

HEALTH AND SAFETY PLAN

Former Jamaica Gas Light Company Manufactured Gas Plant Site Jamaica, Queens, New York

Prepared for:

National Grid One Metro Tech Center Brooklyn, NY 11201

Prepared by:

AECOM 20 Exchange Place, 13th Floor New York, New York 10005

Health and Safety Plan Expiration Date: October 28, 2014

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Project Health and Safety Plan Approval Page

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

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Former Jamaica Gas Light Company Manufactured Gas plant Site. This HASP has been written for the exclusive use of AECOM, its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Prepared by:

w n

October 22, 2013

Date

Sara L. Meissner Assistant Project Manager 212-607-4194

Approved by:

Michael Grasso, CIH District Safety and Health Manager 607-201-6737

October 22, 2013 Date



Executive Summary and Scope of Work

A RI will be implemented on the Site to investigate and delineate MGP-related impacts encountered during the SC in the overburden in the center and along the southern boundary of the Site. The objectives of the RI are:

- To determine the horizontal and vertical extent of the two smaller former holders and the former Purifier and Meter room structure
- To delineate the extent of MGP residuals observed in the center and along the southern boundary of the Site
- To characterize groundwater quality horizontally down gradient of the Site.

To accomplish these objectives, National Grid proposes to implement the following scope of work:

- Property access agreement
- Utility clearance including a geophysical survey
- Mobilization
- Test pit excavation
- Borehole advancement and overburden monitoring well installation
- Collection and analysis of subsurface soil samples
- Groundwater monitoring
- Investigation derived waste management
- Community air monitoring
- Site survey

All work will be performed in accordance with the procedures specified in the 2010 NYSDEC-approved SC Work Plan. A description of the proposed activities is presented in the following sections.

Property Access Agreement

National Grid is working with the owner of the Site and off-Site property to extend existing access agreements. Verbal agreement with the owner of the Site and off-Site property has already been obtained by National Grid for the implementation of this RI Work Plan.

Utility Clearance

A mark-out will be completed to identify subsurface utilities on and adjacent to the Site prior to intrusive activities. Copies of available city sewer and water maps from the Site vicinity will also be obtained and reviewed during underground utility clearance procedures. Following review of the utilities in the Site area, AECOM will contract a private company to locate all underground electric and gas utilities in the vicinity of each proposed subsurface sampling location using geophysical methods. Outlying areas, where information is required to confirm the location of suspected utilities that may act as preferential migration pathways, may also be surveyed using geophysical methods. Lastly, all boring/well locations will be soft excavated, by hand and/or vacuum methods, to a depth of five feet to check for potential utilities. Once clear, drilling and excavation activities will proceed slowly and carefully for the top ten feet of each investigation location. Proposed sampling locations may be shifted to avoid subsurface and overhead utilities as appropriate.

Mobilization

Following procurement of appropriate agreements and permits, AECOM will mobilize to the Site and set up a decontamination area, drum storage area, and heavy equipment laydown area for the RI activities. These areas will be placed within the Site in a centrally located area. AECOM will coordinate field activities with the Site owner and the Site tenant to avoid or minimize disruptions, to the extent practicable.

Test Pits

Three test pits (TP-1, TP-2, and TP-3) will be excavated along and around the former holders, No. 1 and No. 2, and the former purifier/meter house. The test pits will be excavated to investigate the condition of remnants of the former MGP structures. The condition of the soil will be logged to aid in the delineation of observations from nearby borings.

The asphalt in each test pit area will be saw cut to the extent possible prior to excavation. A backhoe will be used to excavate the test pits, which will be approximately 20 feet in length and will extend down to 10 to 15 feet below ground surface. If possible the backhoe will expose the base of each structure or foundation. The bottom of any structure



suspected to contain non-aqueous phase liquid (NAPL) will not be penetrated. The final length and depth of test pit excavation will be based on field observations and professional judgment of the supervising geologist or environmental scientist. Additional test pits will be excavated as needed to further visually delineate any source areas.

The materials uncovered in the test pits will be logged by the supervising geologist or environmental scientist in the field using the most appropriate and current guidelines provided by American Society for Testing and Materials (ASTM) and the Unified Soil Classification System (USCS). Soil will be screened for the presence of volatile organics using a PID. Analytical soil samples may be collected from each test pit if conditions within the test pit are observed to be very different from those previously observed in completed soil borings. These soil samples will be analyzed according to the Soil Sampling section below. Analytical soil samples, to determine soil quality, may be collected from the bottom of the test pit if clean soil conditions are encountered while only waste characterization samples, to characterize for disposal at a thermal facility, may be collected if heavily impacted conditions are encountered.

The corners of each test pit will be flagged for location by survey. Excavation spoils removed from the test pit will be temporarily stored on a sheet of plastic for return to the excavation. To the extent possible, clean soil will be segregated from impacted soil. Upon completion of each test pit, impacted soil and debris will be returned to the excavation first, followed by clean soil and any additional clean backfill needed to return the excavation to original grade. The top 2 feet will be clean soil from the excavation. Any remaining investigation derived waste (IDW) will be handled in accordance with procedures in the SC Work Plan. Between the completion of each test pit and following the completion of all work, the backhoe will be decontaminated (e.g., brush and steam-clean) as deemed appropriate by the supervising geologist or environmental scientist overseeing the work. An asphalt cover will be placed over each area disturbed as a result of the test pit activities.

If necessary, odor control foam and plastic sheeting will be used to minimize odors generated during test pitting. In the event that the CAMP or worker protection air monitoring criteria is exceeded, soil handling and excavation activities will be temporarily suspended and additional odor control measures will be evaluated

The geologist will complete a subsurface test pit log which will describe the type of soil encountered; the presence of visible evidence of MGP residuals; the presence of hydrocarbon-like odors; a description of each subsurface structure encountered; and a sketch and photograph of the sidewalls of the excavations showing locations of impacted soil, soil structures, and remnants of MGP structures encountered, if any.

Borehole Advancement and Monitoring Well Installation

Following or simultaneously with the test pit excavations, one soil boring (SB-16) will be completed within the former purifier and meter house north of SB-12, two soil borings (SB-17 and SB-19) will be completed northeast and southeast, respectively, of the former holder No. 1, one soil boring (SB-18) will be completed north of SB-08, one soil boring (SB-20) will be completed between the former holders No. 1 and No. 2, and three soil borings (SB-21, SB-22, and SB-23) will be completed down gradient of the Site on the FDA parking lot to horizontally delineate any residual MGP materials. The three down gradient soil borings (SB-21, SB-22, and SB-23) will be completed following the completion of on-site soil borings SB-19 and SB-20. This sequence of soil boring completion will ensure that, in the absence of observed contamination, the analytical samples collected in the three down gradient soil borings are at depths that correspond to observations noted during the completion of on-site soil boring SB-19 and SB-20. A step-out soil boring (SB-24) will be completed on 158th Street if impacts are observed in soil boring SB-23. Soil boring locations may be modified based on the observations from the test pit excavations or already completed borings. The borings will be advanced to a maximum depth of 50 feet bgs. However, completion depths may be adjusted shallower in instances where 10 feet of clean soils are encountered below apparently contaminated soils. Soil borings will be advanced a minimum of 40 feet bgs. In the event that impacts are observed above an apparent confining layer, borings will be terminated at the top of the confining layer.

A total of four soil borings will be converted to groundwater monitoring wells (MW-7 through MW-10) to determine the presence or absence of dissolved phase MGP residuals down gradient of observed impacts. The monitoring wells will be constructed and developed in accordance with the SC Work Plan. Following completion, the borings not converted to monitoring wells will be tremie-grouted to the ground surface and the surface restored to match pre-existing conditions.

Soil Sampling

Soil samples for observation and volatile organic compound (VOC) screening by PID will be collected and logged continuously from the ground surface to boring completion. A minimum of three (3) soil samples will be collected from each boring for laboratory analysis. The first sample will be collected at the depth of greatest apparent contamination from the 0 to 5 feet bgs interval. It is anticipated that two subsurface soil samples will be collected from depths greater than 5 feet bgs in each soil boring. One sample will be collected from the zone of worst case impacts. If no impacts are encountered, this sample will be collected from a depth that corresponds horizontally to the impact interval sampled observed in adjacent,



completed soil borings. The second sample will be collected from the first clean interval below any observed impacts or the base of the boring.

Soil samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Certified laboratory for the following analyses:

- Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) compounds using EPA Method 8260B,
- Polycyclic aromatic hydrocarbons (PAH) compounds using EPA Method 8270B,
- Resource Conservation and Recovery Act (RCRA) Metals using EPA Method 6000-7000 Series; and
- Free Cyanide using EPA Method 9014A and 9012B.

Groundwater Gauging and Sampling

A comprehensive round of groundwater sampling will be performed at least two weeks after the development of newly installed wells. All Site wells will be gauged and sampled following the United States Environmental Protection Agency's low-flow groundwater sampling procedures and in accordance with the SC Work Plan. Field measurements will be collected during the sampling of each monitoring well. The following parameters will be monitored: pH, specific conductance, dissolved oxygen (DO), oxidation reduction potential (ORP), temperature, and turbidity.

Groundwater samples will be analyzed for:

- Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) compounds using EPA Method 8260B,
- Polycyclic aromatic hydrocarbons (PAH) compounds using EPA Method 8270B,
- Resource Conservation and Recovery Act (RCRA) Metals using USEPA Method 6000-7000 Series; and
- Total cyanide by EPA Method 9012B.

Investigation Derived Waste Management

All Investigation Derived Waste (IDW) will be collected in properly labeled 55-gallon drums and grouped by environmental matrix. Subsequently, the drums will be characterized with laboratory analyses and properly disposed in accordance with current site management procedures for IDW.

Community Air Monitoring

The Community air monitoring plan (CAMP) provided in Appendix D of the SC Work Plan will be implemented during the investigative activities.

Site Survey

Following completion of the investigation, all sampling and investigation locations will be surveyed for elevation and location using a licensed New York surveyor.

As mentioned above, all RI activities will be conducted as per the NYSDEC approved SC Work Plan.

The data from the SC and the RI field efforts will be combined into a draft RI Report. Appendices to the report will include all pertinent data used to support the SC and RI efforts, including validated laboratory analytical results, boring logs, and all field sampling sheets.

Subcontractors that are anticipated to be used by AECOM are as follows:

- Advanced Geological Services to perform the geophysical survey.
- Zebra Environmental for the advanced of the soil borings for the collection of soil and ground water samples and digging of test pits.
- Test America Laboratories, Inc. for the laboratory analyses of the soil and ground water samples.

The primary physical hazards which may be encountered include:



- Drilling activities.
- Falls (Slips and Trips).
- Manual Lifting.
- Noise Exposure.
- Underground Utilities.
- Overhead Utilities.
- Traffic Control.
- Insects.
- Weather Hazards.
- Heat / Cold Stress.

It is unknown as to the type of chemical hazards which may be encountered. Potential chemical hazards which may be encountered include:

- Volatile Organic Compounds.
- Polycyclic Aromatic Hydrocarbons.
- Inorganic Compounds.
- Dust.

Site personnel are bound by the provisions of this HASP and are required to participate in a preliminary project safety meeting to familiarize them with the anticipated hazards and respective onsite controls. The discussion will cover the entire HASP subject matter, putting emphasis on critical elements of the plan; such as the emergency response procedures, personal protective equipment, site control strategies, and monitoring requirements. In addition, daily tailgate safety meetings will be held to discuss: the anticipated scope of work, required controls, identify new hazards and controls, incident reporting, review the results of inspections, any lessons learned or concerns from the previous day.



TABLE OF CONTENTS

	troduction	.9
1.1	General	. 9
1.2	Project Policy Statement	.9
1.3	References	. 9
2.0 Si	te Information	10
2.1	Site Information	10
2.1.1	General Description	10
2.1.2	Site Background/History	10
2.1.3	Previous Investigations	10
3.0 Ha	azard Assessment (Safety)	11
3.1	Physical Hazards	11
3.1.1	Drilling and Excavation Safety	11
3.1.1.1	Cuts and Lacerations	12
3.1.2	Falls on Same Level	13
3.1.3	Incidental Spills/Releases	13
3.1.3.1	Prevention	13
3.1.3.2	2 Release Reporting	13
3.1.3.3	Response to Release	14
3.1.4	Noise Exposure	14
3.1.5	Traffic/Pedestrian Control	14
3.1.6	Underground Utilities	15
• • =		
3.1.7	Overhead Utilities	15
3.1.7 3.2	Overhead Utilities Biological Hazards	15 15
3.1.7 3.2 3.2.1	Overhead Utilities Biological Hazards Poison Ivy	15 15 16
3.1.7 3.2 3.2.1 3.2.2	Overhead Utilities Biological Hazards Poison Ivy Ticks	15 15 16 16
3.1.7 3.2 3.2.1 3.2.2 3.3	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards	15 15 16 16 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards	15 15 16 16 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress	15 16 16 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress Cold Stress	15 15 16 16 17 17 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress Cold Stress Other Hazards	15 15 16 16 17 17 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.2	Overhead Utilities	15 15 16 16 17 17 17 17 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress Cold Stress Other Hazards Hazard Analysis Unanticipated Work Activities/Conditions	15 15 16 16 17 17 17 17 17 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7	Overhead Utilities	15 16 16 17 17 17 17 17 17 17
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7 4.0 S	Overhead Utilities	 15 16 17 17 17 17 17 18 19
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7 4.0 SI 4.1	Overhead Utilities	15 15 16 17 17 17 17 17 17 18 19 19
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7 4.0 SI 4.1 4.2	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress Cold Stress Other Hazards Hazard Analysis Unanticipated Work Activities/Conditions Task Specific SH&E Procedures HAZWOPER Qualifications Medical Monitoring	15 15 16 17 17 17 17 17 17 18 19 19
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7 4.0 SI 4.1 4.2 4.3	Overhead Utilities	15 15 16 17 17 17 17 17 17 18 19 19 19 19
3.1.7 3.2 3.2.1 3.2.2 3.3 3.4 3.4.1 3.4.2 3.5 3.6 3.6.1 3.7 4.0 SI 4.1 4.2 4.3 4.4	Overhead Utilities Biological Hazards Poison Ivy Ticks Radiological Hazards Weather Hazards Heat Stress Cold Stress Other Hazards Hazard Analysis Unanticipated Work Activities/Conditions Task Specific SH&E Procedures H&E Requirements (Safety) HAZWOPER Qualifications Medical Monitoring Site-Specific Safety Training Tailgate Meetings	15 15 16 17 17 17 17 17 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19 19

AECOM

4.6	Confined Space Entry	. 19
4.7	Hazardous, Solid, or Municipal Waste	. 20
4.8		. 20
4.8.1	Housekeeping	. 20
4.8.2	Smoking, Eating, or Drinking	. 20
4.8.3	Personal Hygiene	. 20
4.8.4	Buddy System	. 20
4.9	Stop Work Authority	. 20
4.10	Client Specific Safety Requirements	. 21
5.0 E	xposure Monitoring Procedures (Health)	. 22
5.1	Contaminant Exposure Hazards	. 22
5.1.1	Volatile Organic Compounds	. 22
5.1.2	Polycyclic Aromatic Hydrocarbons	. 22
5.1.3	Inorganic Compounds	. 22
5.1.4	Dust	. 23
5.2	Route of Entry Assessment of Exposure Hazards	. 23
5.3	Real-Time Exposure Measurement	. 23
5.4	Health and Safety Action Levels	. 23
5.4.1.	1 Monitoring Equipment Calibration	. 24
6.0 E	nvironmental Program (Environment)	. 25
6.1	Environmental Compliance and Management	. 25
6.1.1	Air Emissions	. 25
6.1.2	Hazardous Waste Management	. 25
6.1.3	Storm Water Pollution Prevention	. 25
6.1.4	Wetlands Protection	. 25
6.1.5	Critical Habitat Protection	. 25
6.1.6	Environmental Protection	. 25
7.0 P	ersonal Protective Equipment	. 26
7.1	Personal Protective Equipment	. 26
7.2	PPE Doffing and Donning (UTILIZATION) Information	. 26
7.2.1	Inspection of PPE	. 26
7.2.2	PPE Donning Procedures	. 27
7.2.3	PPE Doffing Procedures	. 27
7.3	Decontamination	. 27
7.3.1	General Requirements	. 27
7.3.2	Decontamination Equipment	. 27
7.3.3	Personal Decontamination	. 28
7.3.4	Equipment Decontamination	. 28

AECOM

8.0 Pr	roject Health and Safety Organization	
8.1 Pr	roject Manager	
8.2 Si	ite Supervisor	
8.2.1	Responsibilities	
8.2.2	Authority	
8.2.3	Qualifications	
8.3 E r	mployees	
8.3.1	Employee Responsibilities	
8.3.2	Employee Authority	
8.4 S a	afety Health and Environmental Manager	
8.5 S ı	ubcontractors	
8.6 Vi	isitors	
9.0 Si	ite Control	
9.1 C	ontrolled Work Areas	
9.1.1	Exclusion Zone	
9.1.2	Contamination Reduction Zone	
9.1.3	Support Zone	
9.2 Si	ite Access Documentation	
9.3 Si	ite Security	
10.0 Er	mergency Response Planning	
10.1 Er	mergency Action Plan	
10.2 Si	ite-Specific Emergency Procedures	
10.3 In	cident Reporting	
10.4 Er	nvironmental Spill/Release Reporting	
10.5 Minor Injuries		
10.6 E r	mergency Contacts	
11.0Pe	ersonnel Acknowledgement1	

ATTACHMENTS

Attachment A	Job Safety Analyses
Attachment B	Material Safety Data Sheets
Attachment C	Applicable SH&E SOPs



1.0 Introduction

This Health and Safety Plan (HASP) provides a general description of the levels of personal protection and safe operating Former Jamaica Gas Light Company Manufactured Gas Plant River in Jamaica, Queens, New York. This HASP also identifies chemical and physical hazards known to be associated with the AECOM-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions, which may occur during field operations.

1.1 General

The provisions of this HASP are mandatory for all AECOM personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the AECOM's North America Safety, Health, and Environmental (SH&E) Procedures and Manual shall be accessible on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable Standard Operating Procedures (SOPs). In the event of a conflict between this HASP, the SOPs and federal, provincial, state, and local regulations, workers shall follow the most stringent/protective requirements. Concurrence with the provisions of this HASP is mandatory for all personnel at the site covered by this HASP and must be signed on the acknowledgement page.

1.2 **Project Policy Statement**

AECOM is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities. We are also committed to protecting and preserving the natural environment in which we operate. The safety of persons and property is of vital importance to the success of this project and accident prevention measures shall be taken toward the avoidance of needless waste and loss. It shall be the policy of this project that all operations be conducted safely. Onsite supervisors are responsible for those they supervise by maintaining a safe and healthy working environment in their areas of responsibility, and by fairly and uniformly enforcing safety and health rules and requirements for all project personnel. Subcontractors shall comply with the requirements of this HASP, provisions contained within the contract document and all applicable rules, requirements and health, safety and environmental regulations. All practical measures shall be taken to promote safety and maintain a safe place to work. Contractors are wholly responsible for the prevention of accidents on work under their direction and shall be responsible for thorough safety and loss control programs and the execution of their own safety plans for the protection of workers. http://my.aecomnet.com/Intranet/Geographies/North+America/Functions/Safety%2C+Health+%26+Environme nt/Policies+and+Procedures/Safety+Manuals/US+Safety+Operating+Procedures

1.3 References

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

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), Occupational Safety and Health Standards (with special attention to Section 120, Hazardous Waste Operations and Emergency Response).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), Safety and Health Regulations for Construction.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.



2.0 Site Information

AECOM will conduct environmental services at the Former Jamaica Gas Light Company Manufactured Gas Plant Site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Project Work Plan developed for project site. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the project site, and the work procedures to be performed. The Project Work Plan prepared by AECOM as a companion document to this HASP provides more detail concerning both site history and planned work operations.

2.1 Site Information

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

2.1.1 General Description

The Former Jamaica Gas Light Company MGP Site is located in Jamaica, Queens County, New York.

