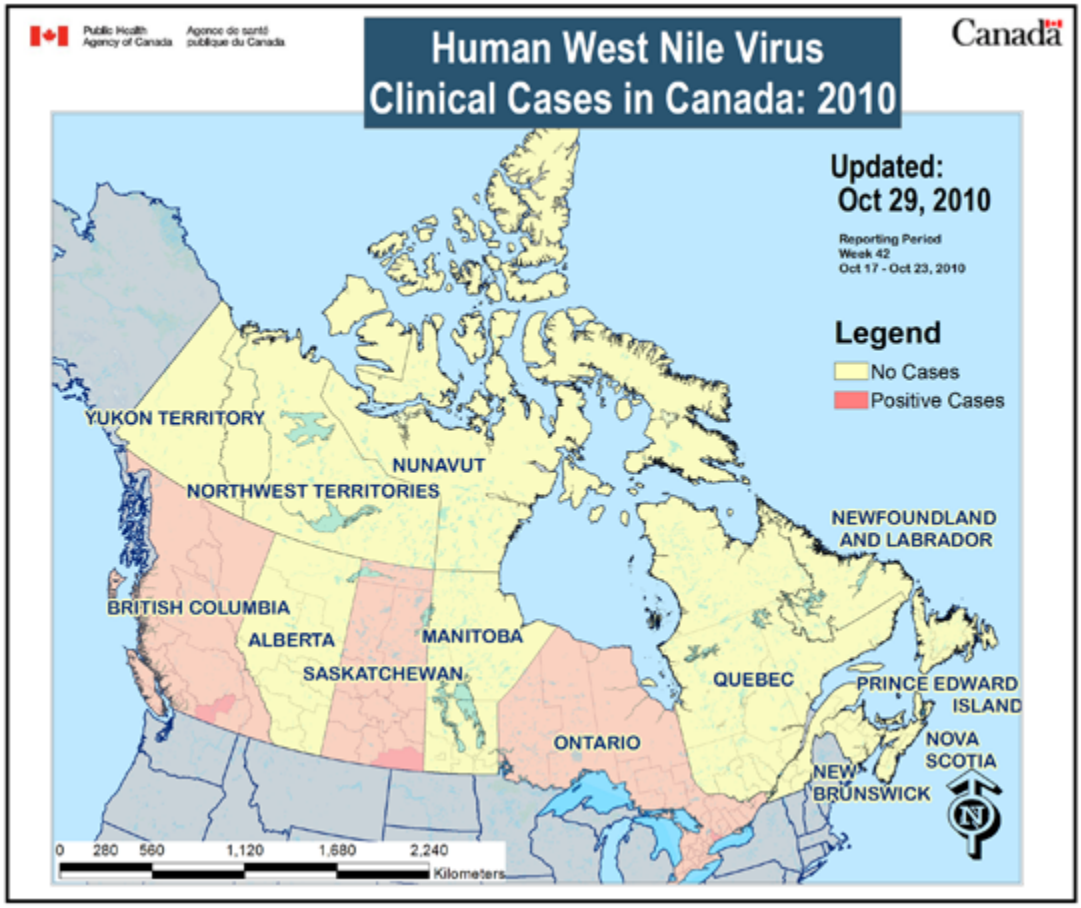
Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/SLE_Map.jpg

Figure 4 Distribution Map for LAC Encephalitis 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.

Americas

Plants of Concern

S3NA-313-WI5

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 Region Safety, Health and Environment Manager.

Figure 1 Distribution Map for Poison Ivy

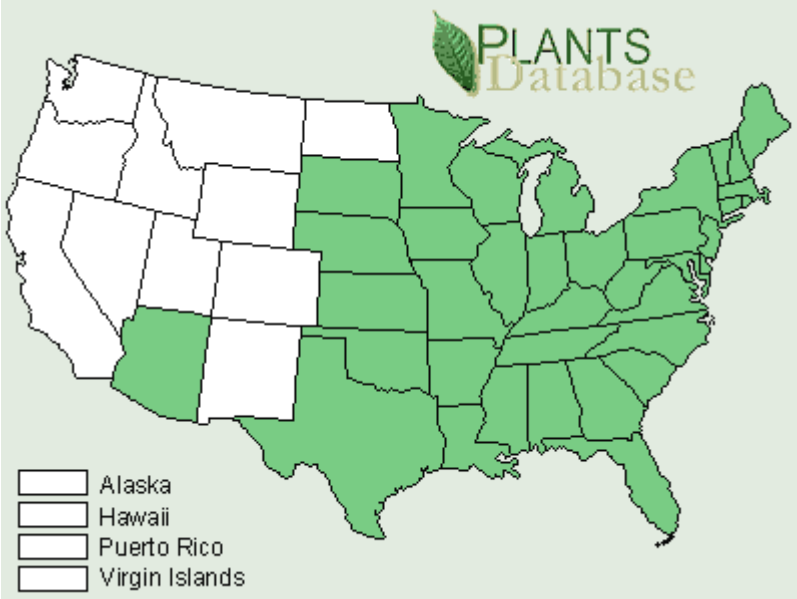


Figure 2 Distribution Map for Poison Oak

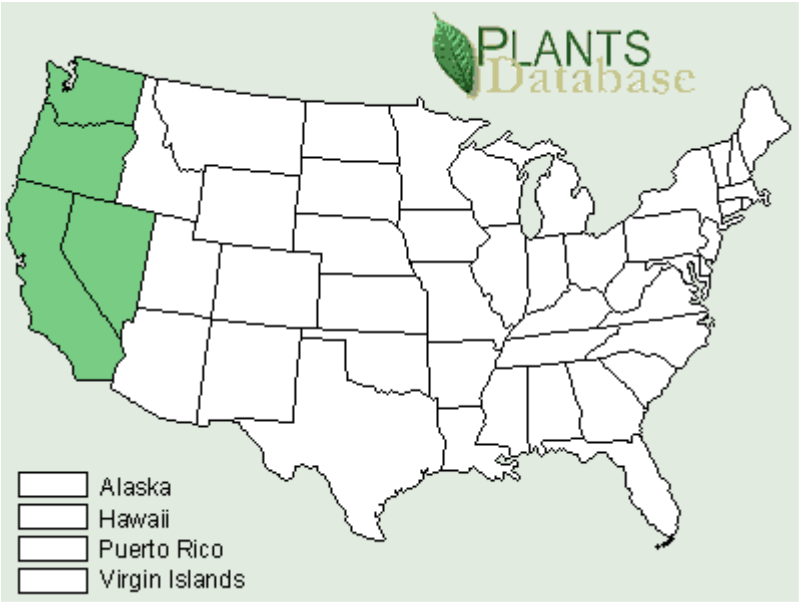
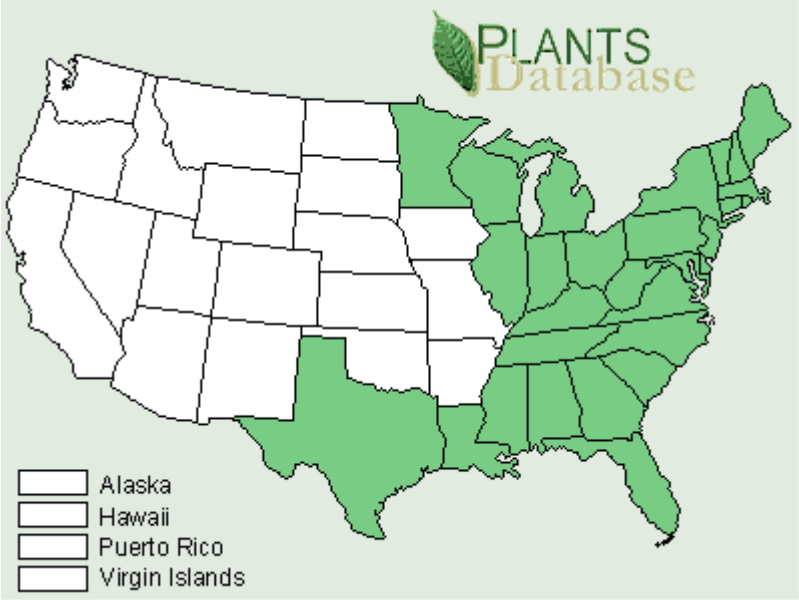


Figure 3 Distribution Map for Poison Sumac



Source for Figures 1, 2, and 3: http://www.tecnuextreme.com/plant-map.htm

Americas

Wild Parsnip Identification

S3NA-313-WI6

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

Americas

Configuration Clothing for Protection Against Ticks and Insects

S3NA-313-WI7

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).

Americas

Insect Repellent Active Ingredient Product Information

S3NA-313-WI8

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 U.S. Environmental Protection Agency and recommended by the Centers for Disease Control and Prevention.

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

Americas

Permethrin Application

S3NA-313-WI9

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.

Americas

Bird Droppings Safe Work Practices

S3NA-313-WI10

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 <u>Prior to work in any area where pigeons or other flying animals may nest, a written statement from the client shall be obtained</u> in regards to the potential for, and extent of, accumulation of excrement on/in the structure from pigeons and other winged animals.

4.2 The client shall be asked to provide appropriate details as to the basis for their statement (e.g., date of last visual survey for pigeon/bird or bat excrement accumulation, date of last excrement removal effort, etc.).

4.3 In no case will an AECOM employee or contract employee be permitted to commence structure inspection procedures without the Project Manager having received and evaluated the aforementioned written statement from the client.

4.4 According to NIOSH, the best way to prevent exposure to *H. capsulatum* spores during survey and inspection work is to avoid situations where excrement and other potentially contaminated material can become airborne and inhaled. Therefore, it is preferable that the efforts to determine if, and to what extent, there is an accumulation of pigeon/bird or bat excrement on/in structures, <u>or</u> the efforts to clean-up/remove/dispose of such contaminated material, be left to the client or subcontracted out.

5.0 Safe Work Practices

5.1 In those cases where AECOM employees or contract employees are contracted by the client to determine the extent of accumulation of animal excrement in/on structures, the following minimum safety and health precautions shall be taken. (NOTE: precautionary measures are based on recommendations and best practices prescribed in the NIOSH 2004 public document titled *Histoplasmosis – Protecting Workers at Risk*).

5.2 All workers shall wear disposable protective clothing (Tyvek® coveralls). Disposable overalls with hoods shall be donned when working in areas where *H. capsulatum* spore-contaminated material is likely to fall from overhead.

5.3 All workers shall wear disposable shoe coverings fitted with ridged soles made of slip-resistant material to reduce the likelihood of slipping on wet or dusty surfaces. Gloves shall be worn.

5.4 All workers shall wear a full facepiece air purifying respirator fitted with P100 (HEPA) cartridges. If entering an enclosed area in which the extent of excrement contamination is unknown, additional protective measures shall be taken such that workers shall wear a powered air-purifying respirator (APR) with full facepiece fitted with P100 (HEPA) cartridges. Any variance from these requirements must be approved by the Region Safety, Health an Environment Manager. Workers donning APRs shall be medically screened, cleared, and trained in their proper use in accordance with AECOM safety program standards.

5.5 If contaminated material must be disturbed for purposes of removal/disposal or during the structure inspect process, it shall be wetted down prior to all work and will be rewetted as necessary to minimize airborne dusting.

5.6 After working in *H. capsulatum* spore-contaminated areas and before removing any respiratory protective equipment, workers shall remove all protective clothing and shoe coverings and seal them in a heavy-duty plastic bag for disposal.

5.7 Workers shall observe a high degree of personal hygiene, even if the exposure is casual. Special care shall be taken to wash hands, face, and other areas of exposed skin thoroughly before eating, drinking or smoking.

Large Carnivores

S3NA-313-WI11

1.0 Hazard

1.1 Most wild carnivores in the feline family (cougars, lynx, and bobcat) or the canine family (wolves and coyotes) are more predictable than bears and are not predatory towards humans; however, all wild animals can be dangerous if they feel threatened or if they are sick or starving.

1.2 Most ungulates (deer, moose, elk, and caribou) will avoid humans and will flee as soon as a human is sighted; however, females with young (during May and June) and males during the mating season (September to November) can be very aggressive, especially if provoked.

2.0 Personal Protective Equipment

2.1 Noise makers such as bear bangers, whistles and bells can be used as deterrents for an approaching animal.

2.2 Pepper (bear) spray can be used to ward off an imminent attack.

3.0 Safe Work Practice

3.1 Most negative encounters with ungulates or carnivores can be avoided with a few key preventative measures:

3.1.1 When working in wilderness isolation, always travel in pairs and make lots of noise.

3.1.2 Always store food in air-tight containers away from sleeping areas (if camping) and never carry strong smelling foods which could attract animals.

3.1.3 Keep your eyes open for fresh animal signs which may indicate a dangerous situation:

- Extensive fresh rubbing on branches in the fall might indicate the presence of a rutting male ungulate that may become aggressive to defend a potential mate.
- A fresh kill or carcass which might indicate the presence of a carnivore that may become aggressive to defend its food.

3.2 Maintaining a distance of at least 100 feet (30 meters) allows large animals an escape route. If you notice any signs of aggression or behavioral changes, you should move away to a safe location. Wildlife should not be enticed by reaching out or simulating calls.

3.3 Pets should be kept secure and away from wildlife as their actions can provoke an attack. Moose, deer and other wildlife may appear quite docile; however, if a dog makes them feel threatened, their behavior can become unpredictable.

3.4 **If you are approached by a carnivore (wolf, coyote, or cougar):**

3.4.1 Pick up small children immediately.

3.4.2 Try to appear bigger, hold your arms or an object over your head.

3.4.3 Face the animal and retreat slowly. Do not run or play dead.

3.4.4 Maintain steady eye contact with the animal.

3.4.5 If the animal continues to approach, deter an attack by yelling, waving a stick or throwing rocks.

3.4.6 If you are attacked, fight back. Hit the animal with a heavy stick or rock.

3.5 **If you are approached by an ungulate (moose, elk, deer, bison or caribou):**

3.5.1 An angry moose, elk or deer will face you with its head and ears lowered.

3.5.2 Back away slowly.

3.5.3 Look for something to get behind like a tree or a car. You can go faster around an obstacle than the ungulate can.

3.5.4 An ungulate is more likely to bluff charge but if it continues the charge and you are attacked in the open, curl up in a ball on the ground. Always protect your head with your arms and lie still.

3.5.5 Stay still after the attack until the ungulate moves away.

Americas

Bear Safety

S3NA-313-WI12

1.0 Hazard

1.1 An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.

1.2 The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criterion, as bears have been encountered within city limits, especially near landfills.

1.3 The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.

1.4 Preparing staff for any type of encounter is key to managing the risk.

2.0 Personal Protective Equipment

2.1 The best deterrent of a “bad bear encounter” is knowledge: a good understanding of the ecology and the behavior of the bears that will likely be encountered.

2.2 Bear Spray and Bear Bangers

2.2.1 Staff must have hands-on training for the safe use of bear spray (a pre-season practice run is a good use of expired bear spray).

2.2.2 Prior to work commencing, staff must ensure that the bear spray they are carrying is still valid and not past its expiration date.

2.2.3 During travel, bear spray must be sealed in an airtight container or bag and must not travel in the cab of a vehicle, aircraft, or helicopter.

2.3 Firearms

2.3.1 Environments and conditions which pose a high risk of bear encounters, may warrant the use of an armed wildlife monitor. Project managers, in consultation with appropriate project staff and Safety, Health and Environment Management, are responsible for determining the level of risk for their projects and whether or not such measures are required.

2.3.2 A person hired as an armed bear monitor must be properly trained in wildlife monitoring as well as certified in the expert usage of firearms.

2.3.3 The usage of an armed bear monitor is intended only as an additional precautionary measure to be used in specific environments to ensure the protection of field staff; staff should still be equipped and trained appropriately for the risk.

3.0 Restrictions

3.1 Staff must not work alone in areas where there is a medium or high risk of a bear encounter.

3.2 AECOM personnel shall not carry firearms or attempt to function as a wildlife monitor and/or perform their professional duties. For possible exceptions contact the Regional SH&E Manager who will evaluate the potential hazards with Regional Manager and Legal and provide written response. This can only be over-ridden with expressed permission of Region Executive and AECOM Chief Security Officer, refer to *WP-001-PR Firearms Standard*.

4.0 Training

4.1 In-house Bear Awareness training must be taken by all field staff who work in bear country every three years at a minimum, or more often as required.

4.2 The Bear Awareness training involves testing and improving the employee's knowledge about bear encounters, watching videos regarding bear awareness and behavior, and participating in group discussions about how to avoid and how to respond to bear encounters.

4.3 Specific considerations are given to black bear, grizzly bear, and polar bear encounters.

5.0 Safe Work Practice

5.1 Staff must be aware of wildlife signs and avoid wildlife encounters.

5.2 Bear Signs

5.2.1 Fresh tracks – It is often better to see the bear's tracks than to see the actual bear. If you can tell the direction that the bear is travelling in, it is prudent to change your course of direction. Bears will travel down the same pathways people or other large animals use. If you have a clear track you can determine which type of bear has passed through the area. If you see more than one track, you can tell that it is possibly a female with cubs. Avoid females with cubs!

5.2.2 Scat – Bear scat will look different depending upon the bear's diet. Close examination of bear scat can sometimes give you an indication of what the bears have been eating at that time of year. If the scat contains remnants of human garbage, there is a human food conditioned bear in the area. These bears associate people with food and can be the most dangerous type of bear to encounter.

5.2.3 Animal carcasses – IF YOU COME ACROSS A CARCASS, LEAVE THE AREA IMMEDIATELY. Grizzly bears will often cover their kills for a few days and let it rot, then come back and eat it. THE BEAR WILL STAY CLOSE BY. Grizzly bears will defend their kill and this is a situation that could prompt a defensive attack by a bear.

5.2.4 Torn-up logs and stumps – Bears will forage for insects in dead logs and rotting trees. You will often see torn up logs and stumps, evidence of their foraging.

5.2.5 Evidence of digging – Holes dug into the ground are often made by grizzly bears digging for roots or ground squirrels. In particular, grizzlies will dig for food in the early spring soon after they leave their dens.

5.2.6 Claw marks on trees – Claw marks can be left on trees by black bears when they have climbed up a tree. Grizzly bears will also leave claw marks on trees and on the ground. Bears will often chew a small tree or a sign-post, so watch for signs of chew marks along the trail.

5.2.7 Hair on trees – Bears will rub against trees, usually trees with rough bark, to scratch themselves. You can find evidence of bears by the hair left in the tree's bark. The higher the hair left on the tree, the bigger the bear. Remember that the bear will often stand on its back legs to scratch its back on the tree.

5.2.8 Daybeds – Bears will be most active in the early morning and in the evening. It would be prudent for field staff to restrict their field activities during the bear's most active foraging times as much as possible. During the heat of the day, bears will rest in daybeds. These can be shallow depressions of piled up leaves in the forest, trampled vegetation, a shallow scrape or a hole. Daybeds are usually located in cool places. Bears will make daybeds along streams and rivers. Daybeds are often associated with feeding places and therefore should be avoided.

5.3 Prevention

5.3.1 Your best defense against bears is to actively practice bear avoidance techniques when working in the field. You can prevent chance encounters by taking the following precautions:

- Know the areas and habitats bears use at different times of the year, and attempt to avoid such areas or be extremely cautious if you have to travel through them.
- Contact the local Fish & Wildlife Office to get current information on the bears in the area. Ask what other camps are in the area and if they are following good bear avoidance practices. (i.e., do they keep a clean camp?) If there are nearby human food sources available, e.g., an open dumpsite, the local bears may not be afraid to approach your camp.
- Always be aware of your surroundings. Stay alert. Watch for signs of bears along your route.
- Use binoculars to look around for bears when you are in open terrain.
- Never approach a bear if you see one feeding in the distance.
- Note the behavior of other wildlife in the area. Flocks of ravens can alert you to a possible animal carcass, and perhaps a bear. The area should be avoided. Bird or squirrel alarm calls might be telling you that a bear is near.
- Whenever possible, travel in daylight and try to avoid areas with restricted visibility, e.g., dense brush.
- Make lots of noise, especially when travelling in dense vegetation. Sing, shout, or talk loudly. You can carry portable air horns or cans of rocks. (Please note that bear bells are not effective – they do not make enough noise to warn a bear that you are approaching. You need to be loud so the bear can hear you coming.) Remember that the noise you make can be masked by loud natural sounds such as the wind or water. Therefore it is possible that the noise you make can go unnoticed by a bear whose attention is focused on feeding. You must make every attempt not to surprise a bear. In areas of loud natural noise, be louder!
- Stay together and travel in groups. Bears are less likely to attack groups of people. When travelling in groups, stay close together. Being in a group doesn't help if the individuals have spread apart along the trail.
- Pets should not accompany you when you are travelling in bear country. If you must take your pet, keep the animal on a short leash at all times. Unleashed dogs will harass bears and once scared, run back to their owner with an angry bear in pursuit.
- Do not wear perfumes or cosmetic products when you are travelling in bear country. Do not mask your human scent.
- 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 them.
- Children should be kept very close by in bear country.
- Carry bear deterrents and know their limitations. Be familiar with how to use the deterrents, how to transport the deterrent safely and under what conditions it is most effective. Carry the deterrent in a belt, out in front and ready to grab at a moment's notice, never in your backpack.

5.4 Field Worker Precautions in Bear Country

5.4.1 Field workers should take extra precautions when working in bear country:

- Make every effort to go out into the field with another person; you should not be working alone in the field. One person can act as a lookout for the other. Keep watch for bear signs.
- Never approach a bear.

- Report where you are going and when you will return every time you leave camp. Have a plan of action if someone does not report back to camp at a specified time.
- Bears do get used to a camp's schedule and you will have fewer surprise encounters if everyone in the camp comes and goes at the same time every day.
- Take a two-way radio with you when you go out into the field.
- Always carry bear deterrents with you in the field and understand each deterrent's limitations. Carry your deterrents on a belt, out in front and ready to use instantly. Do not carry your deterrents in your backpack.
- Keep any food that you take with you sealed in odor-proof/bear-proof containers. Make every attempt to take odorless food with you, not something with a heavy scent.
- Pack out any garbage in odor-proof containers and burn once you return to camp.
- The noise of an ATV or skidoo can scare off a bear. Starting the machine and revving it up can scare off a curious bear. DO NOT CHASE A BEAR WITH AN ATV OR SKIDOO. You may need to drive the ATV around in circles to scare off the bear, but do not chase the bear.
- Take extra precautions when travelling along lakes or stream beds; bears use streams and river beds as travel routes. Be sure to carry noise makers.
- Limit your workday so you are not out in the early morning or evening when bears are most likely to be foraging.
- All **Field Workers** should be proficient in First Aid. Do not go out into the field without first aid training.
- All field camps should have a First Aid Kit.
- All field camps should have means of communication with local ambulance or air ambulance personnel.
- A person's best defense against bears is to avoid them. If this is not possible, then being heard, smelled, or seen may lessen your chances of surprising a bear and/or provoking an attack.
- All wildlife should be respected, avoided, and not harassed at any time.
- Cooking in remote areas should be avoided. Any food should be stored in airtight containers and all garbage should be managed appropriately: "pack it in, pack it out".
- A bear in camp or within human structures is not a chance encounter. If this bear challenges you, you must fight, scream, and do whatever is necessary to live, no matter what species the bear is!
- In general, there are two types of bear encounters: Defensive and Non-defensive for grizzly bears and black bears. Your response will vary based on your assessment of the situation (your training will help you in identifying these situations and the appropriate response).

6.0 Encounters

6.1 General Recommendations When Encountering a Bear

- Consider your surroundings and assess the situation before you act.
- Remain calm. Do not turn your back to a bear.
- DO NOT RUN – 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 25 miles per hour [40 kilometers per hour] 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 Bears are more predictable than once believed and you can determine your best course of action in a confrontation by understanding the bear's characteristics and motivation. There are two pieces of information you should be aware of in any bear encounter:

- The type of bear you are dealing with, and
- The reason for the encounter.

6.2.3 Some people believe that when you stand your ground against a predatory black bear attack, the bear will feel threatened and leave. This has been effective in some cases. HOWEVER, it is not effective against a grizzly bear predatory attack and it is very difficult to know when it will be effective against black bears. Polar bears do not follow the same behavioral patterns as grizzly and black bears; polar bears are almost always aggressive and will not back down. Special considerations must be given to projects where polar bear encounters are anticipated.

6.3 If you can leave undetected:

6.3.1 Leave the area quietly in the same direction that you came from.

6.3.2 Move while the bear's head is down. Stop moving when the bear lifts its head to check its surroundings.

6.3.3 Stay downwind so the bear will not pick up your scent.

6.3.4 When you have moved a safe distance away, you can either watch and wait until the bear leaves or make a wide detour around the bear.

6.3.5 If the bear is unaware of you and approaching, allow the bear the right of way.

6.4 If you cannot leave undetected:

6.4.1 Let the bear know that you are present by smell first; therefore move upwind so they can pick up your scent.

6.4.2 If it is possible, try to keep the bear in your sight. Watch to see if the bear leaves when it smells that a person is nearby.

6.4.3 Attempt to move out of the way without being noticed by the bear. If you cannot do this, talk loudly to let the bear know where you are.

6.5 If the bear is aware of you but in the distance:

- Remain calm.
- Continue walking slowly in the same general direction, but head away from the bear.
- DO NOT RUN. The bear can quickly outrun you if it is so inclined.
- If the bear begins to follow you, drop your pack or some article, (not food) to distract the bear. This may distract the bear long enough for you to escape. If you drop food for the bear – you will help the bear associate food with humans and teach it that aggressive behaviour will be rewarded with food.
- If it is a grizzly following you, climb a tree if there is a large tree around. 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 9 to 13 feet (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:

- A bear will feel threatened in a close confrontation. The bear's natural tendency will be to reduce or to remove the threat. Assist the bear by acting as non-threatening as possible.
- Do not make direct eye contact with the bear.

- Do not make any sudden moves.
- Do not run!
- The bear needs to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the bear an opportunity to leave. Be sure the bear has an open escape route. Do not corner a wild animal.
- Try to back away slowly and/or climb a tree if appropriate.
- Attempt to deter the bear if you are in a safe position.

6.7 If the bear is close and threatening:

- If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the bear is. Try to scare the bear off.
- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the bear in a calm authoritative tone of voice.
- Do not startle or provoke the bear by making sudden moves.
- Never imitate the bear's aggressive sounds, signals or posture. The bear is attempting to establish dominance and imitating its moves is a challenge to its dominance.
- Back slowly away from the bear and drop a pack or some other article in order to distract the bear momentarily.
- Remember that the bear may be defending cubs that you have not yet seen or they have a food cache nearby. Attempt to look as non-threatening as possible.

6.8 If the bear is very close and approaching:

- A distance of less than 164 feet (50 meters) in an open area and closer in a forested area.
- If the bear continues to approach, use your deterrent.
- If the bear does not respond to the deterrent you must now STAND YOUR GROUND!
- If the bear continues to approach and is acting aggressive, YOU MAY HAVE TO SHOOT if you are carrying a firearm.

6.9 If the Bear Charges:

- A bear will charge you at high speed down on all four legs and often crouched low to the ground.
- Bears do not charge when standing up on the hind legs.
- Many charges are bluffs and the bear will often stop or veer off just at the last minute. It is difficult to know if the bear is bluff charging or not until it gets very close.
- When faced with a charging bear you have two options:
  - Use your bear deterrent; or
  - Roll into a ball and cover your neck and head with your arms if you are unarmed and have no other choice.

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. Grizzlies 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.

Americas

Small Mammals

S3NA-313-WI13

1.0 Hazard

1.1 Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against.

1.2 The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus).

1.3 Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

2.0 Personal Protective Equipment

2.1 Full-length clothing (long sleeves and pants)

2.2 Insect repellent

2.3 Respiratory equipment (when directly handling wildlife)

2.4 Gloves (when directly handling wildlife)

3.0 References

3.1 Trapping and Tagging Small Mammals. A RIC Standard for British Columbia. 1993. Dr. Todd Zimmerling.

4.0 Restrictions

4.1 Wildlife handling must only be completed under direct supervision of an experienced individual.

5.0 Training

5.1 Any staff that will be handling wildlife must be adequately trained and/or supervised by a wildlife biologist experienced in the job task.

6.0 Safe Work Practice

6.1 Wild animals can carry a variety of diseases that humans can contract: viral, parasitic, bacterial, and protozoal. Basic Personal Protective Equipment such as full-length clothing, gloves and a respiratory mask will greatly reduce the risk of exposure.

6.2 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.

6.3 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.

6.4 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.

6.5 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.

7.0 Rabies

7.1 You will not be able to accurately determine if an animal has rabies simply by observation as traditional symptoms of rabies (foaming at the mouth, biting, etc.) do not occur in all animals nor at all stages. There are some mammals that are at a higher risk than others for the rabies virus, such as raccoons, skunks, stray cats and dogs, foxes, coyotes, rodents. and bats; however, any mammal can contract the virus.

7.2 Rabies is contracted by contact of an infected animal's saliva with an open wound – a bite or a scratch.

7.3 Symptoms of rabies in humans usually do not present themselves for a minimum of 10 days to a year or longer (the average is 30 to 50 days). Symptoms are typical of a flu, including malaise, loss of appetite, fatigue, headache, and fever. Over half of all patients have pain (sometimes itching) or numbness at the site of exposure. They may complain of insomnia or depression. Two to ten days later, signs of nervous system damage appear; these include hyperactivity and hypersensitivity, disorientation, hallucinations, seizures, and paralysis.

7.4 Because rabies is so difficult to detect and positively identify, it is very important to consult a physician immediately. If rabies is a possibility, begin treatment with the rabies vaccine as soon as possible (unlike other vaccines, rabies vaccination begins after exposure because the virus takes a comparatively long time to induce disease).

8.0 Hantavirus

8.1 Rodents can carry a variety of diseases; of notable concern is the North American hantavirus which can cause Hantavirus Pulmonary Syndrome (HPS).

8.2 A common host of the hantavirus is deer mouse and related species (*Peromyscus* spp.), which are common throughout much of North America.

8.3 Although infection is rare, it can be fatal and, therefore, it is necessary that risk of exposure be minimized. Infection can be spread to humans when they:

8.3.1 Breathe air contaminated by deer mouse saliva, urine or feces containing infectious hantaviruses; or

8.3.2 Accidentally rub eyes, mouth or broken skin with hantavirus-infected deer mouse saliva, urine or feces.

8.4 The following precautions will be taken for all field operations:

8.4.1 Limit exposure to soils handling and use gloves where appropriate.

8.4.2 Wash or sanitize hands often throughout the day and before meals.

8.4.3 Equipment bags, storage areas, and vehicles will be inspected daily for signs of deer mouse infestation.

8.4.4 Rodent-proof storage containers will be used when practical.

8.4.5 Do not enter buildings infested with deer mice without adequate respiratory protection.

8.4.6 Droppings should never be removed by vacuuming or sweeping. Wetting down an area with a mixture of 1:9 household bleach and water solution will reduce risk of airborne exposure.

8.5 If flu-like symptoms develop three days to six weeks after exposure to rodents, a doctor should be contacted immediately (mechanical ventilation is the primary method of treatment).