The Site is comprised of a single, vacant parcel located between 158th and former 159th Streets, south of Beaver Road. A plant located at the site manufactured gas from coal and oil from at least 1886 to the early 1900s, Based on Sanborn maps, the plant was operated by the Jamaica Gas Light Company from sometime prior to 1897 to sometime before 1911 and by The Brooklyn Union Gas Company (BUG), a predecessor company to National Grid, from sometime prior to 1911 until the early 1970s. BUG apparently used the site for the storage of gas from the early 1900's until approximately 1938, after which the gas storage facilities were decommissioned and demolished. The property was subsequently used as offices by BUG until the early 1970s, when the site appears as vacant property on Sanborn maps. Other than the presence of roll off containers and trash compactors currently stored on the site, no other uses of the property were identified. The adjacent property to the south of Prospect cemetary (south of the Site) is operated as a large office/lab building and associated parking lot. To the north of the project site is the Long Island Railroad, which is elevated and inaccessible.

2.1.2 Site Background/History

A review of the history of the Former Jamaica Gas Light Company MGP Site has been developed based on a review of the historic Sanborn Fire Insurance maps, aerial photographs for the Site as well as historic investigation reports.

Sanborn maps were available from 1886, 1891, 1897, 1901, 1911, 1925, 1942, 1951, 1963, 1967, 1981, 1982, 1985 through 1988, 1990 through 1993, 1995, 1996, 1999, and 2001 through 2006. Aerial photos were available for 1954, 1966, 1975, 1984, 1985, and 1994.

The operator of the site is not identified until 1897, when historic documentation state the Jamaica Gas Light Company as the operator sometime prior to 1897 to sometime before 1911 and BUG, from sometime prior to 1911 to the early 1970s. The Site operated in the manufacturing of gas from coal and oil from the at least 1886 to the early 1900s when it apparently was used for the storage of gas until around 1942^{\chi}. The property was subsequently used for office space by BUG as offices until the early1970s when the site appears as vacant property.

2.1.3 Previous Investigations

Based upon AECOM research, both properties have never been the subjects of previous environmental investigations. AECOM conducted Site Characterization work at both the on-site and off-site properties in 2010 and 2012.

3.0 Hazard Assessment (Safety)

3.1 **Physical Hazards**

The general safety procedures in this HASP have been developed to address the potential physical hazards associated with the implementation of this investigative program. Prior to site mobilization, THAs will be developed by AECOM to be executed during the overall proposed program. THAs will be reviewed by the RHSM and Project Managers and appended to this HASP for all field staff to review and use as necessary.

While every effort has been made to address the potential chemical and physical hazards that may be encountered during the implementation of the proposed project activities, unanticipated site-specific conditions or situations may occur. As such, THAs also will be used to manage change in the field. Site workers may elect to perform certain tasks in a manner different than what was originally intended due to a change in field conditions. Therefore, a THA will be completed by AECOM or contractor staff when new tasks or different techniques not addressed in the HASP are proposed. The use of new techniques will be reviewed by the proposed field teams and any new hazards associated with the proposed changes will be documented on the THA along with the proposed control measure for each of the identified hazards.

The following physical hazards are anticipated to be present on the site. Additional hazards may be noted on the THA's developed for the individual tasks.

3.1.1 Drilling and Excavation Safety

AECOM will be overseeing the drilling operations which direct push drilling (Geoprobe) and hollow stem auger drilling (HAS). The hazards associated with drill operations are caught by or between moving or rotating parts, struck by the movement of the drill rig or material being handled, contact with above ground and below ground utilities, and slips trips and falls on slippery surfaces, hose lines, and drilling material.

AECOM employees are not authorized to operate any type of mobile drill rig, and shall stay out of the path of travel of a drill rig and away from rotating and moving parts of a drill rig when it is operating. Specific requirements for drilling and boring can be found in SOP S3NA-405-PR Drilling, Boring, and Direct Push Probing.

Before the start of drilling activities a daily checklist of activities will be reviewed by AECOM with the driller to insure that all necessary items have been addressed prior to execution of the work. These items include:

- Potential Problem Areas/Issues;
- Utility Clearances;
- Overhead utility clearance;
- Health and Safety Measures;
- Spill Prevention Measures.
- Daily Checklist

Additional drilling precautions are as follows:

- The drilling subcontractor will contact NYC/ Long Island One Call (811).
- The drill rig and components shall be inspected daily by the drill rig operator;
- When drill rig is being moved with a pendent controller personnel will stay near or behind the operator;
- Except for the driller and helper, all personnel will stay away (e.g., 15+ ft) from the rig when it is operating unless it is necessary to be near it;
- If required to approach the drill rig for the collection of samples or down hole observations the drill rig must be taken out of gear to stop movement of boring tools. Only then can you approach the rig;
- Loose fitting clothing must be secured when in the vicinity of drilling operations;
- The drill rig operator shall perform a visual safety of the drill rig daily and after it has been moved to a new location;
- Cell phone, text messaging or the use of personal headsets is prohibited when working on or near a drill rig;
- Borehole will be immediately backfilled upon completion of work;
- If a borehole is to be left open, the opening will be marked with "Caution-Open Trench" tape. If necessary, metal plates will be placed over the borehole to permit vehicular crossing; and



• As necessary hearing protection shall be used when near drilling operations.

Excavating and trenching operations shall be performed in such a manner as to protect personnel from the dangers associated with trenching and excavating such as cave-ins, and to prevent damage to underground utilities. All excavation activities shall comply with the requirements of Subpart P of 29 CFR 1926.

In accordance with 29 CFR 1926, a competent person must conduct daily inspection of each trench or excavation, the adjacent hazards and protective systems for evidence of possible cave-in/failure of protective systems, hazardous atmosphere, and other hazardous condition and determine the necessary precautions to take. In addition, the competent person shall perform soil classification in accordance with Subpart P of 29 CFR 1926. The inspections shall be documented. Excavation and trenching procedures are listed in SH&E SOP S3NA--303-PR.

Additional excavation precautions are as follows:

- Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by calling 811. Markings made during the utility investigation must be maintained throughout the course of work.
- If underground utilities not previously identified are encountered, work shall be immediately ceased and the project manager will be notified before proceeding.
- When personnel are required to enter a trench or excavation over 4 feet deep, an adequate means of exit, such as a ladder, steps, or ramp will be provided and located so as to require no more than 25 feet of lateral travel. Ladders will extend at least 3 feet above the edge of the trench and will be securely staked in place.
- Walkways or bridges with standard railings and toe plates must be provided when personnel or equipment are required to cross over excavations.
- The walls and faces of all excavations in which personnel are exposed to danger from moving ground must be guarded by a shoring system, sloping of the ground, or some other equivalent means.
- No person shall be permitted under loads handled by power shovels, derricks, or hoists.
- The spoils pile shall be placed at one side of the excavation. At a minimum, the toe of the spoil pile shall be at least 2 feet away from the edge of the excavation. The spoils pile shall be moved farther back in proportion to the depth of the excavation. The spoils pile height shall not exceed the depth of the excavation and shall be sloped to prevent the soil and rocks from sliding into the excavation.
- All wells, calyx holes, pits, shafts, etc., shall be barricaded or covered. Covers shall be secured in place and marked.
- Protective system(s) to prevent cave-in shall be used when personnel enter excavations 5 feet or greater in depth or if the competent person determines it is necessary at shallower depths. Protective system(s) shall be complaint with the requirements of 29 CFR 1926 Subpart P. A Registered Professional Engineer must design protective systems for excavations/trenches 20 feet or greater in depth.
- Where protective systems are used such as trench boxes, hydraulic shoring, etc., they shall be used in accordance with the manufacturer's specifications and limitations. The manufacturer's tabulated data for such systems will be maintained on the project site.
- Excavation or trenches that pose and atmospheric hazard must be tested for oxygen content, explosive gases/vapors and toxic gases/vapors (i.e. Carbon monoxide, Hydrogen sulfide, contaminants of concern) prior to and during entry

3.1.1.1 Cuts and Lacerations

Geoprobe soil samples are collected in acetate liners that must be cut open in order to collect the sample. Additionally, tubing will need to be cut to facilitate groundwater sampling. Additional tasks for the job may also pose laceration hazards. Tube-cutters are available and should be used to eliminate this hazard. Fixed open blade knives to cut tubing or acetate liners are prohibited. Only utility knives that provide an automatic blade protection device (spring loaded self-retracting utility knife) or recessed blade knife that prevents contact with fingers will be allowed for use. When cutting:

- Keep your free hand out of the way
- Secure the acetate liner so it won't roll or move while you are cutting
- Use only sharp blades; dull blades require more force which results in less knife control



- Cut away from your body
- Don't put your knife in your pocket
- Use a hooked knife (i.e. linoleum knife) or a utility knife with a self-retracting blade

3.1.2 Falls on Same Level

Falls from slips and trips are common workplace occurrences that can result in serious injuries and disabilities. The most common types of falls are falls at the same level. Fall hazards exist in most workplaces including offices, manufacturing and construction. Slips and trips can be prevented by following these guidelines:

- Personnel shall be vigilant in providing clear footing, clearly identifying obstructions, holes, protruding objects, or other tripping hazards and maintaining an awareness of uneven terrain and slippery surfaces.
- Walking and working surfaces shall be kept free of materials, obstructions, and substances that could cause a surface to become slick or otherwise hazardous.
- Makeshift substitute ladders such as toolboxes, buckets, and coolers shall not be used.
- The use of cellular telephones (testing, making or receiving calls) for personal use is prohibited in the work area.
- Walk around, not over or on, debris or equipment that might have been stored in the work area.
- Don't jump from platforms or truck beds.
- When carrying equipment, identify a path that is clear of any obstructions. It might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.
- In winter months use traction aids on footwear such as Yaktrax®.

3.1.3 Incidental Spills/Releases

The purpose of this section is to define practices and procedures for the prevention, containment, and cleanup of incidental discharges of hazardous substances during the project. These substances include both the contaminated material encountered as a result of the environmental activities, such as contaminated soils and decontamination liquids, and fluids, such as lubricating fluids, diesel fuel, gasoline, etc.

3.1.3.1 Prevention

Prevention of unnecessary spills is of first priority. Prevention measures include:

- All equipment will be inspected for leaks before daily and after service.
- All containers will be inspected daily for decay. No open container will be exposed to rainfall, snowfall, etc. without being emptied and cleaned of residue.
- Storage of material such as fuels, oils, and solvents on-site will be limited to the minimum required. All fluids will be stored in individual fluid containers appropriate and approved for the material.
- Drums or other containers too large to be stored in containers will be stored raised off the ground on a liner and covered by plastic.
- All nearby storm sewers, catch basins, drains, and related structures will be protected from being impacted from investigation-related runoff and/or releases to the environment. Prevention methods, such as booms, berms or other effective materials, will be used as necessary to ensure proper mitigation.

3.1.3.2 Release Reporting

All releases must be reported to the AECOM PM, Regional Safety Health and Environmental Manager and Incident Reporting Line at (800-348-5046), with the PM providing notification to the Client representative, no matter how small of a release. Consideration will need to be given to whether or not the release is deemed to be a reportable to the New York Department of Environmental Conservation (DEC) or the EPA, National Spill Response Center. See Section 10.4 Environmental Spill/Release Reporting.

After initial response actions have been completed an incident investigation will be performed to determine the root causes of the incident and corrective actions, and lessons learned shall be shared to prevent future reoccurrence. Once the



response is complete, the responding personnel will conduct an inventory of supplies used during the response effort and restock any used response equipment that could not be decontaminated and reused.

3.1.3.3 Response to Release

A spill containment kit (25 gallon) shall be available on the site. The spill containment kit shall contain the following items; sock boom, sorbent pads and granular absorbent. The response for a release of potentially hazardous material entails the following:

- Determine the nature of the substance released.
- Eliminate all sources of ignition.
- Isolate the affected area or initiate area evacuation.
- Contain the flow of the material from the source if this can be done safely (diking/berms drip pan).
- Following the procedures and using the protective equipment as indicated by the Material Safety Data Sheet (MSDS), contain the release to the smallest area possible and initiate cleanup
- Dispose of all residues in accordance with the MSDS

3.1.8 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use mechanical assistance to lift or move materials and at a minimum, use at least two people to lift, or roll/lift with your arms as close to the body as possible. For additional requirements, refer to S3NA 308 PR, Manual Lifting. The following precautions should be implemented when lifting or moving heavy objects:

- 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;
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards;
- Use mechanical devices to move objects that are too heavy to be moved manually; and,
- If mechanical devices are not available, ask another person to assist you.

3.1.4 Noise Exposure

The use of construction equipment can expose the field team to noise levels that exceed the 85 dB for an 8-hour day. 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;
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ; and
- Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone two (2) feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating ("NRR") of 27 decibels ("dB").

3.1.5 Traffic/Pedestrian Control

If required temporary traffic control shall follow the requirements of NYC Department of Transportation (NYCDOT) Street Works Manual. Within NYC, the NYC DOT has adopted specifications and regulations (Title 34 Department of Transportation 4-13-2012 Chapter 2 Highway Rules) stipulating how street work must be performed in order to minimize disruption and maintain the integrity of the street surface. In order to perform work in the street the AECOM shall obtain the necessary permit from NYC DOT. Minimum requirements for traffic control.



- Cones or channeling devices must be used when vehicles are parked on a roadway.
- Cone tamper must be adequate to warn on-coming traffic
- High-visibility (ANSI Type 2) outer clothing shall be worn when working near traffic
- Wheels of vehicles shall be turned so that if the vehicle is impacted it will be directed away from you.
- Flagging shall be performed by a qualified flag persons.

All pre-existing American's with Disabilities Act (ADA) compliant pedestrian facilities within the work zone must continue to comply with ADA requirements for access during work operations. Consider the following when addressing pedestrian issues within and around work zones:

- Accessibility through the work area for pedestrians must be accounted for prior to starting work operation. If temporary pedestrian ramps are necessary at the work location.
- Pedestrians should not be led into conflicts with work site vehicles, equipment, and operations.
- Pedestrians shall be provided with a safe, convenient path that replicates as nearly as practical the most desirable characteristics of the existing sidewalks or a footpath. Pedestrians generally will not go out of their way. Make alternate pathways reasonable.

3.1.6 Underground Utilities

New York State Law requires that a utility clearance be performed prior to initiation of any subsurface work. The number to call in this area to request a mark-out of natural gas, electric, telephone, cable television, water and sewer lines in the proposed excavation or boring locations is 811. Work will not begin until the required utility clearances have been performed. Additional information on underground utilities can be found in SOP S3NA-417-PR Utilities, Underground.

Utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the drilling contractor must exercise due diligence and try to identify the location of any private utilities on the property being investigated. AECOM can fulfill this requirement in several ways, including:

- Obtaining as-built drawings for the areas being investigated from the property owner;
- Visually reviewing each proposed soil boring locations with the property owner or knowledgeable site representative;
- Performing a geophysical survey to locate utilities; and
- Hiring a private line locating firm to determine the location of utility lines that are present at the property.

All underground utilities shall be exposed via hand or soft-dig techniques within 5 feet of a mark out or within the distance required by the owner of the utility before operating any mechanized equipment. Use of mechanical means or using a hand auger is not permitted.

- When soft digging use a non-cutting nozzle. A digging bar should be limited to prying out material encountered during the soft-dig.
- Where hand digging is performed a blunt-nosed shovel must be used to loosen the soil and a regular shovel to remove to remove it. Do not stab at the soil or stomp on the shovel with both feet. A pickax, hand auger, digging bar or similar tools should not be used.

3.1.7 Overhead Utilities

Accidental contact with an energized line or arcing between a high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. While maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. Additional information on Overhead Electrical Lines can be found in SOP S3NA-406-PR Electrical Lines, Overhead.

3.2 Biological Hazards

It is anticipated that a few biological hazards will be present on both properties. Poisonous plants may be found some landscaped areas located in and near both properties, along with ticks and other biting insects. Stinging insects, such as



bees and wasps may build within proximity of the work zone.. Additional information on Biological Hazards can be found in S3NA-313-PR Wildlife, Plants. Below is a discussion of the most common biological hazards found on project sites, and those anticipated to be of concern here.

3.2.1 Poison Ivy

Poison ivy is a common cause of a skin irritation called contact dermatitis that may result in a red, itchy rash consisting of small bumps, blisters or swelling. This native perennial grows throughout the Northeast, in woods, fields, and sometimes in the garden. It grows in sun or shade, and in wet or dry places. Its growth habit depends on where it is growing, resulting in a trailing ground cover, free-standing shrub, or a vine supported by trees, shrubbery and fences. All parts of the poison ivy plant contain, urushiol, which causes the allergic reaction. Most poisonings occur during the growing season when the presence of lush foliage increases the chance of contact, but the dormant stems and roots of the vine can cause winter poisoning as well.

The best protection against poison ivy is to avoid contact with the plant (leaves, stems and roots). The best defense against contracting poison ivy is to recognize the plants. The adage "leaves of three, let it be" refers to the groupings of three leaflets connected to a common stem that characterize most of these plants. However, if you cannot avoid poison ivy, follow these precautions to help prevent contact:

- Wear protective clothing such as long-sleeved shirts, long trousers, boots or sturdy shoes with socks and gloves;
- Use a barrier cream such as CoreTexIvyX[™] Pre-Contact solution; and
- If heat stress will not be a problem the use of a Tyvek[™] coveralls and nitrile gloves is recommended for areas with heavy poison ivy infestation.

If contact with poison ivy has been made or is suspected, follow these guidelines:

- As soon as possible (within 5–10 minutes of contact), wash all exposed skin with strong soap (i.e. Dawn) and water to remove the oil. If this is not possible, rinse thoroughly with water.
- Use a post-contact skin cleanser such as Technu® skin cleanser or CoreTexIvyX[™] cleanser towelettes.
- Put on gloves to remove clothes and shoes, and wash clothing in hot water and detergent to remove any plant oil that may be on them.
- Notify your supervisor if contact or suspected contact is made with poison ivy.
- If a severe allergic reaction develops, seek medical attention.

3.2.2 Ticks

Ticks transmit bacteria that cause illnesses such as Lyme disease or Rocky Mountain spotted fever. Ticks wait for a host from the tips of grasses and shrubs (not from trees). When brushed by a person, they quickly let go of the vegetation and climb onto the host. Ticks can only crawl; they cannot fly or jump. The tick season typically lasts from April through October; peak season is May through July; seasons can vary depending on climate. Ticks can be active on winter days when the ground temperatures are about 45 degrees Fahrenheit.

The best way to protect oneself against tick borne illness is to avoid tick bites. This includes avoiding known tick-infested areas. However, if wooded areas or areas with tall grass and weeds are visited, the following precautions can be used to help prevent tick bites and decrease the risk of disease:

- Wear protective clothing such as long-sleeved shirts, long trousers, boots or sturdy shoes and a head covering. (Ticks are easier to detect on light-colored clothing).
- Tuck trouser cuffs in socks. Tape the area where pants and socks meet so ticks cannot crawl under clothing.
- Apply insect repellent containing 10 percent to 30 percent N,N-Diethyl-meta-toluamide ("DEET") or 5 percent to 10
 percent picaridin primarily to clothes. Apply sparingly to exposed skin. Do not spray directly to the face; spray the
 repellent onto hands and then apply to face. Avoid sensitive areas like the eyes, mouth and nasal membranes. Be
 sure to wash treated skin after coming indoors.
- Use repellents containing permethrin to treat clothes (especially pants, socks and shoes) but not skin. Always follow label directions; do not misuse or overuse repellents.
- Those who wish to avoid the use of insect repellent or treated clothing should consider the use of the Original Bug Shirt® and pants, and tick/chigger garters.



- If heat stress will not be a problem the use of a Tyvek[™] coveralls or pants is recommended for areas with heavy infestation with ticks.
- Personnel should carefully inspect themselves each day for the presence of ticks or any rashes. This is important since prompt removal of the tick can prevent disease transmission. 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. Contact the RSHEM for guidelines on removing ticks.
- Report tick exposure and bites to your supervisor.

3.3 Radiological Hazards

No on-site radioactive materials that are environmental contaminants have been identified.

3.4 Weather Hazards

Field activities are not permitted when severe weather conditions exist. The Site Supervisor will monitor real-time weather and local weather forecasts during site work activities. 30-30 Rule: Work will be stopped when there are less than 30 seconds between a flash of lightning and the rumble of thunder and workers will seek shelter promptly. Employees will remain in shelter until 30 minutes after the last flash of lightning or rumble of thunder.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events.

3.4.1 Heat Stress

The Site Supervisor will be cognizant of weather conditions and remind field personnel to dress appropriately. Noncaffeinated fluids, such as water, will be available to field personnel. Workers will monitor each other's actions, speech, and appearance for signs and symptoms of heat-related illnesses, including heat exhaustion and heat stroke. Physical signs and symptoms of heat exhaustion include headache, nausea, vertigo, weakness, thirst, and giddiness.

Heat exhaustion may progress to heat stroke if a worker is unable to cool and rehydrate the body. The primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, lack of sweating (usually), hot, dry skin, and an abnormally high body temperature.

Workers should be aware of the key differences between the signs and symptoms of heat stroke and those of heat exhaustion, such as the lack of sweating, the color of the skin (red), and the rise in body temperature. Heat stroke is a medical emergency that requires immediate medical attention.

3.4.2 Cold Stress

Field personnel should dress appropriately with adequate insulating dry clothing to maintain core body temperatures above 98.6°F when air temperatures are below 40°F. If continuous work is to be performed at air temperatures below 20°F, frequent short breaks will be taken to warm-up.

Workers will monitor each other's actions, speech, and appearance for signs and symptoms of cold-related injury, including hypothermia, chilblains, and frostbite. The first symptoms of hypothermia are uncontrollable shivering and the sensation of cold. Cool skin, muscle rigidity, low blood pressure, slowed or irregular pulse, and apparent exhaustion and fatigue after rest manifest as hypothermia progresses, and the core body temperature falls.

Chilblains and frostbite can occur without hypothermia when extremities do not receive sufficient heat from central body stores. Chilblains occur when small blood vessels constrict during cold, most conditions then leak blood into surrounding tissues upon re-warming. Chilblains usually affect the extremities, ears, and cheeks. Damage from chilblains is generally not considered serious, but discomfort can be severe, and the risk of secondary infection exists.

Frostbite occurs when the fluids around the tissue cells freeze and usually affects the extremities, nose, and cheeks. Damage from frostbite can result in tissue death and, therefore, requires immediate medical care.

3.5 Other Hazards

No other hazards have been identified.

3.6 Hazard Analysis

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

3.6.1 Unanticipated Work Activities/Conditions

As a result of unanticipated work activities or changing conditions, additional THAs may be required. All additional THAs will be reviewed and approved by the SH&E Professional.



3.7 Task Specific SH&E Procedures

As discussed in Section5.0, personnel may be exposed to a variety of chemical, physical, and radiologicalhazards resulting from task or equipment-specific activities. The controls for many of these hazards are discussed in SOPs found in the **Series 300 to 500**North America SH&E SOPs.

	SOP#	TITLE		SOP#	TITLE
	S3NA 300 SeriesField(Common)			S3NA 500 SeriesIndustrial 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
\boxtimes	S3NA-304-PR	Fall Protection		S3NA-504-PR	Cadmium
\boxtimes	S3NA-305-PR	Hand and Power Tools	\boxtimes	S3NA-505-PR	Cold Stress Prevention
\boxtimes	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	\square	S3NA-510-PR	Hearing Conservation Program
	S3NA-311-PR	Scaffolding	\square	S3NA-511-PR	Heat Stress Prevention
	S3NA-312-PR	Ladders and Stairways		S3NA-512-PR	Laboratory Safety
\square	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 S	eries 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	\boxtimes	S3NA-520-PR	Spill Response, Incidental
	S4NA(US)-404-PR	Commercial Motor Vehicles			
\boxtimes	S3NA-405-PR	Drilling and Boring			
\boxtimes	S3NA-406-PR	Electrical Lines, Overhead			
	S3NA-407-PR	Electro-fishing			
	S3NA-408-PR	Elevated Work Platforms and Aerial Lifts			
	S3NA-409-PR	Forklifts (operation of)			
	S3NA-410-PR	Hazardous Energy Control			
	S3NA-411-PR	Machine Guarding			
	S3NA-412-PR	Powder-Actuated Tools			
	S4NA(US)-413-PR1	Process Safety Management			
	S4NA(US)-414-PR	Railway Sites			
	S4NA(US)-415-PR	RCRA Regulated Facilities			
	S3NA-416-PR	Tunnel and Underground Work			
\boxtimes	S3NA-417-PR	Utilities, Underground			
	S3NA-418-PR	Welding, Cutting and Other Hot Work			
	S3NA-419-PR	Water, Marine Operations, Boating			
	S3-NA420-PR	Water, Underwater Diving			



4.0 SH&E Requirements (Safety)

4.1 HAZWOPER Qualifications

Personnel performing work at the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the AECOM's North America SH&E Standard Operating Procedures.

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

4.2 Medical Monitoring

In accordance with the requirements of 29 CFR 1910.120(f) site personnel entering the exclusion zone (EZ) or contaminate reduction zone (CRZ) shall be medical qualified to work on a hazardous waste site and to wear respiratory protection.

The medical examinations will be administered on a pre-employment and annual or biannual basis, as warranted in the opinion of examining doctor by symptoms of exposure or specialized activities. These examinations will also be provided to employees upon termination of employment or reassignment to non-hazardous waste site activities. For the purpose of this HASP, all contractors will assume the employer's responsibility in obtaining the necessary medical monitoring for their employees and provide compliance documentation upon request.

4.3 Site-Specific Safety Training

All AECOM personnel performing activities at the site will be trained in accordance with S3NA-003-PR SH&E Training. All personnel are required to remain current in all of their required training and evaluate their need for additional training when there is a change in work. In addition to the general health and safety training programs, personnel will be required to complete any supplemental task specific training developed for the tasks to be performed. Administration and compliance with the requirements for additional task-specific training will be the responsibility of the project or lead manager. Any additional required training that is completed will be documented and tracked in the project files.

4.4 Tailgate Meetings

Prior to the commencement of daily project activities, a tailgate meeting will be conducted by the SSO to review the specific requirements of this HASP, applicable THA. Attendance at the daily tailgate meeting is mandatory for all employees at the site covered by this HASP and must be documented on the attendance form. All safety training documentation is to be maintained in the project file by the SSO.

4.5 Hazard Communication

Hazardous materials that may be encountered as existing on-site environmental or physical/health contaminants during the work activities are addressed in this HASP and their properties, hazards and associated required controls will be communicated to all affected staff and subcontractors.

In addition, any employee or organization (contractor or subcontractor) intending to bring any hazardous material ontothis AECOM-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for review and filing (the SSO will maintain copies of all MSDS on site). MSDS may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable in accordance with the requirements of *S3NA-507-PR Hazardous MaterialsCommunication/WHMIS*.

All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDS.

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

Attachment B provides copies of MSDS for those items planned to be brought on site at the time this HASP is prepared. This information will be updated as required during site operations.

4.6 Confined Space Entry

Confined Space entry is not anticipated.



4.7 Hazardous, Solid, or Municipal Waste

If hazardous, solid, and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State, Provincial, Territorial and/or local regulations. Consult the Regional SH&E Manager for further guidance.

4.8 General Safety Rules

All site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to S3NA-001-PR Safe Work Standards and Rules and S3NA-103-PRGeneral Housekeeping.

4.8.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any AECOM site. Smoking, eating or drinking must be in an approved area.

4.8.3 Personal Hygiene

The following personal hygiene requirements will be observed:

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

Potable Water - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles or water coolers. Where water coolers are available, individualuse cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water – All containers of non-potable water will be marked with a label stating:

Non-Potable Water Not Intended for Drinking Water Consumption

<u>Toilet Facilities</u> - Where toilet facilities are not located on the jobsite, the crews shall have transportation readily available to nearby toilet facilities.

Washing Facilities-Commercial towelettes or equivalent will be available for cleansing of hands or other body parts.

4.8.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for AECOM personnel. Under no circumstances will any employee be present alone in a controlled work area. For areas not in controlled work areas, the procedures outlined in S3NA-314-PRWorking Alone Remote Travel will be followed at all times.

4.9 **Stop Work Authority**

All employees have the right and duty to stop work when conditions are unsafe and to assist in correcting these conditions as outlined in *S3NA-002-PRStop Work Authority*. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected AECOM employees and subcontractors.

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



4.10 Client Specific Safety Requirements

The client has specified no additional health and safety requirements.

AECOM

5.0 Exposure Monitoring Procedures(Health)

5.1 **Contaminant Exposure Hazards**

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical and radiological hazards known, suspected or anticipated to be present on site.

Exposure symptoms and applicable first aid information for each suspected site contaminant identified in the Scope of Work are located in the following subsections.

- Volatile Organic Compounds
- Polycyclic Aromatic Hydrocarbons
- Inorganic Compounds
- Dust

5.1.1 Volatile Organic Compounds

The VOCs associated with potential MGP wastes include BTEX. Exposure to the vapors of BTEX above their respective OSHA permissible exposure limits (PELs) 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 (CNS). Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behaviors. Prolonged overexposure to benzene vapors has detrimental effects on the blood-forming system ranging from anemia to leukemia. The PEL for benzene is 1 part per million (ppm) as an 8 hour time-weighted average (TWA). The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 0.5 ppm. The OSHA PEL for ethylbenzene is 100 ppm. The PEL for toluene is 200 ppm. However, the ACGIH recommends a TLV of 50 ppm for toluene. Xylene is a flammable, colorless liquid with an OSHA PEL of 100 ppm as an 8-hour TWA. Inhalation of xylene vapors above the PEL may result in motor activity changes, irritability and drunken-like behaviors. Xylene vapors are also irritating to the eye.

5.1.2 Polycyclic Aromatic Hydrocarbons

Historic fill encountered throughout New York City typically contain PAH compounds. PAH compounds are a family of multiple ring aromatic compounds commonly found in fossil fuels and formed from the incomplete combustion of organic materials. Repeated contact with PAH compounds may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultra-violet light. Certain PAHs as a group are considered potential human carcinogens (CaPAH). OSHA regulates PAHs as coal tar pitch volatiles (CTPV) and has established a PEL for CTPV of 0.2 mg/m3, as an 8-hr TWA.

Of the PAH compounds typically present in historic fill, naphthalene is typically present at higher concentrations than the other compounds. Naphthalene is easily detected due to its characteristic moth-ball like odor. The inhalation of high concentrations of naphthalene vapor may result in nausea, vomiting, abdominal pain and irritation of the bladder. Prolonged overexposure may result in renal shut down. The OSHA PEL for naphthalene, as an 8-hr TWA, is 10 ppm.

5.1.3 Inorganic Compounds

Lead and other metals are typically found in historic fill. In general, the inhalation of metal dusts is irritating to the upper respiratory tract and nasal mucous membranes. Most metal dusts may cause dermatitis and/or eye irritation.

The early symptoms of lead poisoning, as a result of overexposure (either through ingestion or inhalation) include fatigue, sleep disturbance, headache, aching bones and muscles, digestive irregularities, abdominal pains, and decreased appetite. Chronic overexposures to lead affect the CNS and male and female reproductive systems. Lead has also been identified as a fetotoxin. The OSHA PEL for inorganic lead is 50 micrograms per cubic meter (ug/m3).

Arsenic is a naturally occurring element widely distributed in the earth's crust. Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling.



Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic. The Occupational Safety and Health Administration has set limits of 10 microgram arsenic per cubic meter of workplace air (10 µg/m³) for 8 hour shifts and 40 hour work weeks.

5.1.4 Dust

Dust generated during coring or cutting of concrete, boring, or excavations can be hazardous to the respiratory system and irritating to the eyes. Dust can also carry the contaminants of concern potentially exposing workers by skin contact and inhalation. The ACGIH has established an eight-hour exposure limit for dust at 3 mg/m³. The concentrations of the chemicals of concern in the soil are low enough that inhalation of dust would not by itself be an exposure hazard. However contamination of skin and clothing can provide additional exposures. Therefore the generation and contact with dust should be minimized.

5.2 Route of Entry Assessment of Exposure Hazards

Inhalation: To prevent inhalation of contaminants person work from an upwind position, conduct real time exposure monitoring and limit their time in the area where the airborne concentrations exceed the action level. If necessary, respiratory protection should be worn.

Skin Contact: Avoid direct skin contact with impacted groundwater or soil. Use protective gloves when handling groundwater and soil. Use protective coveralls to protect work clothing from potential contamination. Wash hands after removing gloves and before eating. Shower at the end of the workday.

5.3 Real-Time Exposure Measurement

Monitoring shall be performed within the work area on site in order to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in each THA as work is performed.

Table 5-1 specifies the real-time monitoring equipment, which will be used for this project.

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED	
Photo Ionization Detector (PID)	RAE Systems mini-RAE (min. 10.6 eV bulb)	Petroleum hydrocarbons Organic Solvents	
Particulate Monitor	MIE Model PDM-3 mini-RAM	Aerosols, mist, dust, and fumes	

Table 5-1: Monitoring Parameters and Equipment

*Or similar unit, as approved by the SH&E Professional

5.4 Health and Safety Action Levels

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

Table 5-2: Monitoring Procedures and Action Levels

PARAMETER	LOCATION AND INTERVAL	RESPONSE LEVEL (Meter units/ppm above background)	RESPONSE
	Continuous in the worker's	<5 ppm	Level D work and continue monitoring
Hydrocarbons, VOCs, SVOCs (Total by PID)	breathing zone or in the immediate work area for sustained reading of 10 minutes in duration.	≥ 5 ppm	Stop Work. Consult with PM and SH&E Manager



Dust, Mist, Aerosols	Continuous during intrusive activities involving impacted materials.	<3 mg/m ³		
		(Sustained for more than 10 minutes)	Continue Level D work and continue monitoring.	
		≥3 mg/m ³ (Sustained for more than 10 minutes)	Temporarily cease work operations, contact the PM and SH&E Manager to discuss improving site mitigation measures.	

5.4.1.1 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency or manufacturer for technical guidance for proper calibration. If equipment cannot be precalibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be postponed or temporarily ceased until this requirement is completed.



6.0 Environmental Program (Environment)

6.1 Environmental Compliance and Management

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

6.1.1 Air Emissions

No air emission concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

6.1.2 Hazardous Waste Management

Any investigation derived waste that is identified in the field as being environmentally impacted will be containerized in U.S. Department of Transportation approved steel open top drums or temporary onsite storage tank. The drums and/or tank will be labeled as investigation derived waste, the generation date, generator name, and contact phone number. If a tank is utilized to hold purge water, it will be locked to prevent tampering. AECOM will sample the drums for disposal parameters and assist the NYCEDC in making arrangements for disposal within 90-days of generation. All manifests and waste profiles will be signed by the NYCEDC.

6.1.3 Storm Water Pollution Prevention

No storm water pollution prevention concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

6.1.4 Wetlands Protection

No wetland protection concerns are foreseen on the site. Intrusion into wetland areas will be limited to personnel on foot, accessing surface water sampling points. As such, no additional protective measures are required for the execution of the project.

6.1.5 Critical Habitat Protection

No critical habitat protection concerns are foreseen on the site. Intrusion into critical areas will be limited to personnel on foot, accessing surface water sampling points. As such, no additional protective measures are required for the execution of the project.

6.1.6 Environmental Protection

No additional environmental protection concerns are foreseen on the site. As such, no additional protective measures are required for the execution of the project.

7.0 Personal Protective Equipment

7.1 **Personal Protective Equipment**

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. S3NA-208-PR Personal Protective Equipment Program lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs.

By signing this HASP the employee agreeshaving been trained in the use, limitations, care and maintenance of the protective equipment to be used by the employee at this project. If training has not been provided, request same of the PM/SSO for the proper training before signing.

Table 7-1: Personal Protective Equipment

<u>TYPE</u>	MATERIAL	ADDITIONAL INFORMATION		
Minimum PPE				
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides		
Boots	Leather	ANSI approved safety toe		
Safety Glasses		ANSI Approved; ≥98% UV protection		
Hard Hat		ANSI Approved; recommended wide-brim		
Work Uniform		No shorts/cutoff jeans or sleeveless shirts		
	Additional PP	E		
Hearing Protection	Ear plugs and/ or muffs In hazardous noise areas			
Work Gloves	ANSI cut level 2 or higher If working with sharp objects or powered equipment.			
Protective Chemical Gloves	Nitrile During handling of all potential COC impacted media			
Protective Chemical Coveralls	Tyvek For use where contact potential with COC impacted media exists.			
Protective Chemical Boots	RubberOverbootiesorFor use where contact potential with COC impacted media exists.			
Level C Respiratory Protection	Contact the SH&E manager for guidance if respiratory protection is required.			
Face Shield	Safety glasses or goggles must be worn concurrently.			
Sunscreen	SPF 30 or higher			

7.2 **PPE Doffing and Donning (UTILIZATION) Information**

7.2.1 Inspection of PPE

Before use of protective clothing, all personnel shall determine that the clothing material is correct for the specified task at hand. The clothing is to be visually inspected for imperfect seams, non-uniform coatings, tears and malfunctioning closures. It is to be held up to the light to check for pinholes. It is to be flexed to observe for cracks or other signs of shelf deterioration. If the product has been used previously, it should be inspected inside and out for signs of chemical deterioration, such as discoloration, swelling and stiffness. During work, the clothing should be periodically inspected for evidence of chemical deterioration, closure failure, tears, punctures and seam discontinuities.



Before using gloves, check for pinhole leaks. Face shields and lenses should be checked for cracks, crazing and fogginess. It is imperative that any equipment found to be defective be replaced immediately.

7.2.2 PPE Donning Procedures

The following procedures will be used when donning PPE:

- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers (Never cut disposable booties from your feet with basic utility knives);
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves; and
- Don the remaining PPE, such as safety glasses or goggles.

7.2.3 PPE Doffing Procedures

Whenever a field crew member leaves the exclusion zone of a work area, the following decontamination sequence must be followed:

- Rinse contaminated materials from the boots or remove contaminated overboots;
- Clean reusable protective equipment;
- Remove protective garments and equipment (remove inner gloves last to protect against dermal contact during doffing outer garments);
- All disposable clothing should be placed in plastic bags
- Wash hands, arms, face and neck as appropriate; and
- Proceed to clean area and dress in clean clothing.

7.3 **Decontamination**

7.3.1 General Requirements

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

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the Exclusion Zone (EZ).

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant(s). If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The applicable Material Safety Data Sheet (MSDS) must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with sitespecific requirements determined by site management.

7.3.2 Decontamination Equipment

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

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



• Paper or cloth towels for drying protective clothing and equipment.

7.3.3 Personal Decontamination

Decontamination will take place in the area designated as the CRZ. Personnel egress to and from this zone will be limited in order to minimize the potential spread of contaminated sediments to clean areas. Under no circumstances is a potentially contaminated person to exit the site by means other than through the CRZ, except in emergencies as directed by the Site Health and Safety Officer. Upon leaving the site for any reason, personnel will be required to remove all contaminated clothing or equipment before leaving the CRZ.

For Level D PPE, disposable gloves will be disposed of as municipal waste. All personnel wearing Modified Level D PPE in a work area must undergo decontamination prior to entering a SZ. In the CRZ, the personnel decontamination area will consist of the following stations:

- Station 1: Personnel entering the CRZ will remove the sediment contamination from their outer clothing, boots and instruments using brushes and cloths. Personnel will also wipe down respirators if they have been used.
- Station 2: Personnel will remove their outer garment and outer gloves and dispose of them as municipal waste. Personnel will then decontaminate their boots, with an aqueous solution of detergent or other appropriate cleaning solution. These items will then be hand carried to the next station. Inner gloves may then be discarded as municipal waste.
- Station 3: Personnel will thoroughly wash their hands and face before leaving the CRZ. Air purifying cartridges will be removed from respirators, if used, and then sanitized, dried and placed in a clean plastic bag.

7.3.4 Equipment Decontamination

All potentially contaminated equipment will remain in the EZ until the end of the activity. A bristle brush and a soap and water solution (Alconox) will be used to remove sediment contamination from all equipment and will be decontaminated accordingly before being removed from the CRZ. A pump sprayer may be utilized for each rinse station.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

- Remove majority of visible gross contamination in EZ.
- Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
- Rinse equipment.
- Visually inspect for remaining contamination.

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8.0 Project Health and Safety Organization

8.1 **Project Manager**

The Project Manager (PM) has overall management authority and responsibility for all site operations, including safety. The PM will provide the site supervisor with work plans, staff, and budgetary resources, which are appropriate to meet the safety needs of the project operations. The PM will be held responsible for the safety performance of the project.

8.2 Site Supervisor

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans and for implementing and enforcing this HASP. The Site Supervisor also serves as the Site

8.2.1 Responsibilities

The site supervisor is responsible to:

- Discuss deviations from the work plan with the PM.
- Discuss safety issues with the PM, SH&E Manager and field personnel.
- Development and implementation of corrective actions for site safety deficiencies.
- Conduct inspections of the site for compliance with this HASP and applicable SOPs.