Americas

Snakes

S3NA-313-WI14

1.0 Hazard

1.1 Snakes have the ability to inject venom. A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

2.0 Personal Protective Equipment

2.1 Long pants and shirts

2.2 Heavy gloves if staff will be handling debris or be close to the ground

2.3 Rubber boots, or boots that fully cover the foot (not sandals!) and preferably are at least 10 inches (25 centimeters) high

2.4 Snake Chaps that cover at least the shin

2.5 Personal first aid kit

3.0 References

3.1 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.

3.2 http://www.rattlesnakes.us/

3.3 http://drdavidson.ucsd.edu/Portals/0/snake/Crotalus.htm

4.0 Restrictions

4.1 Staff must not work alone in areas where the risk of a snake encounter is high.

5.0 Training

5.1 Staff must be notified of the hazard before work commences.

6.0 Safe Work Practice

6.1 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.

6.2 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.

6.3 Most snakes are non-aggressive and will only attack if immediately threatened.

6.4 Prevention

6.4.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.

6.4.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.

6.4.3 Try as much as possible not to take a snake by surprise.

6.4.4 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.

6.4.5 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.

6.4.6 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.

6.5 Treatment

6.5.1 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.

6.5.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.

6.5.3 Keep the injured body part motionless and just below heart level.

6.5.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.

6.5.5 Do not allow him to eat or drink anything.

6.5.6 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.

6.5.7 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.

6.5.8 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 and color of the snake's head.

6.5.9 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.

7.0 Species

7.1 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.	

7.2 Venomous snakes in the United States

Rattlesnake(*Crotalus cerastes)* found mostly concentrated in the southwestern United States, they extend north, east and south in diminishing numbers and varieties. Every contiguous state has one or more varieties of rattlesnake.	Western 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.	 Eastern Diamondback
Copperhead (*Agkistrodon contortrix*) is the most common venomous snake found in the eastern United States. It can be found in the states of Texas, Oklahoma, Kansas, Missouri, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, Illinois, Indiana, Ohio, Iowa, Pennsylvania, Maryland, New Jersey, Delaware, New York, Connecticut, and Massachusetts.	
Cottonmouths (water moccasins) (*Agkistrodon piscivorus)* found in the eastern United States from Virginia, south through the Florida peninsula and west to Arkansas, eastern and southern Oklahoma, and east and central Texas.	
Coral Snake (*Micrurus sp.)* found in the southern range of many temperate United States including North Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Arizona, and New Mexico.	 Eastern Coral Snake, *Micrurus fulvius*

Americas

Alligators

S3NA-313-WI15

1.0 Hazard

1.1 Your chance of encountering an alligator is greatest during the animal's courtship and mating season, which takes place from March through September. This is when male alligators become most dominant and aggressive as they try to intimidate rival males and attract females by their show of power. Some males end up having to travel to find a mate. July through September is when mother alligators are guarding nests.

1.2 Mating season takes up much of the warmer months - a very popular time in the southeastern USA for outdoor activities - and alligators are solar-powered, so-to-speak. The warmth from the sun fires up their metabolism, giving them renewed energy; and renewed energy means great potential for conflict.

2.0 Encounter

2.1 The alligator is naturally wary of humans, and will flee quickly if you get too close to it, or it may utter a very audible and compelling warning hiss. In some cases, however, alligators may charge or attack. Here are some examples of such cases:

2.1.1 An alligator that is accustomed to being fed by humans may not be so shy.

2.1.2 An alligator that is surprised and alarmed by your approach may attack, thinking that it is being attacked itself.

2.1.3 A mother alligator caring for her nest or for live babies. If you see alligator babies, or if you encounter a nest (usually a mound of vegetation mixed with mud), remove yourself to a safe distance, the mother alligator is sure to be close by. If you get close, the mother may sound a very audible and intimidating warning hiss. Such a nest may be difficult to identify for a non-expert, but it is likely the mother will issue you a warning.

2.1.4 Alligator mothers are well-known to be practically fearless when defending their offspring, whether the little ones have hatched or not. A mother alligator was observed leaping, jaws agape, to attack a helicopter as it approached the nest area to land. The helicopter carried biologists studying alligator nests.

2.2 Also be careful near heavy vegetation in or near the water's edge. This is where an alligator likes to enjoy privacy and peace during the daylight hours. If you trudge through there and surprise it, the outcome may not be positive.

2.3 Generally, a good minimum distance to keep between you and an alligator or nest is 15 feet (4.6 meters).

2.4 When trying to get past an alligator, make sure not to walk between the alligator and the water, because if it's spooked, it's going to run to the water.

2.5 If an alligator does approach in a threatening manner, make as much noise and movement as possible. This should show the alligator that he has taken on more than he can handle and he'll back away.

3.0 Alligator Charge

3.1 The alligator is not a natural runner. Those short legs obviously don't serve it like a horse's legs do, and the alligator can actually tire out in a relatively short time. When it charges after a human or animal, it is either

trying to scare it away or seize it. It has a fast and furious burst of energy which serves it well for stealth hunting -- grabbing prey when it doesn't expect it. Furthermore, the reptile is opportunistic, which means, quite simply, it doesn't like to work very hard to get its food if it doesn't have to.

3.2 In the very rare event you are charged or chased by an alligator, move in as straight a line as possible away from it as fast as you reasonably can. In many cases, the vegetation features of the wild will serve to protect you by slowing the alligator down, like trees, bumps, bushes, etc. -- your comparatively long legs usually make it easier for you to maneuver through the trees and brush than an alligator's short legs do.

3.3 Most adult humans can outrun even a fast crocodilian, which has been clocked at a maximum of about 10 miles per hour (mph) (17 kilometers per hour [kph]), compared to a human speed of 15-17 mph (24-27 kph). But this doesn't matter much; an alligator will often give up the chase because it sees that the runner is moving away too quickly, and realizes that too much effort will be required to continue pursuit.

3.4 You may have heard somewhere that the zigzag run (running in a "z" pattern, side-to-side) is a good idea, but this is not only an unnecessary maneuver but probably a very unwise one. Here's why:

3.4.1 Unless you're an Olympic athlete, running zigzag over natural topography increases your risk of tripping and falling over rocks, plants, roots, and the like. And it goes without saying that falling while being pursued by an alligator is not good.

3.4.2 Furthermore, an alligator doesn't have the degree of stereoscopic vision we have. It actually has a small 'blind spot' directly in front of it. Hence, the alligator's vision is most effective in the 'sides' of its field of view. So, running zigzag not only slows your rate of distance from your pursuer, it may clearly indicate to the animal exactly where you are; even this point hardly matters since in many cases the alligator may keep its eyes shut while pursuing so as not to get them hit by twigs, grass stalks and branches in its path.

3.4.3 Finally, an alligator bites very effectively in a side-swiping motion, so if you are trying to run zigzag and are slowed down by plants, rocks, or other obstacles, the backwards flying leg of a running human is an optimal target for side-swiping, chomping jaws (the operative word here is "side").

3.5 Simply put, when faced with an attack, move directly away from the alligator as quickly as possible, navigating the terrain as carefully as possible. The zigzag idea will likely not serve you well.

4.0 Alligator Attack

4.1 If it seizes prey, and the prey fights back hard, the alligator may release it, depending on factors such as its own size relative to that of the victim, its own level of aggression, and its measure of hunger. Merely struggling to break free may not be enough counter-aggression to stop an alligator, and may actually prompt a devastating "death roll" response, in which the reptile furiously spins on its central axis to tear muscle and bone free of the victim's body.

4.2 These armored saurian are among the toughest beasts in the animal kingdom, so an attack victim should channel his or her nervous energy and will to survive and take the offensive by fighting hard. Not struggling...fighting very, very, very hard. Others on hand during such an event may be able to help by fighting the reptile, too. This should include punching the snout, poking the eyes, and even jabbing the ears, which are seen as small slits behind the eyes.

5.0 Additional Resources

5.1 http://www.tpwd.state.tx.us/huntwild/wild/species/alligator/index.phtml

5.2 http://corkscrew.audubon.org/Wildlife/Alligators.html

Americas

Water, Working Around

S3NA-315-PR1

1.0 Purpose and Scope

1.1 Establishes the minimum requirements and guidance for AECOM personnel assigned to projects that place them at risk of falling into water, including working ashore near to or over water.

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

2.0 Terms and Definitions

2.1 **PFD** – Personal Flotation Device

2.2 **Life Jacket** – A personal flotation device that will turn over an unconscious worker in the water so their face and nose are not submerged.

2.3 **USCG** – United States Coast Guard

2.4 **TC** – Transport Canada

2.5 **Lifebuoy** – A throwable buoyant rescue ring with 90 feet (28 meters) buoyant line attached.

3.0 References

3.1 Cold Water Boot Camp – http://www.coldwaterbootcamp.com

3.2 S3NA-003-PR1 SH&E Training

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA-209-PR1 Project Hazard Assessment and Planning

3.5 S3NA-419-PR1 Water, Marine Operations-Boating

3.6 S3NA-420-PR1 Water, Underwater Diving

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager**

Responsible for the overall success of a project and the performance of employees engaged in project activities (with the support of **Supervisors**), and as follows:

- Confirm that all appropriate Safety, Health and Environment (SH&E) procedures are identified and implemented and their applicability during the planning stage of field investigation projects.
- Allocate appropriate resources to implement the required measures.
- Designate a field staff person to implement and maintain these measures, maintain related documentation, and to communicate with appropriate parties as necessary.
- Consult with the purchasing department on the appropriate vendors for rentals/leases.
- Confirm that boat/watercraft rental/leasing vendors have appropriate paperwork (licenses, insurance, maintenance records, orientations, etc.).
- Confirm that the project is properly staffed with trained employees.
- Develop and submit a Health and Safety Plan, Task Hazard Analysis, Safe Work Plan or other SH&E planning documents for review and approval by the **Region SH&E Manager**.

4.1.2 **Region SH&E Manager**

Responsible for providing support to the **Project Manager** and his/her designee in the evaluation of safety and health risks and the identification of applicable policies, procedures, and appropriate precautions, and as follows:

- Review all project related Health and Safety Plans, Task Hazard Analysis as required.
- Provide access to safety records, including training records, for field staff.
- Provide support to **Project Manager**.

4.1.3 **Supervisors**

Responsible for verifying current status of field staff's training and equipping them for the work at hand, and as follows:

- Conduct daily safety meetings.
- Perform field safety inspections.
- Confirm that all safety issues and equipment deficiencies are properly corrected, and that the proper equipment is available to the field staff to safely meet the goals and quality objectives of the project.

4.1.4 **Field Staff / Employees on Site**

Responsible for complying with the safe work practices specified in this policy and all other applicable SH&E policies or procedures and reporting all unsafe working conditions, and as follows:

- Review, contribute to, and sign the Task Hazard Analysis prior to beginning the project and whenever new tasks or environmental changes occur.
- Confirming that their SH&E training is up to date.
- Confirming that equipment is properly maintained and functioning.
- Confirm they wear all required Personal Protective Equipment (PPE).

4.2 General Safety Considerations

4.2.1 During project preparation, consideration shall be given to the nature of the site, the type of water hazard, the equipment being used, and the location to determine the Personal Protection Equipment (PPE) and level of emergency preparedness that is required. All projects working near water hazards shall have an appropriate SH&E Plan or task hazard analysis (THA) prepared, refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.2.2 PPE specified in the THA is to be worn as required, to meet the specific regulations of the work area, including local and Federal legislation.

4.2.3 Whenever there exists the possibility of falling into water, personnel shall be attired in a USCG approved Type III or Type V PFD or Life jacket, refer to *S3NA315-WI1 PFD Descriptions and Use*. The vest shall be properly sized for the individual and shall be secured at all times. For cold water conditions (water temperature less than 55 degrees Fahrenheit [13 degrees Celsius]), a USCG-approved Shallang suit shall be worn to protect personnel from risks of cold water immersion.

4.2.4 Swimming is prohibited, unless it is being conducted by certified divers in the completion of their assigned task, or to prevent a serious injury or loss of life in a person in a water/person overboard emergency.

4.2.5 The buddy system shall be utilized whenever there is the possibility of falling into water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks.

4.2.6 Conducting shoreline work alone should be avoided, unless constant communications is maintained between **Field Staff** and **Supervisors,** and prior approval by the **Project Manager** is granted.

4.2.7 A throwable lifebuoy with required rescue line attached (Type IV flotation aid) shall be available.

4.2.8 Additional equipment (i.e., sounding alarms, lifting gear, or rescue boat) as required by legislation shall be immediately available to recover an individual from the water. If the shortest dimension of the water body is greater than the length of line attached to the throw buoy, a skiff or boat shall be available to facilitate a rescue.

4.3 Personal Protective Equipment (PPE)

4.3.1 PPE shall be selected based on the THA and in accordance with the *S3NA-208-PR1 Personal Protective Equipment Program*.

4.3.2 The minimum PPE required for wading in water above the knees includes:

- Personal Flotation Devices or lifejackets shall be worn by all workers who are exposed to the danger of drowning in water deep enough for the lifejacket to be effective.
- All inflatable PFD or life jackets shall be approved and have documented regular inspections.
- Shallang suits – In water temperatures below 55 degrees Fahrenheit (13 degrees Celsius) (regardless of air temperature) personnel are required to wear a USCG-approved Shallang jacket or full-flotation suit, depending on field conditions. This requirement will replace the need for a wearable PFD as these suits (if properly maintained) will provide adequate flotation.
- Waders shall have a slip resistant sole suitable for the substrate.
- Eye protection shall be worn to reduce glare.
- Wading pole shall be used for supporting and testing the substrate before wading.

4.3.3 Rescue equipment shall be on site that is appropriate to the situation (e.g., life buoys with 90 feet [28 meters]) of retrieval line, rescue boat, sounding device).

4.3.4 Blankets and an appropriate first aid kit shall be on site.

4.3.5 Immersion suits, or survival suits as they are often called, can significantly improve survival time in cold water. Recognizing that hypothermia is a major factor in lives lost at sea, the USCG requires that vessels operating in offshore waters north of 32 degrees North latitude carry an immersion suit for each person aboard. These suits are to be used in place of a Type I PFD in an abandon ship situation. It is recommended that personnel familiarize themselves with their use and practice donning the suit before leaving the dock. It is recommended that personnel be able to get into an immersion suit in under a minute. If necessary to abandon ship, personnel, attired in an immersion suit with head covered in a hat, should enter the water slowly, if possible, keep the head out of the water.

4.3.6 Suits should be stored in a clean and dry location. Avoid stacking or compressing the suits in storage as it may result in a loss of buoyancy. Federal regulations require that immersion suits be stowed so that they are readily accessible to the individual for whom they are intended, from both the individual's normal work area and berthing area. If there is no location readily accessible to both areas, then a suit shall be stowed at each location.

4.4 Land-based water work (shoreline/bridge/pier – includes wading)

4.4.1 Use a short line and harness to prevent entry into the water, or approved PFD, when working near fluid-filled tanks, ponds, lagoons, or natural waterways and stay close enough to shore to be pulled back to shore by an attendant. Refer to the *S3NA315-WI2 Safe Work Practices for Shoreline Work.*

4.4.2 Wading in a stream or water body:

- Always proceed upstream so that the wading team is walking into clear water (no turbidity caused by walking), there is good visibility for any debris floating downstream, and there is a reduced risk that the wading team will be pushed against debris or pushed into a deep hole by the current.
- Wading in water deep enough to become submerged in will be done as a two-person crew. If conditions or legislation warrant a "rescue team," then an appropriately sized crew should be

used, with the rescue team stationed on the shore with the appropriate rescue equipment, as per the site-specific rescue plan.

4.4.3 Wading will not occur in the following circumstances:

- If the water is too turbid or too deep to see tripping hazards or deep holes.
- If it appears the bottom is composed of soft sediments where stepping in may result in sinking, or if the bottom consists of clay where slipping is likely.
- If large woody debris is abundant and will be difficult to step over or move around.
- If the water is over the waist of the shortest person on the wading teaming. This does not preclude wading in water bodies that have shallow shorelines that grade into deeper waters. By not wading over waist level there will be approximately 12 Inches (30 centimeters) of "safety distance" on the chest waders, should a member of the wading team step or slip into a deeper area.
- If there is a risk of the current pushing a member of the team downstream.

4.5 Cold Water Operations

4.5.1 Cold water operations are defined as any situation that exposes an individual to falling into water that has a temperature of 55 degrees Fahrenheit (13 degrees Celsius) or less.

4.5.2 Sudden immersion in cold water can induce a gasping reaction and uncontrolled breathing which may cause the victim to ingest water and begin choking, experience cardiac arrest, and other physical body conditions all of which can result in a quick drowning.

4.5.3 Cold water incapacitation precedes hypothermia, making swimming and grasping for safety extremely difficult. So while death by hypothermia may occur in roughly one hour in a water temperature of 55 degrees Fahrenheit (13 degrees Celsius), incapacitation due to failing muscle function will occur in as little as 10 minutes, so regardless of your age, physical conditioning, or ability to swim – your odds of survival are greatly enhanced if you wear a life jacket.

4.5.4 AECOM requires personnel to wear a USCG-approved Shallang suit at all times whenever there is the risk of falling into water. Employees working in these conditions view a training video on the physiological effects of cold water immersion found at: http://www.coldwaterbootcamp.com.

4.5.5 Consideration should be given to the use of immersion of survival suits when project work involves cold water operations.

4.6 Working on Ice

4.6.1 Situations which expose personnel to the risk of falling onto ice covered waters. Working on water with the presence of ice either in the waterway or encroaching in from the shoreline.

4.6.2 Working in situations where ice exists shall be strictly limited due to the extreme hazards associated with falling through the ice cap, cold water immersion, and the logistical difficulties associated with executing a rescue. Specific information and safety considerations regarding working on ice can be found in *S3NA-315-WI3 Ice Safe Work Practices* and by viewing the training video on the physiological effects of cold water immersion found at: http://www.coldwaterbootcamp.com,

4.6.3 Personnel working on ice shall be attired in a USCG-approved Shallang survival suit and be supported by shore side personnel to assist in recovery in the event of a break through. Depending on the nature of the project, on-ice personnel should either wear a harness tethered back to shore, or push a flat bottom boat along on the ice and have the boat tethered back to shore.

4.6.4 Personnel working on ice covered waters should dramatically reduce vessel speed to avoid damaging propellers, shafts, and rudders. Personnel should be cognizant of shoreline ice which can prevent access to alternative ramps and docks that were considered as egress points in emergency planning.

4.6.5 Personnel should be wary that boat ramps on tidally influenced waters can flash freeze at low tide, precluding or compromising safe access and egress.

4.6.6 Extra safety equipment:

- Extra blankets should be kept on site (in a vehicle) when working on or near frozen water bodies.
- An ice pick, ice chisel, and/or ice auger should be used by a member of the crew with experience or training in identifying thin or weak ice.
- A braided rope, preferably 98 feet (30 meters) in length.

4.7 Training

- All **Field Staff** and **Project Managers** working on projects with exposure to open water shall receive training in the hazards, precautions, and rescue procedures associated with working in or over water, refer to the *S3NA-003-PR1 SH&E Training* program.
- All staff working on or near frozen water bodies shall complete Ice Safety Awareness e-learning.
- Staff who will be working on frozen water bodies regularly or for extended periods of time should take an Ice Rescue Training course, or obtain management approval based on their level of experience/competence working on ice.
- Staff working near cold water shall complete awareness level training on Cold Water Immersion.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-315-WI1 PFD Descriptions and Use

6.2 S3NA-315-WI2 Safe Work Practices for Shoreline Work

6.3 S3NA-315-WI3 Ice Safe Work Practices

PFD Descriptions and Use

1.0 Personal Flotation Devices

1.1 AECOM requires all personnel to wear a U.S. Coast Guard- or Transport Canada-approved personal flotation device (PFD) or life jacket at all times whenever there exists the possibility of falling into water. The various types of PFDs to be considered are described below.

1.1.1 **Type I –** Designed for extended survival in rough, open water. This PFD has over 22 pounds of buoyancy and will usually turn an unconscious person face up in the water. It is, however, very bulky and restrictive and not well suited to working on deck; a Type III or Type V PFD is generally preferred. Regardless of this fact, all vessels working in unprotected waters are required to carry a Type I PFD for each person aboard. In the event of an abandon ship situation, all passengers are required to don their Type I PFD as this flotation device will keep you afloat in offshore waters where rescue may be slow in coming.

1.1.2 **Type II –** Designed for calm inland waters where there is a chance of a fast rescue. It is less bulky and less expensive than a Type I, and may turn an unconscious person face-up in the water.

1.1.3 **Type III** – Designed for use in calm water where there is a good chance of a fast rescue. Slightly lighter than a Type II, this PFD will generally not turn an unconscious person face-up in the water. Mustang flotation jackets are considered in the Type III category.

1.1.4 **Type IV –** These are first response rescue devices designed to be thrown to a person overboard or person in the water. These devices include boat cushions, ring buoys, and horseshoe buoys. They are NOT designed to be worn and must be supplemented by wearable PFD. These devices need to be stowed in a location and in a manner that makes them immediately available for emergencies. Type IV devices should not be used for small children, non-swimmers, or unconscious people.

1.1.5 **Type V –** This is a special-use PFD and includes three-piece work vests, flotation deck suits for hypothermia protection (such as Mustang suits), and hybrids for restricted use. Hybrid vests contain some internal buoyancy and are inflatable to provide additional flotation. Immersion suits for cold water survival are also classified as Type V flotation devices.

2.0 Standards

The following standards apply to lifejackets and personal flotation devices:

Association	Standard
British Safety (BS) Standard	BS EN 396-1994, Lifejackets and Personal Buoyancy Aids – Lifejacket 150 N, automatically inflatable units with a minimum buoyancy of 150 N (34 lbs)
Canadian General Standards Board (CGSB)	CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type with a minimum buoyancy of 93 N (21 lbs) CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices with a minimum buoyancy of 69 N (15.5 lbs) CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type with a minimum buoyancy of 125 N (28 lbs)

Americas

Safe Work Practices for Shoreline Work

S3NA-315-WI2

1.0 Planning

1.1 Projects being conducted along the shoreline, on piers or bulkheads, or near or over any water of any kind where there exists the risk of falling into water should incorporate the following safety guidelines when developing field logistical plans.

2.0 Safe Work Practice

2.1 All work shall be performed in accordance with a “Buddy System”.

2.2 If sampling near or in flowing water environments, be aware of slippery or steep banks and fast currents. If the current is fast or the water looks deeper than knee height, do not enter the water. If you must enter the water, a restraining system must be worn and secured to the bank for your retrieval in the event of an emergency.

2.3 Whenever possible, positive controls in the form of fencing or barricades should be considered for long-term waterfront projects to form a security perimeter 10 feet in from the water’s edge to prevent field staff from being exposed to water hazards.

2.4 Field staff involved in sampling contaminated sediments or surface waters or conducting shoreline surveys may require a Hepatitis A and/or tetanus vaccination depending on site conditions and are advised to consult with their Safety, Health and Environment Manager. An Occupational Safety and Health Administration 40-hour HAZWOPER may be required for field staff working on site if warranted by the Project.

2.5 Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water’s edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. It is suggested that workers not be permitted to access areas where these slip/fall hazards exist, especially in locations containing tidal water flow.

3.0 Personal Protective Equipment

3.1 AECOM requires that whenever there exists the possibility of falling into water, field staff shall be attired in a United States Coast Guard-approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured at all times. Prior to and after each use, the PFD/suit shall be inspected for defects, which may alter their strength or buoyancy. Defective units shall be discarded and replaced.

3.2 Field staff protective gear must include long pants, steel-toed rubber boots; with adequate puncture resistance, and Kevlar gloves (whenever sampling or picking up or manipulating ground cover). It is recommended that field staff use a rake to move ground cover and debris and not touch these items directly by hand whenever possible.

3.3 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 Project 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.

4.0 Emergency Response

4.1 Emergency preparedness applies to any work where there exists the risk of falling into water, especially moving waters, along piers, bulkheads, and river banks with a sharp drop off in bathymetry.

4.2 Field staff working alongside waters, especially moving waters, where there exists the possibility of falling in must have an Emergency Response Plan to recover someone in the event they have fallen in.

4.3 A throwable rescue device must be immediately available in the event of an emergency situation. In these situations the position and accessibility of throw rings and other rescue devices (ex: ladders) and the mechanism to recover a person from the water must be considered.

4.4 The number and placement of ladders and throw rings shall be sufficient so that the maximum swimming distance to them is no more than 25 feet.

4.5 Whenever possible, or as required by regulation, at least one lifesaving skiff/boat should be immediately available at locations where employees are working over or adjacent to moving waters, especially strong currents which can quickly move a person out of range of a throwable life ring. For these conditions, it is recommended that a qualified operator be on stand-by for immediate response to aid in recovering a person from the water. Other means such as lifebuoy with throw line and boat hooks shall also be available to assist in the rescue of an incapacitated person in the water.

4.6 If workers have the potential to get stuck in mud or fluidized sediment, air injection equipment designed to free worker's feet/legs may need to be available on site. At a minimum, a safety line should be available to be deployed from safe ground. If a worker does get stuck, they should not struggle as this causes further sinking. Use a pole to conduct sediment probing to assess water depths, the stability of shoreline terrain, and the bearing capacity of bottom sediments ahead of the chosen path.

Americas

Ice Safe Work Practices

S3NA-315-WI3

1.0 Background

1.1 There is no such thing as 100-percent safe ice; there are a number of factors detailed herein which affect the bearing capacity of ice.

1.2 New ice is usually stronger than old ice. Four inches of clear, newly-formed ice may support one person on foot, while a foot or more of old, partially-thawed ice may not. Additional bearing capacity guidelines based on ice thickness can be found at: http://www.dnr.state.mn.us/safety/ice/thickness.html

1.3 Ice seldom freezes uniformly. It may be a foot thick in one location and only an inch or two just a few feet away.

1.4 Ice formed over flowing water and currents is often dangerous. This is especially true near streams, bridges and culverts. Also, the ice on the outside of river bends is usually weaker due to the undermining effects of the faster current.

1.5 The insulating effect of snow slows down the freezing process. The extra weight also reduces how much weight the ice sheet can support. Also, ice near shore can be weaker than ice that is further out.

1.6 Booming and cracking ice isn't necessarily dangerous. It only means that the ice is expanding and contracting as the temperature changes.

1.7 Schools of fish or flocks of waterfowl can also adversely affect the relative safety of ice. The movement of fish can bring warm water up from the bottom of the lake opening holes in the ice which can cause snowmobiles and cars to break through.

1.8 Heavy snowfall early in the season may result in reduced ice thickness due to the insulating effect of the snow.

1.9 A fresh fall of snow will often cover areas that would otherwise be recognized as hazardous.

1.10 Water overflow and ponding caused by increased water levels can cover hazardous areas. Be aware of overhanging riverbanks when ascending and descending.

2.0 Safe Work Practices

2.1 If considering work on frozen waters or in the presence of shoreline ice, the following requirements shall be followed:

2.1.1 Working in situations where ice exists shall be strictly limited. The risks of cold water immersion; slippery shorelines, docks and boat ramps; and navigation hazards around ice and frozen shorelines should be avoided. Field work should be rescheduled to periods of warmer temperatures, when ice and cold water hazards are not an issue.

2.1.2 Avoid working on water immediately prior to freeze-up because of floating ice sheet hazards. Avoid working on ice prior to break-up because of ice cover instability.

2.1.3 Care should be exercised when near the following areas: tributary/stream inflows, lake narrows, beaver dams, riffle areas, industry discharges, sewage lagoons, and open water, as the ice is usually thinner in these areas. Pressure ridges should also be avoided, as there may be open leads, weak ice and/or slush ice in these areas.

2.1.4 Work shall be performed in accordance with the "Buddy System" with rescue communications available.

2.1.5 Do not walk or work on ice unless there is no other way of performing work. Whenever possible, use alternate methods. One suggestion is to have field staff push a flat-bottomed boat onto the ice.

The boat shall have a safety tether tied to it that can be handled by workers standing off the ice cover along the shore line.

2.1.6 Only walk on ice that is fully frozen, not cracked or brittle, with a thickness that will support the necessary weight of workers and associated equipment.

2.1.7 When working on or near an ice surface, field staff should always check the ice thickness and condition thoroughly using an ice pick, ice chisel, and/or ice auger. It is virtually impossible to describe all conditions that may be encountered while working on ice cover; however, the following can be used as guidelines:

- The color of ice, which may range from blue to white to grey, provides an indication of its quality and strength.
- Clear blue ice is generally the strongest.
- White, opaque ice (snow ice) has a relatively high air content and its strength depends on the density; the lower the density, the weaker the ice. High-density white ice has a strength approaching that of clear blue ice.
- Grey ice generally indicates the presence of water as a result of thawing, and shall be considered highly suspect as a load-bearing surface.

2.1.8 When possible, conduct a reconnaissance prior to freeze-up and prior to actually working on the ice cover to become familiar with any potential hazards.

2.2 Personal Protective Equipment (PPE)

2.2.1 PPE shall be selected in accordance with the *S3NA-208-PR1 Personal Protective Equipment Program***.**

2.2.2 Workers are required to wear an approved Shallang flotation suit in accordance with the manufacturer's requirements.

2.2.3 Workers shall wear a restraining system (a lifeline attached to the front of a full-body harness) and stay close enough to the edge to make it possible for a shoreline attendant to pull the individual back off the ice.

2.2.4 Workers shall have available (on their person) tools that can be used to partially penetrate the ice and gain leverage to help in pulling themselves out of the water and back up onto the ice. Equipment is available with capped ends that can be worn safely until needed.

2.3 Unknown Conditions

2.3.1 The following guidelines shall be used when there is insufficient evidence to prove the ice is safe for travel and when the job task cannot be postponed:

- Select an area where the ice is of good quality and hazards are minimized.
- Establish a two-person team where one person acts as an "anchorperson" on shore and the second person, connected to the anchorperson by a braided rope, acts as the "checker", slowly moving out over the ice to sampling locations. (When working on a river, testing with an ice auger or ice bar shall be more frequent than on a lake due to the uncertain nature of river ice.)
- The anchorperson continually looks for hazards and signs of ice failure. (When testing the safety of an ice cover, the best method is to use an ice pick/axe.) The ice in front and to the sides should be struck a solid blow every few paces. The checker should proceed carefully outward checking the ice every few paces. Both staff should work to keep the rope from becoming snagged on ice blocks. The anchorperson should maintain their position as long as the site is deemed hazardous. If the anchorperson has to move, the checker should remain stationary until the anchor has re-established a secure position. When returning from the sample site, the checker should use the above procedure, if required.

- Crews should not be operating on ice greater than 98 feet (30 meters) (or the length of a rope) from shore without appropriate equipment and Rope/Harness Restraint and Rescue System training, unless there is sufficient evidence to prove the ice is safe for travel.

3.0 Vehicle Traffic

3.1 Vehicles operated on ice shall travel with their windows down and with their seatbelt off, and their speed should not normally exceed 9 miles per hour (mph) (15 kilometers per hour [km/hr]) (in order to avoid the effects of the hydrodynamic wave). Nor should speed be less than 1 mph (1.5 km/hr), in order to avoid the effects of a stationary load. Ice thickness should be checked frequently when travelling over long stretches of ice.