8.2.2 Authority

The site supervisor has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SH&E Manager and the PM.

8.2.3 Qualifications

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

8.3 Employees

8.3.1 Employee Responsibilities

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

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

8.3.2 Employee Authority

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

• The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (includin



- g subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SH&E Manager at any time to discuss potential concerns.
- The right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions.

8.4 Safety Health and Environmental Manager

The Safety, Health and Environmental (SH&E) Manager (Michael Grasso) is the member of the AECOM Safety, Health and Environmental Department assigned to provide guidance and technical support for the project. Duties include the following:

- Approving this HASP and any required changes.
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

8.5 Subcontractors

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in *S3NA-213-PR Subcontractors*. Each AECOM subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE and all required training.

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

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the AECOM PM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

8.6 Visitors

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



9.0 Site Control

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

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted.

9.1 Controlled Work Areas

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

- Exclusion Zone: Contaminated work area.
- Contamination Reduction Zone: Decontamination area.
- Support Zone: Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is accessible to the public (e.g., vendors, inspectors).

9.1.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and this HASP will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities.

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

9.1.2 Contamination Reduction Zone

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

9.1.3 Support Zone

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

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

9.2 Site Access Documentation

If implemented by the PM, all personnel entering the site shall complete the "Site Entry/Exit Log" located at the site trailer or primary site support vehicle.

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9.3 Site Security

To maintain site security during working hours:

- Maintain security in the Support Zone and at access control points.
- When feasible, install fencing or other physical barrier around the site.

To maintain site security during off-duty hours:

- Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
- Secure the equipment.

10.0 Emergency Response Planning

10.1 Emergency Action Plan

OSHA defines emergency response as any "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 which results, or is likely to result in an uncontrolled release of a hazardous substance. AECOM personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). AECOM response actions will be limited to evacuation. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

10.2 Site-Specific Emergency Procedures

Site-specific emergency procedures are presented in Table 10-1 with site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures.

Emergency	Evacuation Route	Muster Location	
Chemical Spill	100 feet upwind 158 th Street and Liberty Avenue		
Fire/Explosion	North or South on 158 th Street	158 th Street and Liberty Avenue or 158 th Street and Beaver Rd.	
Tornado	South on 158 th Street	Basement of FDA Building	
Lightning	South on 158 th Street Car		
	Additional Information		
Communication Procedures	Direct verbal communications. Must be supplemented when voices cannot be clearly perceived above ambient noise levels and when a clear line-of-sight cannot be maintained by AECOM personnel. AECOM personnel will bring a mobile phone to the site to ensure that communications with local emergency responders is maintained, when necessary.		
CPR/First Aid Trained Personnel	Field Staff and Subcontractors are trained and certified. Specific people will be identified prior to field programs		
Incidental Spill Response Procedures	Chemicals brought onsite will be limited to fuel for vehicles and small quantities of laboratory preservatives. In the event of a minor spill, sorbent material will be placed on the spill and then transferred to a container for disposal. Field personnel will immediately notify the PM who in turn will notify the account manager and the Department project representative.		

Table 10-1: Emergency Planning

10.3 Incident Reporting

If site personnel are injured and/or requires medical treatment, the Site Supervisor will contact the Regional Safety Manager, AECOM's Incident Reporting Line at (800) 348-5046, and the applicable Project Manager immediately. The Site Supervisor will initiate a written report, using the Supervisor's Report of Incident form (see S3NA-004-PR).

All incidents (first aid ,fire, property damage, near-miss, compliance inspection) occur on-site during any field activity will be promptly reported to the Site Supervisor who will contact the Regional Safety Manager, AECOM's Incident Reporting Line at (800) 348-5046, and the applicable Project Manager immediately. The Site Supervisor will initiate a written report, using the Supervisor's Report of Incident form (see S3NA-004-PR).



10.4 Environmental Spill/Release Reporting

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be immediately reported to the AECOM Project Manager (PM) and Regional SH&E Manager. Also you are required to call the Incident Reporting Line at (800- 348-5046).

The PM is responsible for notifying the client, AECOM legal representative and for determining if the spill or release is reportable to the New York State Department of Environmental Conservation (NYSDEC). The NYSDEC reporting requirements are to contact the NYSDEC Spill Hotline at 1-800-457-7362 within two hours of the discovery of the spill.

10.5 Minor Injuries

Minor occupational injuries or illnesses (First Aid variety) that do not require the services of the emergency hospital, AECOM employees should contact the Incident Reporting Line to report the event and ask for the location of the nearest occupational clinic or asked to be connected with Work Care.

10.6 Emergency Contacts

Emergency Coordinators / Key Personnel					
Name	Title/Workstation	Telephone Number	Mobile Phone		
Katherine Vader	Client Contact	718-963-5480	Same		
Sara Meissner	Assistant Project Manager	212-607-4194	860-617-6377		
TBD	Site Supervisor				
Michael Grasso	District SH&E Manager	607-201-6737	607-201-6737		
Rich Renzi	Regional SH&E Manager	781-224-6450	781-266-7472		
Incident Reporting	Incident Reporting Line	(800) 348-5046			
TBD	TDG/IATA Shipping Expert				
	Organization	/ Agency			
<u>Name</u>	Telephone Number				
Police Department (local	911				
Fire Department (local)	911				
Ambulance Service (EM	911				
-Emergency Hospital (Us					
Queens Hospital	718-883-3000				
82-68 164th StreetJamai					
Emergency Hospital Ro					
Poison Control Center			(800) 222-1222		
Spill Reporting– NYSDE	(800) 457-7362				
National Response Cent	(800) 424-8802				
INFOTRAC(insert accou	(800) 535-5053				
	Public Utilities				
Name			Telephone Number		
Call Before You Dig	811				

Figure 10.1: Emergency Hospital Route/Detail Map

158th St & Liberty Ave, Jamaica, NY 11405

	Start out going southeast on 158 th St toward Liberty Ave	0.01MI
1.	Tum left onto Liberty Ave.	0.5Mi
2.	Tum left onto168thSt.	0.6Mi
3.	Tum left onto Hillaida Ave /RT-25	0.2Mi
	Tum right onto184thSt.	0.7MI
	Make a U.turn at 82 nd Dr onto 184 th St.	0.04MI

82-68164thSt,Jamaica,NY11432-1121


11.0 Personnel Acknowledgement

By signing below, the undersigned acknowledges that he/she has read and reviewed the AECOM Health and Safety Plan for the Former Jamaica Gas Light Company Manufactured Gas plant Site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

Attachment A Job Safety Analyses

Job Safety Analysis

JSA Type: Investigation	🗌 New 🗌 Revised	Date:							
Work Activity:									
Personal Protective Equipment	Personal Protective Equipment (PPE):								
Development Team	Position/Title	Reviewed E	By Posit	tion/Title	Date				
Job Steps ¹	Potential Hazards ²	6	Critical Actions ³	STOP					
				Stop Criter	Work ria				
		•		•					
		•		•					
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Page __ of __



Job Safety Analysis

JSA Type: 🛛 Monitoring 🗌 I	Maintenance	Office	Constr	uction	🛛 Ne	w 🗌 Revised	Date:	
Work Type: Assessment. Work Activity: Drilling using Hollow Stem Auger Rig, Setting Wells, and Sampling								
Personal Protective Equipment	<u>(PPE):</u>					Safety Equipment		
🛛 Hard Hat		🗌 Air Puri	ifying Respi	rator		🛛 First Aid Kit		
Hearing Protection		Chemic	cal Resistan	t Coveralls		⊠ Fire Extinguishe	r (ABC Type	!)
Safety Glasses		Nitrile E	Exam Glove	S		Insect Repellen	t	
Face Shields		🛛 Leathe	r Work Glov	/es		Eyewash bottles	5	
⊠ Safety Shoes								
Hi-Vis Vest								
Development Team	Posit	ion/Title		Reviewe	d By	Position	Title	Date
-								
Processing								
Always operate within design or	environment	tal limits		Always op	erate in a s	safe and controlled co	ondition	
Always ensure safety devices a	re in place ar	nd functionin	g	Always fol	low safe w	ork practices and pro	cedures	
Reviewed JSA at least daily and	d modified an	d reissued a	as needed	Always co	mply with a	all applicable rules an	d regulations	;
Reminded workers of the Stop	Nork Authori	ty Process		Address abnormal conditions				
Always involve the right people	in the decisio	ons making p	process	Follow written procedures for high risk or unusual situations				
Job Steps		Pote	ntial Hazar	Critical Actions				
Underground utility clearance	Striki explo	ng of critical sion electro	utilities, fire),	Location and mark out of underground facilities.			
Set-up on drilling location	Accic and p	lent with traf property dam	fic, workers nage	, visitors,	Discuss rig mobilization plan, clear area of any traffi or people, utilize buddy system with at least 2 observers with continuous eye contact with driver at all times and with pre-determined symbol communication to prevent accidents.			any traffic t 2 driver at
Inspect rig and surrounding are	a. Hydra pede the e	aulic line fail strian struck nvironment.	ure, tank ru by debris, ı	pture, release to	ure, ease to Visually inspect rig (e.g., fire extinguisher, no oil or other fluid leaks, cabling and associated equipment in good condition, air outlet, pressurized hoses secured with whip-checks or adequate substitute, iacks in good condition)			o oil or uipment ses stitute,
Raise derrick. Broken bones, bodily injur crushed hand.			odily injury, o	death, Inspect the cylinder rods and pins. Do not stand in front of the rig when unfolding, the rig could move forward from a failed pin and crush you. Identify pinch points and keep hands and other body parts clear			tand in move ntify ly parts	
Begin well drilling operation. Back strain, eye injury, nois exposure to chemical hazar an underground utility, slips falls, equipment failure.			njury, noise nical hazard utility, slips, ailure.	ie, rds, hitting s, trips andDecontaminate sampling equipment after collecting a sample and decontaminate drilling equipment after each borehole. Use proper lifting techniques.			ollecting a ent after s.	
Step 1: Place 1 st auger in the cleared boring location.	Back hand	Back strain, eye injury, smashed hands, smashed feet, bruise, cuts.			Use proper lifting techniques, including the buddy system as necessary. Be aware of hand, foot, and other body part placement when lifting and moving the augers. Wear non-slip gloves.			buddy ot, and moving
Step 2: Place 2 nd auger on the auger head.	Back hand	strain, eye i s, smashed	njury, smas feet, bruise	hed , cuts.	Use proper lifting techniques, including the buddy system as necessary. Be aware of hand, foot, and other body part placement when lifting and moving the augers. Wear non-slip gloves. Place the auger in the correct position. Tighten bolts.			buddy ot, and moving auger in



Step 3: Advance the auger into the ground.	Hand Injury, Respiratory Risks, Noise, foot injury	Do not touch moving auger parts. Check air contaminant level. Wear ear protection. Stand away from the foot of the rig.
Step 4: Cuttings picked up by shovel and placed in drums.	Back strain, Respiratory Risks, Caught in auger.	Place materials in buckets. Move full buckets downwind of the operation. Do not attempt to lift, push, or move drums without the proper tools and equipment. Conduct air monitoring. Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. Do not wear loose clothing, dangling jewelry, long hair, or other hazards that could potentially get caught by the rotating auger.
Continue downward (repeat steps 1- 4)	See Steps 1-4.	See Steps 1-4.
Install well.	Back strain. Eye injury. Slip, trip and fall hazards. Cross-contamination. Non-approved well construction.	Use proper lifting techniques. Keep pathways from well supplies to borehole clear of tripping hazards. Make sure casing and other materials are clean before going into borehole. Verify authorization by any required inspectors for well installation/grouting.
Pull augers from ground and replace with constructed well.	Back Strain, Crushed hands and feet. Trip and fall hazards. Cuts and bruises	Use proper lifting techniques. Store augers away from work area.
Gauge water levels and product thickness (where applicable) in wells.	Back strain, inhalation or dermal exposure to chemical hazards, repetitive motion.	Perform air monitoring. Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location for quick access. Maintain safe distance from wellhead. Bend at knees, not at the waist.
Develop well by hand bailing or pumping.	Physical injury from mechanical failure of vacuum truck. Trip hazard. Exposure to contaminants. Cross- contamination. Electric shock. Back strain.	Make sure equipment is in good working order and pressurized hoses are whip-checked. Perform air monitoring. Have appropriate respirator with combination organic vapor/P-100 cartridges within 3- 5 feet of work area, readily available. Keep work area orderly. Decontaminate all equipment going into well. Any generators must be equipped with GFCI circuit.
Purge well(s) and collect purge water. Purging of the wells can be done by using one of two methods, by hand bailer or submersible pump.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Spilling contaminated water.	Decontaminate reusable purging equipment between each sampling location. If disposable bailers are used, then they will be properly disposed of. If the bailers are reusable, then they will be washed in an Alconox wash, rinsed with tap water, and then rinsed with de-ionized or distilled water. Decontamination water will be transferred to 55-gallon drums and staged. Use proper lifting techniques. Perform air monitoring. Have appropriate respirator with combination organic vapor/P-100 cartridges within 3- 5 feet of working location, readily available. Keep work area clear of tripping or slipping hazards.
Dispose or store purge water on- site.	Back strain. Exposure to contaminants. If disposing through on- site treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	Use proper equipment to transport water (pumps, drum dollies, etc.). Perform air monitoring. Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location for quick access. Label storage containers properly, and locate in isolated area away from traffic and other site functions. Coordinate off-site disposal (where applicable). Do not attempt to lift, push or move drums without the proper tools or equipment.
Clean site and demobilize.	Lifting hazards.	Use buddy system as necessary to remove traffic control. Leave site clean of refuse and debris. Clearly mark/barricade any borings that need later topping off or curing. Notify site personnel of departure, final well locations, and any cuttings/purge water left on- site. Use proper lifting techniques.

Project:	Jamaica MGF		Contract:	Nati	onal Grid	Contractor:	AECOM/
Activity:	Excavation/Trenching		Activity Location: 158 th Street a		et and Liberty Aver	nue, Jamaica, Queens, NY	
JHA Prepare	ed By:	Sara Meissner		Est. Start I	Date:	11/1/2013	

Identify Steps/Tasks to Perform Activity	Safety/Health Hazards	Controls
Underground facilities locate	Fire/explosion, damage to utilities	Call 811 before digging-ensure you have a ticket number. Do not dig unless you see that utilities have been marked out or flagged. Observe marked locations of underground utilities if marked. Excavate by hand when within two (2) feet in any direction of known underground obstructions.
Traffic Control	Struck by motor vehicles	Establish work zone. Never turn your back to traffic, use spotter when setting up work zone. Wear high- visibility hard hat and outer garment. Avoid distractions when establishing work zone (e.g. cell phone use, use of ear buds /headset for music.)
Mobilize excavating equipment	Struck by equipment in work zone	Wear high-visibility hard hat and outer garment. Maintain eye contact with operator. Stay out of equipment blind spots, if cannot see the operator they cannot see you.
	Noise	Use of hearing protection required when using a pavement breaker or concrete saw.
	Slip/trips/falls	Lay out air/hydraulic hose as not to create a trip hazard. Work form the inside to outside of area to be broken. Keep the rubble in front of you.
Breaking pavement	Struck by	Concrete saw must have a guard. Stand to the side of the saw. Start saw on ground. Watch for people behind you when starting saw.
		Do not guide pavement breaker spade/point with feet. Release trigger when moving breaker. Keep other out of area. Use protective footwear when using pavement breaker. Eye/face protection required.

Version 1 Revision Date: 10/28/2013

Identify Steps/Tasks to Perform Activity	Safety/Health Hazards	Controls
Pavement Breaking	Dust	Use only wet methods when cutting concrete. Position yourself and others upwind from dust. When breaking concrete minimize dust by using water. Position yourself and others upwind from dust.
	Musculoskeletal disorders	Perform stretching before beginning work. Use heavier pavement breakers (90lbs over a lighter breaker). Wear ant-vibration gloves. Take frequent rest breaks and changing working positions.
Digging	Struck by	Place spoil pile at least 2' feet away from the excavation. Workers to stand clear of trucks being loaded.
	Striking underground utilities or other significant obstructions.	Stop work: Hand digging required to visually establish location. If obstruction is a utility notify 811. Excavate by hand when within two (2) feet in any direction of known underground obstructions.
Excavate to proper depth	Cave-ins from unsupported sides	Excavations greater 5 feet in depth will require a protective system such as shoring or trench box. Trench box must be 18" above natural level of the ground. Shores must be 6" above natural level of the ground. Back filled area around trench box with soil to prevent lateral movement.
		Competent person to inspect excavation and surrounding area looking for evidence of cave-ins (Soil/pavement cracking). Protect structures such as curbs, sidewalks, signs etc.
	Falls	Use ladder- Secure ladder from movement extend 3' above excavation. Ladder to be located every 25'.
		Provide walkways with guardrail systems when excavation is over 6' deep.

Identify Steps/Tasks to Perform Activity	Safety/Health Hazards	Controls
Excavate to proper depth	Falling objects	Place spoil pile on one side at least 2' for more from excavation. Tools/ pipes/ equipment stored 2' from edge. Secure rolling objects.
	Potential for Hazardous atmosphere	Comp. person-monitor air in excavation 4' or deeper for O2, LEL, Hydrogen sulfide, organics CO.
		Fuel-saws, generator, pumps away from excavation. Locate same so exhaust does not enter excavation.
Working in excavation	Struck by	Stay in confines of protective system. Do not work under suspended loads. Level excavation when padding/backfilling is being placed by loader or excavator.
	Caught between	Remove shores per direction of comp. person.
		Exit if excavation shows signs of cave-ins, water intrusion, haz atmosphere, failure of protective system.
	Haz atmosphere (exhaust from jumping jack, plate compactor, etc.)	Never fuel equip. in excavation. Ensure equip. is tuned up and has muffler. Do not use in excavations deeper than 4' feet.
Secure excavation if it must remain open	Vehicle and pedestrian exposed to open cut.	Use road plates and secure to prevent movement. Secure with fencing set back at least six feed. Use of Jersey barriers on traffic side with warning flashers.

Project:	Jamaica MGF		Contract:	Nati	onal Grid	Contractor:	AECOM
Activity:	Excavation		Activity Location: 158 th Street a		et and Liberty Ave	nue, Jamaica, Queens, NY	
JHA Prepare	ed By:	Sara Meissner		Est. Start I	Date:	11/1/2013	

Equipment to be Used	Environmental Considerations	Training Requirements
Track Excavator	Fuel spills- limit amount of fuel used stored on site. Store in approved self-closing can. Use funnel when	Competent Person-excavation
Compressor with jack hammer	fueling. Locking fuel caps on equipment. Have spill control supplies on-site.	Pre-job briefing prior to start of work. Review JHA
Concrete saw		
Dump truck	Equipment will not be serviced on-site (oil change, repair work)	Mechanics, labors, etc excavation trenching safety.
Trash Pump (dewatering equipment)		Specific training for operating heavy equipment
Ladder	Hydraulic leaks-inspect equipment for leaks and damaged hoses. Have spill control supplies on-site	Daily safety meeting- Review of applicable MSDSs
Hydraulic shore or Trench box	Noise-work with in designated hours.	
	Storm water runoff- use of slit fence, slit pads in storm drains. Frac tanks to hold potentially contaminated Water. Filter sock on hose discharging water to storm drain.	
	Dust- implementation of dust control procedures.	
Hard hat-required		Training in use care and limitation of PPE.
Hi-visibility outer garment- ANSI Class 2		
Eye protection-safety glasses minimum		
Protective footwear (steel too, rubber boots)		
Gloves		
Gas monitor		Competency in the use of gas monitor

Attachment B Material Safety Data Sheets

.....Alconox

SPI Supplies Division Structure Probe, Inc. P.O. Box 656 West Chester, PA 19381-0656 USA Phone: 1-(610)-436-5400 Fax: 1-(610)-436-5755 E-mail: spi3spi@2spi.com WWW: http://www.2spi.com Manufacturer's CAGE: 1P573



Material Safety Data Sheet

SPI #01200-AB and #01200A-AB Alconox[®] Powdered Detergent

Section 1: Identification

Date Effective...... November 14, 2005 (most recent revision)

Chemical Name/Synonyms... On Label: Alconox®

Chemical Family...... Anionic powdered detergent

Emergencies Contacting CHEMTREC:

24 Hour Emergency Use Only #'s... Worldwide phone: 1-(703)-527-3887 Worldwide FAX: 1-(703)-741-6090 Toll-free phone: 1-(800)-424-9300 USA only



Product or Trade Name.... SPI #01200-AB and #01200A-AB Alconox® Powdered Detergent

CAS #. Not applicable

Chemical Formula..... Not applicable

Section 2 Composition Component Name CAS # OSHA OSHA ACGIH ACGIH

No hazardous ingredients in Alconox Powdered Detergent as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

Hazardous Material Information System USA	Health	0			
	Fire Hazard	0	National Fire Protection Association		
	Reactivity	0	USA		
	Personal Protection			\checkmark	

NFPA (National Fire Protection Association) Rating (Scale 0-4): HEALTH=0 FLAMMABILITY=0 REACTIVITY=0 OTHER=0 Not known

Section 3: Hazard Identification

Routes of entry Inhalation? Yes Skin? No Ingestion? Yes

Health Hazards (Acute and chronic): Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

Section 4: First Aid Measures

Signs and Symptoms of Exposure: Exposure may irritate mucous membranes. May cause sneezing.