3.2 Particular care should be exercised when approaching or travelling close to shore, or over shallow water, because of severe stressing of the ice due to reflection of the generated wave.

3.3 Stationary loads should be relocated to shore as soon as feasible and not left overnight.

The following tables contain guidelines for weight loads on ice.

Table 1. Ice Strength for Continuous Travel

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
One person on foot	5.0	6.0
Group, in single file	8.0	9.0
Passenger car 2,000	18	21
Light truck 2,500	20	23
Medium truck 3,500	26	30
Heavy truck 7,000	35	41
10,000	38	44
25,000	63	73
45,000	80	92
70,000	100	115
110,000	123	144

Table 2. Ice Strength for Stationary Loads (more than 2 hours) and Working on Ice

Permissible Load (kg)	Effective Ice Thickness (cm) (clear, blue ice)	
	Lake	River
1,000	20	23
2,000	30	35
4,000	45	52
8,000	60	69
25,000	110	127
45,000	150	173
70,000	180	207
110,000	230	265

4.0 Rescue

4.1 If someone falls through ice:

- Don't approach the hole.
- Call the emergency number prior to attempting a rescue.
- Throw a rope or line to the victim to pull them out.
- Get medical assistance for the victim.

4.2 If you fall through the ice:

- Remain calm and look towards the shore.
- Place your hands and arms on the unbroken surface of the ice using the ice picks if available.
- Work forward by kicking your feet.
- If the ice breaks maintain your position and slide forward again.
- Once on the surface of the ice, don't stand. Instead, roll away from the hole.
- Crawl back to shore along your original path.

Americas

Drilling, Boring, and Direct-Push Probing

S3NA-405-PR1

1.0 Purpose and Scope

1.1 Provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with drilling, boring and direct-push probing, including encountering underground utilities, subsurface installations, and potential overhead hazards.

1.2 Provides the minimum requirements to be followed when drilling, boring, and probing work are performed.

1.3 This procedure applies to all Americas-based employees and operations.

1.4 The **Project Manager** is responsible for meeting all the requirements in this procedure.

1.5 A variance provision has been included for certain requirements of this procedure found in Sections 4.3.2, 4.8.1 and 4.10. Any variance from these procedures must be approved by the **District General Manager** or the **District SH&E Manager.**

1.6 AECOM's clients may have specific procedures which must be followed to identify and map utility and subsurface structures on their properties or facilities. Following the client's procedures over this procedure must be approved by the **District General Manager** or the **District SH&E Manager**.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling, and communications, etc.

2.2 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.3 **Intrusive Activities –** Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench, or depression in an earth surface formed by earth removal.

2.4 **Subsurface Installations –** Includes subterranean tunnels, underground parking garages, and other structures beneath the surface.

3.0 References

3.1 I2-141-PR1 Subs Management Procedure

3.2 S3NA-003-PR1 SH&E Training

3.3 S3NA-205-PR1 Equipment Inspections & Maintenance

3.4 S3NA-208-PR1 Personal Protection Equipment Program

3.5 S3NA-306-PR1 Highway and Road Work

3.6 S3NA-406-PR1 Electrical Lines, Overhead

3.7 S3NA-406-FM1 Overhead Electrical Lines Acknowledgement

3.8 S3NA-417-PR1 Underground Utilities and Subsurface Installation Clearance Process

3.9 S3NA-510-PR1 Hearing Conservation Program

3.10 Learning Management System (LMS)

3.11 National Groundwater Association, 2008

3.12 Environmental Remediation Drilling Safety Guideline

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager –** Initial and authorize work to proceed using the *S3NA-405-FM2 Pre-Drilling, Boring, and Direct-Push Checklist*. Authorizes (with Site Supervisor and District SH&E Manager's concurrence) if interrupted due to unexpected effect.

4.1.2 **District General Manager** and **District SH&E Manager –** Authorize any variances from this procedure. Authorization to proceed with drilling if interrupted due to unexpected debris or concrete.

4.2 Flow Chart/Checklist

4.2.1 *S3NA-405-FM1 Key Points to Know Flow Chart for Pre-Drilling, Boring, and Direct-Push Probing* is a flow chart of the key points to know of the Pre-Drilling, Boring, and Direct-push probing requirements that are addressed in this procedure. Prior to any intrusive subsurface work, the *S3NA-405-FM2 Pre-Drilling, Boring, and Direct-Push Checklist* must be filled out and signed by the **AECOM Project Manager**. If the answer to any question on the checklist is "No" or "N/A", no ground disturbance can take place without the approval of the AECOM Project Manager. The **Project Manager** must initial the checklist to authorize this approval.

4.3 Urban (or Non-Urban Areas without a one-call system)

4.3.1 Be aware that in urban (i.e., city or town) areas there may be subsurface installations (e.g., underground garages) and utilities (e.g., public water, sewer, and gas pipelines) that are not covered by one-call systems. These subsurface installations and utilities require additional investigation and diligence beyond the one-call system. Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.

4.3.2 In urban areas, private utility locating companies must be called to identify, through geophysical surveys and other means, the presence of private utilities installed by the property owner (i.e. irrigation systems) and to verify the presence of public utilities on the properties. Hand clearing is required in urban areas. Private locates are also required in urban areas. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager.** Private locates and hand clearing is also recommended for non-urban areas.

4.3.3 The presence of subsurface installations and utilities requires special care when obstructions/ refusal and voids are encountered and when unexpected absence of soil recovery occurs during drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.

4.4 Permits and Access Agreements

4.4.1 All applicable permits (e.g., government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.2 All applicable client on-site safety procedures shall be understood and adhered to, and all client permits will be obtained.

4.4.3 Access agreements will be obtained and adhered to as necessary.

4.4.4 Federal/State/Provincial/Territorial regulations that govern drill rig operations and exposed moving parts shall be adhered to.

4.5 Pre-Qualifying and Re-Qualifying Drilling Subcontractors

4.5.1 All drilling subcontractors will be properly pre-qualified through AECOM's Subport (refer to *I2-141-PR1 Subs Management Procedure*). The qualifications of the drilling crew performing the work will be evaluated prior to each mobilization and each day by AECOM's on-site representative to assure

that their safety performance, training, qualifications, equipment, processes, and approaches reflect AECOM standards for excellence.

4.5.2 All drilling subcontractor equipment will be properly maintained and properly equipped, and the drilling subcontractor will verify their equipment is fully functional as a normal part of their daily and pre-work routine. Refer to *S3NA-205-PR1 Equipment Inspections & Maintenance* procedure.

4.6 General Health and Safety

4.6.1 Health and Safety Plan – At a minimum, a health and safety plan (HASP) that includes task hazard analyses (THAs) shall be prepared prior to any drilling, boring, and direct-push probing activities. The HASP will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions. All HASP requirements will be followed by the project team.

4.6.2 Training

- All on-site staff involved with drilling, boring, and direct-push probing activities shall be provided with on-site orientation of the drill rig and its operation.
- All on-site staff involved with drilling, boring, and direct-push probing shall be trained in identifying underground utilities and subsurface installations and the requirements.
- All operators and assistants shall have industry-standard safety training and be versed in the equipment to be utilized. This training may include, but is not limited to, HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate. All staff involved with drilling, boring and direct-push probing activities at a client site shall receive the applicable client-required training. Refer to the *S3NA-003-PR1 SH&E Training* and *Learning Management System (LMS).*

4.6.3 Personal Protective Equipment – Refer to the *S3NA-208-PR1 Personal Protection Equipment Program* for best practices. These requirements may be modified or expanded in the HASP, which will override these requirements. Clothing shall be close fitting and comfortable without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the rig.

4.6.4 Hearing Conservation – Hearing conservation program requirements may apply when working around operating equipment. Refer to *S3NA-510-PR1 Hearing Conservation Program*. Each worker shall wear noise-reducing ear protectors around operating equipment or during elevated noise levels. Distance from the elevated noise level is the primary measure of control for non-essential drilling personnel.

4.7 Identification and Mapping of Utility and Subsurface Structures

4.7.1 The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3NA-406-PR1 Electrical Lines Overhead* and *S3NA-417 PR1 Underground Utilities and Subsurface Installation Clearance Process*.

4.7.2 Documentation of utility and subsurface installation clearance process (calling one call, responses from utilities) must be at the site along with the scaled site plan will be on-site at all times of intrusive activities.

4.8 Site Walk

4.8.1 A site walk shall be conducted by the project team/site manager with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards. If possible, particularly at urban and industrial sites, the client/property owner or someone knowledgeable about the site and site utilities will attend the site

walk. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager**.

4.8.2 The Site Walk is iterative with the Identification and mapping of Utility and Subsurface Structures and should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures.

4.9 Proposed Subsurface Investigation Locations

4.9.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.

4.9.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

4.10 Utility Clearance Investigation Location Confirmation

4.10.1 In urban areas, proposed subsurface locations will be hand cleared to 5 feet/1.5 meters (soil borings and wells) or 2 foot/0.6 meter (soil gas sampling probes) using non-mechanical methods (including soft dig (e.g., post hole digger, air knife, hand auger, etc.). Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas, hand clearing should be conducted if possible. Any variance from these requirements must be approved by the **District General Manager** or the **District SH&E Manager.**

4.11 Drill Rig Inspections

4.11.1 All drill rigs will be inspected prior to the initiation of drilling and daily during drilling following the *S3NA-405-FM3 Daily Drill Rig Inspection Checklist*. This inspection is the responsibility of the drilling subcontractor who will provide written documentation of the inspection prior to the start of drilling each day.

4.12 Unanticipated Concrete/Debris or Void

4.12.1 If unanticipated concrete/debris is encountered and/or if a void is encountered, drilling will be immediately discontinued and the **Project Manager** notified. Drilling may only proceed with **District General Manager** or the **District SH&E Manager** approval.

4.13 Traffic Control

4.13.1 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 (refer to *S3NA-306-PR1 Highway and Road Work*).

4.13.2 All traffic control devices shall be installed, placed, and maintained in accordance with a Traffic Control Plan, client specifications, and/or the Manual of Uniform Traffic Control Devices and Manual of Uniform Traffic Control Devices for Canada in Canada. Traffic control devices shall consist of and not be limited to

- Directional and informational signage;
- High visibility barricades, cones, or barrels;
- Lighting; and
- Other equipment and devices as required.

4.14 Clearing Work Areas

4.14.1 In addition to any minimum requirements the drilling subcontractor may have, prior to set up, adequate site clearing and leveling shall be performed to accommodate the rig and supplies and provide a safe working area. Clearing the site includes clearing the intended drilling area of

underground utilities in accordance with *S3NA-417-PR1 Underground Utilities and Subsurface Installation Clearance Process*. Drilling or probing shall not commence when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

4.15 Drilling Activities

4.15.1 In addition to any minimum requirements the drilling subcontractor may have, 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, safety glasses, and hearing protection shall be worn in the work zone (radius around the rig equal to the height of the drill rig mast) of a rig.
- Gas monitoring shall be conducted as appropriate.
- Hands shall be kept away from moving parts including augers.
- When observing drilling, stand upwind of the drill rig to prevent potential exposure to vapors that may be emitted from the borehole.
- The emergency shut-off switch on the rig shall be identified to site personnel and tested on a daily basis by the operator.
- Unauthorized personnel shall be kept outside of the rig work zone.
- Rig crew and other field personnel shall not use a cell phone while operating the drill rig or other equipment or within the rig work zone.
- Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick) look up to check for overhead obstructions. Refer to *S3NA-417-PR1 Utilities, Underground* and *S3NA-406-PR1 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 shall 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.
- The operator of a rig shall only operate a drill rig from the position of the controls. The rig shall not be in operation if the operator of the rig leave the area of the controls
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line should be used.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area. Exhaust fumes can be toxic and some cannot be detected by smell.
- Clean mud and grease from boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes shall be covered, protected, or backfilled adequately and according to Federal/State/Provincial/ Territorial or local regulations on completion of the drilling project.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending and descending. Always use adequate fall protection and a full body harness when climbing above 6 feet (2 meters) of the ground. Do not attempt to use one

or both hands to carry a tool while on a ladder. Use a hoist line and a tool “bucket” or a safety hook to raise or lower hand tools.

4.16 Use of Manual Slide Hammer

4.16.1 The following health and safety procedures should be followed when using a manual slide hammer to install shallow injection points, drive point piezometers and drill tools:

- Only use a manual slide hammer that either attaches directly to the point/piezometer being driven or that incorporates a cap on the point/piezometer/drill tool that prevents the slide hammer from slipping off the point/piezometer/drill tool.
- Always grasp the slide manual slide hammer (handles if equipped with handles) with both hands while driving the point/piezometer/drill tool.
- Never allow hands or feet to get between the manual slide hammer and the drive plate or anvil.

4.17 Use of Augers

4.17.1 The following general health and safety procedures should be followed when supervising borings with continuous flight hollow-stem augers:

- Never place hands or fingers under the bottom of an auger section when it is being hoisted over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When augers are rotating, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Use a long-handled shovel to move auger cuttings away from a rotating auger. Never use your hands or feet to move cuttings away from a rotating auger.
- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.
- Loud noises may occur while driving split spoons. At minimum hearing protection shall be worn when driving split spoons.
- Keep feet clear of rope cat head rope.

4.18 Rotary, Sonic and Core Drilling

4.18.1 In addition to the health and safety procedures identified above, the following general health and safety procedures should be followed when supervising borings with rotary, sonic and core drilling:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.
- When drill rods are rotating, stay clear of the rotating components of the drill rig. Never reach behind or around a rotating drill rod for any reason.
- Use a long-handled shovel to move cuttings away from the top of the borehole. Never use your hands or feet to move cuttings away from the borehole.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Keep away from area where drill rods are being moved or raised to the rig. Do not stand in the area where a drill rod will fall or slide if it should be dropped.

- Loud noises may occur during drilling. Hearing protection shall be worn.

4.19 Direct-push

4.19.1 The following general health and safety procedures should be followed when supervising drilling borings with direct-push drilling:

- 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.

4.20 Site Movement of Equipment

4.20.1 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/Provincial/ Territorial, 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.
- 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 unless client requirements specify that the keys remain in the ignition switch at all times.

4.20.2 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 weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the height of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.
- The rig and tools should be secured to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

4.20.3 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.
- Discharge all passengers before moving a drill rig on rough or 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.

5.0 Records

5.1 None

6.0 Attachments

6.1	S3NA-405-WI1	Core Drilling Machine Safety Card
6.2	S3NA-405-FM1	Key Points to Know Flow Chart for Pre-Drilling, Boring, and Direct-Push Probing
6.3	S3NA-405-FM2	Pre-Drilling, Boring, and Direct-Push Checklist
6.4	S3NA-405-FM3	Daily Drill Rig Inspection Checklist
6.5	S3NA-405-ST	Drilling and Boring – Jurisdictions/Regulations

Americas

Core Drilling Machine Safety Card

S3NA-405-WI1

1.0 Objective / Overview

1.1 Core drilling machines are used on all types of jobs. They can be electrical or gas powered and come with a stand or can be hand held. Caution should be used when operating such a machine. It may look harmless and easy to run, but drilling machines have many hazards.

1.2 Prior to coring activities the location should be checked for buried utilities following the Pre-Drilling, Boring and Direct-Push Checklist (S3NA-405-FM2).

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 Utilities

3.2 Electrical shock

3.3 Flying debris

3.4 Severe cuts

3.5 Hearing loss

3.6 Breathing fumes or dust

3.7 Binding/biting – torque control

4.0 Training Requirements

4.1 Review of Applicable SOPs (e.g., *S3NA-305-PR1 Hand and Power Tools*; *S3NA-302-PR1 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.

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Key Points to Know Flow Chart for Pre-Drilling, Boring and Direct Push-Probing Requirements

S3NA-405-FM1

Before Any Drilling, Boring and Direct Push Probing Activities

PERMITS and ACCESS AGREEMENTS

- **Government and Utility/Infrastructure Permits**
- **Client Permits and Procedures**
- **Access Agreements**

KEY POINT
Must obtain all permits and sign Access Agreement (if required).

↓

GENERAL HEALTH and SAFETY

KEY POINT: Must prepare Health & Safety Plan, which includes a Task Hazard Analysis.

↓

IDENTIFICATION and MAPPING OF UTILITY and SUBSURFACE STRUCTURES

KEY POINT: Must generate a comprehensive site map illustrating known locations of overhead/subsurface utilities, subsurface structures, and proposed boring locations.

SITE WALK

KEY POINT: Must perform a site walk utilizing site map and 360 degree view to verify known conditions and identify potential issues. Add discovered items/issues to map for use in location confirmation.

↓

PROPOSED SUBSURFACE INVESTIGATION LOCATIONS

KEY POINT: Confirm that locations meet the minimum set-back distances described in Section 4.9

↓

UTILITY CLEARANCE INVESTIGATION LOCATION CONFIRMATION

KEY POINT: Locations must be hand-cleared, as described in Section 4.10

↓

DRILL RIG INSPECTIONS

KEY POINT: Drill rig inspected and documented daily by operator prior to drilling.

↓

BEGIN DRILLING, BORING OR DIRECT PUSH PROBING

KEY POINT: Complete FM2 checklist. If unanticipated concrete/debris and/or if a void is encountered, stop work and notify the Project Manager. Authorization to proceed must have the concurrence of the Project Manager and the District General Manager or District SH&E Manager.

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Pre-Drilling, Boring and Direct-Push Checklist

S3NA-405-FM2

Location:		**Project #:**
Contractor:		**Client:**
Date:	**Time:**	**Weather:**
Inspector:		**Project Manager:**

Notes:

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

		Yes	No	N/A
I.	**Permits and Access Agreements**			
1.	Have all appropriate permits been identified and obtained (e.g., drilling, encroachment, working near railroads, etc.)?	☐	☐	☐
2.	Have all client requirements, including client permits been identified and obtained?	☐	☐	☐
3.	If working off-site is(are) site access agreement(s) executed?	☐	☐	☐
II.	**General Health and Safety**			
1.	Has a Health and Safety Plan been prepared for AECOM employees?	☐	☐	☐
2.	Do on-site personnel have required-level PPE?	☐	☐	☐
3.	Do on-site personnel have required-level of training?	☐	☐	☐
4.	Are appropriate monitoring equipment as specified in the HASP/THAs available at each drill rig location?	☐	☐	☐
5.	Has the field screening equipment been calibrated as required by the HASP?	☐	☐	☐
6.	Are calibration gases available at the site?	☐	☐	☐
7.	Does each drill rig have a fire extinguisher, absorbent materials to cleanup a spill, and a first aid kit?	☐	☐	☐
III.	**Identification and Mapping of Utility and Subsurface Structures**			
1.	Is a Site Plan showing the proposed subsurface locations and utility locations attached to this check list?	☐	☐	☐
2.	Have utilities and subsurface installations been investigated as being present, including the following:	☐	☐	☐
	a. Steam, gas and electric?	☐	☐	☐
	b. Sewer and water?	☐	☐	☐
	c. Subterranean tunnels?	☐	☐	☐
	d. Fiber optics (Note routine utility geophysical survey will not identify fiber optic cables)?	☐	☐	☐
	e. Traffic control cables?	☐	☐	☐
	f. Others (identify)?	☐	☐	☐

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
3. Have all Federal/State/Provincial/Territorial and other "One Call" providers marked their facilities or otherwise notified they do not have any facilities near the proposed subsurface/intrusive locations?	☐	☐	☐
4. Has the Federal/State/Provincial/Territorial or other "One Call" provider identified what utilities and underground structures are *not* included in their provider system (e.g., non-utility underground structures)?	☐	☐	☐
5. As noted in the exception at the bottom of Section VI of this checklist, has a utility locating contractor performed geophysical and/or other surveys of the proposed subsurface/intrusive locations?	☐	☐	☐
6. Were all circuits on during subsurface checks if the checks were for identifying energized lines (e.g., circuits on timers or light sensing switches)?	☐	☐	☐
7. If overhead utilities or obstructions are present that may prevent the safe operation of drilling/excavation equipment, has the AECOM Overhead Electrical Line Acknowledgement Form been signed?	☐	☐	☐
8. Was there visual verification that each of the proposed locations does not lie on a line connecting two similar manhole covers (e.g., sanitary sewer or storm drain)?	☐	☐	☐
9. Was there visual verification that the ground in the vicinity of each of the proposed subsurface locations has not subsided, been excavated and patched, give the appearance it may be covering a former trench (e.g., linear cracks, sagging curbs, linear re-pavements) and do not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas?	☐	☐	☐
IV. Site Walk			
1. Has a site walk been performed that includes the following:	☐	☐	☐
a. Reviewing all planned intrusive locations?	☐	☐	☐
b. Adjusting locations away from subsurface utilities and installations?	☐	☐	☐
c. Determining the appropriate utility clearance activities for each location?	☐	☐	☐
d. Determining the presence and location of overhead utilities and obstructions?	☐	☐	☐
e. Walk around perimeter of the site to observe physical hazards?	☐	☐	☐
f. Walk around 50 feet (15 meters) from perimeter of the site to observe physical hazards?	☐	☐	☐
g. Walk around 50 feet (15 meters) radius from each proposed subsurface intrusion location?	☐	☐	☐
V. Proposed Subsurface Investigation Locations*			
1. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utility?	☐	☐	☐
2. Are all of the proposed subsurface locations at least 7 feet (2.1 meters) from the pad surrounding any underground storage tanks (USTs) shown on the Site Plan?	☐	☐	☐
3. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities shown on the Public Right-of-Way street improvements?	☐	☐	☐
4. Are all proposed subsurface locations requiring a drill rig for installation at least 10 feet (3 meters) from any energized overhead power line (or further based on line voltage)?	☐	☐	☐

Questions must be answered prior to any intrusive subsurface work. DO NOT DISTURB GROUND if you have answered "No" or "N/A" to any of the questions without the approval of the AECOM Project Manager.

Any variance from these procedures must be approved by the District General Manager or District SH&E Manager.

	Yes	No	N/A
5. Are all of the proposed subsurface locations at least 5 feet (1.5 meters) from any subsurface utilities identified during any geophysical survey performed using ground-penetrating radar (GPR) in conjunction with other technology?	☐	☐	☐

** These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.*

VI. Utility Clearance Investigation Location Confirmation*

1. Have subsurface locations been hand cleared as follows? Hand clearance should be extended if locations of deep utilities and structures are not known. In non-urban areas hand clearing should be conducted if possible.	☐	☐	☐
a. For soil borings/monitoring wells excavate to a minimum of 5 feet (1.5 meters) below ground surface using non-mechanical methods.	☐	☐	☐
b. For soil gas sampling excavated to 2 foot (0.6 meter) below grade or below the bottom of a concrete floor prior to the installation of soil gas sample probe points?	☐	☐	☐

** Exceptions to requirements of the utility clearance process include the following:*

- *Sites where extensive utility mapping has been completed and/or where extensive activities have already been performed.*
- *Locations where facility layout is well documented and understood.*
- *Sites or portions of large sites where utilities are known not to exist currently or to not have ever existed throughout the life of the facility, property or site.*

VII. Drill Rig Inspections

1. Structural Damage, Loose Bolts	☐	☐	☐
2. Ropes / Cables show no signs of faying, kinking, excessive ware	☐	☐	☐
3. Loose or Missing Guards, Fluid Leaks	☐	☐	☐
4. Damaged Hoses and/or Damaged Pressure Gauges	☐	☐	☐
5. Tires / Tracks in good condition. Inflated	☐	☐	☐
6. Check and test all safety devices such as:	☐	☐	☐
a. Emergency shutdown switches, at least daily	☐	☐	☐
b. All gauges and warning lights, and ensure control levers are functioning properly	☐	☐	☐
c. First aid and fire extinguishers on drill rig	☐	☐	☐
d. Back up alarm functioning properly	☐	☐	☐
7. Suitable storage for tools, materials, and supplies	☐	☐	☐
8. Pipes, drill rods, casing, and augers stacked on racks to prevent rolling and sliding	☐	☐	☐
9. Platforms and other work areas free of debris materials and obstructions	☐	☐	☐
10. Parts / platforms, derrick can move freely with no obstructions	☐	☐	☐

Comments:

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Daily Drill Rig Inspection Checklist

S3NA-405-FM3

Location:		**Project #:**
Contractor:		**Client:**
Date:	**Time:**	**Weather:**
Contractor Signature:		**Project Manager:**

This form is to be filled out and signed by the drilling subcontractor.

	Yes	No
I. General Safety		
Safety Officer Designated for Job:	☐	☐
Name:		
Safety Meeting Performed (Daily)	☐	☐
II. Drill Rig Inspection		
Structural Damage, Loose Bolts	☐	☐
Loose or Missing Guards, Fluid Leaks	☐	☐
Ropes / Cables show no signs of faying, kinking, excessive ware	☐	☐
Damaged Hoses and/or Damaged Pressure Gauges	☐	☐
Tires / Tracks in good condition. Inflated	☐	☐
Check and test all safety devices such as:		
Emergency shutdown switches, at least daily	☐	☐
All gauges and warning lights, and ensure control levers are functioning properly	☐	☐
First aid and fire extinguishers on drill rig	☐	☐
Back up alarm functioning properly	☐	☐
Comments:		
III. Drilling Operations		
Mast or derrick down when moving rig	☐	☐
Overhead obstructions identified before mast is raised	☐	☐
Drill rig stabilized using leveling jacks or solid cribbing	☐	☐
Secure and lock derrick	☐	☐
Comments:		
IV. 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	☐	☐
Inspect and lubricate parts daily	☐	☐

Americas

Key Drilling and Boring – Jurisdictions/Regulations

S3NA-405-ST

Jurisdiction	Regulation
United States	
OSHA	29 CFR 1910.212
Canada	
Alberta	OHS Code (2014) Part 37, 756 – 779
British Columbia	OHS Regulation (WorkSafeBC – 2013) Part 8.2 – 8.10, Part 12.84 – Part 12.92
Manitoba	Workplace Health and Safety Regulation (217/2006) Part 41.1 – 41.22
New Brunswick	OHS Regulation (91-191) Sect 38, 237, 241, 242,243
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 52, 61, 68, 71, 73, 151.4, 151.5, 151.6, 163, 164, 166, 167
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 9, 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 245/97 – Exploration, Drilling and Production Ontario Water Resources Act: O. Reg 903 – Wells
Prince Edward Island	OHS Regulations (EC180/87) Sect 30.2, 30.8, 31.1, 45.1
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, 3.15.9, 4.5, 8.5
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Part 29, 410 – 439
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Part 1.08 – 1.21, Part 14.34 – 14.38, Part 17.21 – 17.61

Americas

Electrical Lines, Overhead

S3NA-406-PR1

1.0 Purpose and Scope

1.1 Provides the safe work requirements to be observed where overhead electrical lines, electrical apparatus, or any energized (exposed or insulated) parts are present at a job site.

1.2 This procedure applies to all AECOM Americas-based employees and operations, except where local or governmental regulations are more stringent.

2.0 Terms and Definitions

2.1 **Arc Flash Hazard** – A dangerous condition associated with the possible release of energy caused by and electric arc. Arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage, harm, fire, or injury.

2.2 **Electrical Hazard** – A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

2.3 **Minimum Approach Distance (M.A.D.)** – The M.A.D. is the closest distance any employee or any part of the operating equipment is permitted to approach an energized or a grounded object.

2.4 **Qualified Person (Electrical Transmission and Distribution) –** A person trained and knowledgeable in the construction and operation of electrical transmission and distribution equipment or a specific work method, and has been trained to recognize and avoid electrical hazards that might be present with respect to that equipment or work method.

2.5 **Types of Overhead Lines**:

- Overhead electrical lines
- Structural cable supports
- Guy wires
- Cable television / communication lines

3.0 References

3.1 29 CFR 1926 Subpart CC, “Cranes & Derrics in Construction”

3.2 29 CFR 1926 Subpart V, “Power Transmission and Distribution”

3.3 29 CFR 1926.453, “Aerial Lifts”

3.4 American National Standards Institute (ANSI) A92 Series, “Elevating and Vehicle Lift Devices”

3.5 ANSI B30.5, “Mobile and Locomotive Cranes”

3.6 Learning Management System (LMS)

3.7 National Fire Protection Agency (NFPA) 70E, “Standard for Electrical Safety in the Work Place”

3.8 I2-141-PR1 Subs Management Procedure

3.9 S3NA-004 PR1 Incident Reporting

3.10 S3NA-209-PR1 Project Hazard Assessment and Planning

3.11 S3NA-302-PR1 Electrical, General

4.0 Procedure

4.1 Roles & Responsibilities

4.1.1 **Project Manager**

- Identify conditions where overhead electrical lines may be present and outline what is required in the task hazard analysis or safety plan refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning*.
- Coordinate and communicate with subcontractors or employees working around overhead electrical lines, refer to *I2-141-PR1 Subs Management Procedure*.
- Confirm the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement form* is completed by anyone working around overhead electrical lines on the project site.

4.1.2 **SH&E Department**

- Assist and support the Project Manager in planning and responding to concerns regarding the exposure to overhead electrical lines.

4.1.3 **Employees**

- Inform the Project Manager of field conditions that may expose risks to overhead electrical lines.

4.1.4 **Overhead line Owner/Operator**

- Complete the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement* and submit to AECOM prior to performing work.

4.2 Training

4.2.1 **Project Managers** shall ensure that each equipment operator and crew member assigned to work with the equipment is trained in accordance with the *S3NA-209-PR1 Project Hazard Assessment and Planning* for specific required training assigned in the LMS. Additional training requirements include:

- Overhead lines are presumed to be energized unless the utility **overhead line owner/ operator** confirms that the overhead line has been and continues to be de-energized and visibly grounded at the worksite.
- Overhead lines are presumed to be uninsulated unless the utility **overhead line owner/operator** or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution confirms that a line is insulated.
- The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
- Follow the *S3NA-302-PR1 Electrical, General* procedures to properly ground equipment and the limitations of grounding.

4.3 General Requirements

4.3.1 **Project Managers** must contact the overhead owner/operator (i.e. local utility company) before work is done or before equipment is operated within 50 feet (15.25 meters) of an energized overhead line, to determine the voltage of the overhead line and establish the appropriate M.A.D. The Minimum Approach Distance vs Voltage varies from Province to Province in Canada. The minimum approach distance or the regulatory minimum distance requirements, whichever is more stringent, must be maintained. Figure 4-1 lists the Phase-to-Phase voltage rating voltages in kilovolts and the M.A.D.s applicable to all AECOM operations:

Figure 4-1: Minimum Approach Distances (M.A.D.)

Voltage Range (Kilovolts) (Phase-to-Phase)	Minimum Approach Distance (M.A.D.) in Feet (Meters)
Personnel must allow for equipment movement and electrical line swaying when establishing a M.A.D.	
0 – 50 KV	10 (3)
Over 50 – 200 KV	15 (5)
Over 200 – 350 KV	20 (6)
Over 350 – 500 KV	25 (8)
Over 500 – 750 KV	35 (11)
Over 750 – 1,000 KV	45 (14)
Note: This requirement shall apply except where client, local, or governmental regulations are more stringent.	

Source: American National Standards Institute, Publication B30.5.

4.3.2 An appropriate distance must be kept between equipment, its occupants, their tools and energized overhead lines, electrical apparatus, or any energized parts.

4.3.3 These minimum approach distances do not apply to a load, equipment, or building that is transported under energized overhead power lines if the total height, including equipment transporting it, is less than 13.5 feet (4.15 meters).

4.3.4 **Project Managers** or designated employees must formally notify (using the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement form*) all subcontractors or equipment operators of an energized overhead line before work is done or equipment is operated in the vicinity of the overhead line at distances less than 50 feet (15.25 meters) and obtain the operator's assistance in protecting workers involved. **Project Managers** must formally notify all subcontractors of overhead lines with the *S3NA-406-FM1 Overhead Electrical Lines Acknowledgement* form.

4.3.5 **Employees** must not place earth or other material under or beside an overhead line if doing so reduces the safe clearance to less than 50 feet (15.25 meters). To maintain a safe distance of 50 feet (15.25 meters):

- Install warning devices and signs (hang a sign from and mark all guy wires to warn traffic of low clearance; provide warning signage for all overhead services).
- Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.
- Position signs or other devices to determine the “Danger Zone.”
- Inform all job site personnel of the danger zone and the safe distances required.
- Beware of atmospheric conditions, such as temperature, humidity, and wind that may dictate more stringent safety procedures.

4.3.6 Operation of heavy equipment and cranes in areas with overhead lines represents a significant arc flash and electrical hazard to all personnel on the job site. Accidental contact with an energized overhead line or arcing between a high power line and grounded equipment, can cause harm to nearby equipment operators or ground personnel and damage to power transmission systems and/or operating equipment.

4.3.7 Although maintaining a safe distance from all energized overhead lines is the preferred means for control of this hazard, this may not always be feasible due to site conditions. If work will (or may) occur within 50 feet (15.25 meters) of any energized conductor, the procedures outlined below will be observed:

4.3.7.1 Overhead electrical 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, aerial work platforms, etc.) will occur within 50 feet (15.25 meters) of the line.

4.3.7.2 Job site personnel must maintain a clearance of at least 10 feet (3 meters) between any part of the operating equipment, its occupants and their tools from any overhead line carrying up to 50,000 volts.

4.3.7.3 One foot (0.3 meters) additional clearance is required for every additional 30,000 volts or less.

4.3.7.4 If equipment operation must take place within 50 feet (15 meters), a signal person must be used with clear view of the overhead utility & the equipment operator.

4.4 Minimum Approach Distance Reduction

4.4.1 Where any work task will not allow the minimum safe working distance to be maintained, an alternate means of protection must be implemented by the **Project Manager** and approved by the **Safety, Health and Environment (SH&E) Department**. In order of preference, acceptable procedures are:

- De-energize the overhead line(s)/lockout by local utility authorities; or
- Implement alternative procedures as identified by the **overhead line owner/operator** or a registered professional engineer.

4.4.2 De-energize Overhead Lines

- Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site overhead lines are often under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the **overhead line owner/operator**. De-energizing of an overhead line often requires advance coordination with the **overhead line owner/operator**. At least one week advance notice should be provided.
- **Project Managers** must confirm with the utility **overhead line owner/operator** that the overhead line has been de-energized and visibly grounded at the job site.

4.4.3 Alternative Procedures

- **Project Managers** may implement alternative procedures to prevent arc flash and electrical contact. These procedures must be identified by the **overhead line owner/operator** or a registered Professional Engineer who is a Qualified Person with respect to electrical power transmission and distribution.
- A planning meeting with the **Project Manager**, **SH&E Department** and the **overhead line owner/operator** (or registered Professional Engineer) must be held to determine the most effective alternative procedures.
- Alternative procedures shall meet all client, local and governmental regulatory requirements.
- Insulating Barriers must be rated for the voltage line being guarded. These barriers may not be part of or attached to the equipment. The M.A.D. shall only be reduced within the designed working dimensions of the insulating barrier. This determination shall be made by a Qualified

Person in accordance with local or governmental requirements for work practices near energized equipment.

- Dedicated Line Spotters must be trained to enable them to effectively perform their task, including training on the applicable local and governmental regulations.

4.5 Additional Safety Measures

4.5.1 The following additional safety measures shall be implemented as needed when working around energized power lines:

- Provide equipment with proximity warning devices. These provide an audible alarm if any part of the equipment gets too close to a line.
- Install ground safety stops. These prevent vehicles from accidentally entering hazardous areas.
- Equip cranes with a boom-cage guard. This prevents the boom from becoming energized if an electrical line is contacted.
- Utilize insulated links and polypropylene tag lines. These prevent the transmission of electricity to loads or tag line handlers if an electrical line is contacted.

  NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures in Section 4.1.

4.6 Emergency Planning

4.6.1 **Project Managers** shall complete a site-specific emergency plan as part of their project safety plan or task hazard analysis for all operations during which equipment is operated within 50 feet (15.25 meters) of an energized overhead power line or conductor. This plan shall identify the following information:

- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The potentially energized zone around the equipment.
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- The means to de-energize the power line or live conductor.
- The contact information for the utility **overhead line owner/operator** and emergency services.
- In the event of an incident, the **employee** must report it in accordance with *S3NA-004 PR1 Incident Reporting*.

5.0 Records

5.1 Retain the Overhead Electrical Lines Acknowledgement forms in the project files.

6.0 Attachments

6.1 S3NA-406-FM1 Overhead Electrical Lines Acknowledgement Form

Americas

Overhead Electrical Lines Acknowledgment

S3NA-406-FM1

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 *S3NA-406-PR1 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**

Americas

Boat and Vessel Operations

S3NA-419-PR1

1.0 Purpose and Scope

1.1 Establishes the procedure for AECOM employees who perform work on boats and vessels.

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

2.0 Terms and Definitions

Refer to *S3NA-419-WI1 Nautical Terminology* for more definitions.

2.1 **Small Boat** – A boat less than 18 feet in length including canoes, kayaks, rafts, and dinghys with an outboard motor.

2.2 **Mid-size Boat** – A boat greater than 18 feet but less than 26 feet in length, including single and pontoon-style hulls, barges, or other platforms.

2.3 **Large Vessel** – A boat or vessel larger than 26 feet in length.

2.4 **Boat or Vessel Operator** – Person responsible for the overall safe operation of the boat/vessel.

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-208-PR1 Personal Protective Equipment

3.3 S3NA-209-PR1 Hazard Assessment and Planning

3.4 S3NA-301-PR1 Confined Spaces

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region Safety, Health and Environment (SH&E) Manager / SH&E Department**

Provide training and technical guidance to operation, including the following:

- Approve safety plans.
- Approve personnel assigned safety duties.

4.1.2 **Project Manager**

Responsible for the overall success of a project and the performance of employees engaged in project activities. The Project Manager identifies and implements all appropriate SH&E procedures. Additional responsibilities include the following:

- Confirm that subcontractors selected to support project operations have been approved by the AECOM Region SH&E Manager.
- Select an appropriate boat/vessel for the planned work activities.
- Obtain approval from the AECOM Region SH&E Manager for the operation of any vessel in offshore, ports or harbors, navigation channels, or waterways handling commercial ship traffic.
- Develop and submit a Safe Work Plan, Task Hazard Analysis, Float Plan and other SH&E Planning Documents for review and approval by the Region SH&E Manager.
- Allocate appropriate resources, including emergency and safety equipment, to complete the project as planned.
- Designate a Marine Safety Officer to implement and maintain safe work practices and

procedures. Marine Safety Officers are responsible for the following:

- Implement and monitoring safe work practices specified by this procedure and supporting SH&E documentation.
- Conduct marine safety briefings and inspections as needed.
- Conduct field verification of the competency of boat/vessel operators and field staff.

4.1.3 **Boat/Vessel Operator**

- Maintain current boating/vessel licenses as required by local, State, Provincial, and Federal regulations and standards.
- Operate boats/vessels in accordance with this SOP and as required by local, State, Provincial, and Federal regulations and standards.

4.1.4 **Marine Safety Officer**

- Shall be designated by the Project Manager and approved by the Region SHE Manager.
- Have experience in boat and vessel operations similar to those planned for the operation.

4.1.5 **Field Staff**

- Comply with the safe work practices specified in this procedure and all other applicable AECOM SH&E policies.
- Verify that they meet training and qualification requirements, and reporting deficiencies to their Supervisor and Project Manager.
- Use equipment that has been inspected, and use equipment only as intended.
- Follow all safe work practices in this procedure, in the project SH&E documents, as required by local, State, Provincial, and Federal regulations or standards, and as instructed by the Marine Safety Officer or Vessel Operator.
- Immediately report incidents, near misses, unsafe acts and conditions when they occur to the Marine Safety Officer and/or the responsible supervisor.

4.2 Training and Qualifications

4.2.1 All personnel working aboard boats/vessels shall have completed training in accordance with *S3NA-003-PR1 SH&E Training* and maintain a current:

- Safe Boating Course (approved by **Region SH&E Manager**);
- CPR/First Aid certification;
- Hazardous Waste Operations and Emergency Reponses training (if marine operations involve hazardous waste or the response to a hazardous waste emergency response);
- Hepatitis A vaccination (if marine operations involve sampling sediments or surface waters with contamination from sewage);
- Fire extinguisher training (if a fire extinguisher is required on board); and
- Additionally, all personnel shall be competent swimmers.

4.2.2 **Vessel Operators** shall have completed and maintain current:

- All training and qualification requirements noted above for all personnel working aboard boats/vessels.
- Field competency verification training or documented experience with operating the boat/vessel and that they understand all applicable marine safety regulations.
- Maintain current boat/captain licenses per local, state, provincial, and federal regulations and standards.

4.3 General Requirements

4.3.1 All boats and vessels shall be operated by a qualified **Vessel Operator** in accordance with local, State, Provincial, and Federal Marine Safety Laws.

4.3.2 All tasks performed aboard a boat/vessel shall be assessed for hazards, and hazards shall be controlled, refer to *S3NA-419-WI2 Boating Safe Work Practices*. Assessment and controls shall be documented in the Task Hazard Analysis or Safety Plan, refer to *S3NA-209-PR1 Hazard Assessment and Planning, S3NA-419-WI4 Float Plan* and S3NA-*419-WI6 Emergency Response Procedures*.

4.3.3 Personal Protective Equipment shall be selected based on the task-specific hazard analysis, refer to *S3NA-208-PR1 Personal Protective Equipment and S3NA-419-WI5 Marine Safety Equipment*.

4.3.4 All boats and vessel will be outfitted with safety equipment as required by local, State, Provincial, and Federal regulations or standards, and as identified in the task-specific hazard analysis, refer to

4.3.5 Vessels working offshore shall be sized to withstand and remain stable through all forms of expected weather conditions, refer to *S3NA-419-WI3 Small Boat Operation and S3NA-419-WI7 Hazardous Weather Operations*. Local weather, tide, current conditions, and navigational needs shall be evaluated as a part of project planning.

4.3.6 All boats/vessels equipped with propulsion machinery shall be licensed and registered in accordance with local, State, Provincial, and Federal regulations or standards.

4.3.7 Should the vessel have locations designated as confined spaces, they shall be managed in accordance with *S3NA-301-PR1 Confined Spaces*.

4.3.8 Chartered or subcontracted boats/vessel or operators shall be evaluated by the **Project Manager** for overall suitability for the intended task. Charters/subcontractors are responsible for providing qualified operators and licensed and inspected boats/vessels and for stocking and maintaining emergency supplies and equipment, refer to *S3NA-419-WI8 Charters and Subcontractors*.

4.3.9 Impacts to marine traffic shall be evaluated as a part of project planning. Notification of the Coast Guard or other jurisdictional agency shall be made, as required by local, State, Provincial, and Federal regulations and standards. Additional notifications to other vessels via day shapes may be necessary.

4.3.10 Work in security zones and security sensitive areas (near bridges, reservoirs, etc.) shall be performed only with the authorization of governing security agency(s).

4.3.11 A daily safety inspection will be conducted by the **Marine Safety Officer** prior to beginning marine operations. The inspection criteria shall be developed as a part of project SH&E documentation.

4.3.12 A daily safety briefing of all field staff and operators shall be conducted by the **Marine Safety Officer** prior to beginning marine operations. The daily safety briefing shall include, at a minimum:

- Review of planned activities, including the associated Task Hazard Analysis;
- Review of emergency procedures, including the location and operation of emergency supplies;
- Discussion of personal protective equipment required for planned actives; and
- Opportunity for field staff to ask questions.

5.0 Records

5.1 Float plans and other documents with planning and response will be retained in the project files.

6.0 Attachments

6.1 S3NA-419-WI1 Nautical Terminology

6.2 S3NA-419-WI2 Boating Safe Work Practices

6.3 S3NA-419-WI3 Small Boat Operation

6.4 S3NA-419-WI4 Float Plan

6.5 S3NA-419-WI5 Marine Safety Equipment

6.6	S3NA-419-WI6	Emergency Response Procedures
6.7	S3NA-419-WI7	Hazardous Weather Operations
6.8	S3NA-419-WI8	Charters and Subcontractors

Nautical Terminology

1.0 Nautical Terminology

- **Abeam** – At right angles to the keel of the boat, but not on the boat.
- **Aboard –** On or within the boat.
- **Above Deck –** On the deck (not over it – see Aloft).
- **Aft** – Toward the stern of the boat.
- **Aground** – Touching or fast to the bottom.
- **Ahead** – In a forward direction.
- **Aloft –** Above the upper deck of the boat.
- **Amidships –** In or toward the center of the boat.
- **Anchor** – A heavy metal device, fastened to a chain or line, to hold a vessel in position, partly because of its weight but chiefly because the designed shape digs into the bottom.
- **Astern –** In back of the boat, opposite of ahead.
- **Bearing –** The direction of an object expressed either as a true bearing as shown on the chart, or as a bearing relative to the heading of the boat.
- **Bight –** Any curved section, slack part, or loop formed in a rope or line.
- **Boat** – A vessel for transport by water. Constructed to provide buoyancy by excluding water and shaped to give stability and permit propulsion.
- **Bow** – The forward end of the boat.
- **Bulkhead –** Wall-like constructions inside a vessel, as for forming watertight compartments, subdividing space, or strengthening the structure.
- **Buoy** – An anchored float used for marking a position on the water, a hazard, or a shoal. A surface marker floats for a mooring.
- **Captain –** A person who is at the head of or in authority of all others aboard a vessel.
- **Certified Vessel (or Inspected Vessel) –** A category of vessel that is subject to a mandatory U.S. Coast Guard safety inspection.
- **Cleat –** A fitting to which lines are made fast. The classic cleat to which lines are belayed is approximately anvil-shaped.
- **Cockpit –** A sunken, open area, generally in the after part of a small vessel, provides space for part or all of the crew.
- **Dive –** A descent into the water, an underwater diving activity utilizing compressed gas, an ascent, and return to the surface.
- **Dock** – A protected water area in which vessels are secured to a pier or a wharf.
- **Drain Plug –** A removable plug in the transom used for draining water out of a boat.
- **Emergency Position Indicating Radio Beacon (EPIRB)** – Transmits a signal that allows rescue personnel to determine a vessels position at sea once it is activated in the event of an emergency.
- **Fathom –** A depth increment of 6 feet (1.82 meters).

- **Fender** – A cushion, placed between boats, or between a boat and a pier, to prevent damage.
- **Float Plan –** A document prepared by the boat crew and left with a competent person shore side that defines the itinerary and particulars of the vessel and crew, serving as an informational resource for emergency responders in the event the boat does not return at the appointed time.
- **Freeboard** – The portion of the side of a hull that is above the water.
- **Gunwales** – The widened edge at the top of the side rail of the boat, where the edge is reinforced.
- **Knot** – A measure of speed equal to one nautical mile (6,076 feet) per hour or 1.16 miles per hour.
- **Knot –** A fastening made by interweaving rope to form a stopper, to enclose or bind an object, to form a loop or a noose, to tie a small rope to an object, or to tie the ends of two small ropes together.
- **Leeward** – The direction away from the wind.
- **Life-line** – A line secured along the deck to lay hold of in heavy weather.
- **Listing –** Leaning to one side due to the unequal distribution of weight.
- **Mooring –** An arrangement for securing a boat to a mooring buoy or a pier.
- **Overboard –** Over the side or out of the boat.
- **Personal Flotation Device (PFD) –** PFD is official terminology for life jacket. When properly used, the PFD will support a person in the water and keep their face and nose (airway) out of the water in either a conscious or unconscious condition.
- **Port –** The left side of the boat when looking forward (toward the bow).
- **Running Lights –** Navigation lights required to be shown on boats underway between sundown and sunup.
- **SCUBA Diving** – A diving mode independent of surface supply in which the diver uses an open circuit, self-contained underwater breathing apparatus.
- **Starboard** – The right side of the boat when looking forward (toward the bow).
- **Station bill** – The posted bill showing assigned stations for each crew member during maneuvers and emergency drills.
- **Stem** – The forward most part of the bow.
- **Stern –** The after part (back) of the boat.
- **Transom** – The aft face or back board of the boat.
- **Wake –** Moving waves, track, or path that a boat leaves behind when moving across the water.
- **Wide berth –** At a considerable distance.
- **Windward –** Toward the direction from which the wind is coming (a.k.a. weather side); the opposite of leeward.

Americas

Boating Safe Work Practices

S3NA-419-WI2

1.0 General

1.1 Verify experience or conduct field competency verification of all **Boat/Vessel Operators** for the boat/vessel to which they are assigned prior to starting operations.

1.2 Boats/vessels operated offshore, in ports or harbors, in navigation channels, or in waterways handling commercial traffic require approval by the **Project Manager** and **Region Safety, Health and Environment (SH&E) Manager**.

1.3 **Project Managers** shall select a vessel of appropriate size and configuration for expected work and operating conditions.

1.4 Vessels larger than 18 feet in length and/or greater than 25 horsepower must be approved for use by the **Project Manager** and the **Region SH&E Manager**.

1.5 **Project Managers** shall select a Boat/Vessel-qualified Operator, **Marine Safety Officer,** and **field staff** for the operating conditions.

1.6 Vessel operations are limited to 12 hours (dock to dock) to minimize fatigue.

1.7 Single-handed boat/vessel operations are not permitted unless approved by the **Project Manager** and the **Region SH&E Manager**. Controls, such as a communication and/or rescue plan, shall be in place for all single-handed boat/vessel operations.

1.8 Field staff is not permitted to work on deck alone unless approved by the **Project Manager** and the **Region SH&E Manager**. Controls, such as a communication and/or rescue plan, shall be in place for all field staff working alone.

1.9 The buddy system is required for all tasks, unless approved by the **Project Manager** and the **Region SH&E Manager**. Controls, such as a communication and/or rescue plan, shall be in place for all field staff working alone.

1.10 Vessel operators shall observe speed limits, right-of-way, and other applicable boating restrictions and guidelines.

1.11 Only qualified and authorized field staff are permitted to operate hydraulic machinery (winches, A-frames, etc.) for the deployment and recovery of scientific gear or surveying equipment.

1.12 All personnel shall be advised of the inherent risks associated with marine operations, including exposure to weather, marine operations, and chemical, biological, and physical hazards.

1.13 Swimming is prohibited, unless it is being conducted by certified divers in the completion of their assigned task or to prevent a serious injury or loss of life in a person in water/person overboard emergency.

1.14 A float plan shall be filed prior to departure.

1.15 All gear, personnel effects, and deck equipment shall be properly stowed to prevent shifting and blocking of walking/working paths.

1.16 All field staff in small boats shall remain properly seated at all times while the boat is underway. Sitting on the gunwales is not permitted. Standing at the edge of open transoms whenever the boat is underway or preparing to maneuver is not permitted.

1.17 All field staff shall keep their hands, arms, legs, and body away from docks, pilings, and other stationary objects when the vessel approaches to prevent a crushing injury.

1.18 Running is prohibited on the deck of any vessel.

1.19 All lines shall be stored to prevent tripping or entanglement. All field staff shall stay clear of lines, cables, or chains under tension.

1.20 Moving and carrying gear aboard a boat shall be conducted with one free hand to hold onto railings whenever using stairwells. Heavy and bulky items shall be broken down into smaller lifts or lifted with assistance from another field staff member.

1.21 When loading boats/vessels with gear or people, distribute weight evenly to prevent listing.

Small Boat Operations

1.0 Starting the Engine

1.1 The transport lock for the engine should be lifted or adjusted and the engine should be lowered into the water. If starting in a shallow area, make sure that the engine is at least lowered to the point where the cooling water intake is below the waterline

1.2 Attach engine electronics to battery leads.

1.3 Check to make sure the fuel line is properly attached. Prime the fuel line by squeezing the fuel “bulb” until it becomes firm. Open the air vent on the top of the gas can cap.

1.4 Make sure throttle position is in neutral and if necessary turn choke on.

1.5 Turn the key or pull the start recoil-to-start engine. Inspect engine to make sure that cooling water system is working (i.e. a stream of water is flowing from the engine). If the cooling water system is not working, stop the engine immediately and check to make sure water intake and exit ports are clear.

1.6 Allow engine to warm up at idle speed before leaving dock or shore.

2.0 Leaving Dock or Shore

2.1 Make sure all personnel on board are wearing life jackets.

2.2 Loosen bow and stern lines, having one line tender hold a single wrap around a cleat to hold fast until the operator has given the command to release lines.

2.3 Prior to leaving shore or dock, the boat operator will make one final observation to determine if there are any oncoming boats or other hazards.

2.4 If the waterway is clear to proceed, the boat operator will instruct the line tender to release the lines and push away from the dock.

2.5 With all personnel seated and in position, and all docking lines and boat fenders recovered, the boat operator may put the engine in gear and make headway.

3.0 Returning to Dock or Shore

3.1 Before approaching dock or shore, determine which personnel will be in charge of bow and stern lines. Notify line tenders not to “pull” the boat in by the line while docking; this may cause the operator to lose control of the boat.

3.2 Approach the dock or shore at low speed heading into any prevailing currents. Place the throttle in neutral position when arriving at dock. If the boat is still moving forward when at the dock, apply a quick burst of reverse throttle to stop the forward motion of the boat, recognizing that it may take several feet of travel to cease forward motion.

3.3 If necessary, secure fenders to the side of the boat next to the dock prior to landing

3.4 When the boat has stopped its forward motion and is sitting alongside the dock, have the bow and stern personnel step off the boat to secure the lines. Jumping any open water gap between the boat and dock is strongly discouraged; falling into the water between the boat and dock can cause serious injury. Once the lines have been secured, the engine can be secured.

4.0 Anchoring

4.1 If short-term vessel anchoring is a required part of project operations, select an area offering maximum shelter from wind, current, and boat traffic.

4.2 Determine depth of water and type of bottom (preferably sand or mud). Calculate the amount of anchor line you will need. General rule: the required length of anchor line is 5 to 7 times the depth of water plus the distance from the water to where the anchor will attach to the bow. For example, if the water depth is 8 feet (2.43 meters) and it is 2 feet (0.6 meters) from the top of water to your bow cleat, you would multiply 10 feet (3 meters) by a factor of 5 to 7 to get the amount of anchor line to put out. In tidal areas, be aware that the scope may need to be adjusted with tidal changes and boat swing.

4.3 Bring the bow of the vessel into the wind or current. When you get to the spot where you want to anchor, place the engine in neutral. When the boat comes to a stop, slowly lower the anchor. Do not throw the anchor over, as it will tend to entangle the anchor in the anchor line.

4.4 When adequate anchor line has been let out, back down on the anchor with the engine in idle reverse to help set the anchor. Secure the anchor line to the bow cleat at the point where you want it to stop; make certain you take a couple wraps around the cleat prior to "cleating off."

4.5 When the anchor is firmly set, use reference points (landmarks) in relation to the boat to make sure the boat is not drifting. Check these points frequently, especially in areas subject to tidal changes. If the holding ground is questionable, let out additional anchor line, "cleat off,' and then back down on the anchor to get a good "bite" into the bottom.

5.0 Proper Fuel Management

5.1 To ensure that you will have enough fuel to safely return to the dock, always apply the one-third rule for fuel management, which proportions your available fuel supply as follows:

5.1.1 One-third of fuel going out;

5.1.2 One third of fuel to get back; and

5.1.3 One third of fuel for reserve.

6.0 Small Boat Trailering

6.1 All boats/watercraft will be transported in accordance with Federal, State, Provincial, and local regulations. Appropriate equipment (racks or trailers) will be used to transport boats/watercraft to the project site. Always launch from trailers at a designated boat ramp.

6.2 Prior to moving vehicle to boat ramp:

- Attach bow and stern lines to boat. Make sure length of lines are such that the lines reach the dock or shore where the boat will be placed.
- Remove the belly strap holding the boat to the trailer.
- Determine one individual who will assist the driver in backing the boat down the ramp. Work out audible and visual signals to assist driver in the off-loading process.
- Check to make sure drain plug is inserted in the boat.
- Disconnect trailer signal light cable.

7.0 At the Boat Ramp

7.1 Before backing vehicle and trailer down the boat ramp, make sure the trailer and vehicle are in a straight line

7.2 Check to make sure that boat ramp is clear of personnel, vehicles, or boats before proceeding. The individual assisting the driver in backing up should stand to the driver's side of vehicle and well clear of trailer and either be positioned where the driver can make direct visual contact or see them in a mirror.

7.3 Back the trailer down the boat ramp to the edge of the water, and stop. The driver's assistant should disconnect the safety chain and cable from the boat and roll up any excess cable onto the trailer winch. (Disconnect the safety chain and cable ONLY if located on a LEVEL surface; otherwise, leave the cable and safely chain attached until the boat is floated off the trailer). The driver's assistant should take bow and stern lines in hand and then move clear of the trailer and vehicle.

7.4 Once all personnel are clear of vehicle, back the trailer into the water until the wheels are covered or the boat begins to float on its own. The backing momentum will push the boat away from the trailer. Once the boat is clear of the trailer, the trailer can be pulled out of the water. The boat should be pulled to the dock or shore and secured using bow and stern lines.

8.0 Loading the Trailer

8.1 Determine job assignments for personnel, one person will have to pilot the boat onto the trailer, one shore person will have to attach the safety cable and reel the winch, and one person will have to drive the vehicle.

8.2 Back the vehicle and trailer down the boat ramp, stopping when the tires of the trailer are submerged, or when all but the two rollers nearest the vehicle are submerged. (Apply the emergency or parking brake on the vehicle).

8.3 Maneuver the boat away from the dock and approach the trailer at a very slow speed. The boat operator should aim the bow of the boat for the bow roller. Place the control of the boat in neutral just before arriving at the trailer. The shore person should stand clear as the vessel approaches and rides up the trailer.

8.4 When the boat comes to a complete stop, the shore person steps in, attaches the safety cable to the boat, and begins to reel in the cable. As the boat is being reeled in, care should be taken to keep the boat in line with the trailer.

8.5 Once the bow of the boat is snug with the bow roller, the boat operator should raise the engine and lock it for transport. The boat operator can then climb out of the boat. Care should be taken when climbing out of the boat. Using a step ladder to facilitate exiting the boat is recommended.

8.6 Once all personnel are clear of the boat and trailer, the vehicle driver should place the vehicle in drive and slowly begin to apply the accelerator. As this is being done, the driver should release the emergency brake and pull the trailer from the water. Make sure the boat is resting on all of the trailer rollers in an even manner. If this is not the case, then back the trailer into the water, loosen the safety cable and reposition the boat.

8.7 Once the trailer is completely out of the water, stop the vehicle on a level surface. A staging area is typically provided to complete final preparations for securing the boat and equipment prior to getting on the road.

9.0 Prior to Hauling the Boat

9.1 Remove all loose equipment from boat such as personal flotation devices, personal effects, sensitive survey instrumentation, or other marine electronics. Remove all trash or flyaway items.

9.2 Secure compartment hatches, and stow and lash down anchors and other loose gear.

9.3 Remove the drain plug.

9.4 Attach the belly strap to firmly secure the boat to the trailer.

9.5 Connect the trailer electrical connection to vehicle electrical plug. Check the turn signals, brake lights, and running lights on the trailer to make sure they are all working properly.

9.6 Return the boat/watercraft to the appropriate facility.

10.0 Special Considerations for Transporting a Boat

10.1 For car top transportation of canoes and kayaks, be sure the rack system is appropriately sized and configured to secure the boat and that the vehicle is properly rated to handle the increased weight. Ratcheting or grip lock fasteners should be used to properly secure the boat and prevent shifting. A minimum of two belly straps plus additional lines both fore and aft are recommended.

10.2 For transporting small Jon-boats in the bed of a pick-up truck, ratcheting straps or grip lock fasteners are to be used to pull and hold the boat in the truck bed. One belly strap at the front end of the truck bed is also recommended to hold the boat down.

10.3 In either scenario, loads that project more than 3 feet beyond the rear bumper of the vehicle are required to fly a red warning flag from the back of the boat to warn motorists of the overhanging load.

1.0 Float Plan

1.1 Float plans shall be prepared for all vessel operations to document vessel information (make/model, hull color, and other distinguishing features), personnel on board, description of activities being performed, expected time of departure, planned time and location for arrival, course being traveled, and pertinent contact calling information for reaching the vessel. This information shall be submitted to a competent individual on shore who assumes the responsibility of initiating emergency response procedures if the vessel does not check in at the designated time.

1.2 In the event that a vessel's return is delayed, and it is not an emergency, the boat crew must inform those holding the float plan and subsequently notify them upon returning to the dock so that the float plan can be closed out, avoiding an unnecessary and costly search.

1.3 If the vessel was trailered to a public ramp, then vehicle information (make/model and license), ramp location, and contact information for the local police department should be included in the float plan.

2.0 Sample Float Plan

FLOAT PLAN

www.cgaux.org

INSTRUCTIONS: Complete this plan before you go boating and leave it with a reliable person who can be depended upon to notify the Coast Guard, or other rescue organization, should you not return or check-in as scheduled. If you have a ***change of plans*** after leaving, be sure to notify the person holding your Float Plan.

Do NOT file this plan with the Coast Guard.

www.uscgboating.org

VESSEL

IDENTIFICATION:

Name & Home Port _____

Doc. / Registration No. _____

Year & Make _____

Length _____ Type PWR Draft ____ (Inch/CM) Hull Mat. Fiber

Hull Color(s) _____

Prominent Feature(s) _____

PROPULSION:

Primary - Type Gas IO No. Eng __ Fuel Capacity ____

Auxiliary - Type none No. Eng __ Fuel Capacity ____

TELECOMMUNICATIONS:

Radio Call Sign _____

DSC MMSI Number _____

Radio-1: Type VHF-FM Ch / Freq. Monitored _____

Radio-2: Type _____ Ch / Freq. Monitored _____

Cell Phone _____

Pager _____

NAVIGATION: (Check all on board)

☐ Maps ☐ Charts ☐ Compass ☐ GPS / DGPS

☐ Radar ☐ Loran C ☐ Sounder ☐ _____

SAFETY & SURVIVAL

VISUAL DISTRESS SIGNALS:

☐ Day Only type

☐ Night Only type

☐ Day & Night type

PFDs: (Do not count Type IV devices)

___ Quantity on board

AUDIBLE DISTRESS SIGNALS:

☐ Horn / Whistle

☐ Bell

☐ _____

GROUND TACKLE:

☐ Anchor - line length ____ ft.