Medical conditions generally aggravated by exposure: Not established. Unnecessary exposure to this product or any industrial chemical should be avoided.

Respiratory conditions may be aggravated by powder if air borne.

Emergency and First Aid Procedures:

Eyes: Immediately flush eyes with copious amounts of water for minimum 15 minutes. Call physician.

Skin: Flush with plenty of water.

Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs readminister fluids. See a physician for discomfort.

Section 5: Fire Fighting Measures

NFPA Rating: Not known

Extinguishing Media

Suitable/Not suitable:

SMALL FIRE: Use DRY chemical powder, water, foam, carbon dioxide

LARGE FIRE: Use extinguishing media suitable for the surrounding materials.

Special firefighting procedures:

Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.

Unusual Fire/Explosion Hazards: None

Hazardous thermal decomposition products: None known.

Protection of fire fighters: No special measures are required.

Flammable Limits: LEL: No data UEL: No data

Section 6: Accidental Release Measures

Personal precautions: No special precautions

Environmental Precautions and Clean Up Methods:

Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.

Section 7: Handling and Storage

Material should be stored in a dry area to prevent caking.

Section 8: Exposure Controls and Personal Protection

Engineering controls: Normal ventilation is normally required when handling or using this product. Avoid conditions that could produce dusting.

Personal Protective Equipment

Respiratory system: Dust mask recommended but not required.

Skin and body: Laboratory coat recommended but not required.

Hands: Impervious gloves recommended

Eyes: Goggles are recommended, especially when handling solutions irrespective of what they might be.

Other: Wash hands before eating, drinking, or smoking.

Section 9: Physical and Chemical Properties

Physical State and Appearance: White powder interspersed with cream colored flakes.

Odor: None

Boiling Point: Not applicable

Melting Point: Not applicable

Density (water = 1): Not applicable

Solubility: Appreciable, to 10% at ambient conditions.

Octanol/water partition coefficient: Not available

pH: Not known

Flash Point: None

Flammability: Non-flammable

Autoignition temperature: Not applicable

Section 10: Stability and Reactivity

Chemical Stability: The product is stable

Hazardous polymerization: Will not occur

Conditions to Avoid: None

Hazardous Products of Deposition: May release CO₂ on burning.

Reactions with Air and Water: Does not react with air, water or other common materials.

Section 11: Toxicological Information

Summary: Not considered to be toxic to humans or animals.

Skin Effects: Can be locally irritating

Eye Irritation: Can be irritating to the eyes

Inhalation: Dust can be irritating to mucous membranes

Sensitization: Not known

Chronic toxicity: There is no known effect from the chronic exposure to this product.

Section 12: Ecological Information

Exotoxicity: Not know but it is expected to be low because the material is biodegradable.

Environmental Fate: It is biodegradable.

Bioaccumulation: Not expected to occur (because the material is biodegradable).

Section 13: Disposal Considerations

This material is NOT classified as a hazardous material by RCRA. Use only licensed transporters and permitted disposal facilities and conform to all laws.

Recycle to process, if possible.

Germany water class: VCI WGK: No products were found.

Methods of disposal; waste of residues; contaminated packaging:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

Proper Shipping Name: Non-Regulated, No dangerous cargo

DOT Hazard Class: Non-Regulated, No dangerous cargo

UN/NA ID: Non-Regulated, No dangerous cargo

Packing Group: Not Applicable

Labels: Not Regulated

Marine Pollutant: No

NAER Guidebook: Not Regulated

DOT Status: Not Regulated

Land-Road/Railway:

ADR/RID Class: No dangerous cargo

Sea:

IMDG Class: No dangerous cargo

Air:

IATA-DGR Class: No dangerous cargo

Section 15: Regulatory Information

TSCA: All components of this product are listed on the TSCA 8(b) inventory. If identified components of this product are listed under the TSCA 12(b) Export Notification Rule, they will be listed below. TSCA 12(b) Component Listed under TSCA Section SARA Title 3: Section 313 Information/Emissions Reporting (**40 CFR 372**): Component Reporting Threshold SARA-Section 311/312: No components present in this product are subject to the reporting requirements of this statute. CERCLA Hazardous Substances and their Reportable Quantities: Component Reportable Quantity EU Regulations: Risk Phrases: This product is not classified according to the EU regulations.

Safety Phrases: Not applicable

Contains: Not applicable

California Prop. 65:

Proposition 65 requires manufacturers or distributors of consumer products into the State of California to provide a warning statement if the product contains ingredients for which the State has found to cause cancer, birth defects or other reproductive harm. If this product contains an ingredient listed by the State of California to cause cancer or reproductive toxicity, it will be listed below:

None found

Section 16: Other Information

Disclaimer of Liability:

Caution! Do not use SPI Supplies products or materials in applications involving implantation within the body; direct or indirect contact with the blood pathway; contact with bone, tissue, tissue fluid, or blood; or prolonged contact with mucous membranes. Products offered by SPI Supplies are not designed or manufactured for use in implantation in the human body or in contact with internal body fluids or tissues. SPI Supplies will not provide to customers making devices for such applications any notice, certification, or information necessary for such medical device use required by US FDA (Food and Drug Administration) regulation or any other statute. SPI Supplies and Structure Probe, Inc. make no representation, promise, express warranty or implied warranty concerning the suitability of these materials for use in implantation in the human body or in contact with internal body tissues of fluids.

The information and recommendations set forth above are taken from sources believed to be accurate as of the date hereof, however SPI Supplies and Structure Probe, Inc. make no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assume no liability to any user thereof. The information contained in this sheet does not constitute a hazard assessment and should not be used in place of the user's own assessment of work place risks as required by other health and safety legislation. Be aware of the Structure Probe, Inc. <u>Copyright Policy</u>. Structure Probe, Inc. grants a nonexclusive license to make unlimited copies of this safety sheet for internal use only. Quite obviously, this information would pertain only to this material when purchased from SPI Supplies as product from other sources, with other ingredients and impurity levels could have substantially different properties.

Thursday February 22, 2007

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Worldwide Distributors, Representatives, and Agents

.....Isobutylene Calibration Gas



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:

NON-FLAMMABLE GAS MIXTURE

PRODUCT USE: SUPPLIER/MANUFACTURER'S NAME: ADDRESS:

Document Number: 002103 For general analytical/synthetic chemical uses. AIRGAS INC. 259 North Radnor-Chester Road, Suite 100 Radnor, PA 19087-5283 1-610-687-5253 1-800-949-7937 1-423-479-0293 April 22, 2001

BUSINESS PHONE: EMERGENCY PHONE: International: DATE OF PREPARATION:

2. COMPOSITION and INFORMATION ON INGREDIENTS								
CHEMICAL	CAS #	mole %		EXPOSURE LIMITS IN AIR				
NAME			AC	GIH	OSHA		NIOSH	OTHER
			TLV	STEL	PEL	STEL	IDLH	
			ppm	ppm	ppm	ppm	ppm	ppm
Isobutylene	115-11-7	1 ppm -	There are no specific exposure limits for Isobutylene. Isobutylene is a simple					
		1.7%	asphy	kiant (SA). Ox	ygen levels sł	nould be main	tained above	19.5%.
Air	25635-88-	Balance		There are no	specific expo	sure limits ap	olicable to Air.	
	5							
Air is a mixt	ure of gases.	The primary c	omponents o	f air, and the a	approximate c	oncentration of	of each compo	onent, are
	listed below							
Nitrogen	7727-37-9	79%	There are no specific exposure limits for Nitrogen. Nitrogen is a simple					
-			asphy	kiant (SA). Ox	ygen levels sł	hould be main	tained above	19.5%.
Oxygen	7782-44-7	21%		There are	no specific ex	posure limits	for Oxygen	

NE = Not Established. See Section 16 for Definitions of Terms Used.

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, odorless, non-flammable gas. The main health hazards associated with releases of this gas are related to the high pressure within the cylinder. Air, the main component of this product, is generally considered non-flammable, however, Air will support combustion. The flammable component of this gas mixture is below the LEL. A cylinder rupture hazard exists when this product, which is under pressure, is subjected to heat or flames. Emergency responders must wear personal protective equipment appropriate for the situation to which they are responding.

<u>SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE</u>: The most significant route of overexposure for air is by inhalation at elevated or reduced pressure.

INHALATION: This product is non-toxic. Air, the main component of this product, is necessary for life.

<u>OTHER POTENTIAL HEALTH EFFECTS</u>: Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

<u>HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms</u>. Over-exposure to this product may cause the following health effects:

ACUTE: The most significant hazards associated with compressed air is the pressure hazard. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to this gas.

TARGET ORGANS: ACUTE: Respiratory system under ambient low pressure conditions. Central nervous system under ambient high pressure conditions. CHRONIC: None expected.

PART II What should I do if a hazardous situation occurs?

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus equipment should be worn.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s). Remove victim(s) to fresh air, as quickly as possible. In case of eye contact which leads to irritation, immediately flush eyes with copious amounts of water for at least 15 minutes. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Only trained personnel should administer supplemental oxygen.

In case of frostbite, place the frostbitten part in warm water. DO NOT USE HOT WATER. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

<u>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE</u>: Acute or chronic respiratory conditions, as well as disorders involving the "Target Organs", as listed in Section 3 (Hazard Information), may be aggravated by overexposure to the components of this product.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen as soon as possible, following exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable. AUTOIGNITION TEMPERATURE: Not applicable. FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable. Upper (UEL): Not applicable.

5. FIRE-FIGHTING MEASURES (Continued)

FIRE EXTINGUISHING MATERIALS: Non-flammable gas. Use extinguishing media appropriate for surrounding fire.

<u>UNUSUAL FIRE AND EXPLOSION HAZARDS</u>: When involved in a fire, this material may decompose and produce toxic gases including carbon monoxide and carbon dioxide. Additionally, when involved in fire, the cylinders may rupture.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

<u>SPECIAL FIRE-FIGHTING PROCEDURES</u>: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed cylinders from area, if it can be done without risk to fire-fighters. Withdraw immediately in case of rising sounds from venting pressure relief devices or any discoloration of tanks or cylinders due to a fire.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel. Minimum Personal Protective Equipment should be Level D: safety glasses, and mechanically-resistant gloves. Level B, which includes the use of Self- Contained Breathing Apparatus, should be worn when oxygen levels are below 19.5% or are unknown. Locate and seal the source of the leaking gas. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in place or remove it to a safe area and allow the gas to be released there.

PART III How can I prevent hazardous situations from occurring?

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Do not eat or drink while handling chemicals.

<u>STORAGE AND HANDLING PRACTICES</u>: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits.

<u>SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS</u>: Protect cylinders against physical damage. Store in cool, dry, well-ventilated, fireproof area, away from flammable or combustible materials and corrosive atmospheres. Store away from heat and ignition sources and out of direct sunlight. Do not store near elevators, corridors or loading docks. Do not allow area where cylinders are stored to exceed 52°C (125°F). Isolate from incompatible materials including flammable materials (see Section 10, Stability and Reactivity), which can burn violently. Use only storage containers and equipment (pipes, valves, fittings to relieve pressure, etc.) designed for the storage of Air. Do not store containers where they can come into contact with moisture. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap inplace until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gashandling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap. Mark empty cylinders "EMPTY". NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with this product. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, Safe Handling of Compressed Gases in Containers. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres".

<u>PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT</u>: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged out safely. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation.

<u>RESPIRATORY PROTECTION</u>: Maintain Oxygen levels above 19.5% in the workplace. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

<u>EYE PROTECTION</u>: Splash goggles, face-shields or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or Canadian Standards.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders of this product. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

<u>BODY PROTECTION</u>: Use body protection appropriate for task. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for **Air**, the main component of this product , unless otherwise stated:

 RELATIVE VAPOR DENSITY: 1
 EVAPOR

 SPECIFIC GRAVITY: Not applicable.
 FI

 SOLUBILITY IN WATER: 1.49% (v/v)
 BI

 VAPOR PRESSURE, mmHg @ 20°C:.
 pl

 EXPANSION RATIO:
 Not applicable.
 V

 SPECIFIC VOLUME:
 13.3 ft3/lb; (0.833 m3/kg)
 COEFFICIENT WATER/OIL DISTRIBUTION:

main component of this product , unless otherwise state <u>EVAPORATION RATE</u> (nBuAc = 1): Not applicable. <u>FREEZING POINT</u>: -216.2°C (-357.2°F) <u>BOILING POINT</u> @ 1 atmos: -194.3°C(-317.8°F) <u>pH</u>: Not applicable. <u>VAPOR PRESSURE</u>: Not applicable. m₃/kg) <u>ODOR THRESHOLD</u>: Not applicable. TION: Not applicable.

The following information is pertinent to this gas mixture:

APPEARANCE, ODOR AND COLOR: This product is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinctive properties to this product. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Normally stable.

DECOMPOSITION PRODUCTS: None known.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE. Air (the main component of this product) is not compatible with fuels, in that air will support combustion. The Isobutylene component of this mixture is incompatible with Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

<u>CONDITIONS TO AVOID</u>: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART III How can I prevent hazardous situations from occurring?

11. TOXICOLOGICAL INFORMATION

<u>TOXICITY DATA</u>: The following toxicology data are for the components of this gas mixture present at a level greater than 1 mole %:

ISOBUTYLENE:

LC50 (Inhalation-Rat) 620 gm/m3/4 hours LC50 (Inhalation-Mouse) 415 gm/m3/2 hours

<u>SUSPECTED CANCER AGENT</u>: No component of this gas mixture is found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC, and therefore is not considered to be, nor suspected to be, cancer causing agents by these agencies.

<u>IRRITANCY OF PRODUCT</u>: Contact with rapidly expanding gases can cause frostbite and damage to exposed skin and eyes.

SENSITIZATION OF PRODUCT: No component of this product is a skin or respiratory sensitizer.

<u>REPRODUCTIVE TOXICITY INFORMATION</u>: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to cause mutagenic effects in humans.

Embryotoxicity: This product is not reported to cause embryotoxic effects in humans.

Teratogenicity: This product is not reported to cause teratogenic effects in humans.

<u>Reproductive Toxicity</u>: This product is not reported to cause adverse reproductive effects in humans. A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with

the reproductive process.

<u>BIOLOGICAL EXPOSURE INDICES</u>: Biological Exposure Indices (BEIs) have been determined for the components of this product are as follows:

12. ECOLOGICAL INFORMATION

<u>ENVIRONMENTAL STABILITY</u>: This gas will be dissipated rapidly in well-ventilated areas. <u>EFFECT OF MATERIAL ON PLANTS or ANIMALS</u>: No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases. <u>EFFECT OF CHEMICAL ON AQUATIC LIFE</u>: No evidence of an adverse effect of this product on aquatic

life is currently available.

13. DISPOSAL CONSIDERATIONS

<u>PREPARING WASTES FOR DISPOSAL</u>: Product removed from cylinder must be disposed of in accordance with appropriate U.S. Federal, State and local regulations or with regulations of Canada and its Provinces. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT

OF TRANSPORTATION.

 PROPER SHIPPING NAME:
 Compressed gases, n.o.s. (Air, Isobutylene)

 HAZARD CLASS NUMBER and DESCRIPTION:
 2.2 (Compressed Gas)

 UN IDENTIFICATION NUMBER:
 UN 1956

 PACKING GROUP:
 Not Applicable

 DOT LABEL(S) REQUIRED:
 Compressed Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is considered as dangerous goods, per regulations of Transport Canada. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

<u>U.S. SARA REPORTING REQUIREMENTS</u>: The components of this gas mixture are not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

<u>U.S. SARA THRESHOLD PLANNING QUANTITY</u>: There are no specific Threshold Planning Quantities for this material. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory. OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: The components of this gas mixture are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None. California - Permissible Exposure Limits for Chemical Contaminants: None. Florida - Substance List: Isobutylene. Illinois - Toxic Substance List: None. Kansas - Section 302/313 List: None. Minnesota - List of Hazardous Substances: Isobutylene. Massachusetts - Substance List: None. Missouri - Employer Information/Toxic Substance List: None. New Jersey - Right to Know Hazardous Substance List: Isobutylene. North Dakota - List of Hazardous Chemicals, Reportable Quantities: None. Pennsylvania - Hazardous Substance List: Isobutylene. Rhode Island - Hazardous Substance List: None. Texas - Hazardous Substance List: None. West Virginia - Hazardous Substance List: None. Wisconsin - Toxic and Hazardous Substances: None.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is on the California Proposition 65 Lists.

LABELING: CAUTION: HIGH PRESSURE GAS. MAY ACCELERATE COMBUSTION. Keep oil and grease away. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Use in accordance with the Material Safety Data Sheet.

FIRST-AID:IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If
breathing is difficult, give oxygen. Call a physician.
IN CASE OF FROSTBITE, obtain immediate medial attention.
DO NOT REMOVE THIS PRODUCT LABEL.

ADDITIONAL CANADIAN REGULATIONS:

<u>CANADIAN DSL INVENTORY</u>: The components of this product are listed on the DSL Inventory. <u>OTHER CANADIAN REGULATIONS</u>: Not applicable. <u>CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS</u>: The components of this product are not on the CEPA Priorities Substances Lists. CANADIAN WHMIS SYMBOLS: **Class A:** Compressed Gases

16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc. 9163 Chesapeake Drive, San Diego, CA 92123-1002 858/565-0302

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. AirGas, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AirGas, Inc. 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 his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. **EXPOSURE LIMITS IN AIR:**

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average

(TWA), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (C). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30- minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (OSHA). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: 0 (minimal acute or chronic exposure hazard); 1 (slight acute or chronic exposure hazard); 2 (moderate acute or significant chronic exposure hazard); 3 (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); 4 (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: 0 (minimal hazard); 1 (materials that require substantial pre-heating before burning); 2 (combustible liquid or solids; liquids with a flash point of 38-93 **200**[100 **3**] **(C)** ass IB and IC flammable liquids with flash points below 38 4 (Class) Affammable liquids with flash points below 23 $\Box C [73 \Box F]$ and boiling points below 38 D (dd mally stable); tiv im aterial that can become unstable at elevated temperatures or which can react slightly with water); 2 (materials that are unstable but do not detonate or which can react violently with water); 3 (materials that can detonate when initiated or which can react explosively with water); 4 (materials that can detonate at normal temperatures or pressures). PERSONAL PROTECTIVE EQUIPMENT CODES: B: Gloves and goggles; C: Gloves, goggles, rubber apron (appropriate body protection); D: Gloves, goggles, faceshield; rubber apron (appropriate body protection);. X: Special attention should be given to PPE Selection.

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point – Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL – the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD50** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC50** – Lethal Concentration (gases) which kills 50% of the exposed animals; **C50** – Lethal Concentration (gases) which kills 50% of the exposed animals; **concentration** expressed in parts of material per million parts of air or water; **mg/m3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International

Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: EC is the effect concentration in water.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act **(SARA)**; the Canadian Domestic/Non-Domestic Substances List **(DSL/NDSL)**; the U.S. Toxic Substance Control Act **(TSCA)**; Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act **(CERCLA or Superfund)**; and various state regulations. Attachment C Applicable SH&E SOPs



S3NA-302-PR Electrical, General

1.0 Purpose and Scope

- 1.1 To minimize and control electrical hazards in the workplace.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.
- 1.3 As a general rule, AECOM employees should not work on exposed, energized systems with a potential greater than 50 volts. This work should be subcontracted to a qualified electrician. Should it be necessary for an AECOM employee to perform work on exposed, energized systems with a potential greater than 50 volts, the requirements of this procedure will be followed.

2.0 Terms and Definitions

- 2.1 **Arc Rating:** The maximum incident energy resistance demonstrated by a material prior to breakdown or at the onset of a second-degree skin burn (expressed in cal/cm²).
- 2.2 Arc Flash: A dangerous condition associated with the release of energy during an electrical arc.
- 2.3 **Arc Flash Analysis:** A mathematical determination of the energy released by an electric arc and the distance from the source that a flash hazard exists. The process for an Arc Flash Analysis is defined in NFPA 70E of the National Electric Code.
- 2.4 **Circuit Protective Device:** A load-rated switch, circuit breaker, or other device specifically designed as a disconnecting means for opening, reversing, or closing of live circuits.
- 2.5 Energized Electrical Equipment: Electrically connected to or having a source of voltage.
- 2.6 **Flash Hazard:** A dangerous situation associated with the release of energy caused by an electric arc.
- 2.7 **Ground Fault Circuit Interrupter (GFCI):** An electrical device that protects the users of all devices connected to it from electrical shock. The GFCI is part of the circuit or device in use and continuously measures the current in that circuit. If a leakage of current is detected, as in the case of an electrical short circuit, the circuit is opened at the GFCI and current cannot flow beyond the GFCI.
- 2.8 **Hazardous Atmospheres:** Areas that contain or may contain explosive or flammable atmospheres require specific electrical precautions. OSHA regulates the use of electrical devices in explosive atmospheres according to National Electrical Code criteria and classifications for hazardous atmospheres.
- 2.9 **Portable Electric Equipment:** Cord- and plug-connected equipment and extension cords.
- 2.10 **Qualified Persons:** Individuals who have specific and documented training to avoid the hazards of working on or near energized electrical equipment and have been specifically permitted to work on or near exposed energized and parts.
- 2.11 **Shock Hazard:** A dangerous situation associated with the possible release of energy caused by contact or approach to live parts.
- 2.12 **Unqualified Persons:** Individuals with little or no training to avoid the hazards of energized electrical parts or equipment.

3.0 Attachments

- 3.1 S3NA-302-FM Energized Electrical Work Permit
- 3.2 S3NA-302-ST Electrical Regulations
- 3.3 S3NA-302-WI1 Electrical Safe Work Practices
- 3.4 S3NA-302-WI2 Ground Fault Protection Safe Work Practices
- 3.5 S3NA-302-WI3 Generator Safety Card



4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Project Manager (Field Task Manager, Supervisor)**

- The **Manager** of any **employee** performing work on exposed, energized systems above a potential of 50 volts will trained to the same level as a Qualified Person (1910.332).
- The AECOM **Project Manager**, **Field Task Manager**, or **Supervisor** is responsible for determining if AECOM employees are exposed to electrical hazards.
- The **Manager** or **Supervisor** will determine the appropriate safe guards to be put in place to protect employees.
- The **Manager** or **Supervisor** will confirm that only Qualified Persons are assigned duties that expose them or others to live electrical current above 50 volts.
- 4.1.2 **Region\District SH&E Manager** is responsible for the following:
 - Approving all Energized Electrical Work Permits.
 - Providing technical guidance in support of this procedure.
- 4.1.3 **Site Safety Coordinator** shall assist the site **manager/supervisor** in compliance with the requirements of this procedure.

4.1.4 Employees

- All AECOM employees engaged in project field activities shall follow these procedures.
- AECOM **employees** will stop work if workers, other than Qualified Persons, are exposed to live electrical systems at unknown voltages or potentials greater than 50 volts
- No staff shall open electrical panels unless they are a Qualified Person.

4.2 Training

- 4.2.1 **Employees** who have potential exposures to electrical hazards, Qualified Persons, shall be trained in and be familiar with the electrical safety-related work practices required by the applicable regulations.
- 4.2.2 All other on-site personnel, Unqualified Persons, will be advised of the electrical hazards and the procedures to mitigate their risk.

4.3 General Requirements for Use of Electricity

- 4.3.1 AECOM personnel who meet the requirements of a Qualified Person and have been specifically designated as such in the project health and safety plan may set up temporary circuits up to 240 volts. Maintenance or installation of circuits over 240 volts will require professionally trained personnel (i.e. professional electricians).
- 4.3.2 All electrical panels, lines, equipment, and facilities are to be considered energized unless confirmation that they are de-energized can be obtained from a Qualified Person or electrician.
- 4.3.3 All work on de-energized systems will be performed using established Hazardous Energy Control procedures. Lockout devices will be used to prevent the operation/energizing of equipment or circuits during maintenance or other work. Tagout devices will be used only where it is not feasible to use a lockout device.
- 4.3.4 Insulated tools and electrical handling equipment shall be inspected prior to use to confirm that their protective properties are not damaged. Damaged equipment will be tagged "DAMAGED" and removed from service.
- 4.3.5 S3NA-302-WI1 Electrical Work Safe Work Practices outlines additional requirements for working on live electrical systems located on AECOM job sites. All work on exposed, energized electrical systems at potentials above 50 volts will be approved by the **Region** or **District Safety Manager**

4.4 General Requirements for Field/Worksite Use of Electricity

4.4.1 Electrical outlets utilized to supply power for electrical equipment during field operations shall be of the three-wire grounding type. Whenever possible, they should be tested for correct polarity and adequacy of the ground with a circuit analyzer. If it is determined that the outlet is incorrectly wired or inadequately grounded, it should not be used.



4.4.2 Ground Fault Circuit Interrupter (GFCI) devices will be in place between the equipment and power source for all temporary circuits unless protected by an assured equipment grounding program as defined in this procedure and *S3NA-302-WI2 Ground Fault Protection Safe Work Practices* (i.e., circuits that are not part of a permanently installed facility electrical system, such as on a construction site or temporary field installation).

4.5 Distribution System Setup

- 4.5.1 Only qualified personnel shall perform electrical wiring or connections.
- 4.5.2 Under no circumstances shall electrical lines be routed through doorways, hatches, windows, or other openings where lines could be crimped, bent, or cut.
- 4.5.3 Electric lines crossing work areas, personnel, or vehicular traffic areas shall be either fastened securely overhead (at a height that provides safe clearance for work operations), or protected by a cover capable of withstanding the imposed loads without creating a trip hazard.
- 4.5.4 Circuit breakers shall be labeled to indicate their use.
- 4.5.5 All circuit breaker panels shall be kept covered when not in use.
- 4.5.6 A fuse puller shall be used to remove cartridge fuses where one or more energized circuits are present.
- 4.5.7 All live parts of electrical equipment operating at 50 volts or more shall be properly guarded against accidental contact, which includes:
 - Limit access to the equipment to qualified employees only.
 - Unqualified Persons shall remain at least one meter (three feet) from exposed, energized systems managed by AECOM Qualified Persons. This distance shall be nine meters (10 feet) for systems with a potential greater than 240 volts.
 - Label using the proper accident prevention sign, stating DANGER as well as the voltage of the equipment.
 - Provide a conductor of the ampacity of not less than the rating of the circuit breaker or fuses protecting that circuit.
 - Confirm that a bare conductor or earth return is not used for any temporary circuit.
 - Confirm that all electrical wiring is protected from physical damage by covering and by not placing it in a location where it can be crimped or cut, etc.

4.5.8 Extension Cord Use

- Extension cords and electrical connections on handheld and other power tools will be inspected prior to use for cuts, kinks, frayed wires, etc. If any deficiency is noted, the equipment will be tagged "DAMAGED" and removed from service. Manufacturer-installed insulated electrical cords will not be repaired or spliced.
- Extension cords are to be kept clean, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or create a tripping hazard. Extension cords will be appropriate for the specific task and environment.
- Extension cord sets for use in field operations should be of the three-wire grounding type and should be designed for hard or extra-hard use. This type of cord will typically utilize insulated wires within an outer insulated sleeve. Examples of such cord include the type marked S, ST, SO, STO, SJ, SJO, or SJTO. Molded wire (flat) cord sets should not be used in field situations. The cord will minimally be rated for the intended current (e.g., heavy duty extension cords are often available in both 15 and 20 amp versions).
- Use of extension cords is allowed only for temporary installations not to exceed 90 days (e.g., decorations).
- Extension cords shall be provided with a plug cap that is either molded to the cord or equipped with a cord clamp to prevent strain on the terminal screws.
- Extension cords shall not be fastened with staples or otherwise hung in a manner that could damage the outer jacket or insulation.



- Extension cords shall be inspected prior to each use to confirm that there is no damage or defects. Defective cords shall not be used.
- Extension cords used with grounding-type equipment (e.g., three-prong plug) shall contain a grounding-type conductor (have three plugs to accept the ground plug).
- Ground fault circuit interrupters shall be used for all nonpermanent wiring needed for construction purposes or when working in wet or moist areas or onboard ships.
- Extension cords used in highly conductive work locations (e.g., wet areas) shall be of the type approved for such locations.
- Grounding-type equipment (e.g., three-prong plugs) shall not be modified to mate to incompatible outlets (e.g., cut off grounding prong to fit two prong outlets).

4.5.9 Temporary Lights/Task Lights

- A temporary light shall not be suspended by the cord unless the cord and light are designed for suspension.
- Temporary lights shall be equipped with bulb protectors unless they are installed at least 7 or more feet overhead.

4.6 Working on or Near Energized Parts

4.6.1 Working on Energized Circuits

Working on or near energized parts covers either potential direct physical contact or contact by means of tools or equipment and working close enough to the energized part to draw an arc. Any AECOM **employee** (Qualified Person) assigned to work on exposed, live electrical systems above 50 volts shall have a person knowledgeable about the task to be performed and emergency response procedures assigned to observe the Qualified Person during the task with the potential exposure. This observer shall have no other assignments during the potential exposure.

- Prior to performing any work near exposed, energized systems, the Qualified Person shall:
 - o Perform a Shock Hazard Analysis.
 - Perform an Arc Flash Analysis.
 - Establish emergency contacts.
 - o Complete and have approved the Energized Electrical Work Permit.
 - Have all required personal protective equipment (PPE), insulated tools, and test equipment tested and ready to use.
 - Know and understand the procedures to be followed.
 - Ensure that adequate lighting and clearance space is available.
 - Remove all conductive clothing and jewelry.
- 4.6.2 Working Near Overhead Power Lines
 - Personnel working in the vicinity of overhead power lines, either on the ground or elevated, shall comply with S3NA-406-PR Electrical Lines, Overhead.
 - All workers and equipment including cranes and drill rigs shall maintain a clearance distance of at least 50 feet from overhead power lines unless a detailed assessment demonstrating that a smaller clearance distance provides protection has been completed.

4.7 Grounding

- 4.7.1 The path to ground from circuits, equipment, and enclosures will be permanent and continuous.
- 4.7.2 Electrical installations at project sites will be protected by either an equipment grounding conductor program or GFCIs. The two options are:
 - All 120-volt, single-phase, 15- and 20-amp receptacles that are not part of permanent wiring will be protected by GFCIs.
 - The equipment grounding conductor program will cover extension cords, receptacles, and cordand plug-connected equipment. The program will include the following elements:



- o A written description of the program.
- At least one competent person to implement the program.
- Daily visual inspections of extension cords and cord- and plug-connected equipment for defects. Equipment found damaged or defective shall be removed from use and not used until repaired.
- Continuity tests of the equipment grounding conductors or receptacles, extension cords, and cord- and plug-connected equipment every three months.
- Compliance with the requirements for grounding of systems, circuits, and equipment (see 1926.404 in the US).
- 4.7.3 If the equipment grounding conductor program option is chosen, the designated competent person at the site shall maintain inspection records.

4.8 Assured Grounding

- 4.8.1 Where AECOM Operations is responsible, projects will have in place a program for the testing and inspection of all temporary electrical supply systems.
- 4.8.2 Assured grounding is applicable to all cord sets, receptacles that are not a part of the permanent wiring of a building or structure, and all equipment and tools connected by cord or plug.
- 4.8.3 All cord sets and receptacles will be visually inspected for damage before use.
- 4.8.4 All items covered by this procedure shall have their grounding conductor tested for continuity and all cord attachments and receptacles shall be tested for polarity to be sure the ground conductor is connected to the proper terminal.
- 4.8.5 Testing will be done on the following intervals:
 - Before first use of any item.
 - After repairs and before placing back into service.
 - After every incident that might reasonably be suspected of causing damage.
 - At intervals not to exceed 3 months.\
 - Any tool, cord, or service that does not pass the required tests may not be made available to employees. Such equipment shall be tagged out of service and delivered to the supervisor or competent person for repair or replacement.
 - Only a qualified employee (electrician) designated as the competent person may test electrical devices and will:
 - Prior to testing any item, remove any and all of the old color-coding tape or zip strips.
 - Perform the required ground conductor testing and polarity verifications.
 - After passing the necessary tests, the items will be marked by putting a wrap of the color coding tape or zip strip (of the appropriate color) around the cord close to the male and female ends of the electrical cord or by the male end on tools. Receptacle outlets will be marked in the most practical manner.

4.9 Personal Protective Equipment/Work Practices

- 4.9.1 PPE requirements shall be determined based on the results of each of the following: Task Hazard Analysis, Shock Hazard Analysis, and Arc Flash Analysis.
- 4.9.2 Nonconductive hardhats shall be worn when there is danger of head injury from electric shock or burns due to exposure to energized parts.
- 4.9.3 Jewelry shall not be worn when working around or with energized parts.
- 4.9.4 Insulated tools shall be used to work with energized parts. Tools that have insulation that might be damaged (e.g., rubber handles) shall be inspected prior to each use to confirm the insulation is not damaged.
- 4.9.5 Eye protection with side shields shall be worn when working with energized parts.



- 4.9.6 Rubber mats, non-conductive shields, or protective barriers shall be used as needed to protect employees from electrical hazards.
- 4.9.7 Appropriate insulating gloves shall be worn to pick up or unplug connections that are in highly conductive areas, such as in water.
- 4.9.8 Do not plug in or unplug electric equipment with wet hands.

4.10 **Portable Electrical Equipment**

- 4.10.1 Double-insulated, portable, industrial-type electrical tools meeting the requirements of the National Electrical Code (NEC) are authorized for use (ground wire not required). Where this type of tool is used, the equipment will be distinctly marked.
- 4.10.2 Portable electrical tools not provided with special insulating or grounding protection are not for use in damp, wet, or conductive locations (e.g., by persons standing on the ground or on metal floors).
- 4.10.3 All portable electrical appliances and equipment with non-current-carrying metal parts to which personnel may be exposed shall be grounded by a continuous conductor of adequate capacity from the device to a grounded receptacle. The Site Safety Officer shall resolve any question of whether or not a particular appliance should be grounded.
- 4.10.4 Manufacturer-installed guards shall not be tampered with, modified, or removed. These guards will be in place and utilized during operation of equipment.
- 4.10.5 The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment that requires examination, adjustment, servicing, or maintenance while energized shall not be less than 36 inches deep and 30 inches wide or the width of the equipment, whichever is greater.
- 4.10.6 Portable electrical equipment shall be handled in a manner that will not cause physical damage to the equipment.
- 4.10.7 Portable electrical equipment shall not be carried by the cord.
- 4.10.8 Cords shall not be used to raise or lower equipment.
- 4.10.9 Extension cords shall not be fastened with staples, nails, wire, or otherwise hung in such a fashion that could damage the outer jacket or insulation.
- 4.10.10 Electrical cords shall not be removed from a receptacle by pulling on the cord line.
- 4.10.11 Employees' hands shall not be wet when plugging and unplugging cord and plug connected equipment and extension cords.
- 4.10.12 Disconnect portable electric equipment when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- 4.10.13 Portable electric equipment and extension cords used in potentially wet locations shall be approved for use in those locations by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation (e.g., F.M., UL, etc.).
- 4.10.14 Portable electric equipment and extension cords used in areas exposed to gases, fumes, vapors, liquids, or other agents having a deteriorating effect shall be approved for use in those locations.
- 4.10.15 Portable electric equipment and extension cords used in areas in which hazardous concentrations of flammable gases or vapors exist shall be approved for use in those locations.
- 4.10.16 If an adapter is used to accommodate a three-wire cord to a two-hole receptacle, the adapter wire will be attached to a known ground. The third prong shall never be removed from the plug.
- 4.10.17 After a circuit is de-energized by a circuit protective device, the circuit may not be manually reenergized until it has been determined that the equipment and circuit can be safely energized.
- 4.10.18 The outlet box for portable extension cords for outdoor use shall be weatherproof and shall be maintained in good condition.

5.0 Records

- 5.1 The Shock Hazard Analysis and the Arc Flash Analysis forms shall be retained in the project file.
- 5.2 The completed S3NA-302-FM Energized Electrical Work Permit shall be retained in the project file.



6.0 References

- 6.1 S3NA-406-PR Electrical Lines, Overhead
- 6.2 S3NA-410-PR Hazardous Energy Control



S3NA-302-FM Energized Electrical Work Permit

PART 1: To be completed by the requester

Job Work Number

- (1) Description of circuit/equipment/job location:
- (2) Description of work to be done:

(3) Justification of why the circuit/equipment cannot be de-energized or the work cannot be deferred until the next scheduled outage:

Requester/Title	Date	Time
-----------------	------	------

PART II: To be completed by the electrically qualified persons doing the work:

		Check When Complete
(1)	Detailed job description procedure to be used in performing the above detailed work:	
(2)	Description of the Safe Work Practices to be employed:	
(3)	Results of the Shock Hazard Analysis:	
(4)	Determination of Shock Protection Boundaries:	
(5)	Results of Flash Hazard Analysis:	
(6)	Determination of the Flash Protection Boundary:	
(7)	Necessary personal protective equipment to safely perform the job:	
(8)	Means employed to restrict the access of unqualified persons from the work area:	
(9)	Evidence of completion of a Job Briefing including discussion of any job-related hazards:	



(10) Do you agree that the above described work can be done safely?(If <i>no</i>, return to requester)	🗌 Yes 🗌 No	
Electrically Qualified Person(s) Date/Time Electrically Qualified Person(s)	Date/Time	
Electrically Qualified Person(s) Date/Time Electrically Qualified Person(s)	Date/Time	
Authorized by:		
Authorized Supervisor	Date/Time	

Notes:

S3NA-302-ST Electrical Regulations

1.0 Regulations

Jurisdiction	Regulation
United States	
OSHA	National Fire Protection Association (NFPA) Publication 70, National Electrical Code Occupational Health and Safety Administration 29 CFR 1910, Subpart S Electrical Occupational Health and Safety Administration 29 CFR 1926, Subpart K Electrical
Canada	
Alberta	OHS Code (2009) Sect 225 – 227, Schedule 4 Alberta Electrical and Communication Utility Code (2002)
British Columbia	OHS Regulation (1997) Sect 19.1 – 19.40 Electrical Safety Act
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 25.0 – 25.8, 26.45, 38.1 – 38.17
New Brunswick	OHS Regulation (91-191) Sect 286 – 298
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 84 – 87
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 120 – 128
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 96
Ontario	Reg. 213/91 Sect 181 – 195.3 Reg. 851 Sect 41, 60
Prince Edward Island	OHS Regulations (EC180/87) Sect 36.1 – 36.44
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 331 Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.11.1 – 2.11.6, 5.1.1 – 5.3.1, Schedule 7
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 450 – 466, Schedule Table 22
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 9.18 – 9.20

2.0 Standards

Canadian Standards	C22.1-98, Canadian Electrical Code - Part I
Association	



S3NA-302-WI1 Electrical Safe Work Practices

1.0 Purpose

The purpose of this guideline is to confirm that all live electrical work conducted under the control of AECOM personnel is carried out in accordance with recognized best practices in order to provide adequate protection to workers from the hazards of potential arc flash and/or electrical shock.

2.0 Associated AECOM Policies

In addition to this guideline, AECOM will also follow all Federal and State/Provincial Regulations, in particular NFPA-70E and 29CFR part 1910 as well as relevant AECOM SH&E procedures, including *S3NA-302-PR Electrical, General* and *S3NA-410-PR Hazardous Energy Control*.