OTHER GEAR / SUPPLIES:

☐ Lifeboat / Life Raft ☐ Flashlight / Searchlight

☐ Dinghy / Skiff ☐ Signal Mirror

☐ Food / Water ☐ Drogue / Sea Anchor

☐ EPIRB none ☐ _____

☐ Foul Weather Gear ☐ _____

PERSONS ON BOARD

OPERATOR: Age M/F Notes (Special medical condition, Can't swim, etc.)

Name _____ ___ M ____

Address _____ Experience: w/Boat ☐ w/Area ☐

City _____ State ____ Zip code _____ Home Phone _____

Vehicle (Year, Make & Model) _____ Vehicle License No. _____

Where will trailer be parked? _____ Trailer License No. _____

PASSENGERS: Name & Home Phone Age M/F Notes (Special medical condition, Can't swim, etc.)

1. _____ ___ ___ _____
2. _____ ___ ___ _____
3. _____ ___ ___ _____
4. _____ ___ ___ _____
5. _____ ___ ___ _____

Attach Supplemental Passenger List if additional passengers on board

ITINERARY

	DATE	TIME	LOCATION	MODE OF TRAVEL	REASON FOR STOP	CHECK-IN TIME
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						
Depart						
Arrive						

Attach Supplemental Itinerary if additional space required

Contact 1 _____ Phone Number _____

Contact 2 _____ Phone Number _____

If you have a genuine concern for the safety or welfare of any persons on board this vessel, who have not returned or checked-in within a reasonable amount of time, then follow the step-by-step instructions on the **Boating Emergency Guide** included with this plan, or on the World Wide Web at:

http://www.uscgaux.org/~floatplan/BoatingEmergencyGuide.htm

Americas

Marine Safety Equipment

S3NA-419-WI5

1.0 Requirements

1.1 All boats and vessel will be outfitted with marine safety equipment as required by local, State, Provincial, and Federal regulations and standards, and as identified in the task-specific hazard analysis.

1.2 This includes, but is not limited to:

- U.S. Coast Guard-approved personal floatation device for each person aboard the boat/vessel;
- Sufficient lines for securing boat/vessel dockside;
- A sound-signalling device or appliance;
- Emergency engine shut-off lanyard, securely attached to boat/vessel operator;
- Lifeboats/rafts (offshore vessels);
- Fire/smoke detection equipment;
- Marine fire extinguishers;
- VHF Marine Radio;
- Emergency Position Radio Beacon;
- Life Ring/Retrieval Line;
- Survival Suits - For cold water conditions (water temperature less than 55 degrees Fahrenheit [12.8 edgrees Celsius]), a Coast Guard-approved Mustang suit shall be worn to protect personnel from risks of cold water immersion;
- Functioning, battery-operated spot or flashlights;
- Paddles or manual propelling devices;
- A bailing container;
- Buoyant heaving line no less than 49 feet 3 inch (15 meters) in length;
- Maps or appropriate navigation equipment; and
- First aid kit.

1.3 Safety equipment selected shall be in accordance with local, State, Provincial, and Federal regulations and standards.

1.4 Safety equipment shall be appropriate for the configuration and crew size as well as the size of the vessel.

Emergency Response Procedures

1.0 Requirements

1.1 Specific emergency response procedures shall be developed in the project-specific health and safety plan.

1.2 Review emergency procedures prior to departure to ensure that all hands understand their individual roles and responsibilities in the event of an emergency, and the location and proper use of emergency equipment aboard.

1.3 The following summary information is provided for consideration in the development of project-specific emergency response plans.

1.4 Emergency response plans may vary depending on the size and configurations of boats/vessels and the size and abilities of the crew.

2.0 Person Overboard

2.1 A person in the water shall be considered a person in distress, and immediate emergency response actions shall be taken.

2.2 Prior to the start of operations, the **Marine Safety Officer** shall confirm that suitable rescue equipment is available to facilitate the emergency rescue of an individual who has fallen into the water.

2.3 The **Marine Safety Officer** shall conduct a safety briefing to discuss emergency response procedures, the type and location of safety gear that is available, and the roles and responsibilities of each crew members during an emergency.

2.4 All crew members should be instructed to

- NEVER LOSE SIGHT OF THE INDIVIDUAL IN THE WATER,
- Inform the Captain, or vessel operator, as quickly as possible.
- Throw a ring lifebuoy to the general vicinity of the victim. Do not throw a ring lifebuoy directly at the victim. Hitting the victim with the ring buoy may cause additional injuries.

2.5 All person-overboard situations shall be reported as an incident in accordance with *S3NA-004-PR1 Incident Reporting.*

3.0 On-Board Fire

3.1 The **Marine Safety Officer** will conduct a safety orientation to inform crew members of the location of fire extinguishers, specific emergency procedures, and the individual responsibilities expected of all hands in the event of an on-board fire.

3.2 If a fire is encountered, DO NOT attempt to fight the fire without sounding an alarm first; what could appear to be a small fire can quickly get out of control.

3.3 The extinguishers generally found on project vessels are portable hand-held units designed for multiple use applications, i.e., extinguishers labeled “BC” are approved for both B and C type fires. These types of extinguishers can be carried to the fire to quickly knock down the fire before it has the chance to get out of control. Crew members must be aware that, because these extinguishers are portable, they carry only a limited supply of extinguishing agent. In general, continuous application can be sustained for only a minute or less. Extinguishers are activated by pulling the safety pin and squeezing the release handle. Aim the extinguisher at the base of the flame. Apply the extinguishing agent in short bursts and in a sweeping motion across the base of the fire until the fire is extinguished. If you must enter a space, never let the fire get between you and the door. If your initial attack with a portable extinguisher fails get out immediately and close the door.

4.0 Abandon Ship

4.1 The **Marine Safety Officer** will conduct a safety orientation prior to departure to point out the location of life rafts, procedures for manually deploying the raft, and specific individual responsibilities expected of all hands in the event the vessel needs to be abandoned.

4.2 The decision to abandon ship is a matter of last resort; it is always better to remain with the boat, which is much more visible, until rescue assistance arrives on the scene. If the severities of the situation, through causes that include collision, sinking, fires, or grounding dictate that it is safer to abandon ship, then a distress call must be made to inform authorities of your situation so that rescue assistance can be provided and that your time in the water is kept to a minimum.

4.3 For coastal and offshore waters, a distress call is made on the marine VHF radio using Channel 16. This frequency is monitored by the U.S. Coast Guard and it is the official hailing frequency reserved for ship-to-ship calling and broadcasting safety information and distress calls. Appropriate actions for transmitting a distress signal will be taken by the ship's crew, but if matters need to be taken into your own hands, the protocols of a distress call are:

4.4 A distress call protocol begins with "MAYDAY" "MAYDAY" "MAYDAY," after which the following information is provided:

- Vessel name and description,
- A brief description of your emergency
- Your position and the last landmark seen,
- The number of people that are on board and/or in the water,
- What form of assistance is needed/advise of any imminent dangers,
- Your cell phone number if calling by cell, and
- If hailing on the marine VHF wait 10 seconds for a response. Repeat this information if there is no response.

4.5 For inland waters, or work within protected coastal waters where local authorities (marine patrol, harbormaster, police, and fire rescue) may provide a more effective response, dial 911 emergency services and provide the same information listed above. It is also important to remember that most powered vessels built after 1978 are designed to float even when full of water or in the capsized position. If either of these situations occurs, it is important that you stay with the boat if possible, and remain calm. To reduce the effects of hypothermia, climb into or onto the boat to get as much of your body as possible out of the water.

4.6 Vessels working offshore must carry sufficient numbers of U.S. Coast Guard-approved life rafts to accommodate 100 percent of the persons aboard. These units are designed to float free from the sinking vessel and to inflate automatically in the unlikely event that the vessel should sink. A hydrostatic release mechanism and weak link are provided on the life raft container to satisfy this requirement. The life raft container can also be removed from the storage cradle and deployed manually, if the situation provides sufficient time to safely achieve this task. An instruction card is generally displayed in a prominent location aboard the vessel and can also be found directly on the raft container. If the vessel is operating in ocean service or coastwise transit the life raft must be rated for Ocean Service.

4.7 The decision to abandon ship lies solely with the Captain of the vessel. If the order is ever given, you will be expected to follow the directions of the ships' crew, in a calm and orderly fashion. DO NOT PANIC! You will be required to assemble at a predetermined station, fully clothed, with your lifejacket on. For offshore cold-water operations, bring your immersion suit. If time permits, don your immersion suit; the suit will protect you from the elements and provide plenty of flotation, but keep your lifejacket with you. Stand by calmly at your station and await further orders. Bring a portable radio unit and ensure that the ships' Emergency Position Indicating Radio Beacon has been energized. If the order to abandon ship is given, enter the life rafts in an orderly fashion and remain in the general vicinity of the vessel until rescue assistance arrives.

5.0 Emergency Position Indicating Radio Beacon (EPIRB)

5.1 The EPIRB is a battery-operated, self-activating emergency transmitter. All vessels operating more than 20 miles (32 kilometers) from land are required to carry at least one approved Class-A EPIRB.

5.2 An EPIRB unit is not generally required on vessels that are operating less than 20 miles (32 kilometers) from land and that are equipped with a marine VHF-FM radio. The EPIRB will enable rescuers to quickly locate a disabled vessel by providing a tracking signal to all search and rescue units within range of the unit.

5.3 Prior to departure, check with the Captain of the vessel to ensure that the unit is functioning properly and that the unit has been suitably tested within the last 30 days.

5.4 The operation of most units is usually tested simply by activating the TEST switch and checking for a positive indication from the unit. If no indication is observed, check or replace the battery, and retest. A defective unit should be returned to an authorized service center for repairs.

5.5 A functioning unit should be stowed in a suitable rack, in the inverted position, with the power switch in the automatic position. The unit will float free from the storage rack in the unlikely event the vessel sinks and begin transmitting automatically when it rights itself on the surface.

5.6 If the situation permits, the EPIRB should be brought into the life raft in the event that the vessel must be abandoned; the unit can be activated manually simply by inverting the unit to the upright position.

5.7 Do not test the EPIRB by inverting the unit, as this will send out a false alarm and initiate an unnecessary search and rescue for which you may be held accountable.

Americas

Hazardous Weather Operations

S3NA-419-WI7

The following guidelines are provided as safety considerations to avert the risks of encountering hazardous weather and seas during on-water project operations.

1.0 Planning

1.1 Use online resources such as National Oceanic and Atmospheric Administration (NOAA) marine weather forecasts to evaluate current and predicted weather and predicted sea-state information, and available National Data Buoy Center buoy information to cross-check marine forecasts with real-time and hind cast records of offshore sea-state conditions.

1.2 Additional protective measures could include assigning a coworker at the office to watch developing weather reports and radar loops to track incoming weather if there is some uncertainty in the weather at the time of departure.

1.3 On-water operations should be postponed whenever small craft warnings are in effect.

1.4 Despite the best of planning measures, severe weather such as thunderstorms, squall lines, gusty winds, and shifting wind directions with approaching storms or weather fronts can develop quickly and present a safety risk to marine personnel. Therefore, it is important that proper consideration be given to the vessel being selected to support your project and the operational limitations associated with that vessel. The vessel must be sized and configured to weather the worst case sea-state that might be expected in a given day. Factors such as length, freeboard, horsepower, sea-keeping abilities, watertight integrity of enclosed spaces, and inherent flotation should be considered in selecting a vessel for working in exposed waters, either offshore or a windward side of large bodies of water whether in coastal or inland locations.

1.5 While offshore, monitor NOAA weather radio for the latest watches, warnings, or advisories. If weather conditions are predicted to deteriorate, be sure to leave for the return trip back to dock with ample time to avoid hazardous weather conditions.

1.6 If possible, consider revising your project itinerary to reposition the vessel to work within a survey area or group of sampling stations that are closer to shore if weather conditions appear threatening or if wind directions have winds coming off the land and thus near-shore sea-states would be reduced due to the reduced fetch, saving the furthest offshore or most exposed survey areas for better weather.

2.0 Sudden Weather Changes

2.1 Dark, threatening clouds usually foretell the approach of severe weather. Other things to watch for are a sudden drop in air temperature, a shift in wind direction, an increase in winds speeds, or an increase in winds that are running counter to the prevailing current direction—a situation that can quickly increase sea states.

2.2 If thunder can be heard, you are at risk of being struck by lightning. Open-vessel platforms (those without adequate enclosed spaces for shelter) shall return to the dock immediately so that personnel can seek refuge. If there is insufficient time to get back to the dock, seek out the nearest shelter (shore side support truck, alternate dockage, or any nearby building along shoreline). As a last resort, personnel should set out an anchor and get as low as possible in the boat. Use boat cushions or other non-conducting materials to insulate the body from metal hulls. For vessels with enclosed spaces, keep below decks (if possible) keeping away from metal objects that are not grounded, and do not touch more than one grounded object at the same time.

2.3 If you find yourself in a rapidly deteriorating sea while in route back to the dock:

2.3.1 Reduce vessel speed enough to maintain control, while still maintaining headway.

2.3.2 Turn on running lights.

2.3.3 Sound fog horn or audible device if there is fog.

2.3.4 Head the bow of the boat at about a 45-degree heading to the wave direction.

2.3.5 Keep bilges free of accumulating water.

2.3.6 Check that gear is secured.

2.3.7 Remain calm and think clearly.

Charters and Subcontractors

1.0 Responsibilities

1.1 When chartering or subcontracting uninspected vessels, the **Project Manager** shall determine the overall suitability of the vessel for the expected task.

1.2 Subcontractors are responsible for:

1.2.1 Providing qualified or U.S. Coast Guard-licensed marine staff, the appropriately sized vessel, and all required gear to safely support field activities.

1.2.2 Stowing and maintaining all safety and emergency equipment.

1.2.3 Being service-ready at the start of all operations. All unsafe gear will be removed from service until unsafe conditions have been corrected.

1.2.4 Maintaining current U.S. Coast Guard inspections of the following items:

- Hull inspection to ensure seaworthiness of vessel;
- Main/auxiliary power inspection to ensure safe and operable machinery for vessel propulsion and emergency power;
- Pressure vessel inspection to ensure that they are structurally sound with operable safety devices;
- Electrical systems inspection to ensure satisfactory installation of wiring and equipment;
- Lifesaving systems inspection to ensure satisfactory and adequate means to abandon ship;
- Fire-fighting systems inspection to ensure fixed and portable devices are suitable for the intended space and type of fire;
- Navigation inspection to ensure adequacy and proper operation of navigation equipment;
- Pollution prevention inspection to ensure compliance with international regulations and domestic laws; and
- The vessel should hold some form of “letter of designation” that it can legally operate, at a minimum, as a six-passenger charter, and within this designation the vessel must be operated by a properly licensed Captain and competent crew.

Americas

Cold Stress Prevention

S3NA-505-PR1

1.0 Purpose and Scope

1.1 To protect employees from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all employees can be repeatedly exposed without adverse health effects.

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

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°F (35°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 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-208-PR1 Personal Protective Equipment

3.3 S3NA-605-PR1 Medical Surveillance Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager**

- Ensuring the safety of employees on their project sites, consistent with *S3NA-505-ST Cold Exposure* standards
- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign employees physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating employee capability.
- Confirm employees are properly trained to recognize the symptoms of cold stress.

4.1.2 **Region SH&E Manager**

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.

- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.1.3 **Supervisor**

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that employees are physically capable of performing the assigned tasks and are not in a physically compromised condition.

4.1.4 **Employee**

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly vested condition.
- Report all suspected cold stress-related illnesses.

4.2 Restrictions

4.2.1 Staff working in extreme cold (wind chill or ECT below 10°F or -12°C) shall not work alone.

4.2.2 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frost bite, refer to *S3NA-505-WI2 Symptoms and Treatment*:

- If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist, refer to *S3NA-605-PR1 Medical Surveillance Program*.
- 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.

4.3 Training

Before they begin work in a cold environment, **employees** that might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. **Employees** that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress**,** refer to *S3NA-003-PR1 SH&E Training*. **Employees** 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;
- The harmful effects of excessive alcohol consumption in a cold stress environment;
- The hazards associated with unstable snow or ice build ups; and
- First aid procedures for symptoms related to cold stress.

4.4 Personal Protective Equipment (PPE)

All PPE will comply with the requirements of *S3NA-208-PR1 Personal Protective Equipment* and consider the following requirements:

- Wear multiple layers of loose fitting clothing to maintain immobile layers of warm air next to the body.
- Avoid cotton, especially blue jeans.
- Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.
- Use insulated footwear with adequate traction to prevent slips and falls.
- Confirm extra blankets or sleeping bags are on-site.
- Sunglasses and sunscreen should be used when there is a persistent combination of snow and direct sun.
- If shelter is not readily available, consider supplying temporary shelters
- Confirm that employees carry fire starter materials if working in remote areas.
- 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 96.8oF (37oC) shall be provided to **employees** if work is performed in air temperatures below 40oF (5oC). 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 32oF (0o C) regardless of wind speed. However, older **employees** or **employees** 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 –25oF (-32o C) or below.

4.5.6 At air temperatures of 40oF (5oC) or less, it is imperative that **employees** who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.

4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.

4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.

4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.

4.5.12 Supplies such as PPE, fuels, enclosures, de-icing, traction aids, warm drinks, and batteries will be specified by the **Region 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 employees' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 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, **employees** should use gloves.

4.6.2 To prevent contact frostbite, **employees** should wear anti-contact gloves:

- When cold surfaces below 20oF (-6o C) are within reach, each **employee** should be warned to prevent inadvertent contact by bare skin.
- If the air temperature is 0oF (-18o C) or less, **employees** 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 **employees** should wear cold protective clothing appropriate for the level of cold and physical activity.

4.6.4 Additional Cold Stress Prevention Measures:

For work practices at or below 10°F (-12° C) ECT, the following will apply:

- The **employee** should be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
- New **employees** should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing.
- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the employee.
- The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The **employee** should be protected from drafts to the greatest extent possible.
- 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, and
    - Safe work practices.

4.6.5 Eye protection for employees 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 **Employees** handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40°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 **employee** is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Work-Warming Regimen

4.7.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below -15°F (–26°C), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The **employees** should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure.

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 **employees** from returning to the cold environment with wet clothing.

5.0 Records

5.1 Exposure assessments will be documented in the project files.

6.0 Attachments

6.1 S3NA-505-WI1 Temperature Thresholds

6.2 S3NA-505-WI2 Symptoms and Treatment

6.3 S3NA-505-ST Cold Exposure

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: *2014 Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio.*

Table 2. Equivalent Chill Temperature Chart (F)

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)									
	50	**40**	**30**	**20**	**10**	**0**	**-10**	**-20**	**-30**	**-40**
	Equivalent Chill Temperature (°F)									
Calm	50	40	30	20	10	0	-10	-20	-30	-20
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-24	-33	-46	-58	-70
15	36	22	9	-5	18	-32	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-75	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	35	-51	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Wind speeds >40 mph have little additional effect	**LITTLE DANGER**				**INCREASING DANGER**			**GREAT DANGER**		
	Trenchfoot and immersion foot may occur at any point on this chart.									

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 2014 Threshold Limit Values for Chemical Substances and Physical Agents.

Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.

Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.

Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater 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.

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; and
- 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), and
- 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, and
- Shivering.

1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:

- Pain in the extremities,
- Severe shivering and numbness,
- Low core body temperature,
- Drowsiness and muscular weakness,
- Apathy,
- Mental confusion,
- Loss of consciousness,
- Shock, and
- Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

2.1 Frostbite

2.1.1 Wrap the victim in woollen blanket and keep dry until he or she can be brought inside.

2.1.2 Remove the victim from the cold environment.

2.1.3 Do not rub, chafe, or manipulate frozen parts.

2.1.4 Place the victim in warm water (102ºF to 105ºF) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.

2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.

2.1.6 Do not allow the victim to walk if his or her feet are affected.

2.1.7 Have the victim gently exercise the affected parts once they are thawed.

2.1.8 Seek immediate medical attention for thawing of serious frostbite.

2.2 Hypothermia

2.2.1 Bring the victim into a warm room or shelter as quickly as possible.

2.2.2 Give artificial respiration and stop any bleeding, if necessary.

2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.

2.2.4 Remove all wet clothing.

2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.

2.2.6 Do not allow the victim to sleep.

2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.

2.2.8 Keep the victim still. Do not try to walk.

2.2.9 Do not rub numb skin.

2.2.10 Get medical attention as soon as possible.

Americas

Cold Exposure

S3NA-505-ST

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

Americas

Compressed Gases

S3NA-506-PR1

1.0 Purpose and Scope

1.1 This procedure provides the requirements for using, handling, storing, transporting, disposition and/or decommissioning compressed gas cylinders in accordance with 29 CFR 1910.

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

2.0 Terms and Definitions

2.1 **Compressed Air (Non-Breathable)** – Air that is at a pressure greater than that of the atmosphere. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment. Utilized for tools, equipment, and mechanical machinery and cleaning purposes as described in this procedure.

2.2 **Compressed Gas** – Any material or mixture in a pressure vessel having:

- An absolute pressure exceeding 40 pounds per square inch (PSI) at 70°F (25 pounds per square inch gauge); or
- An absolute pressure exceeding 104 Psia at 130°F, regardless of the pressure at 70°F.

2.3 **Cylinder –** Pressure vessel designed for pressures higher than 40 Psia and having a circular cross section.

2.4 **Pneumatics –** The use of pressurized air to affect mechanical motion for machinery, equipment and tools.

2.5 **Psi** – Pounds per square inch.

2.6 **Psia –** Pounds per square inch absolute (i.e., pressure in a container that would appear on an ordinary gauge plus the local atmospheric pressure [14.696 psi at sea level]), psig- pounds per square inch gauge.

2.7 **Psig** – Pounds per square inch gauge. The pressure in a vessel or container as registered on a gauge attached to the container. This reading does not include the pressure of the atmosphere outside the container.

2.8 **Disposition** – Recycling, treatment, or disposal of a compressed gas cylinder and/or its contents.

2.9 **Decommission –** The removal of a compressed gas cylinder from service by rendering it permanently unusable.

3.0 References

3.1 29 CFR 1910.101 Handling of Compressed Gas Cylinders

3.2 Compressed Gas Association Pamphlet P-1-1965

3.3 DOT's Emergency Response Guidebook

3.4 S3NA-003-PR1 SH&E Training

3.5 S3NA-208-PR1 Personal Protective Equipment Program

3.6 S3NA-209-PR1 Project Hazard Assessment and Planning

3.7 S3NA-418-PR1 Welding, Cutting, and Other Hot Work

3.8 S3NA-508-PR1 Hazardous Materials Handling, Shipping, and Manifesting

3.9 S3NA-602-PR1 Exposure Monitoring

3.10 S4NA-514-PR1 Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO) (US)

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Manager

- Ensuring the safety of employees on their project sites, consistent with *S3NA-506-ST Compressed Gases* standards.
- Implement these procedures during all activities involving compressed gases.
- Seek consultation with the SH&E Department when unknown compressed gas cylinders are encountered.
- Confirm employees have received the appropriate training as it relates to compressed gases/compressed gas cylinders.
- Confirm a hazard assessment/evaluation of the activities involving compressed gases has been completed.
- Contact the SH&E Department prior to any compressed gas cylinder operation.
- Immediately report any leaking/suspected leaking compressed gas cylinder(s) to the SH&E Department and implement the appropriate emergency action(s).
- Immediately report the discovery of any unknown compressed gas cylinder(s) to the SH&E Department and cordon off the area in all directions a minimum of 50 feet.
- Confirm that all compressed gas cylinders are properly inspected, stored, and, secured.
- Confirm that all compressed gas cylinders are handled in a safe manner, protecting both the person and cylinder.
- Confirm that all compressed gas cylinder manifolds and connections are properly made and inspected.
- Contact local emergency services prior to the start of any compressed gas cylinder operation.

4.1.2 Region SH&E Manager / SH&E Department

- Review and authorize all compressed gas cylinder operations.
- Conduct/support compressed gas hazard assessments/evaluations.
- Provide awareness training to project teams regarding hazards of encountered compressed gases.
- Support the identification/disposition of unknown compressed gas cylinders.
- Support the development of a site-specific cylinder plan.

4.1.3 Employee

- Immediately report any leaking/suspected leaking compressed gas cylinder(s) to Project Manager.
- Immediately report the discovery of any unknown compressed gas cylinders to Project Manager.
- Properly handle all compressed gas cylinders.
- Shall be supervised by employees experienced in the operation of compressed gas tools and equipment.

4.2 Training

On-site orientation to the use and hazards of the equipment shall be completed for all **employees** handling or coming into contact with compressed air tools and equipment or compressed gas cylinders, refer to *S3NA-003-PR1 SH&E Training* and *S3NA-506-WI1 Compressor Safety Card*.

4.3 Personal Protective Equipment

All PPE will comply with the requirements of *S3NA-208-PR1 Personal Protective Equipment* and *S3NA-506-WI1 Compressor Safety Card*.

4.3.1 The inspection of cylinders containing unknown substances will be performed in a Level A (PPE) ensemble as a minimum, while cylinders containing known substances, and in good condition, will be inspected in an appropriate ensemble designated within the site-specific Health and Safety Plan (HASP), refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.3.2 Where the use of a Level A or B ensemble is anticipated, the **SH&E Department** shall be contacted during the pre-task planning to determine the appropriate Level ensemble components, and **employees** involved in the activity. The use of a Level A PPE ensembles are required to be approved by the **Region SH&E Manager**.

4.3.3 PPE includes, but is not limited to:

- Eye and face protection
- Steel toed work boots
- Hearing protection
- Gloves
- Respiratory equipment, as required

4.4 General Use of Compressed Air or Gas

4.4.1 Compressed air or other compressed gases are not to be used to blow dirt, chips, or dust from clothing while it is being worn. Compressed air used for other types of cleaning (other than clothing/persons) is to be limited to 30 psig.

4.4.2 The use of blown compressed air is to be controlled, and proper personal protective equipment or safeguards utilized, to protect against the possibility of eye injury to the operator or other persons.

4.4.3 Compressed air or gases are not to be used to empty containers of liquids.

4.4.4 Compressed gases are not to be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the operating gas pressure with a safety factor of at least four.

4.5 Air Compressor Operations

4.5.1 Air compressor equipment should be operated only by authorized and trained **employees**.

4.5.2 The air intake should be from a clean, outside, fresh air source. Screens or filters can be used to clean the air.

4.5.3 Air compressors should never be operated at speeds faster than the manufacturer's recommendation.

4.5.4 Equipment should not become overheated.

4.5.5 Moving parts, such as compressor flywheels, pulleys, and belts that could be hazardous should be effectively guarded.

4.5.6 Keep the air supplied tools clean and dry. Dust, moisture, and corrosive fumes can damage tools.

4.5.7 Keep tools clean, lubricated, and maintained according to manufacturer's instructions.

4.5.8 Only use attachments and accessories recommended by the manufacturer.

4.5.9 Review the manufacturer's instruction before using a tool.

4.5.10 Post warning signs where pneumatic tools are used.

4.5.11 Set up screens or shields in areas where nearby workers may be exposed to flying fragments, chips, dust, and excessive noise.

4.5.12 Be aware of proper handling and ergonomics while using the tool.

4.5.13 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.

4.6 Air Hoses

4.6.1 Use the proper hose and fittings of the correct diameter.

4.6.2 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.

4.6.3 Choose air-supply hoses that have a minimum working pressure rating of 1035 kPa (150 psig) or 150% of the maximum pressure produced in the system, whichever is higher.

4.6.4 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.

4.6.5 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.

4.6.6 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).

4.6.7 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.

4.6.8 Do not operate the tool at a pressure above the manufacturer's rating.

4.6.9 Turn off the air pressure to hose when not in use or when changing power tools.

4.6.10 Do not carry a pneumatic tool by its hose.

4.6.11 Do not use compressed air to blow debris or to clean dirt from clothes.

4.6.12 All pipes, hoses, and fittings shall have a rating of the maximum pressure of the compressor. Compressed air pipelines should be identified (psi) as to maximum working pressure.

4.6.13 Air supply shutoff valves should be located (as near as possible) at the point-of-operation.

4.6.14 Air hoses should be kept free of grease and oil to reduce the possibility of deterioration.

4.6.15 Avoid trip hazards. Hoses should not be strung across floors or aisles where they are liable to cause **employees** to trip and fall. When possible, air supply hoses should be suspended overhead, or otherwise located to afford efficient access and protection against damage.

4.6.16 Hose ends shall be secured to prevent whipping if an accidental cut or break occurs.

4.6.17 Pneumatic impact tools, such as riveting guns, should never be pointed at a person.

4.6.18 Before a pneumatic tool is disconnected (unless it has quick disconnect plugs), the air supply shall be turned off at the control valve and the tool bled.

4.6.19 Shop air used for cleaning should be regulated to15 psi unless equipped with diffuser nozzles to provide lesser pressure.

4.6.20 Goggles, face shields or other eye protection shall be worn by **employees** using compressed air for cleaning equipment.

4.6.21 Static electricity can be generated through the use of pneumatic tools. This type of equipment shall be grounded or bonded if it is used where fuel, flammable vapors or explosive atmospheres are present.

4.6.22 The following are hazards associated with the use of compressed air tools and equipment:

- Poorly designed tool (wrist strain);
- Vibration (vibration-induced white finger);

- Noise (hearing loss); and
- Dust (respiratory problems).

4.6.23 The following hazards have the potential to cause serious bodily injury when working with compressed air:

- Incorrect tool selection;
- Use of damaged tool;
- Improper, inadequate, or no guards;
- Rotating shaft (entanglement);
- Wheel breakage (grinder);
- Flying chips;
- Whipping of the hose;
- Accidental start up;
- Compressed air entering the body;
- Dropped tool; and
- Tripping over hose.

4.7 Compressed Air Equipment Maintenance

4.7.1 Only authorized and trained **employees** should service and maintain air compressor equipment.

4.7.2 Exposed, non-current-carrying, metal parts of compressor should be effectively grounded.

4.7.3 High flash point lubricants should not be used on compressors because of its high operating temperatures that could cause a fine or explosion.

4.7.4 Equipment should not be over lubricated.

4.7.5 Gasoline or diesel fuel powered compressors shall not be used indoors.

4.7.6 Equipment placed outside but near buildings should have the exhausts directed away from doors, windows and fresh air intakes.

4.7.7 Soapy water of lye solutions can be used to clean compressor parts of carbon deposits, but kerosene or other flammable substances should not be used. Frequent cleaning is necessary to keep compressors in good working condition.

4.7.8 The air systems should be completely purged after each cleaning.

4.7.9 During maintenance work, the switches of electrically operated compressors should be locked open and tagged to prevent accidental starting.

4.7.10 Portable electric compressors should be disconnected from the power supply before performing maintenance.

4.8 Compressed Gas Cylinder Requirements

4.8.1 Cylinders are not to be used unless they bear Department of Transportation (DOT) markings showing that they have been tested as required by DOT regulations.

4.8.2 Cylinders shall never be dropped, struck, or permitted to strike each other violently. Cylinders may be moved by tilting and rolling them on their bottom edges.

4.8.3 Valve protection caps shall always be kept on cylinders when they are being moved or stored, and until ready for use.