3.0 Responsibilities

3.1 AECOM's Project Manager

- 3.1.1 Be familiar with all precautions and Federal and State/Provincial regulations and Best Practices, including NFPA-70E.
- 3.1.2 Provide training on this Best Management Practice to authorized employees covering:
 - Nature and control of known shock and arc flash hazards.
 - Means of eliminating and controlling shock and arc flash hazards.
 - Special electrical personal protective equipment (PPE) requirements (task-specific).
 - Procedure for reporting any deviations to this Best Practice.
- 3.1.3 Control access to energized electrical equipment with potential of shock or arc flash to authorized personnel only.
- 3.1.4 Confirm availability of proper tools for the operation and maintenance of electrical equipment.
- 3.1.5 Proper identification and guarding of potentially hazardous electrical equipment.
- 3.1.6 Providing available electrical one-line diagrams.
- 3.1.7 Confirm proper housekeeping around energized electrical equipment at all times.
- 3.1.8 Provide proper working conditions, including adequate lighting, to facilitate work in a safe environment.
- 3.1.9 Proper supervision of employees.
- 3.1.10 Maintaining a list of authorized electrical supervisor, authorized electrical worker, and attendant.
- 3.1.11 Implementation and ongoing evaluation of this Best Management Practice.
- 3.1.12 Terminate the work and cancel the permit when live work has been completed or any new electrical hazard arises.
- 3.1.13 Verify that communication modes are available and have been tested.
- 3.1.14 Remove unauthorized individuals who enter or who attempt to enter the approach boundaries during live work.
- 3.1.15 Confirm that live work remains consistent with terms of the live work permit and that acceptable working conditions are maintained.


3.1.16 Withdraw the live work permit and stop all work if unsafe conditions are reported during any live work (e.g. sparking, smoldering etc.). Do not permit work on that equipment until the cause of any unsafe condition is thoroughly investigated and the live work procedure has been reviewed to prevent reoccurrence.

3.2 Authorized Electrical Attendant

- 3.2.1 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.
- 3.2.2 Understand the hazards that may be faced during live work, including the potential for arc flash, shock hazard, and other related hazards.
- 3.2.3 Be aware of the potential of arc flash or shock possible to the authorized worker.
- 3.2.4 Maintain an accurate count of authorized workers working near the live equipment or inside approach boundaries.
- 3.2.5 Remain near the approach boundary until relieved by another authorized electrical attendant.
- 3.2.6 Communicate with authorized workers as necessary to confirm maintenance of safe conditions at all times.
- 3.2.7 Monitor activities inside and outside the approach zone to determine if it is safe for the worker to continue to remain in the approach zone. Order the authorized worker to stop live work under any of the following conditions:
 - The attendant detects a problem;
 - The attendant detects the signs of short-circuiting, such as electrical sparking, smoldering, or any other abnormality;
 - The attendant detects a situation outside the approach zone that could endanger the worker; and
 - If the attendant cannot effectively and safely perform all assigned duties.
- 3.2.8 Perform no other duties that might interfere with the attendant's primary duty to monitor and protect the authorized worker.

3.3 Authorized Electrical Worker

- 3.3.1 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.
- 3.3.2 Be continuously alert, focused, and aware of the hazards of performing the task.
- 3.3.3 Understand AECOM Safety, Health and Environmental policies and standards as well as site-specific electrical safe work practices.
- 3.3.4 Examine and understand all the documents provided by AECOM and manufacturers, including all specific hazards, advisories, cautions, etc.
- 3.3.5 Perform all work in accordance with applicable federal and state/provincial regulations, AECOM policies, safe work practices, and this Best Management Practice.
- 3.3.6 Be knowledgeable of the use and selection of the proper tools to safely perform the electrical task safely.
- 3.3.7 Complete a Safe Work Plan prior to the start of a task and during work, if conditions change.
- 3.3.8 Maintain good housekeeping around work areas. Remove all debris, materials, etc., at the completion of tasks.
- 3.3.9 Report any hazardous (uncontrolled) conditions to AECOM's authorized supervisor.
- 3.3.10 Understand the hazards that may be faced during live work, including arc flash, shock, or other electrical hazards.

S3NA-302-WI1 Electrical Safe Work Practices Revision 0 01 December 2010

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- 3.3.11 Properly use required PPE and electrical tools as specified in this best practice.
- 3.3.12 Communicate with the attendant as necessary.
- 3.3.13 Alert the attendant whenever any abnormality occurs (e.g., sparking, minor shock, burning smell, etc.) or symptoms of unsafe conditions are observed.
- 3.3.14 Stop all work and exit from the approach zone whenever:
 - An order to evacuate is given by the authorized attendant or the authorized supervisor; or
 - When the worker observes any warning sign or symptom of short circuiting or a dangerous situation; or
 - When the supervisor gives an order to stop work.

4.0 Multi-employer Live Electrical Work Coordination

- 4.1 **AECOM's Requirements:** When using another employer to perform work involving live electrical work, AECOM will:
- 4.1.1 Inform the contractor that the workplace contains shock and/or arc flash potential and that live work is allowed only through compliance with a live work permit program meeting the requirements of NFPA-70E.
- 4.1.2 Appraise the contractor of the elements of the work, including the hazards identified and all past experiences with the live work that make the live work hazardous.
- 4.1.3 Appraise the contractor of any precautions or procedures that have been implemented for the protection of employees in the approach zone where contractor personnel will be working.
- 4.1.4 Coordinate live work operations with the contractor when both AECOM employees and contractor employees will be working in or near approach zone, so that employees of AECOM and the contractor do not endanger each other.
- 4.1.5 Debrief the contractor at the conclusion of the live work operations.
- 4.2 **Contractor Requirements:** In addition to complying with the live work permit requirements, each contractor who is retained to perform live electrical work will:
- 4.2.1 Obtain any available information regarding live work from the project manager.
- 4.2.2 Coordinate live work operations with the project manager when both AECOM personnel and contractor personnel will be jointly working in or near the approach zone.
- 4.2.3 Practice all precautions and federal and state/provincial regulations and Best Practices including NFPA-70E.
- 4.2.4 Inform AECOM's project manager of the live work permit that the contractor will be using and of any hazards confronted or created during live work, either through debriefing or during live work.

5.0 Review and Update

This Best Management Practice will be reviewed and updated annually.



6.0 Definitions

- 6.1 **Arc Rating:** The maximum incident energy resistance demonstrated by a material prior to breakdown or at the onset of a second-degree skin burn (expressed in cal/cm2).
- 6.2 **Flash Hazard:** A dangerous situation associated with the release of energy caused by an electric arc.
- 6.3 **Energized Electrical Equipment:** Electrically connected to or having a source of voltage.
- 6.4 **Shock Hazard:** A dangerous situation associated with the possible release of energy caused by contact or approach to live parts.

7.0 Required Minimum Qualifications

- 7.1 All electrical work including instrumentation, installations, maintenance, troubleshooting, calibration, and operation of breakers will only be conducted by qualified, trained, and skilled personnel (this includes AECOM personnel and contractors/subcontractors). These personnel will meet all qualification requirements mandated by the federal/state regulations as well as applicable electrical associations and trade bodies.
- 7.2 The Project Manager, in consultation with SH&E Department, will determine the minimum qualifications requirements for any work with the potential for arc flash.

8.0 Working on or Near Electrical Conductors of Circuit Parts

- 8.1 Safe work practices shall be used to safeguard employees from injury when working on or near exposed electric conductors or circuit parts that can be energized.
- 8.1.1 Live Parts Safe Work Conditions: Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them.
- 8.1.2 Live Parts Unsafe Work Conditions: Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have not been put into electrically safe conditions.
- 8.2 Working on or near exposed electrical conductors OR circuit parts that are, or might become, energized
 Prior to working on or near exposed electrical conductors and circuit parts operating at 50 volts or
 more, lockout/tagout devices shall be applied in accordance with AECOM and site-specific policies.
- 8.3 Electrical Hazard Analysis If the live parts operating at 50 volts or more are not placed in electrically safe condition, other safety-related work practices shall be used to protect employees who might be exposed to electrical hazards. Safe work practices mentioned below shall be established before any person approaches exposed live parts within limited approach boundary:
- 8.3.1 Shock Hazard Analysis A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the PPE necessary in order to minimize the possibility of electrical shock.
- 8.3.2 Flash Hazard Analysis A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis shall determine the flash protection boundary and the PPE that people within the flash protection boundary shall use.



9.0 Shock Hazard Analysis and Approach Boundaries

- 9.1 The National Fire Protection Association (NFPA) has determined that a comprehensive Shock Hazard Analysis Survey is the best method to:
- 9.1.1 Systematically analyze shock hazards,
- 9.1.2 Identify approach boundaries, and
- 9.1.3 Identify appropriate PPE.
- 9.2 Before permitting live work on electrical equipment, each project site having electrical equipment operating at more than 50 volts is required to conduct Shock Hazard Analysis Survey. Upon completion of the survey, the applicable electrical areas/spaces will be labeled in accordance with survey results.
- 9.3 Shock hazard analysis for individual equipment is not required if a facility-wide shock hazard analysis has been conducted and if conditions (including labels and signage) are maintained at all times.

NOTE: Only authorized personnel are allowed to work within the approach boundaries.

- 9.4 No qualified person shall approach or take any conductive object closer to exposed live parts operating at 50 volts or more than the restricted approach boundary set forth in Appendix A-1 [Table 130.2 (C) of NFPA 70-E].
- 9.5 In the absence of facility-wide survey, a shock hazard analysis (including the identification of approach boundaries) shall be conducted in accordance with NFPA 70E Section 130.2 and Table 130.2 (C) (see Appendix A-1 of this Practice) for all electrical equipment operating at over 50 volts.
- 9.6 Results of both facility-wide as well as individual shock hazard survey shall be made available to all authorized employees. Additionally, any recommendations given by the survey generated from the survey shall be reviewed by the project manager and shall be addressed in a timely manner.

10.0 Arc Flash Hazard Analysis and Approach Boundaries

- 10.1 Arc flash safety requirements apply to all electrical equipment operating at 50 volts or more.
- 10.2 Similar to the shock hazard analysis, the NFPA has determined that a comprehensive Arc Flash Hazard Analysis Survey is the best method to:
- 10.2.1 Systematically analyze the potential for arc flash,
- 10.2.2 Identify the limits of the approach, and
- 10.2.3 Identify appropriate PPE.
- 10.3 Once a comprehensive facility arc flash survey has been conducted and electrical work areas/spaces are labeled in accordance with survey results, an individual arc flash hazard analysis is not required, provided that qualified personnel confirm that the conditions, as indicated on the labels and signs, are maintained.

NOTE: Only authorized personnel are allowed to work within the limits of approach.

- 10.4 Please refer to Appendix A-1 for details.
- 10.5 Prior to performing any work on energized electrical systems, an arc flash hazard analysis [including the identification of approach boundaries) will be conducted in accordance Appendix F of this practice (taken from NFPA 70E Section 130.3)].

11.0 Required PPE Categorized by Exposure

The following specialized PPE requirements will be used while working on energized electrical systems:

- 11.1 PPE as prescribed by the shock hazard analysis and arc flash analysis; or
- 11.2 PPE requirements identified in Appendix A-2 of this practice (taken from NFPA 70E Sections 130.2 and 130.7).

12.0 Required Tools and Equipment

12.1 Only tools and testing or protective equipment approved by ANSI/ASTM for the relevant voltage rating [see Table130.7(C)(8) or Canadian Standards Association for appropriate voltage rating] will be used when working on energized electrical systems. All tools and testing or protective equipment will be visually inspected prior to use to confirm that the protection systems associated with the tool or equipment are not damaged or impaired and that diagnostic meters and tools are configured properly. Any tool or testing or protective equipment suspected of being compromised will be immediately taken out of service and will be tagged for disposal.

13.0 Work on Energized Electrical Systems

- 13.1 It is the policy of AECOM that all electrical maintenance or troubleshooting will be done on de-energized circuits, to the extent practical. Work on energized circuits can only be done under special circumstances using a "Live Work Permit" issued by authorized electrical supervisor. This permit takes into consideration the voltage levels, known electrical hazards, communication requirements, and need for watch persons, etc. The following procedure will be observed for a live work permit:
- 13.1.1 The person requesting the work (authorized worker) will complete the permit and will retain the original with him or her during the work. Copy of the permit will be displayed at a prominent location in the control room as a notice that live work has been authorized in certain part of the plant/project.
- 13.1.2 Permit will be reviewed for correctness, proper safety precautions, and adequacy of controls by the authorized electrical supervisor. After satisfying all safety requirements, an authorized electrical supervisor will sign the permit and will give the original copy to the authorized electrical worker.
- 13.1.3 Upon work completion, the authorized worker will note any observation on the permit and will return the original to the authorized supervisor.
- 13.1.4 Authorized supervisor will keep both copies of the permit as a controlled record for a period of 12 months.
- 13.2 The following conditions will be met for live electrical work:
- 13.2.1 If any equipment or instrumentation is to be disabled while other related components or systems are still functioning, the Live Work Permit should record how process safety of the remaining systems will be maintained.
- 13.2.2 All electrical and instrumentation work conducted will be recorded in the applicable MCC log. The documentation will include a reference to the permit number where appropriate.
- 13.2.3 The worker will inform the operations supervisor that he or she intends to de-energize a circuit. He or she will also inform the operations supervisor when the work is complete and that the system can be returned to service.
- 13.3 See S3NA-302-FM Energized Electrical Work Permit for a suggested template for a "Live Work Permit."

14.0 Lockout/Tagout Policy and Procedures

14.1 All equipment will be locked out prior to any work commencing in accordance with AECOM's policy S3NA-410-PR Hazardous Energy Control and applicable site specific lockout/tagout program.



15.0 Troubleshooting Procedure

15.1 The troubleshooting of electrical equipment often requires working with live circuits. Where possible, work will be done on de-energized circuits following the relevant AECOM and site-specific lockout/tagout policy. However, troubleshooting may require limited work on live circuits; if such work is required it will be done using the "Live Work Permit" and site-specific Troubleshooting Guidelines.

16.0 Housekeeping

- 16.1 All areas containing electrical equipment will:
- 16.1.1 Be maintained and kept clean.
- 16.1.2 Be well illuminated.
- 16.1.3 Not be used for storage of supplies.
- 16.1.4 Not be used for the storage of any flammable materials.
- 16.1.5 Be assessed for safety hazards.
- 16.1.6 Be suitably ventilated to control dust, temperature, and humidity.

17.0 Communication

- 17.1 Personnel working in or around equipment with electrical hazards will employ a suitable means of communication to confirm their safety.
- 17.2 The means of communication may include:
- 17.2.1 Authorized attendant (required for ALL live work conducted on 600 volts and above) (CFR 29 1910.335(b)(3) in the United States).
- 17.2.2 Permits.
- 17.2.3 Two-way radios.

18.0 Signage and Labels

- 18.1 MCCs, ECRs, battery rooms, and electrical panels are required to have the following labeling to identify arc flash and shock hazards. The information on the label will include:
- 18.1.1 Flash Hazard Boundary (Arc Flash Current).
- 18.1.2 Flash Hazard at 18 inches in cal/cm² or joules.
- 18.1.3 Hazard Risk Categories (PPE requirements).
- 18.1.4 Shock Hazards.
- 18.1.5 Limited Approach Boundaries.
- 18.1.6 Restricted Approach.
- 18.1.7 Prohibited Approach.
- 18.1.8 Log book to record all electrically related activities.
- 18.2 All doorways to buildings and enclosures containing energized electrical equipment will be signed to indicate that:
- 18.2.1 Access is restricted to authorized personnel only.
- 18.2.2 Electrical hazards exist beyond this (boundary, door, etc.).

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19.0 Management of Change

19.1 Any changes to electrical and/or project instrumentation will be conducted following the prescribed management of change policy.



APPENDIX A-1

Table 130.2(C) Approach Boundaries to Live Parts for Shock Protection

(All dimensions are distance from live part to employee.)

Nominal Voltage Range (Phase to Phase)	Limited Approach Boundary Exposed Moveable Conductor	Exposed Fixed Circuit Parts	Restricted Approach Boundary; includes inadvertent movement adder	Prohibited Approach Boundary
Up to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
50-300	10 ft	3.5 ft	Avoid Contact	Avoid Contact
300-750	10 ft	3.5 ft	1 ft	1 inch
More than 750 volts	Consult NACO's Master Electrician or other authorized electrician.			



APPENDIX A-2

Table 130.7(C)(10) Protective Clothing and Personal Protective Equipment (PPE) Matrix

Table 130.7(C)(11) Protective Clothing Characteristics

Hazard/Risk Category		Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm2 (cal/cm2)]	
0		Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd ² (1)	N/A	
1		FR shirt and FR pants or FR coverall (1)	16.74 (4)	
2		Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)	
3		Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)	
4		Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)	
NOTE:				
Arc rating:	g : Arc rating is defined in Article 100 and can be either ATPV or E_{BT} .			
ATPV:	ATP heat curv	ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve.		
Е _{вт} :	E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.			

APPENDIX B

Protective Clothing and Equipment		Protective Systems for Hazard/Risk Category					
		-1					
	Hazard/Risk Category Number	(Note 3)	0	1	2	3	4
No	n-melting (according to ASTM F 1506-00) or Untreate	d Natural	Fiber			
a.	T-shirt (short-sleeve)	Х			Х	Х	Х
b.	Shirt (long-sleeve)		Х				
C.	Pants (long)	х	х	X (Note 4)	X (Note 6)	х	х
FR	Clothing (Note 1)	•				•	•
a.	Long-sleeve shirt			х	х	X (Note 9)	х
b.	Pants			X (Note 4)	X (Note 6)	X (Note 9)	х
c.	Coverall			(Note 5)	(Note 7)	X (Note 9)	(Note 5)
d. Jacket, parka, or rainwear				AN	AN	AN	AN
FR	Protective Equipment						
a.	Flash suit jacket (multilayer)						Х
b.	Flash suit pants (multilayer)						Х
с.	Head protection						
	1. Hard hat			Х	Х	Х	Х
	2. FR hard hat liner					AR	AR
d.	Eye protection		_	_	_		
	1. Safety glasses	Х	Х	Х	AL	AL	AL
	Safety goggles				AL	AL	AL
e.	Face and head area protection		—	—	—	—	—
	 Arc-rated face shield, or flash suit hood 				X (Note 8)		
	2. Flash suit hood					Х	Х
	 Hearing protection (ear canal inserts) 				X (Note 8)	х	x
f.	Hand protection			_	—	—	—
	Leather gloves (Note 2)			AN	Х	Х	Х
g.	g. Foot protection						
	Leather work shoes			AN	Х	Х	Х
AN	AN = As needed AL = Select one in group AR = As required X = Minimum required						

NOTES:

1. See Table 2. Arc rating for a garment is expressed in cal/cm².

2. If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.

3. Hazard/Risk Category Number "-1" is only defined if determined by Notes 3 or 6 of Table 130.7(C)(9)(a).

4. Regular weight (minimum 12 oz/yd² fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 4.

5. Alternate is to use FR coveralls (minimum arc rating of 4) instead of FR shirt and FR pants.

6. If the FR pants have a minimum arc rating of 8, long pants of non-melting or untreated natural fiber are not required beneath the FR pants.

7. Alternate is to use FR coveralls (minimum arc rating of 4) over non-melting or untreated natural fiber pants and T-shirt.

8. A face shield with a minimum arc rating of 8, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or, alternately, a flash suit hood), is required.

 Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4 and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing, instead of FR coveralls over FR shirt and FR pants over non-melting or untreated natural fiber clothing.

Hazard/Risk Category	Clothing Description (Typical number of clothing layers is given in parentheses)	Required Minimum Arc Rating of PPE [(J/cm2 (cal/cm2)]
0	Non-melting, flammable materials (i.e., untreated cotton, wool, rayon, or silk, or blends of these materials) with a fabric weight at least 4.5 oz/yd ² (1)	N/A
1	FR shirt and FR pants or FR coverall (1)	16.74 (4)
2	Cotton underwear – conventional short sleeve and brief/shorts, plus FR shirt and FR pants (1 or 2)	33.47 (8)
3	Cotton underwear plus FR shirt and FR pants plus FR coverall, or cotton underwear plus two FR coveralls (2 or 3)	104.6 (25)
4	Cotton underwear plus FR shirt and FR pants plus multilayer flash suit (3 or more)	167.36 (40)
NOTE		

Table 2: Protective Clothing Characteristics

NOTE:

Arc rating is defined in Article 100 and can be either ATPV or E_{BT} . ATPV is defined in ASTM F 1959-99 as the incident energy on a fabric or material that results in sufficient heat transfer through the fabric or material to cause the onset of a second-degree burn based on the Stoll curve. E_{BT} is defined in ASTM F 1959-99 as the average of the five highest incident energy exposure values below the Stoll curve where the specimens do not exhibit breakopen. E_{BT} is reported when ATPV cannot be measured due to FR fabric breakopen.