4.8.4 Do not lift cylinders by the valve protection cap.

4.8.5 Cylinder valves are to be kept closed except when gas is being used or when connected to a permanent manifold. Valves of empty cylinders shall be closed.

4.8.6 Cylinders shall never be used as rollers or supports, or for any purpose other than carrying gas.

4.8.7 Threads on regulator connections or other auxiliary equipment shall be the same as those on the cylinder valve outlet.

4.8.8 When withdrawing cylinder content, open the cylinder valve slowly. Point the valve opening away from yourself and other persons.

4.8.9 Before a regulator is removed from a cylinder, close the cylinder valve and release all pressure from the regulator. This procedure also serves as a check to confirm that the main cylinder valve is completely closed.

4.8.10 Never hammer the valve wheel in attempting to open or close the valve.

4.8.11 No person, except the owner of the cylinder or person authorized by the owner, shall refill a cylinder (Exceptions to this includes the filling self-contained breathing apparatus cylinders with compressed air or the filling of the [Foxboro] Organic Vapor Analyzer (OVA) hydrogen cylinders). Disposable cylinders shall not be refilled with any material after use of the original contents.

4.8.12 Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high-temperature steam lines.

4.8.13 Cylinders are to be stored in an assigned area, with full and empty cylinders stored separately. Empty cylinders shall be marked empty.

4.8.14 Stored fuel gases and oxygen cylinders are to be separated by at least 20 feet, or by a fire wall at least 5 feet high that has a fire-resistance rating of at least ½ hour.

4.8.15 Oxygen, nitrogen, helium, or freon cylinders shall only be stored or transported in an upright or horizontal position. Acetylene cylinders shall always be kept in an upright position. All horizontally-placed cylinders are to be secured by chocks or ties to prevent rolling.

4.8.16 Cylinders are to be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap is not to be removed or the cylinder valve opened until the cylinder is secured.

4.8.17 Repair of leaks shall never be attempted on a pressurized system. System pressure should be reduced to atmospheric pressure as rapidly as possible, and the **Project Manager** notified immediately.

4.8.18 Compressed gas cylinders shall be legibly marked for the purpose of identifying the gas content with either the chemical or the trade name of the gas. Such marking is to be done by means of stencilling, stamping or labelling, and shall not be readily removable. Whenever practical, the marking is to be located on the shoulder of the cylinder. Positive identification of the gas in any cylinder is required before connecting cylinders for use.

4.8.19 Gas cylinders moved by hoist shall be handled in suitable cradles or job-made “skip” (materials) boxes. Any slings used for this purpose shall be specifically designed for that cylinder handling.

4.8.20 Cylinders shall not be placed where they might form part of an electrical circuit.

4.8.21 Transfer of compressed gases (including acetylene) from one cylinder to another, or mixing of gases in a cylinder, is prohibited.

4.8.22 Oxygen cylinders are never to be stored near:

- Highly combustible materials, especially oil and grease;
- Reserve stocks of acetylene or other fuel gas cylinders; and
- Any other substance likely to cause or accelerate fire.

4.8.23 Compressed oxygen is never to be used:

- As breathing air;
- To purge pipelines, tanks, or any confined area;
- To supply a head-pressure tank;
- In pneumatic tools;
- In oil preheating burners;
- To start internal combustion engines;
- For ventilation;
- For cleaning clothing; and
- In any other way as a substitute for compressed air.

4.8.24 Use of a cylinder's contents for purposes other than those intended by the supplier is prohibited.

4.8.25 Cylinders of compressed natural gas or propane equipped with a pressure relief device shall always be positioned in a manner that this device remains above the liquid level (i.e., if stored or installed horizontally on a forklift, relief device is positioned at the top).

4.9 Special Precautions for Compressed Gas Cylinders Containing Hydrogen

4.9.1 Inside buildings, cylinders of hydrogen should be separated from oxygen cylinders by a minimum distance of 20 feet or by a barrier of non-combustible material at least 5 feet high having a fire resistance rating of at least one half hour.

4.9.2 Conspicuous signs should be posted in hydrogen storage areas forbidding smoking, open flames or the use of lights or lighting not approved for use in flammable areas.

4.9.3 Although not required for gaseous hydrogen systems having a total hydrogen content of less than 400 cubic feet, it is recommended that hydrogen storage areas are labeled, "Hydrogen-Flammable Gas-No Smoking-No Open Flame" or equivalent.

4.10 Inspection of Compressed Gas Cylinders

4.10.1 Prior to formally accepting any delivered compressed gas cylinders, a visual inspection of each cylinder will be documented as specified below. In addition, all compressed gas cylinders stored at an AECOM facility will be routinely inspected.

- Visually inspect the cylinder, refer to *S3NA-506-FM1 Cylinder Inspection.*
- Verify that all the required markings are on the cylinder.
- If required, determine when the cylinder was last hydrostatically-tested.
- Inspect the safety relief devices, if required.
- If any defects are noted during the inspection, the cylinder should be refused on delivery and a new delivery requested (notify the **Project Manager).**

4.10.2 Where compressed gas cylinders are stored at an AECOM facility, a qualified person will be designated to confirm cylinder activities comply with the requirements in this procedure. Inspection entails the evaluation of the integrity of the cylinder as well as the serviceability of any attached manifold and valve fittings. Remote cylinder inspection is recommended for worker and public safety. The inspection of any cylinder will be conducted by a qualified person, refer to *S3NA-506-FM1 Cylinder Inspection*.

4.11 Cylinder Inspection Procedures

4.11.1 All cylinder inspection procedures will adhere to the procedures identified in CGA P-22, The Responsible Management & Disposition of Compressed Gases & Their Containers (most current edition). For valve or fitting identification, the information contained in CGA V-1, Compressed Gas

Association Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections (most current edition). At a minimum, the inspection process will include the following procedures:

- Observe the cylinder from a safe distance to identify any visual markings or other information.
- Inspect the cylinder size, shape, and general condition (if visible, include the valve system/stem in the inspection process).
- If the cylinder or valve system appears to be in poor condition or has lost structural integrity, do not approach the cylinder. Observations indicating a cylinder is in poor condition may include:
  - Leaking,
  - Hissing sound,
  - Odor in vicinity of the cylinder,
  - Rusty components,
  - Bulging side wall or end, and/or
  - Corroded valve system.

4.11.2 If the cylinder is determined to be in poor condition, cordon the area off and limit access to necessary **employees** only.

4.11.3 Wear applicable PPE and approach the cylinder with the appropriate direct reading air monitoring instrument (do not approach from the ends of the cylinder), then determine the airborne contaminant concentrations in the immediate area.

4.11.4 Document cylinder information (i.e., visible markings, labels, placards, etc.).

4.12 Ground Transport of Compressed Gas Cylinders

4.12.1 AECOM will transport (drive/haul) quantities of compressed gases which do not exceed Materials of Trade (MOT) quantities, whereas the transport of placardable quantities is prohibited without the proper DOT licenses/credentials and consultation with the **SH&E Department**.

4.12.2 Compressed gas cylinders in portable service are to be conveyed by suitable trucks, to which they are securely fastened. All gas cylinders in service shall be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.

4.13 Air/Common Carrier Transport

4.13.1 All shipping of compressed gases via air/common carrier including instrument gases, regardless of quantity, shall be conducted by a qualified and trained HazMat Shipper (Level 1-2 Shipper), and shall conducted under the oversight of a designated DOT/International Air Transport Association (IATA) shipping specialist, refer to *S3NA-508-PR1 Hazardous Materials Handling, Shipping, and Manifesting.*

4.13.2 No compressed gas cylinder, regardless of contents or quantity, will be shipped via an external carrier vendor (i.e., UPS, FedEx, etc.) without the authorization of:

- **Region SH&E Manager**, and
- DOT/IATA shipping specialist.

4.14 Cylinder Disposition & Decommissioning Activities

4.14.1 All cylinders shall be inventoried, staged, and inspected.

4.14.2 Prior to the commencement of cylinder activities, local emergency response agencies (i.e., Fire Department, Medical, and Emergency Response, if separate) shall be contacted and activities coordinated with the local agencies.

4.14.3 Air monitoring is mandatory during cylinder operations.

4.14.4 A **Region SH&E Manager** shall be contacted during the planning stages of a cylinder effort in order to determine whether a site-specific cylinder plan is required.

4.14.5 A copy of the DOT Emergency Response Guidebook (most current edition) and applicable Compressed Gas Association, Inc. (CGA) guidelines shall be on site during activities.

4.15 Cylinder Color Coding Determination

4.15.1 The color coding of compressed gas cylinders is governed by the CGA, which has assigned specific colors to categories or classes of chemicals/substances.

4.15.2 While recently manufactured cylinders reflect the color coding guidance established by the CGA, older cylinders may not reflect this nomenclature. It is also possible for cylinders to have been repainted a different color from their original.

4.15.3 Cylinder contents should never be determined by the color of the cylinder alone.

4.15.4 The following table provides general guidance on the standard color coding scheme and potential contents associated with those colors.

Standard Color (Color of Cylinder)	Class of Material
Yellow	*Flammable Materials*. All materials known ordinarily as flammables or combustibles.
Brown	*Toxic and Poisonous Materials*. All materials extremely hazardous to life or health under normal conditions, such as toxics or poisons.
Blue	*Anesthetics and Harmful Materials*. All materials productive of anesthetic vapors and all liquid chemicals and compounds hazardous to life and property but not normally productive of dangerous quantities of fumes or vapors.
Green	*Oxidizing Materials*. All materials, which readily furnish oxygen for combustion and fire producers that react explosively or with the evolution of heat in contact with many other materials.
Gray	*Physically Dangerous Materials*. All materials, not dangerous in themselves, which are asphyxiating in confined areas or which are generally handled in a dangerous physical state of pressure or temperature.
Red	*Fire Protection Materials*. All materials provided in piping systems or in compressed gas cylinders exclusively for use in fire protection.

Note: Old cylinders that predate the CGA standard color scheme may not adhere to the color schemes shown above; therefore, additional characteristics such as color bands or identifying decals should also be evaluated. Also, the CGA *Handbook of Compressed Gases*, (most current edition) should be consulted for further information.

4.16 Air Monitoring Requirements

4.16.1 Air monitoring requirements are dependent upon the specific substances contained within the cylinders and will be specified within the individual HASP prepared prior to commencement of field activities. Air monitoring parameters, refer to *S3NA-602-PR1 Exposure Monitoring*, may include, but are not limited to:

- Explosivity (i.e., lower explosive limit [LEL]), and
- Chemical-specific substance (e.g., chlorine, ammonia, arsine, etc.).

4.16.2 Action levels will be identified in the site-specific HASP.

4.17 Cylinder Staging

4.17.1 Staging involves the organization, and sometimes consolidation, of cylinders that have similar contents or characteristics.

4.17.2 The staging of cylinders will occur in a remote location at the site in order to minimize the potential injury or property damage from an accidental release or emergency decompression (if the integrity of the cylinder is in question, it should not be moved).

4.17.3 Safe distances will be based on the evacuation distances provided in DOT's Emergency Response Guidebook (most current edition).

4.17.4 When multiple cylinders containing different substances are present, the distance should be based on the greatest evacuation distance required by the substances present.

4.18 Cylinder Disposition Operations

4.18.1 Disposition refers to the recycling, treatment, or disposal of a compressed gas cylinder and/or its contents.

4.18.2 Recovery and recycling of materials are preferred over any other method of disposition. Cylinder disposition activities shall be approved by the **Region SH&E Manager**.

4.18.3 An effort should be made to recover and recycle the contents of a cylinder; however, if recovering or recycling the contents is not possible, then other options include:

- Venting to the Atmosphere,
- Flaring,
- Neutralization, and
- Detonation.

4.18.4 Under no circumstances will poisonous, toxic, or ozone-depleting substances be vented to the atmosphere. Only cylinders containing flammable gases should be detonated, as the flammable contents will be consumed in the subsequent explosion.

4.18.5 If the cylinder valve has been determined to be inoperable, then the available options for disposition are limited to having an outside vendor perform the remote opening and sampling of the cylinder, or detonation of the cylinder where the cylinder contents are consumed in the subsequent explosion (flammable gases only).

4.19 Venting to the Atmosphere

Cylinders that contain non-flammable, non-toxic materials can be vented to the atmosphere. All venting activities will be performed in accordance with the following procedures:

- Atmospheric venting will be accomplished at a remote location and in compliance with all applicable environmental air regulatory requirements.
- Atmospheric venting activities will be completed in a Level B Ensemble (unless otherwise specified in the site-specific HASP and cylinder plan).
- Venting activities will be dependent upon a wind direction that does not carry the outgas plume in the direction of an adjacent public structure.
- The cylinder will be properly grounded to confirm a static charge is not generated, potentially resulting in ignition of a flammable gas.
- All tools used on the cylinder will be non-sparking.
- Low-pressure discharging will not exceed 15 pounds per square inch gauge (psig).
- Once discharging has started, all workers will retreat to the exclusion zone (minimum 100 feet) around the remote location until the discharging process is complete.

4.20 Flaring

Flaring activities involve the combustion of the cylinder contents through the discharge of a low-intensity flame. Flaring activities will be performed in accordance with the following procedures:

- Flaring will be accomplished at a remote location and in compliance with all applicable environmental air regulatory requirements.

- Flaring activities will be completed in a Level B Ensemble (in addition, the flaring team members will don Nomex fire-retardant forearm-length gloves and other fire-retardant clothing as specified in the site-specific cylinder plan).
- Flaring activities will be dependent upon a wind direction that does not carry the combustion plume in the direction of any offsite structure or activity, or into uncontrolled (public access) areas.
- The cylinder will be properly grounded to confirm a static charge is not generated, potentially resulting in ignition of a flammable gas.
- All tools used on the cylinder will be non-sparking.
- Low-pressure discharging will not exceed 15 pounds per square inch gauge (psig).
- A hot work permit shall be completed prior to the start of flaring activities, refer to *S3NA-418-PR1 Welding, Cutting, and Other Hot Work*.
- No other cylinders will be within 35 feet of the cylinder being flared.
- Flaring activities will use a low-pressure discharge and maintain a small, low-intensity flame.
- A firewatch will be established, with a worker stationed outside the exclusion zone with a fire extinguisher (20A:100B:C) during flaring activities (i.e., fire watch). During the work the worker assigned to the firewatch will have no other duties.
- The flare will be positioned so that it is not pointing toward any flammable materials, persons, or equipment in the immediate area.

4.21 Neutralization

Neutralization refers to the on-site neutralization of the cylinder contents through a controlled chemical reaction process. Specialized equipment may be necessary based on the chemical involved, as well as reaction by-products, catalysts, or physical conditions (i.e., temperature, acidic, basic, etc.). Neutralization activities will be performed in accordance with the following procedures:

- Neutralization is the required disposition method for cylinders containing acid gases, as well as many alkaline gases.
- The neutralization process shall be approved by a professional engineer (e.g., chemical) or based on a published chemical-specific neutralization methodology.
- Liquid levels in the reaction vessels will be maintained at least 12 inches below the top of the vessel.
- Based on the specific chemical reaction, the temperature of the reaction vessel and its contents will be monitored continuously and controlled accordingly.
- Pressure levels will be maintained within acceptable limits to prevent the reaction from accelerating, unwanted by-product formation, or the break-through of the chemical intended to be neutralized.
- **Employees** will wear the PPE identified within the site-specific HASP and cylinder plan.

4.22 Detonation

4.22.1 Detonation refers to the use of explosives to open and subsequently consume the contents of the cylinder by the heat generated during the explosion. Detonation activities will be performed in accordance with the following procedures:

4.22.2 A detonation plan shall be submitted to and approved by the **Region SH&E Manager** prior to the commencement of cylinder detonation activities.

4.22.3 The detonation of compressed gas cylinders will be completed under the guidance of experienced ordnance and explosives (OE) professional who is licensed in the use of explosives, refer to *S4NA-514-PR1 Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO) (US*).

4.22.4 A sufficient amount of explosives will be used to consume the entire contents of the cylinder (flammable gases only).

4.22.5 A blast pit will be excavated where all detonations will take place.

4.22.6 The OE professional will determine the blast hazard zone/potential debris impact zone, and this area will be evacuated prior to the detonation.

4.22.7 The OE professional will sound a warning signal (e.g., horn or equivalent) three times to indicate that a detonation is imminent and confirm all persons have evacuated the blast hazard zone prior to detonation.

4.22.8 **Employees** will be on standby outside the blast hazard zone with fire extinguishers (minimum rating of 20A:100B:C).

4.23 Cylinder Decommissioning Operations

4.23.1 Decommissioning refers to the removal of a compressed gas cylinder from service by rendering it permanently unusable.

4.23.2 Prior to decommissioning, cylinder contents will be verified, removed from the cylinder, and the cylinder purged with an inert gas (e.g., nitrogen, carbon dioxide, etc.).

4.23.3 All identifying marks or decals will be removed from the cylinder.

4.23.4 The **Region SH&E Manager** shall be contacted prior to the decommissioning of compressed gas cylinders that contain or previously contained:

- Ethylene oxide,
- Arsine,
- Diborane,
- Hydrogen selenide,
- Cyanogen chloride,
- Amines,
- Hydrogen sulphide,
- Acetylene, or
- Methyl mercaptan.

4.23.5 Additional safety precautions may be necessary due to highly reactive residues left behind by these substances.

4.23.6 The recommended methods of decommissioning include:

- Burning/torch-cutting an elongated hole into the side of the cylinder, refer to *S3NA-418-PR1 Welding, Cutting and Other Hot Work;*
- Torch-cutting the cylinder in half; and
- Crushing the cylinder.

5.0 Records

5.1 None.

6.0 Attachments

6.1 S3NA-506-WI1 Compressor Safety Card

6.2 S3NA-506-FM1 Cylinder Inspection

6.3 S3NA-506-ST Compressed Gases

Americas

Compressor Safety Card

S3NA-506-WI1

1.0 Objective / Overview

1.1 Compressors should be used with extreme caution in order to prevent personal injury.

1.2 When using a compressor it's important to follow the manufacturer's instructions to avoid injuring someone or damaging your compressor.

1.3 Allow only trained, authorized personnel to operate the compressor. Along with training, other safety measures include: proper maintenance of equipment and personal protective equipment.

2.0 Safe Operating Guidelines

2.1 Follow manufactures recommended operating instructions, every compressor is not the same. Maintain adequate ventilation.

2.2 Gas and Diesel powered generators emit carbon monoxide (CO). Never operate a fuel-powered compressor in an enclosed building without proper ventilation.

2.3 Turn the compressor off to refuel. Gasoline and its vapors may ignite if they come into contact with hot components or an electrical spark, store fuel in a properly designed container in a secure location.

2.4 Operators shall perform a pre-operational check of all air hoses, couplings, and connections to determine if leakage or other damage exists. Tag unsafe equipment and take out of service immediately.

2.5 Decompress air from the compressor prior to removing any caps or air equipment attachments such as jackhammers, drills, etc.

2.6 Keep oil and flammable material clear of air fittings and joints.

2.7 Make sure connections are secure to avoid a hose coming loose during use.

2.8 To avoid a shock, make sure that your hands are dry and you're standing in a dry place whenever you operate an electrically powered compressor.

2.9 Use only UL-listed, three-prong extension cords. Be sure the extension cord is the proper size (wire-gauge) to handle the electric load that will be plugged into it.

2.10 Have a Class A:B:C fire extinguisher readily available at all times.

3.0 Potential Hazards

3.1 Burns from contact with the hot muffler or engine

3.2 Shocks/electrocution

3.3 Noise exposure

3.4 Inhaling exhaust gases, CO

3.5 Contact with pressurized air

4.0 Training Requirements

4.1 Review of Applicable SOPs.

4.2 Demonstrated knowledge on the use of the compressor.

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 Long Sleeve Shirt (e.g., to shield from burns, etc.)

Americas

Cylinder Inspection

S3NA-506-FM1

Basic Cylinder Information	
Serial Number:	Cylinder Size:
Pressure Rating:	Current Pressure:
Vendor/Owner:	Contents:
Date of Receipt:	Date of Inspection:
Inspected by (*Name*):	

Condition	Yes	No
DOT container specification number present on cylinder?		
Proper DOT shipping name, ID # and hazard class on cylinder?		
Manufacturer's name and appropriate hazard warnings present?		
Serial number of cylinder and inspectors official mark present?		
Most recent hydrostatic test date marked and within 5 years?		
Cylinder valve and neck ring free of oil, grease or other foreign matter?		
Valve threads clean and in good condition?		
Pressure rating of cylinder not exceeded?		
Cylinder surface is free of cracks, and dents, gouges, weld defects, etc.?		
Cylinder surface is free of arc burns and fire burns?		
Cylinder cap is present and threaded in place?		
Cylinder surface, particularly bottom, is free of excessive corrosion, and pitting?		

This checklist will be used by employees who accept the delivery of compressed gas cylinders at an office, laboratory, or project location to document the condition of the cylinder upon receipt. In offices where cylinders are stored, used or shipped to project locations on a regular basis, the qualified person designated to oversee cylinder operations will use this checklist to perform routine cylinder inspections and create a historical file on the condition of each cylinder.

Americas

Compressed Gases

S3NA-506-ST

Jurisdiction	Regulation
United States	
OSHA	49 CFR (Transportation), Parts 100-185 Hazardous Materials Regulations
	29 CFR 1910 (General Industry) Subpart H Hazardous Materials
	29 CFR 1926 (Construction) Subpart J .350 Gas Welding and Cutting
DOT	Emergency Response Guidebook (latest edition)
Compressed Gas Association, Inc. (CGA)	CGA Guidelines and CGA Handbook of Compressed Gases (latest editions)
Canada	
Alberta	OHS Code (2009) Sect 171
British Columbia	OHS Regulation (1997) Sect 4.41
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 27.1 – 27.3
New Brunswick	OHS Regulation (91-191) Sect 74 – 79
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 75
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 45 – 49
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 155 – 162
Ontario	O. Reg. 213/91 Sect 6, 42 O. Reg. 851 Sect 49
Prince Edward Island	OHS Regulations (EC180/87) Sect 37.18 – 37.23
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 77, 78, 325 – 328 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.13.4 – 3.13.10
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 371, 372
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 4.05, 4.06, 8.20, 8.21

The following standards apply to compressed gas tools and equipment:

Association	Standard
Canadian Standards Association (CSA)	CAN/CSA Standard-Z275.3-M86 (R2004), Occupational Safety Code for Construction Work in Compressed Air
OSHA	29 CFR 1926 (Construction) Subpart I .300-307 Tools-Hand and Power

Americas

Hazardous Materials Communication/WHMIS

S3NA-507-PR1

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, safety data sheets (SDS), and employee training.

1.2 This procedure applies to all AECOM Americas-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

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:

2.11.1 **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;

2.11.2 **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.

2.11.3 **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**.**

2.11.4 **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:

2.14.1 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

2.14.2 The carcinogen is 0.1%or more of the mixture or product;

2.14.3 Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.

2.14.4 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; and
- Any drug in solid form used for direct administration to the patient (i.e., tablets or pills).

2.15 **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.

2.16 **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.

2.17 **SDS –** A Safety Data Sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Controlled Products regulations, schedule 1).

2.18 **SDS Administrator –** The individual or group designated by the Office Manager (Operations) or Project Manager to maintain the establishment-specific inventory list or log and the SDS binder required if that establishment uses or stores hazardous substances.

2.19 **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.

2.20 **Mixture –** Any solution or intimate admixture of two or more substances which do not react chemically with each other.

2.21 **Reactivity** – A measure of the tendency of a substance to undergo chemical reaction with the release of energy.

2.22 **Solubility –** The ability of substance to blend and mix uniformly with another.

2.23 **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.

2.24 **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.

2.25 **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 (SDSs) and worker education and training programs.

3.0 References

3.1 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)

3.2 S3NA-003-PR1 SH&E Training

3.3 S3NA-208-PR1 Personal Protective Equipment Program

3.4 S3NA-209-PR1 Project Hazard Assessment and Planning

3.5 S3NA-509-PR1 Hazardous Waste Operations and Emergency Response

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region SH&E Manager / SH&E Department**

- 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 SDSs are available for each substance listed on the HSI.
- Provide interpretation of SDSs 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.
- Review SDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.1.2 **Project Manager / Site Safety Officer (SSO)**

- Access or obtain, and maintain copies of SDS 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.

4.1.3 **Office Manager (Operations)**

- 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 SDS administrator for their establishment if they store or use hazardous substances.
- Confirm, if required, that the SDS Administrator maintains an HSI for their establishment.
- Confirm that SDS are available for all substances listed on their establishment's HSI.
- Confirm that a copy of this Procedure and the site-specific SDS are available to all employees. Employees shall be instructed in the location of this Procedure and the SDS.
- Confirm that all employees in their office affected by the HAZCOM standard are provided with the appropriate training, including new employees.

4.1.4 **Supervisor**

- 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 SDS 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 SDSs from all subcontractor organization for the relevant chemicals they bring onto an AECOM controlled site.

4.1.5 **Employee**

- 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 SDS and how to work with that material safely.
- Provide a copy of all SDSs received to the SDS Administrator at their facility.
- Verify that an SDS is available in their work area for each hazardous substance that they use.

4.2 General Procedure

4.2.1 Confirm that containers of hazardous substances that they use are properly labelled. All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.

4.2.2 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.

4.3 Employee Information and Training

4.3.1 Each AECOM employee who handles or is exposed to hazardous substances must be provided information and training, refer to *S3NA-003-PR1 SH&E Training*, on hazardous substances in their work area:

- At the time of their initial assignment; and
- Whenever a new hazard is introduced into their work area.

4.3.2 As a minimum, the training requirements apply to employees in the following job categories:

- All employees who perform field work that involves the use of, or potential exposure to, hazardous substances; and
- Laboratory Employees.

4.3.3 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 labelling system and the SDS, and how he/she can obtain and use appropriate hazard information.
- 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; and

- 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.

4.3.4 Periodic Training and Training for Non-Routine Tasks

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 SDS is received, which indicates significantly increased risks to employee health as compared to those stated on the previous SDS; and
- 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.

Supervisors, in coordination with their **Region SH&E Manager**, shall provide such training through an explanation of the information on the contents of the SDS for that substance.

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; and
- Emergency procedures for spills, fire, disposal, and first aid.

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.

4.3.5 Documentation of Initial and Periodic Training

- All training required shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.4 Hazardous Waste Exemption

4.4.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. AECOM employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the Resource Conservation and Recovery Act (RCRA) and other local waste related laws and regulations and the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and *S3NA-509-PR1 Hazardous Waste Operations and Emergency Response.*

4.5 Hazardous Substance Inventory and Chemical Usage

Establishment of a Specific Hazardous Substance Inventory (HSI) or WHMIS Log, as referenced or contained within the safe to work plan, refer *S3NA-209-PR1 Project Hazard Assessment and Planning*, shall include:

- 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 **Office Manager (Operations)** shall assure that one is developed and maintained by someone appointed as the establishment's SDS 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 or project specific HSIs shall be managed as a permanent record.

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, refer to *S3NA-208-PR1 Personal Protective Equipment Program.*

4.6 Safety Data Sheets (SDS)

4.6.1 Establishment-Specific SDS Inventory

- If it is determined that an AECOM establishment is required to maintain an establishment-specific inventory SDSs for the specific hazardous substances must be maintained on file at that establishment.
- The **Region SH&E Manager** shall audit the local office or project for SDS 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 SDS 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 SDSs

SDSs should be maintained at the local establishment that uses that hazardous substance. Copies of the SDS should be made available to the employee upon request to the office's SDS Administrator.

4.6.4 Field Access to SDSs

When hazardous substances are brought into the field, the user must assure that a copy of the SDS for that substance accompanies it and is available at the field location where it is to be used.

4.6.5 SDSs for AECOM Products

It is unlikely that AECOM activities would create a chemical for which a new SDS were needed. If such a chemical were created, the **SH&E Department** shall work with the appropriate operations groups to draft, review, and publish the new SDS.

4.6.6 Content of the Safety Data Sheet:

- Safety Data Sheets, previously referred to as Material Safety Data Sheets, will now require a 16-section format that is essentially the same as the ANSI standard for *Hazardous Workplace Chemicals-Hazard Evaluation and Safety Data Sheets and Precautionary Labeling Preparation* (ANSI Z400.1 & Z129.1 – 2010).
- Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.
- Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.
- Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

- Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.
- Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.
- Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).
- Section 9, lists the chemical's characteristics.
- Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
- Section 11, Toxicological information includes routes of exposure; related symptoms, acute and Section 9, Physical and chemical properties chronic effects; numerical measures of toxicity.
- Section 12, Ecological information
- Section 13, Disposal considerations
- Section 14, Transport information
- Section 15, Regulatory information
- Section 16, Other information, includes the date of preparation or last revision.

SDSs 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 SDSs is proprietary and not provide the information to AECOM.

When SDSs supplied to the **Region SH&E Manager** indicate that proprietary information has been withheld, the **Region SH&E Manager** will either obtain the necessary information to make a hazard assessment or reject the material for use within AECOM.

4.6.8 For Canadian operations, all relevant SDS must be current (no more than 3 years old) and readily available (in French and English) for all hazardous materials.

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:

- Product name or Identifier;
- Hazard Pictogram;
- Signal Word;
- Physical, Health, Environmental Statements;
- Supplemental Information;
- Precautionary Measures and Pictograms;
- First Aid Statements;
- Name and Address of Company; and
- Telephone Number.

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. The following pictogram will be used to identify carcinogens:

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 labeled containers with the lids securely closed and taped if possible.

4.8.2 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, SDS, or the manufacturer's specifications.

4.8.3 All hazardous chemicals must be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.

4.8.4 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, contact the **SH&E Department** for guidance If this general requirement is infeasible.

4.9.2 General exceptions to this rule are the following:

- Liquid paper;
- Toner;
- Cleaners;
- Isobutylene calibration gas; and
- pH calibration solutions for instruments.

4.9.3 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program.

4.9.4 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.

4.10 Canada-specific

4.10.1 Consumer products are exempt from supplier labels and SDS requirements. Some cleaning solvents may be packaged as consumer products and these must be labeled in accordance with the Consumer Product Act requirements.

4.10.2 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 Attachments

6.1 None

Americas

Hearing Conservation

S3NA-510-PR1

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 Americas-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.

2.5 **Time-Weighted Average Sound Level** – That sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-605-PR1 Medical Surveillance Program

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Region SH&E Manager**

- 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 Manager / Office Managers (Operations)**

- 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.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.

4.1.3 **Employee**

- 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 General 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)
90	8
95	4
100	2
105	1
110	1/2
115	1/4 or less

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	8
90	4
95	2
100	1
105	1/2
110	1/4 or less

4.3 Training

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 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.

4.3.3 Hearing protection training is conducted annually 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 shall be enrolled in the medical surveillance program and undergo a baseline audiogram within 6 months of the first exposure. Thereafter, annual audiograms will be compared with the baseline exam.

4.4.2 Enrolled employees will receive audiograms during their exit physicals; refer to *S3NA-605-PR1 Medical Surveillance Program*.

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 persist, 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 **Region SH&E Manager** 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 a 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 When information indicates that any employee's exposure may equal or exceed the action level as specified in Table 2, the **Region SH&E Manager** shall develop and implement a monitoring program to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

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 three 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 at no cost to the 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 Noise exposure measurement records will be retained for two years at the project/facility.

5.2 Audiogram records will be retained in the employee's medical records as per *S3NA-605-PR1 Medical Surveillance Program*.

5.3 Employee training session documentation will be retained in accordance with *S3NA-003-PR1 SH&E Training*.

6.0 Attachments

6.1 S3NA-510-WI1 Hearing Protection Guidelines

6.2 S3NA-510-FM1 Site-Specific Hearing Conservation Program

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.

_____ 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 employees 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 employees 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: _____

Americas

Heat Illness Prevention

S3NA-511-PR1

1.0 Purpose and Scope

1.1 Establishes a Heat Illness 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 Americas-based employees and operations.

2.0 Terms and Definitions

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

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

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

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

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

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

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

2.8 **Sunburn** – Caused by unprotected exposure to ultraviolet light that is damaging to the skin. The injury is characterized by red painful skin, blisters, and/or peeling.

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

3.0 References

3.1 S3NA-003-PR1 SH&E Training

3.2 S3NA-004-PR1 Incident Reporting (Americas)

3.3 S3NA-203-PR1 Emergency Response Planning, Field

3.4 S3NA-208-PR1 Personal Protective Equipment

3.5 S3NA-209-PR1 Project Hazard Assessment and Planning

3.6 American Conference of Governmental Industrial Hygienists (ACGIH)

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 **Project Managers**

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

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

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

4.1.3 **Supervisor**

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned Employees.
- Ensure that Employees have been trained on the recognition of heat illness.
- Ensure that adequate supplies of appropriate fluids are readily available to Employees.
- Ensure that a proper rest area is available.
- Conduct heat illness 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 illnesses.

4.1.4 **Employee**

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

4.2 Restrictions

4.2.1 The Buddy System is required when working in high heat conditions; Employees shall not work alone. Employees 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. Also refer to the *S3NA-511-ST Heat Exposure* standards.

4.2.2 Clothing corrections shall be applied in accordance with the heat stress and strain section of the ACGIH Standard.

4.3 Exposure Controls

4.3.1 If **Employees** are or may be exposed, the **Supervisor** shall:

- Conduct a heat stress assessment to determine the potential for hazardous exposure of Employees, and
- Develop and implement a heat stress exposure control plan within the Safe Work Plan or Task Hazard Analysis, refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*.

4.3.2 If **Employees** are or may be exposed, the **Supervisor** shall implement engineering controls (e.g., shelters, cooling devises, etc.) to reduce the exposure of **Employees** to levels below those 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 **Employees** 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 **Employees** 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 **Employee**.

4.3.5 If an **Employee** shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant on site, if available, or by a physician, refer to *S3NA-511-WI2 Symptoms and Treatment* for more specifics.

4.4 Heat Stress Planning

4.4.1 Heat stress can be a significant field site hazard, especially for Employees wearing CPC. To prepare the field for emergency response planning, refer to *S3NA-203-PR1 Emergency Response Planning, Field* procedure. The project and site specific risks need to be planned using a Safe Work Plan or Task Hazard Analysis, refer to the *S3NA-209-PR1 Project Hazard Assessment and Planning* procedure.

4.4.2 The workforce will gradually work up to a full workload under potentially stressful conditions to allow for proper acclimation.

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

4.4.4 Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow **Employees** to loosen or remove protective clothing, and sufficient seating should be available for all **Employees**. During breaks, **Employees** 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.

4.5 Symptoms and Treatment

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

4.5.2 Anyone exhibiting symptoms of heat stroke (red dry skin, or unconsciousness) must be taken immediately to the nearest medical facility. Steps must be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.5.3 Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.

4.6 Prevention

4.6.1 All **Employees** working in extreme heat or sun should understand the following guidelines for preventing and detecting heat exhaustion and heat stroke.

- Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
- Try to schedule work for the coolest part of the day, early morning and evening.

- Avoid strenuous physical activity outdoors during the hottest part of the day.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Avoid sudden changes of temperature, refer to *S3NA-511-WI1 Temperature Thresholds*.
- Air out a hot vehicle before getting into it.
- If you take diuretics, ask your doctor about taking a lower dose during hot weather.
- When working in heat, drink 1 quart of water per hour of work.
- Avoid caffeine and alcohol as they increase dehydration.
- Monitor urine frequency and color to detect dehydration, refer to the *S3NA-511-GL1 Dehydration Chart*.

4.6.2 Personal Protective Equipment

- Review the *S3NA-208-PR1 Personal Protective Equipment* procedure.
- Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
- Apply sunscreen to exposed skin (SPF 30 or greater, follow directions on label).
- Wear sunglasses with UV protection.
- Pack extra water to avoid dehydration (try freezing water in bottles overnight to help keep the water cooler for longer during the day).

4.7 Work-Rest Schedule Practices

- Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 ounces (1 quart) per hour during the work shift; fluid replacement at frequent intervals is most effective.
- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.
- 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 a.m.–10 a.m., 3 p.m.–7 p.m.).
  - 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 **Supervisor** must continually evaluate its effectiveness through observation of **Employees** for signs/symptoms of heart stress. Measurement of each employee'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:

- At the start of the workday each employee's baseline pulse rate (in beats per minute [bpm]) is determined by taking a pulse count for 15 seconds and multiplying the result by four or by using an automated pulse count device. Pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:
    - Each employee's maximum heart rate at the start of any break should be a bpm of less than 180 minus employee's age. If this value is exceeded for any **Employee**, the duration of the following work period will be decreased by at least 10 minutes.
    - At the end of each work period, all employees' heart rates must have returned to within +10% of the baseline pulse rate. If any employee'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.
- 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 degrees Fahrenheit (°F) (36.6 degrees Celsius [°C]), shorten the next work cycle by one-third without changing the rest period.
    - If the oral temperature still exceeds 99.6°F (36.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.
- 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.

4.8.2 All physiological monitoring of heat stress will be documented using *S3NA-511-FM1 Heat Stress Monitoring Log*.

4.9 Provision of Water

4.9.1 Water shall be provided (paid) by the project or program; if **Employees** purchase their own drinking water because water is not otherwise available on site, they shall be reimbursed.

4.10 Training

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

4.10.2 Those **Employees** potentially exposed to heat stress will receive training, refer to the *S3NA-003-PR1 SH&E Training* procedure. Training will include, but is not limited to:

- Sources of heat stress (environmental and personal), influence of protective clothing, and importance of acclimatization;
- How the body handles heat and acclimatization;
- Recognition of heat-related illness symptoms;
- Preventative/corrective measures;
    - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
    - All employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.

- First aid procedures for heat stress-related illnesses; and
- Immediate reporting of any heat-related incident (injury, illness, near-miss), refer to the *S3NA-004-PR1 Incident Reporting (Americas)* procedure.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3NA-511-WI1 Temperature Thresholds

6.2 S3NA-511-WI2 Symptoms and Treatment

6.3 S3NA-511-FM1 Heat Stress Monitoring Log

6.4 S3NA-511-GL1 Dehydration Chart

6.5 S3NA-511-ST Heat Exposure

1.0 Work-Rest Schedule

The prevention of heat stress is best performed through Supervisor observation of Employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow Employees to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the Supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the Employees (e.g., acclimated/not), and protective clothing being used.

1.1 Establishing a Work-Rest Schedule:

1.1.1 AECOM permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

- Wet Bulb Globe Thermometer (WBGT) Method: This method is preferred if a WBGT meter is available.
- Adjusted Temperature Method: This method should be used only if WBGT data is not available.

1.1.2 Either procedure will provide the Supervisor with a recommended routine; however, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

1.2 WBGT Work-Rest Schedule Guidelines:

1.2.1 Table 1, the Non-CPC Activities WBGT Chart, is intended for use where personnel are not utilizing Chemical Protective Clothing (CPC). Where workers are required to utilize CPC, Table 2, the CPC Activities WBGT Chart, will be used.

1.2.2 WBGT readings are compared directly with the values of the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Regimen	WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85°F (29.4°C)	81°F (27.2°C)	78°F (25.6°C)	
75% Work – 25% Rest	86°F (30°C)	83°F (28.3°C)	81°F (27.2°C)	
50% Work – 50% Rest	88°F (31.1°C)	85°F (29.4°C)	83°F (28.3°C)	81°F (27.2°C)
25% Work – 75% Rest	90°F (32.2°C)	87°F (30.6°C)	86°F (30°C)	85°F (29.4°C)

Modified from ACGIH's 20`4 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers

Table 2. CPC Activities WBGT chart

Work-Rest Regimen	WBGT			
	Light Work	**Moderate Work**	**Heavy Work**	**Very Heavy Work**
Continuous Work	74°F (23.3°C)	70°F (21.1°C)	67°F (19.4°C)	
75% Work – 25% Rest	75°F (23.9°C)	72°F (22.2°C)	70°F (21.1°C)	
50% Work – 50% Rest	77°F (25°C)	74°F (23.3°C)	72°F (22.2°C)	70°F (21.1°C)
25% Work – 75% Rest	79°F (26.1°C)	76°F (24.4°C)	75°F (23.9°C)	74°F (23.3°C)

Modified from ACGIH's 2014 *Threshold Limit Values for Chemical Substances and Physical Agents*, for acclimatized workers

1.3 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)

[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

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	
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.

[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.

Symptoms and Treatment

1.0 Heat Illness Symptoms

1.1 The following 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. Symtpoms include:

- 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 ;
- Exhaustion;
- Mood changes (irritable, or confused/can't think straight); and
- Fainting

1.1.3 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 degrees Fahrenheit (°F) (40.5 degrees Celsius [° 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])
- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Skin may still be moist or the victim may stop sweating and the skin may be red, hot, and dry;
- Rapid, weak pulse or rapid, strong pulse;
- Rapid, shallow breathing;
- Nausea;
- Dizziness and confusion; and
- Coma.

2.0 Recommended Treatment for Heat Stress-related Illnesses

2.1 Heat Cramps

2.1.1 Treatment for heat cramps includes:

- Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary.

- Take more frequent breaks and drink more water.
- Move victim to a cool place.
- Administer drinks of cool water.
- Apply manual pressure to cramped muscles.
- Seek medical attention if symptoms are not alleviated or if more serious problems are indicated.

2.1.2 Heat Exhaustion

Treatment of heat exhaustion includes:

- 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) includes:

- Call for immediate medical help and then try to lower the temperature as quickly as possible:
  - Apply cool (not cold) water the person's whole body, then fan the person.
  - Wrap in wet sheet.
  - If available, use cold packs under arms, neck, and ankles
  - 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
- Protect from injury during convulsion.
- Ensure that the person's airway is open.
- Transfer to a medical facility immediately.

AECOM

Americas

Heat Stress Monitoring Log

S3NA-511-FM1

The purpose of this form is to monitor employees for heat illness. It is the responsibility of the Foreman or Supervisor-in-Charge to ensure that each person completes the required information.

Project Name:			**Foreman/Supervisor:**								**Work/Rest Schedule1:** IN *(min)* OUT *(min)*					
Date:	**Water Provided[1]**		**Acclimated[2]**		**Initial Vitals[3]**	**Vital Signs and Time In/Out[3]**					**Celcius/ Farenheit (circle one)**					
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**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		
					P			**P**			**P**			**P**		
					BP			**BP**			**BP**			**BP**		
					Temp			**Temp**			**Temp**			**Temp**		

1. Each employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.
2. Am Employee is "acclimated" if he/she has worked in a hot environment for at least 7 to 10 consecutive days. If an Employee is acclimated, check "Yes." If an Employee is not acclimated, check "No" and reduce the "Min In" by 50 percent for that Employee until the 7- to 10-day period is reached.
3. "Vitals" refers to Employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work and at each break period, or as specified in the Heat Stress Exposure Control Plan.

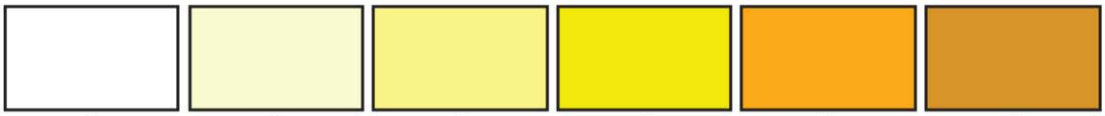
Americas

Dehydration Chart

S3NA-511-GL1

GUIDANCE TOOL FOR MONITORING DEHYDRATION

URINE COLORATION CHART



1	2	3	4	5	6
Target		Dehydration		Severe Dehydration	
CONTINUE DRINKING WATER TO MAINTAIN CURRENT HYDRATION LEVELS.		INCREASE WATER CONSUMPTION TO IMPROVE HYDRATION LEVELS, INCREASE BREAKS FREQUENCY, TAKE BREAKS IN A COOL SHADED AREA.		STOP WORK! FIND A SHADED AREA AND BEGIN TO DRINK COOL TO ROOM TEMPERATURE WATER SLOWLY AND STEADILY.	

PREVENTING DEHYDRATION

- Start hydrating at least 3 days prior to working in high heat conditions
- Always bring enough water to maintain hydration. CalOSHA requires consuming 1 quart per hour of your work shift - more may be needed

Note: This information is guidance only and should not supersede the recommendation or instruction of a personal physician or medical professional. Contact your physician or medical professional if you have a personal medical condition or take medication for a personal condition which may be adversely affected by dehydration. Urine color can be affected by medications, vitamins and or other personal health conditions.

Americas

Heat Illness Prevention

S3NA-511-ST1

The following Occupational Health and Safety regulations apply directly to heat stress hazards:

Jurisdiction	Regulation
United States	
OSHA	1910.132
California	8 California Code of Regulations 3395
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

Americas

Spill Response, Incidental

S3NA-520-PR1

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 is intended to address small incidental spills from work related equipment and supplies. For operations with bulk quantities of fuels, chemicals, oils, and for operations where AECOM is providing emergency response services for spills, the Region SH&E Manager will specify spill prevention and preparedness criteria including training, equipment, and proficiency.

1.3 This procedure applies to all AECOM Americas 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:

- A release at or above a reportable quantity (RQ) of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance (40 CFR 302.8) is required to be reported to the National Response Center (NRC).
- A hazardous chemical release at or above an RQ under the Emergency Planning and Community Right-to-Know Act (EPCRA) (Title III under the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 350-372) is required to be reported to state and local officials.
- A release in violation of a facilities Spill Prevention, Control, and Countermeasure (SPCC) Plan (40 CFR 112).

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.

- 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 References

3.1 Title 40 Code of Federal Regulations (CFR) 302.8

3.2 40 CFR 350-372; 40 CFR 112

3.3 S3NA-003-PR1 SH&E Training

3.4 S3NA-004-PR1 Incident Reporting

3.5 S3NA-101-PR1 Emergency Response Planning, Office

3.6 S3NA-203-PR1 Emergency Response Planning, Field

3.7 S3NA-207-PR1 Medical Services and First Aid

3.8 S3NA-208-PR1 Personal Protective Equipment Program

3.9 S3NA-209-PR1 Project Hazard Assessment and Planning

3.10 S3NA-509-PR1 Hazardous Waste Operations and Emergency Response

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager**

All AECOM emergency responders and their communications shall be coordinated and controlled through the Project Manager. The individual in charge shall implement the and shall be responsible for the following tasks:

- Become the individual in charge at the incident until relieved by more qualified personnel.
- Making notifications the appropriate agency , the AECOM incident Reporting line, and operations, refer to *S3NA-520-WI1 Spill Notification Numbers* for US and Canadian required notifications.
- Designate a safety supervisor who is knowledgeable about the operations being implemented at the emergency response site and who will have specific responsibility to identify and evaluate hazards and to provide direction on the safety of operations for the emergency at hand. If the safety supervisor judges activities to be an Immediately Dangerous to Life or Health (IDLH) and/or to involve an imminent danger condition, the safety supervisor shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.
- Identify all hazardous substances or conditions present and address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance, and handling procedures.
- Implement appropriate emergency operations.
- Limit the number of emergency response personnel at the emergency site.
- Implement the buddy system in groups of two or more.
- 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 (SH&E) Manager**

- 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 **Employees**

- Follow precautions and safe handling practices to avoid spills.
- Alert Project Manager to any deteriorating hazardous materials containers within the office or project area.
- Report all spills and leaks to the 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.

4.2 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-PR1 Emergency Response Planning, Offices* and *S3NA-203-PR1 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 follow-up remediation work shall be done in accordance with *S3NA-509-PR1 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

(Note: Local and state emergency response plans may need to be review and incorporated into the plan.)

4.3 Training

4.3.1 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 **Project Manager** and in accordance with the *S3NA-003-PR1 SH&E Training*.

4.4 Spill Response Equipment

4.4.1 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

4.4.2 Spill response equipment shall be placed adjacent to areas where chemicals are routinely handled, stored, and/or where shipments are received. Similar types of spill response equipment shall also be available in any AECOM vehicle or rented vehicle in which chemicals are being transported. Access to the spill response equipment shall be designed to avoid likely spill locations.

4.5 Spill Response Equipment for Field Programs

The amount of chemicals being used during a field program will dictate the types and quantity of spill response equipment that is brought to the site. If several squirt bottles of decontamination 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), refer to *S3NA-209-PR1 Project Hazard Assessment and Planning*, and will provide a greater level of detail regarding the specific spill response effort for that field program.

4.6 Immediate Response

4.6.1 Evacuate all personnel that will not be involved in the clean-up from the immediate area of the spill or release.

4.6.2 Take all reasonable measures to confine, repair, and remedy the effects of the spill; clean-up must be done by knowledgeable personnel and is in accordance with the product label and MSDS.

4.6.3 Use the appropriate equipment and PPE so that you do not expose yourself to any chemicals or hazardous substances, refer to *S3NA-208-PR1 Personal Protective Equipment Program*.

4.6.4 Clean up teams shall be organized outside the spill area and re-enter for clean-up activities.

4.6.5 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, then evacuate the area and call for competent response from local authorities.

4.7 First Aid

4.7.1 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. Refer to *S3NA-207-PR1 Medical Services and First Aid*.

4.7.2 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.

4.7.3 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.

4.8 Reporting

4.8.1 Should there be a spill or leak involving a hazardous product, employees shall immediately notify the **Supervisor** and SH&E Incident Reporting Line, refer to *S3NA-004-PR1 Incident Reporting.*

4.8.2 "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.

4.8.3 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.

4.8.4 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 release refer to *S3NA-520-WI1 Spill Notification Numbers*.

4.8.5 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 Attachment

6.1 S3NA-520-WI1 Spill Notification Numbers

Americas

Spill Notification Numbers for North America

S3NA-520-PR1

Jurisdiction	Name	Phone
Within the United States		
National Response Center		1-800-424-8802
Within Canada		
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

ATTACHMENT C

AECOM Stretching Exercises

AECOM

Stretch First for Safety First

Never do a stretch that causes pain
Do not bounce while stretching
Warm-up prior to stretching
Stretch in a secure area, away from traffic
Make sure ground underfoot is flat, smooth, dry and stable
Have a fixed object near by to help maintain balance

Sidebends: Place your hands on your hips and gently lean to either side and hold for 10 seconds, then repeat with the other side.

Ham Strings: Sit with one leg out in front of you, if you cannot sit on the ground you can rest one leg on a curb, or other elevated object. Extend your arm(s) in front of you and bend forward from the waist. Hold for 10 seconds. Repeat with the other leg.

Calf stretch: Place your hands on a fixed object and take one step back with one leg. Keep a 90 degree angle with the other leg. Push your heel of the extended leg toward the ground and hold for 10 seconds, then switch legs and repeat.

Ankles: Raise one foot slightly in front of your body and roll your ankle 10 times towards the right and then 10 times towards the left. Repeat with the other foot. Use a fixed object to maintain balance during this stretch.

Wrists: Point your fingers downward, use the opposite hand to apply gentle pressure on the back, pushing your fingers toward you. Hold for 10 Seconds. Flex the same hand so your fingers are pointed upward, gently pull back with the opposite hand, hold for 10 seconds.

Shoulders: Bring one arm across you chest and press it towards your chest with your other arm. Hold for 10 seconds and repeat with the other side. Be sure to stand with feet shoulder width apart.

Back Stretch - front: With your feet shoulder width apart, bend forward from the waist/hips. Your arms can hang downward, or you can place your hands on your hips. Hold for 10 seconds.

Back Stretch - back: With your feet shoulder width apart, your hands on your hips, gently lean backwards. Hold for 10 seconds.

Squat: With your feet shoulder width apart, bend at the knees and lower to the ground. Keep your back upright and straight. Your arms can be reached out in front of you to help maintain balance.

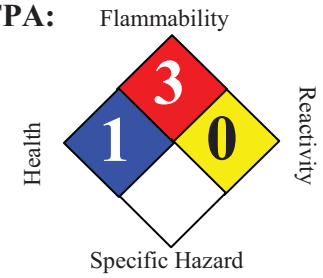
Quads: With your feet shoulder width apart, stabilize yourself with one hand on a fixed object, reach behind you with the other hand and raise the same foot, grab the foot and gently press your foot toward your body. Keep your knees parallel while stretching. Hold for 10 seconds and repeat with the other side.

ATTACHMENT D

Safety Data Sheets

Safety Data Sheet
Gasoline, Unleaded

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Gasoline, Unleaded			
Synonyms	:	Blend of Highly Flammable Petroleum Distillates, Regular, Mid-Grade, Premium, 888100008809			
SDS Number	:	888100008809	**Version**	:	1.1
Product Use Description	:	Fuel			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications :
Flammable Liquid – Category 1 or 2 depending on formulation.
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Skin Irritation – Category 2
Eye Irritation – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms :

Signal Word : **Danger**

Hazard Statements

Extremely flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing blood cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by repeated and prolonged inhalation or skin contact. Causes eye irritation. Can be absorbed through skin.
May cause drowsiness or dizziness. Extreme exposure such as intentional inhalation may cause unconsciousness, asphyxiation and death.
Repeated or prolonged skin contact can cause irritation and dermatitis.

Harmful to aquatic life.

Precautionary statements

Prevention : Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat, sparks, open flames, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response : In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage : Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers. Some containers not approved for gasoline may dissolve and release flammable gasoline liquid and vapors.

Disposal : Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Gasoline, natural; Low boiling point naphtha	8006-61-9	10 - 30%
Toluene	108-88-3	10 - 30%
Xylene	1330-20-7	10 - 30%
Ethanol; ethyl alcohol	64-17-5	0-8.2%
Trimethylbenzene	25551-13-7	1 - 5%
Isopentane; 2-methylbutane	78-78-4	1 - 5%

Naphthalene	91-20-3	1 - 5%
Benzene	71-43-2	Less than 1.3%
Pentane	109-66-0	1 - 5%
Cyclohexane	110-82-7	1 - 5%
Ethylbenzene	100-41-4	1 - 5%
Butane	106-97-8	1 - 20%
Heptane [and isomers]	142-82-5	0.5 - 0.75%
N-hexane	110-54-3	0.5 - 0.75%

SECTION 4. FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye contact : Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Obtain medical attention.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders. Aspiration may cause pulmonary edema and pneumonitis. Swallowing gasoline is more likely to be fatal for small children than adults, even if aspiration does not occur.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray or fire fighting foam. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers. Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Extremely flammable liquid and vapor. This material is combustible/flammable and is sensitive to fire, heat, and static discharge.

Special protective equipment for fire-fighters : Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Further information : Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental precautions : Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods for cleaning up : Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling : Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.
(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).
(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Reports suggest that government-mandated ethanol, if present, may not be compatible with fiberglass gasoline tanks. Ethanol may dissolve fiberglass resin, causing engine damage and possibly allow leakage of explosive gasoline.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

No decomposition if stored and applied as directed. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Store only in containers approved and labeled for gasoline.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Ethanol; Ethyl alcohol	64-17-5	PEL	1,000 ppm 1,900 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
	Cyclohexane	110-82-7	PEL	300 ppm 1,050 mg/m3
	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Heptane [and isomers]	142-82-5	PEL	500 ppm 2,000 mg/m3
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
ACGIH	Toluene	108-88-3	TWA	50 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Ethanol; Ethyl alcohol	64-17-5	TWA	1,000 ppm
	Trimethylbenzene	25551-13-7	TWA	25 ppm
	Isopentane; 2-Methylbutane	78-78-4	TWA	600 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Pentane	109-66-0	TWA	600 ppm
	Cyclohexane	110-82-7	TWA	100 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Heptane [and isomers]	142-82-5	TWA	400 ppm
		142-82-5	STEL	500 ppm

	N-hexane	110-54-3	TWA	50 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection : Gloves constructed of nitrile or neoprene are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.

Respiratory protection : A NIOSH/ MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Work / Hygiene practices : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear to straw colored liquid

Odor : Characteristic hydrocarbon-like

Odor threshold 0.5 - 1.1 ppm

pH : Not applicable

Melting point/freezing point About -101°C (-150°F)

Initial boiling point & range Boiling point varies: 30 – 200°C (85 – 392°F)

Flash point < -21°C (-5.8°F)

Evaporation rate : Higher initially and declining as lighter components evaporate

Flammability (solid, gas) : Flammable vapor released by liquid

Upper explosive limit	7.6 %(V)
Lower explosive limit	1.3 %(V)
Vapor pressure	345 - 1,034 hPa at 37.8 °C (100.0 °F)
Vapor density (air = 1)	Approximately 3 to 4
Relative density (water = 1)	0.8 g/mL
Solubility (in water)	Negligible
Partition coefficient (n-octanol/water)	2 – 7 as log Pow
Auto-ignition temperature	Approximately 250°C (480°F)
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	0.64 to 0.88 mm²/s range reported for gasoline
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature)	: Hydrocarbon liquids without static dissipater additive may have conductivity below 1 picoSiemens per meter (pS/m). The highest electro-static ignition risks are associated with ”ultra-low conductivities” below 5 pS/m. See Section 7 for sources of information on defining safe loading and handling procedures for low conductivity products.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, alkaline products and strong acids. Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.
Conditions to avoid	: Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	: Ignition and burning can release carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Skin contact	: Irritating to skin. Can be partially absorbed through skin.
Eye contact	: Irritating to eyes.
Ingestion	: Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Inhalation and further information

Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, over excitation. Exposure to very high levels can result in unconsciousness and death.

Repeated over-exposure may cause liver and kidney injuries.
Components of the product may affect the nervous system.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.
This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Component:

Gasoline, natural; Low boiling point naphtha	8006-61-9	Acute oral toxicity: LD50 rat Dose: 18.8 mg/kg Acute inhalation toxicity: LC50 rat Dose: 20.7 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Moderate eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethanol; Ethyl alcohol	64-17-5	Acute oral toxicity: LD50 rat Dose: 6,200 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 19,999 mg/kg Acute inhalation toxicity: LC50 rat Dose: 8,001 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may cause skin irritation and/or dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h

		Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	:	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	:	Benzene (CAS-No.: 71-43-2)
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3)

Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
Ethanol; Ethyl alcohol	64-17-5	Toxicity to fish: LC50 Species: Leuciscus idus (Golden orfe) Dose: 8,140 mg/l Exposure time: 48 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9,268 - 14,221 mg/l Exposure time: 48 h
Isopentane; 2-Methylbutane	78-78-4	Toxicity to fish: LC50 Species: Oncorhynchus mykiss (rainbow trout) Dose: 3.1 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.3 mg/l Exposure time: 96 h
Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
Pentane	109-66-0	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9.74 mg/l Exposure time: 48 h
Cyclohexane	110-82-7	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 3.78 mg/l Exposure time: 48 h

Heptane [and isomers]	142-82-5	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 4 mg/l Exposure time: 24 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 1.5 mg/l Exposure time: 48 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: Petrol
UN-No.	: 1203
Class	: 3
Packing group	: II

TDG

Proper shipping name	: Gasoline
UN-No.	: UN1203
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3

Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1203
Description of the goods	:	Gasoline
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Flammable liquid
Highly toxic by ingestion
Moderate skin irritant
Severe eye irritant
Carcinogen

TSCA Status : On TSCA Inventory

DSL Status : . All components are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Revision Date : 08/09/2012

6, 8, 10, 12, 14, 16, 64, 68, 91, 112, 306, 1092, 1106, 1500, 1570, 1571, 1651, 1652, 1654, 1700, 1701, 1702, 1710, 1711, 1714, 1726, 1729, 1730, 1732, 1733, 1826, 1848, 1880, 1950

Safety Data Sheet

Material Name: Diesel Fuel, All Types

SDS No. 9909
US GHS

Synonyms: Ultra Low Sulfur Diesel; Low Sulfur Diesel; No. 2 Diesel; Motor Vehicle Diesel Fuel; Non-Road Diesel Fuel; Locomotive/Marine Diesel Fuel

* * * Section 1 - Product and Company Identification * * *

Manufacturer Information

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

Phone: 732-750-6000 Corporate EHS
Emergency # 800-424-9300 CHEMTREC
www.hess.com (Environment, Health, Safety Internet Website)

* * * Section 2 - Hazards Identification * * *

GHS Classification:

Flammable Liquids - Category 3
Skin Corrosion/Irritation – Category 2
Germ Cell Mutagenicity – Category 2
Carcinogenicity - Category 2
Specific Target Organ Toxicity (Single Exposure) - Category 3 (respiratory irritation, narcosis)
Aspiration Hazard – Category 1
Hazardous to the Aquatic Environment, Acute Hazard – Category 3

GHS LABEL ELEMENTS

Symbol(s)

Signal Word

DANGER

Hazard Statements

Flammable liquid and vapor.
Causes skin irritation.
Suspected of causing genetic defects.
Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
Harmful to aquatic life.

Precautionary Statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. No smoking
Keep container tightly closed.
Ground/bond container and receiving equipment.

Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wear protective gloves/protective clothing/eye protection/face protection.
Wash hands and forearms thoroughly after handling.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapours/spray.

Response
In case of fire: Use water spray, fog or foam to extinguish.
IF ON SKIN (or hair): Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell.
If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting.
IF exposed or concerned: Get medical advice/attention.

Storage
Store in a well-ventilated place. Keep cool.
Keep container tightly closed.
Store locked up.

Disposal
Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
68476-34-6	Fuels, diesel, no. 2	100
91-20-3	Naphthalene	<0.1

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

First Aid: Skin
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or with waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and the area of the body burned.

First Aid: Ingestion
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

First Aid: Inhalation

Remove person to fresh air. If person is not breathing, provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Extinguishing Media

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, and other gaseous agents.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Unsuitable Extinguishing Media

None

Fire Fighting Equipment/Instructions

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

* * * Section 6 - Accidental Release Measures * * *

Recovery and Neutralization

Carefully contain and stop the source of the spill, if safe to do so.

Materials and Methods for Clean-Up

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Caution, flammable vapors may accumulate in closed containers.

Emergency Measures

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Personal Precautions and Protective Equipment

Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental Precautions

Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Prevention of Secondary Hazards

None

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Handle as a combustible liquid. Keep away from heat, sparks, excessive temperatures and open flame! No smoking or open flame in storage, use or handling areas. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks."

Incompatibilities

Keep away from strong oxidizers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: 100 mg/m3 TWA (inhalable fraction and vapor, as total hydrocarbons, listed under Diesel fuel)
Skin - potential significant contribution to overall exposure by the cutaneous route (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH:	10 ppm TWA
	15 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA:	10 ppm TWA; 50 mg/m3 TWA
NIOSH:	10 ppm TWA; 50 mg/m3 TWA
	15 ppm STEL; 75 mg/m3 STEL

Engineering Measures

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

Personal Protective Equipment: Respiratory

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Personal Protective Equipment: Hands

Gloves constructed of nitrile, neoprene, or PVC are recommended.

Personal Protective Equipment: Eyes

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

Personal Protective Equipment: Skin and Body

Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Clear, straw-yellow.	**Odor:**	Mild, petroleum distillate odor
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	0.009 psia @ 70 °F (21 °C)	**Vapor Density:**	>1.0
Boiling Point:	320 to 690 °F (160 to 366 °C)	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.83-0.876 @ 60°F (16°C)
Evaporation Rate:	Slow; varies with conditions	**VOC:**	ND
Percent Volatile:	100%	**Octanol/H2O Coeff.:**	ND
Flash Point:	>125 °F (>52 °C) minimum	**Flash Point Method:**	PMCC
Upper Flammability Limit (UFL):	7.5	**Lower Flammability Limit (LFL):**	0.6
Burning Rate:	ND	**Auto Ignition:**	494°F (257°C)

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatible Products

Keep away from strong oxidizers.

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if swallowed.

B: Component Analysis - LD50/LC50

Naphthalene (91-20-3)

Inhalation LC50 Rat >340 mg/m3 1 h; Oral LD50 Rat 490 mg/kg; Dermal LD50 Rat >2500 mg/kg; Dermal LD50 Rabbit >20 g/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

Contact with eyes may cause mild irritation.

Potential Health Effects: Ingestion

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Potential Health Effects: Inhalation

Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Respiratory Organs Sensitization/Skin Sensitization

This product is not reported to have any skin sensitization effects.

Generative Cell Mutagenicity

This material has been positive in a mutagenicity study.

Carcinogenicity

A: General Product Information

Suspected of causing cancer.

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

B: Component Carcinogenicity

Fuels, diesel, no. 2 (68476-34-6)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans (listed under Diesel fuel)

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Reproductive Toxicity

This product is not reported to have any reproductive toxicity effects.

Specified Target Organ General Toxicity: Single Exposure

This product is not reported to have any specific target organ general toxicity single exposure effects.

Specified Target Organ General Toxicity: Repeated Exposure

This product is not reported to have any specific target organ general toxicity repeat exposure effects.

Aspiration Respiratory Organs Hazard

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Fuels, diesel, no. 2 (68476-34-6)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	35 mg/L [flow-through]	

Naphthalene (91-20-3)

Test & Species		Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]	
96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]	
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]	

96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [Flow through]
48 Hr EC50 Daphnia magna	1.09 - 3.4 mg/L [Static]

Persistence/Degradability

No information available.

Bioaccumulation

No information available.

Mobility in Soil

No information available.

* * * Section 13 - Disposal Considerations * * *

Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

Disposal of Contaminated Containers or Packaging

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 14 - Transportation Information * * *

DOT Information

Shipping Name: Diesel Fuel
NA #: 1993 **Hazard Class:** 3 **Packing Group:** III
Placard:

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Naphthalene (91-20-3)

CERCLA: 100 lb final RQ; 45.4 kg final RQ

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the de minimis levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right- To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

State Regulations

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Fuels, diesel, no. 2	68476-34-6	No	No	No	Yes	No	No
Naphthalene	91-20-3	Yes	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Fuels, diesel, no. 2	68476-34-6	Yes	DSL	EINECS
Naphthalene	91-20-3	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	2
Reactivity	0

HMIS® Hazard Rating

Health	1*	Slight
Fire	2	Moderate
Physical	0	Minimal
		*Chronic

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

Literature References

None

Other Information

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

End of Sheet

SAFETY DATA SHEET

Air

Section 1. Identification

GHS product identifier : Air

Chemical name : air

Other means of identification : Compressed Air ; Breathing Quality Air ; synthetic air, reconstituted air, medical air, medical air USP.

Product use : Synthetic/Analytical chemistry.

Synonym : Compressed Air ; Breathing Quality Air ; synthetic air, reconstituted air, medical air, medical air USP.

SDS # : 001002

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May support combustion.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

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Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Chemical name : air

Other means of identification : Compressed Air ; Breathing Quality Air ; synthetic air, reconstituted air, medical air, medical air USP.

CAS number/other identifiers

CAS number : Not applicable.

Product code : 001002

Ingredient name	%	CAS number
Nitrogen	76.5 - 80.5	7727-37-9
oxygen	19.5 - 23.5	7782-44-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : “None expected”

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

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

Most important symptoms/effects, acute and delayed

Potential acute health effects

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

Inhalation : “None expected”

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

Frostbite : Try to warm up the frozen tissues and seek medical attention.

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

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

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

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Section 4. First aid measures

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

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Section 7. Handling and storage

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

None.

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

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

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Section 8. Exposure controls/personal protection

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas.

Color : Colorless.

Boiling/condensation point : -194.3°C (-317.7°F)

Melting/freezing point : -216.2°C (-357.2°F)

Critical temperature : Lowest known value: -146.95°C (-232.5°F) (nitrogen).

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Flash point : Not available.

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

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

Vapor pressure : Not available.

Vapor density : Highest known value: 1.1 (Air = 1) (oxygen). Weighted average: 1 (Air = 1)

Gas Density (lb/ft ^{3}) : 0.0749

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

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Section 10. Stability and reactivity

Incompatibility with various substances : Not considered to be reactive according to our database.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

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

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

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

Inhalation : “None expected”

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

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

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

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Section 11. Toxicological information

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

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

Other adverse effects : No known significant effects or critical hazards.

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Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1002	UN1002	UN1002	UN1002	UN1002
UN proper shipping name	Air, compressed	Air, compressed	Air, compressed	Air, compressed (nitrogen, oxygen)	Air, compressed (nitrogen, oxygen)
Transport hazard class(es)	2.2	2.2	2.2	2.2	2.2
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	-	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	-

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

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: All components are listed or exempted.
United States inventory (TSCA 8b): All components are listed or exempted.

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

Clean Air Act Section 602 Class I Substances : Not listed

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Section 15. Regulatory information

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

No products were found.

State regulations

Massachusetts : The following components are listed: NITROGEN; OXYGEN (LIQUID)

New York : None of the components are listed.

New Jersey : The following components are listed: NITROGEN; OXYGEN

Pennsylvania : The following components are listed: NITROGEN; OXYGEN

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: Not determined.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

WHMIS (Canada) : Class A: Compressed gas.

CEPA Toxic substances: None of the components are listed.
Canadian ARET: None of the components are listed.
Canadian NPRI: None of the components are listed.
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

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Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

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

Health	0
Flammability	0
Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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

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

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 10/14/2014.

Date of issue/Date of revision : 10/14/2014.

Date of previous issue : 9/22/2014.

Version : 0.03

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations

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Section 16. Other information

DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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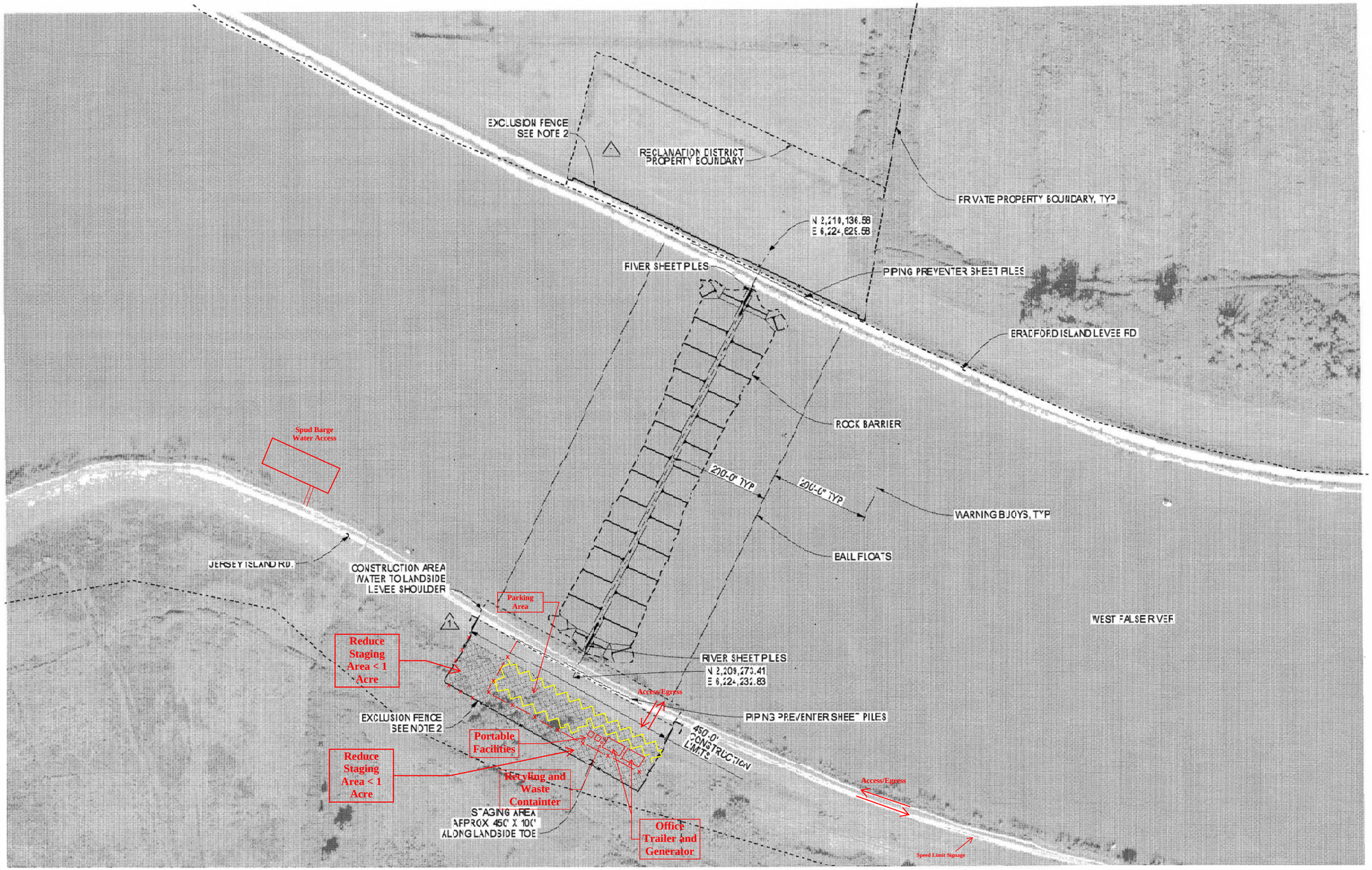
ATTACHMENT E

Emergency Response Site Plan



SITE PLAN (Not To Scale)

WEST FALSE RIVER - GENERAL PLAN

SCALE 1"=100'

0 50 100

NOTES:

1. DATUM- CALIFORNIA STATE PLANE ZONE 3, NAD 83, NAVD 88, FEET
2. EXCLUSION FENCE INSTALLED AS DIRECTED.

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF ENGINEERING
STATE WATER FACILITIES

REV.	DESCRIPTION	SJB	APP.
1	ADDENDUM # 1 AE. B3 AND D4	TM	TM

DESIGNED: NATHAN V. SMITH, REG. C.E No. 71181
CHECKED: ANNA B. GUTIERREZ, REG. C.E No. 71270
DRAWN: NATHAN V. SMITH, REG. C.E No. 71181
REVIEWED: JAMES M. LOPES, REG. C.E No. 61181
SUBMITTED: JAMES M LOPES, REG. C.E No. 61181
APPROVAL RECOMMENDED DATE:
TRU VANNGUYEN
CHIEF GENERAL ENGINEERING SECTION, REG C.E. No. 15997
APPROVED: DATE: APR 13 2015
ORIGINAL SIGNED BY
JOSEPH V. ROYER
CHIEF GEOTECH. SERVICES BRANCH REG.C.E. No. 52714

THINK SAFETY - ACT SAFELY

STATE WATER FACILITIES
DROUGHT EMERGENCY

TEMPORARY ROCK BARRIER
2015

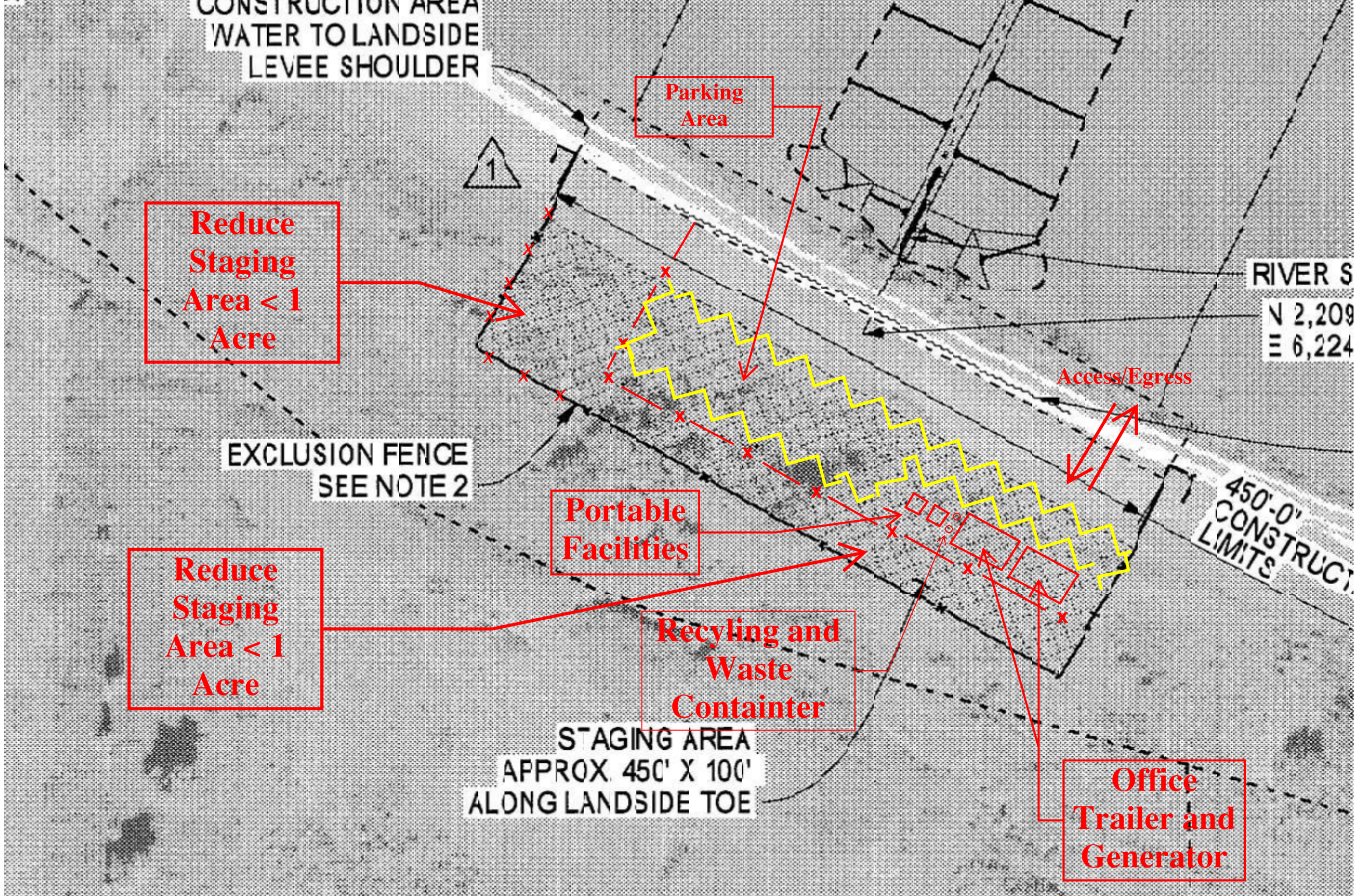
WEST FALSE RIVER

WEST FALSE RIVER

GENERAL PLAN

SPEC. NO.	SHEET NO.	REVISION	DRAWING NO.
15-04	003	01	C-202

V:\ Plot.BV.22:34.PEN
4/16/2015


CONSTRUCTION AREA
WATER TO LANDSIDE
LEVEE SHOULDER
Parking Area
1
Reduce Staging Area < 1 Acre
RIVER S
N 2,209
E 6,224
Access/Egress
EXCLUSION FENCE
SEE NOTE 2
Portable Facilities
450'-0"
CONSTRUCT
LIMITS
Reduce Staging Area < 1 Acre
Recyling and Waste Containter
STAGING AREA
APPROX. 450' X 100'
ALONG LANDSIDE TOE
Office Trailer and Generator

ATTACHMENT F

Project Contact Information

Emergency Drought Barrier Project Contact List updated 5/5/15				
Work Trailer/Construction Supervisor (916) 539-7726				
AECOM Project Team Check-In/Check-Out Line (916) 335-3927				
Name	Organization	Office Phone	Cell Phone	E-mail
Rachel August	DWR	(916) 376-9838	(916) 759-7418	Rachel.August@water.ca.gov
Katherine Bandy	DWR	(916) 376-9793	(661) 619-3595	Katherine.Bandy@water.ca.gov
Jess Barnes	DWR	(916) 376-9789	(760) 267-6918	Jessica.Barnes@water.ca.gov
Joaquin Garza	DWR	–	(916) 662-5053	Joaquin.Garza@water.ca.gov
Don Guy	DWR	(916) 376-9787	(916) 684-2941	Donald.Guy@water.ca.gov
Lesley Hamamoto	DWR	(916) 376-9784	(916) 208-0320	Lesley.Hamamoto@water.ca.gov
Wayne Jensen	DWR	–	(916) 802-7257	Wayne.Jensen@water.ca.gov
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Kenneth Karcher	DWR	–	(916) 217-9907	Kenneth.Karcher@water.ca.gov
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Jacob McQuirk	DWR	(916) 653-9883	(916) 425-6857	Jacob.McQuirk@water.ca.gov
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Peter Boice	AECOM	(415) 796-8153	–	Peter.Boice@aecom.com
Pam Brillante	AECOM	(916) 414-5831	(916) 799-7071	Maria.Valle@aecom.com
Cindy Davis	AECOM	(916) 414-5810	(916) 712-2213	Cindy.Davis@aecom.com
Diana Edwards	AECOM	(415) 365-3226	–	Diana.Edwards@aecom.com
Derek Jansen	AECOM	(415) 796-8100	–	Derek.Jansen@aecom.com
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Mandi McElroy	AECOM	(510) 874-3097	–	Mandi.Mcelroy@aecom.com
Ivan Parr	AECOM	(510) 893-3600	–	Ivan.Parr@aecom.com
Norm Ponferrada	AECOM	(510) 893-3600	(209) 598-7826	Norm.Ponferrada@aecom.com
Jonathon Stead	AECOM	(510) 874-3058	(510) 520-2364	Jon.Stead@aecom.com

Emergency Drought Barrier Project Contact List updated 5/5/15				
Work Trailer/Construction Supervisor (916) 539-7726				
AECOM Project Team Check-In/Check-Out Line (916) 335-3927				
Name	Organization	Office Phone	Cell Phone	E-mail
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Tracy Walker	AECOM	(916) 266-4928	(916) 204-5682	Tracy.Walker@aecom.com
Monique Meyer	AECOM	(916) 361-6421	(916) 335-3927	Monique.meyer@aecom.com
Chuck Epstein	AECOM	(916) 361-6444	(916) 201-3759	Chuck.epstein@aecom.com
Richard Pearl	Dutra		(707) 333-8753	Rpearl@dutragroup.com
Crystal Spurr	CDFW	(209) 234-3420	–	Crystal.Spurr@wildlife.ca.gov
Jim Starr	CDFW	(209) 234-3420	–	Jim.Starr@wildlife.ca.gov
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Garwin Yip	NMFS	(916) 930-3611	–	Garwin.Yip@noaa.gov
Oscar Biondi	SWRCB	(916) 323-9397	–	Oscar.Biondi@waterboards.ca.gov
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Kim Turner	USFWS	(916) 930-5603	–	Kim_S_Turner@fws.gov

ATTACHMENT G

Tailgate Safety Briefing Attendance Form

AECOM

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

DWR 2015 Emergency Drought Barrier Project

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
Required PPE	☐ yes	☐ n/a	Smoking, Eating, & Drinking	☐ yes	☐ n/a
Boating Operations	☐ yes	☐ n/a	Heat/Cold Stress	☐ yes	☐ n/a
Float Plan and Communications Protocol	☐ yes	☐ n/a	Chemical Hazards	☐ yes	☐ n/a
Emergency Action Plan & Procedures	☐ yes	☐ n/a	Hazards - Working at Night	☐ yes	☐ n/a
Allergies or Medical Conditions of Coworkers	☐ yes	☐ n/a	Required Equipment	☐ yes	☐ n/a
Tagging Procedures	☐ yes	☐ n/a	Encounters with the Public / Talking Points	☐ yes	☐ n/a
Site Control / Visitors to the Site	☐ yes	☐ n/a	Eqpmt. Inspections/Safety Checklists	☐ yes	☐ n/a

COMMENTS/OTHER

Tailgate Meeting Attendees

Print Name/Company	**Signature/Time In/Time Out**

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.

ATTACHMENT H

SWP Receipt and Acceptance Form

Safe Work Plan Receipt and Acceptance Form

Project Name: 2015 Emergency Drought Barrier Project

Project Location: Sacramento–San Joaquin Delta (False River)

I have received a copy of the Safe Work Plan prepared for the above-referenced site and activities. I have read and understood its contents and I agree that I will abide by its requirements.

Name: _____

Signature: _____

Date: _____

Representing: _____

ATTACHMENT I

Fieldwork Line of Fire Training

Fieldwork Line of Fire

Safety for life

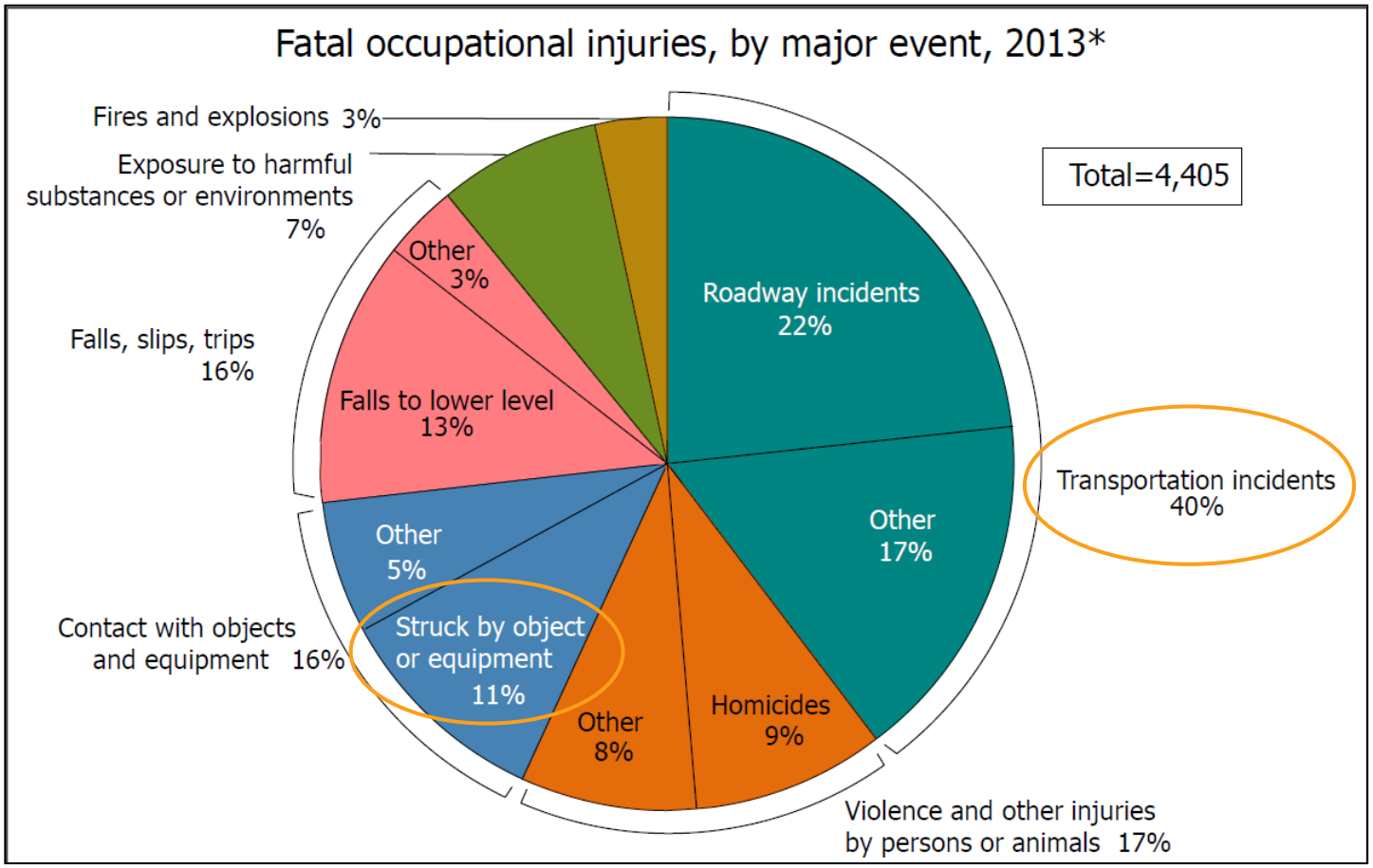
AECOM

Design and Consulting Services Americas

Safety Campaign 2015:

Fieldwork Line of Fire

Causes of fatal work injuries



***Bureau of Labor Statistics**

Note: Transportation incidents also include "struck by" cases. Struck by incidents present a wide range of hazards, including: dump trucks, bobcats and equipment, machinery, suspended loads, release of pressure, and a host of other situations.

What is “Line of Fire”?

“Line of Fire,” or LOF, is a military term that describes the path of a discharged missile or firearm. It is the path an object will travel. In fieldwork, there are many objects that have potential to create line of fire exposure. It is a term often coined on construction sites.

Action: Please ask each field team member for an example of an object or activity they encounter in the field that worries them and could hurt them significantly.

How do you protect yourself from LOF?

Awareness/alertness is the first defense. Be alert for conditions that may change where the Line of Fire zone exists, including wind gusts and falling objects. Employees must not become complacent. They must constantly consider whether hazards are presented and how to avoid them.

Perform a job site walk-down to identify missing or weak defenses in areas such as barricading, equipment guards and excavation shoring.

Remind workers to stay clear of hazards by using flagging, barricades, job briefings and three-way communication.

Pay close attention to personnel and objects above, below and in the immediate work area during **any** job evaluation. No material should be dropped unless absolutely necessary and then no greater than six feet uncontrolled. The drop zone shall always be guarded and cleared and with appropriate set back if material is expected to bounce or move.

Lifting/hoisting:

- Never walk under a suspended load.
- Communicate to other workers when entering a lifting/hoisting zone, even if only for a short period.
- Never position yourself in a place where a falling or slipping load could strike you.
- Never walk in the swing radius of a crane or heavy equipment that is not barricaded.

Tensioned lines

- Be aware and stay clear of tensioned lines such as cable, chain and rope.
- Use only correct gripping devices. Select proper equipment based on size and load limit.
- Be cautious of torque stresses that drilling equipment and truck augers can generate. Equipment can rotate unexpectedly long after applied torque force has been stopped.

Objects with fall potential

- Not all objects are overhead. Be especially mindful of top-heavy items and items being transported by forklift or flatbed. In general, materials should not be stacked more than four feet high and must be properly blocked or cribbed.

How do you protect yourself from LOF?

Objects with roll potential
- Secure objects that can roll, such as tools, cylinders and poles.
- Secure rolling stock using approved binders; apply parking brakes or use chocks to prevent movement.

Pressurized cylinders and lines
- Safety standards for compressed cylinders include securing all tanks upright and installing caps when not in use.

High-pressure hydraulic tools and powder actuated tools
- Stay clear of operators using this equipment. Only operate this equipment if properly trained and approved in writing by the SH&E Department.

Regulator/gauge pressurization
- During the instant that pressure is introduced into a cylinder regulator gauge, stand aside and avoid facing the front or back of the regulator gauge.

Electrical equipment
- Stay clear of contractors performing breaker or transformer work. Follow set back requirements for all work near energized electrical lines.

Spring-loaded devices
- Springs come in a variety of shapes and sizes, and can release tremendous energy if compression as tension is suddenly released.

Vehicle/heavy equipment
- Use parking brakes and wheel chocks for any vehicle or equipment parked on an incline.
- When working near moving, heavy equipment, such as trucks and cranes, remain in the operator's full view. Obtain the operator's attention prior to approaching equipment.
- Do not get in the operating range of heavy equipment including scissor lifts and boom trucks.
- Take precautions for all pedestrian and vehicle traffic when positioning vehicles and equipment at a job site.

Minimizing Line of Fire Risk

There are many “lines of fire” (even as simple as standing on a project site near an adjacent public roadway).

Action: Please go around the room to each field team member and ask what advice they can share on how to eliminate or minimize Line of Fire objects in the field workplace.

Awareness and distractions prevention

To reduce the risk of being injured by a Line of Fire object, AECOM requires that staff follow these practices:

- Do not wear music earbuds or music headphones during fieldwork.
- Use the phone only in safe designated locations on the worksite. If necessary, leave the phone in the work vehicle.
- Be constantly vigilant of what is around you – situational awareness. Make it a habit to regularly stop and look, especially on busy construction sites.
- Envision what might happen and place yourself in a position to not be injured if it does.
- Do not try and multi-task.

Action: Are there any other ideas from the team to prevent distractions and increase awareness?

Taking

- No job is so important that you have to take a risk that could hurt you or a co-worker.
- Do not cut corners. Do not deviate from Task Hazard Analysis control measures.
- If there is a changed condition, stop work and re-assess the steps with the team that will be taken to keep everyone safe.
- If the changed condition warrants additional tools or equipment, stop the work until they can be obtained.

Action: Does anyone on the team have a story of a Line of Fire fieldwork incident they can share?

Culture of Caring – Line of Fire

- If you see someone in a Line of Fire, alert them and STOP WORK if necessary to keep the person from getting hurt. This includes coworkers, subcontractors, non-managed contract workers, the general public, etc.

- Hold a safety stand-down immediately on the project site for any Line of Fire object that is uncontrolled.

- Report all near misses in the AECOM reporting system.

- Leave the area if dangerous activities continue by others not under AECOM control and report to your management and SH&E team.

Safety for life

Please complete the attendance record and submit it to the SH&E Department POC on the attendance record.

END

AECOM

AECOM

DCS Americas Field Employees - Line of Fire Safety Stand-Down Attendance Record

DATE: 4/30/2015 **PAGE** 1 **OF** 1

LOCATION: DWR Emergency Drought Barrier

STAND-DOWN CONDUCTED BY:

Name (Print Legibly)	Signature	Office Location	Employee Number

NOTE: Please e-mail this attendance form to laura.waterworth@aecom.com when completed.