Figure F.1 Hazard/Risk Analysis Evaluation Procedure Flow Chart.



APPENDIX E

Flash Protection Boundary

For system that are above 600 volts or less, the Flash Protection Boundary shall be 4.0 ft., based on the product of clearing time of 6 cycles (0.1 second) and the available bolted fault current of 50 kA, or any combination not exceeding 300 kA cycles (5,000 ampere seconds).

For clearing times and bolted fault currents other than 300kA cycles, or under engineering supervision, the Flash Protection Boundary shall alternatively permitted to be calculated in accordance with the following general formula:

 $D_c = [2.65 \text{ x MVA}_{bf} \text{ x t }]^{1/2}$

or

 $D_c = [53 \text{ x MVA x t }]^{1/2}$

where:

 D_c = distance in feet from an arc source for a second-degree burn

MVA_{bf} = bolted fault capacity available at point involved (in mega volt-amps)

MVA = capacity rating of transformer (mega volt-amp). For transformer with an MVA rating below 0.75 MVA, multiply the transformer MVA rating by 1.25

t = time of arc exposure (in seconds)

At voltage levels above 600 volts, the Flash Protection Boundary is the distance at which the incident energy equals 5 J/cm2 (1.2 cal/cm²). For situations in which fault-clearing time is 0.1 second (or faster), the Flash Protection Boundary is the distance at which the incident energy equals 6.24 J/cm² (1.5 cal/cm²).



S3NA-302-WI2 Ground Fault Protection Safe Work Practices

1.0 Background

1.1 OSHA standard 1926.404(b)(1) requires "ground fault protection" on construction sites. The standard allows two different approaches to providing the required protection for employees from electrical ground faults. Either "ground fault circuit interrupters" (GFCI) are to be used with temporary receptacles, or an "assured equipment grounding conductor program" is to be established in which plug-connected electrical equipment, extension cords, and temporary receptacles are tested on a periodic basis.

2.0 Ground Fault Circuit Interrupters

- 2.1 A GFCI is an electrical device that is designed to prevent electrocution from electrical leakage. It is designed to measure the difference in amperage between the "hot" wire and the "neutral" wire in a circuit. Under ideal conditions, the amperage should be the same in both wires. If there is electrical leakage (a ground-fault), the amperages will be different. If the difference is more than a predetermined amount, the GFCI "trips" and stops the flow of electricity.
- 2.2 GFCIs may trip from many causes:
- 2.2.1 Electrical leakage in the tool from internal defects.
 - Electrical leakage in the extension cord from damaged insulation or from normal leakage in long runs of cords.
- 2.2.2 Moisture in the air or cords lying in water or on moist dirt.
- 2.2.3 Too many tools on one GFCI circuit.
 - Electromagnetic interference from two-way radios or from power transmission lines.
- 2.2.4 Faulty wiring of the GFCI into the circuit.
- 2.2.5 Defective GFCI.
- 2.2.6 Any such tripping will require the problem to be corrected before the protected circuit can be re-set.
- 2.3 All 120-volt, single phase, 15 and 20 ampere temporary receptacles shall be protected with "approved" GFCIs. "Approved" means listed by Underwriters Laboratories.
- 2.4 There are several types of GFCIs.
- 2.4.1 A combination circuit breaker and GFCI that is installed in place of the ordinary circuit breaker.
- 2.4.2 A receptacle containing a built-in GFCI.
- 2.4.3 A portable GFCI that plugs into a receptacle and allows the extension cord or tool to be plugged into the GFCI.
- 2.4.4 A portable unit containing several GFCI protected receptacles.
- 2.5 GFCIs contain a test button and a reset button. Each GFCI needs to be tested prior to use and on a periodic basis depending upon the manufacturer's recommendations (at a minimum monthly).

3.0 Assured Equipment Grounding Conductor Program

3.1 If an assured equipment grounding conductor program is to be used instead of GFCIs to provide ground fault protection, the program shall be governed by the following requirements.



- 3.1.1 Temporary receptacles shall be electrically grounded in accordance with the temporary wiring requirements of the National Electrical Code.
- 3.1.2 Extension cords shall be three-wire cords containing an equipment grounding conductor (ground wire).
- 3.1.3 Electrical equipment that is plugged into a receptacle or extension cord (portable electrical tools, bench grinders, electric heaters, etc.) shall have a ground wire properly attached to the non-current-carrying metal parts of the equipment. (Double-insulated tools have no ground wire and are therefore exempt from these testing and recording requirements but still need to be inspected for defects.)
- 3.1.4 The Worksite Manager and/or Supervisor are required to designate one or more competent persons to administer this testing and recording program.
- 3.1.5 Periodic testing of all plug-connected equipment, all extension cords, and all temporary receptacles is to be conducted at the following times:
 - Before a new item (equipment, cord, or receptacle) is put into use.
 - After any repairs to the item.
 - After any incident in which the item may have been damaged.
 - Within 3 months of the last test. (An exception is allowed in the Standard in which extension cords, and temporary receptacles, which are fixed in place and are not exposed to damage, may be tested every 6 months.)
- 3.1.6 The purpose of the test is to determine the following:
 - Temporary receptacles—to be sure that the receptacle is grounded.
 - Extension Cords—to be sure that the ground wire is connected to the proper terminal at each end and that the ground wire is continuous throughout the length of the cord.
 - Plug Connected Equipment—to be sure that the ground wire is connected to the proper terminal and to the non-current carrying metal parts of the equipment and that the ground wire is continuous from the equipment to the plug.
- 3.1.7 The tests may be conducted using the following instruments:
 - A receptacle tester may be used to test receptacles and to test extension cords when plugged into a receptacle.
 - A continuity tester, or a volt-ohm meter, may be used to test equipment and to test extension cords when not plugged into a receptacle.
- 3.1.8 Records must be kept to show which items have passed the test and when the test was conducted. These records may be either written inspection logs, a color coding system using colored tape attached to the item, or some other effective means.
- 3.1.9 Color coding shall be used in the following manner:
 - After a plug-connected piece of equipment or an extension cord has passed the test, colored tape is to be placed around the cord near the plug. After a temporary receptacle has passed the test, colored tape is to be placed on the cover plate.
 - Any set of colors may be used, with the exception of white, black, or silver.
 - If there has been no overall site requirements established by the general contractor, use the following colors for the test periods.

January, February, March	Red
April, May, June	Blue
July, August, September	Orange
October, November, December	Green



- 3.1.10 The tests administered every three months are to begin on the first working day of each quarter. Testing and color coding are to be continued until all items covered by this program have been tested. The test administered every six months, for those receptacles and extension cords needing only semi-annual testing, are to be color coded using the quarterly color current at the time of the semi-annual test.
- 3.1.11 A visual inspection of plug-connected equipment, extension cords, and temporary receptacles is to be made by the user before each use. The purpose of the visual inspection is to look for damage or defects that could affect the safe use of the item. (Exception: extension cords and temporary receptacles that are fixed in place and not exposed to damage are not required to be give a daily visual inspection, but it is a good idea to do the daily visual inspection anyway.)
- 3.1.12 Equipment, cords, or receptacles showing damage or defects that could affect its safe operation are not to be used. This applies not only to the visual inspection before each use but also applies to any evidence of damage observed any time during use. Damaged items are to be taken out of service and are not to be used until properly repaired and retested.
- 3.1.13 Equipment covered by this program is not to be used until the equipment has been tested and color coded according to the requirements of this program.
- 3.1.14 A copy of this program is to be kept at the worksite.



S3NA-302-WI3 Generator Safety Card

1.0 Objective/Overview

1.1 Portable generators should be used with extreme caution in order to prevent personal injury. When using a portable generator it is important to follow the manufacturer's instructions to avoid injuring someone or damaging your generator or appliances. Allow only trained, authorized personnel to operate the generator. Along with training, other safety measures include proper maintenance of equipment and personal protective equipment (PPE). Remember muscle strains are the most common injury associated with portable generators.



2.0 Safe Operating Guidelines:

2.1 Follow manufacturer's recommended operating instructions; every generator is not the same. Maintain adequate ventilation. Generators emit carbon monoxide (CO). Never operate a generator in an enclosed building without proper ventilation. Turn the generator off to refuel. Gasoline and its vapors may ignite if they come into contact with hot components or an electrical spark, so store fuel in a properly designed container in a secure location. To avoid a shock, make sure that your hands are dry and that you are standing in a dry place whenever you operate the generator. Turn off equipment and lights supplied by the generator until it is running. Use the right extension cord. Use only UL-listed, three-prong extension cords. Be sure the extension cord is the proper size (wire-gauge) to handle the electric load that will be plugged into it. Make sure the generator is properly grounded prior to each use. Using a portable generator to tie into the wiring of an existing structure shall be done only by a licensed electrician.

2.1.1 Potential Hazards:

- Lifting, carrying, and pulling starter cords.
- Burns from contact with the hot muffler or engine.
- Shocks/electrocution.
- Noise exposure.
- Inhaling exhaust gases, CO.

2.1.2 Training Requirements:

- Review of Applicable SOPs.
- Back Injury Prevention.
- Demonstrated knowledge on the use of a generator.
- Review of manufacturers operating guidelines.



- 2.1.3 Personal Protective Equipment (Level D PPE):
 - Leather Gloves.
 - Hearing Protection.
 - Long Sleeve Shirt (i.e., to shield from burns, etc.).
- 2.1.4 Other Safety Tips:
 - Have a Class A:B:C fire extinguisher readily available at all times.



S3NA-305-PR Hand and Power Tools

1.0 Purpose and Scope

- 1.1 Provides the AECOM requirements for all manually-operated hand and power tools and equipment use, handling and storage.
- 1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

- 3.1 S3NA-305-GL Hand and Power Tools Guide
- 3.2 S3NA-305-WI1 Chainsaw Safety Card
- 3.3 S3NA-305-WI2 Circular Saw Safety Card
- 3.4 S3NA-305-WI3 Cut Off Saw Safety Card
- 3.5 S3NA-305-WI4 Hand-held Grinder Safety Card
- 3.6 S3NA-305-WI5 Impact Wrench Safety Card
- 3.7 S3NA-305-WI6 Nail Gun Safety Card
- 3.8 S3NA-305-WI7 Pentak Vacuum Safety Card
- 3.9 S3NA-305-WI8 Power Drill Safety Card
- 3.10 S3NA-305-WI9 Pressure Washer Safety Card
- 3.11 S3NA-305-WI10 Reciprocating Saw Safety Card
- 3.12 S3NA-305-WI11 Sander Safety Card
- 3.13 S3NA-305-WI12 Utility Knife Safety Card
- 3.14 S3NA-305-WI13 Wood Chipper Safety Card
- 3.15 S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card
- 3.16 S3NA-305-WI15 Pneumatic Tools Safety Card
- 3.17 S3NA-305-WI16 Manual Hand Tools Safety Card
- 3.18 S3NA-305-WI17 Small Engines Safety Card
- 3.19 S3NA-305-WI18 Electric and Battery Powered Hand Tools Safety Card

4.0 Procedure

- 4.1 **Roles and Responsibilities**
- 4.1.1 **Project Managers/Field Task Managers/Supervisors**. Each **Manager/Supervisor** must ensure that all aspects of this procedure are followed and adhered to on all AECOM projects, sites and locations. If a specific tool is not included in this work instruction section of this SOP, appropriate guidelines shall be established prior to work associated with that equipment, including following manufacturer's recommendations.
- 4.1.2 **Region SH&E Manager** provides technical guidance and support as to this procedure.
- 4.1.3 **Employees. Employees** shall not work with any tool that they are not familiar with without first obtaining training associated with that equipment. In addition, **employees** must following manufacturer's recommendations for its use and must not modify the equipment without first obtaining authorization from the manufacturer.



4.2 **Restrictions**

- 4.2.1 No **employee** shall use any hand tool, unless they are familiar with the use and operation of the equipment or have received specific instruction on its use and operation.
- 4.2.2 All tools will be used in accordance with manufacturer's specifications.

4.3 Training

4.3.1 Instruction in the proper use, safe handling, and maintenance of tools will be provided to employees unfamiliar with the tool.

4.4 **Personal Protective Equipment**

4.4.1 Lockout devices (padlocks, multiple lock hasps, tags), gloves appropriate to the task, safety-toed boots, as required, hard hats and eye & face protection, as required.

4.5 Inspections

- 4.5.1 All tools must be inspected prior to each use. Any tool that is defective or has missing parts must not be used. Every broken or defective tool must be tagged or identified as such. Tagged tools will be returned to your supervisor for repair or replacement. Tagged tools will be immediately removed from service.
- 4.5.2 All tools must be inspected to manufacture's specifications according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly.

5.0 Records

5.1 None

6.0 References

- 6.1 S3NA-208-PR Personal Protective Equipment Program
- 6.2 S3NA-302-PR Electrical, General
- 6.3 S3NA-305-GL1 Hand and Power Tools
- 6.4 S3NA-410-PR Hazardous Energy Control
- 6.5 S3NA-510-PR Hearing Conservation Program



S3NA-305-GL Hand and Power Tools

1.0 Exposure

1.1 Employees who use hand and power tools and are exposed to the hazards of falling, flying, abrasive, and splashing objects, or to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate personal protective equipment.

2.0 Basic Safety rules

- 2.1 Keep all tools in good condition with regular maintenance.
- 2.2 Use the right tool for the job.
- 2.3 Examine each tool for damage before use and do not use damaged tools.
- 2.4 Operate tools according to the manufacturers' instructions.
- 2.5 Provide and use properly the right personal protective equipment.
- 2.6 All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable vapors).
- 2.7 When a temporary power source is used for construction a ground-fault circuit interrupter should be used
- 2.8 Eye protection is required, and head and face protection is recommended for employees working with pneumatic tools.
- 2.9 Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- 2.10 Compressed air guns should never be pointed toward anyone.
- 2.11 Workers should never "dead-end" them against themselves or anyone else.
- 2.12 A chip guard must be used when compressed air is used for cleaning.
- 2.13 Use of heavy jackhammers can cause fatigue and strains. Heavy rubber grips reduce these effects by providing a secure handhold.
- 2.14 Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield also should be used.
- 2.15 Noise hazard associated with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

3.0 Hazard Prevention Sharp Objects

- 3.1 Employees, when using saw blades, knives, or other tools, should direct the tools away from aisle areas and away from other employees working in close proximity.
- 3.2 Knives and scissors must be sharp; dull tools can cause more hazards than sharp ones.
- 3.3 Cracked saw blades must be removed from service.
- 3.4 Wrenches must not be used when jaws are sprung to the point that slippage occurs.
- 3.5 Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads.
- 3.6 The wooden handles of tools must not be splintered.
- 3.7 Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.



4.0 Hazard Prevention of Power tools

4.1 **Precautions**

- 4.1.1 Never carry a tool by the cord or hose.
- 4.1.2 Never yank the cord or the hose to disconnect it from the receptacle.
- 4.1.3 Keep cords and hoses away from heat, oil, and sharp edges.
- 4.1.4 Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
- 4.1.5 Keep all people not involved with the work at a safe distance from the work area.
- 4.1.6 Secure work with clamps or a vise, freeing both hands to operate the tool.
- 4.1.7 Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- 4.1.8 Maintain tools with care; keep them sharp and clean for best performance.
- 4.1.9 Follow instructions in the user's manual for lubricating and changing accessories.
- 4.1.10 Be sure to keep good footing and maintain good balance when operating power tools.
- 4.1.11 Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.
- 4.1.12 Remove all damaged portable electric tools from use and tag them: "Do Not Use."

4.2 Guards

- 4.2.1 The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded.
- 4.2.2 Machine guards, as appropriate, must be provided to protect the operator and others from the following:
 - Point of operation.
 - In-running nip points.
 - Rotating parts.
 - Flying chips and sparks.
- 4.2.3 Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches (5.08 centimeters) in diameter must be equipped at all times with guards.
- 4.2.4 An upper guard must cover the entire blade of the saw.
- 4.2.5 A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work position.

5.0 Operating Controls and Switches

- 5.1 The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released: drills; tappers; fastener drivers; horizontal, vertical, and angle grinders with wheels more than 2 inches (5.08 centimeters) in diameter; disc sanders with discs greater than inches (5.08 centimeters); belt sanders; reciprocating saws; saber saws, scroll saws, and jigsaws with blade shanks greater than 1/4-inch (0.63 centimeters) wide; and other similar tools.
- 5.2 These tools also may be equipped with a "lock-on" control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers.
- 5.3 The following hand-held power tools must be equipped with either a positive "on-off" control switch, a constant pressure switch, or a "lock-on" control:
- 5.3.1 Disc sanders with discs 2 inches (5.08 centimeters) or less in diameter.
- 5.3.2 Grinders with wheels 2 inches (5.08 centimeters) or less in diameter.



- 5.3.3 Platen sanders, routers, planers, laminate trimmers, nibblers, shears, and scroll saws; and jigsaws, saber and scroll saws with blade shanks a nominal 1/4-inch (6.35 millimeters) or less in diameter.
- 5.3.4 It is recommended that the constant-pressure control switch be regarded as the preferred device.
- 5.3.5 Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches (5.08 centimeters), chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

6.0 Electrical Shock Caution

- 6.1 Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electricpowered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death.
- 6.2 An electric shock also can cause the user to fall off a ladder or other elevated work surface and be injured due to the fall.
- 6.3 To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a lowvoltage isolation transformer.
- 6.4 Three-wire cords contain two currentcarrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground.
- 6.5 The third prong must never be removed from the plug.
- 6.6 Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On doubleinsulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

7.0 Electric Tools General Practice

- 7.1 Operate electric tools within their design limitations.
- 7.2 Use gloves and appropriate safety footwear when using electric tools.
- 7.3 Store electric tools in a dry place when not in use.
- 7.4 Do not use electric tools in damp or wet locations unless they are approved for that purpose.
- 7.5 Keep work areas well lighted when operating electric tools. Ensure that cords from electric tools do not present a tripping hazard.
- 7.6 In the construction industry, employees who use electric tools must be protected by ground-fault circuit interrupters or an assured equipment-grounding conductor program.

8.0 Pneumatic Tools (powered by compressed air)

- 8.1 There are several dangers associated with the use of pneumatic tools. First and foremost is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.
- 8.2 Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected.
- 8.3 A short wire or positive locking device attaching the air hose to the tool must also be used and will serve as an added safeguard.
- 8.4 If an air hose is more than 1/2-inch (12.7 millimeters) in diameter, a safety excess flow valve must be installed at the source of the air supply to reduce pressure in case of hose failure.
- 8.5 In general, the same precautions should be taken with an air hose that are recommended for electric cords, because the hose is subject to the same kind of damage or accidental striking, and because it also presents tripping hazards.
- 8.6 When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.



- 8.7 Pneumatic tools that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.
- 8.8 Airless spray guns that atomize paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa) must be equipped with automatic or visible manual safety devices that will prevent pulling the trigger until the safety device is manually released.

9.0 Liquid Fuel Tools (operated with gasoline)

- 9.1 The worker must be careful to handle, transport, and store gas or fuel only in approved flammable liquid containers, according to proper procedures for flammable liquids.
- 9.2 Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapors.
- 9.3 When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators such as atmosphere-supplying respirators must be utilized to avoid breathing carbon monoxide.
- 9.4 Noise hazards associated with gasoline engines must be mitigated by proper hearing protection utilization. Ear Plugs, ear muffs or a combination of the two must be used to protect workers from excessive noise levels.
- 9.5 Fire extinguishers must also be available in the area.

10.0 Hydraulic Power Tools (fluid run)

- 10.1 The fluid used in hydraulic power tools must be an approved fireresistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.
- 10.2 The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.
- 10.3 All jacks—including lever and ratchet jacks, screw jacks, and hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.
- 10.4 A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm, and place a block between the jack cap and load if the cap might slip.
- 10.5 To set up a jack, make certain of the following:
- 10.5.1 The base of the jack rests on a firm, level surface;
- 10.5.2 The jack is correctly centered;
- 10.5.3 The jack head bears against a level surface; and
- 10.5.4 The lift force is applied evenly.
- 10.6 Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule:
- 10.6.1 For jacks used continuously or intermittently at one site—inspected at least once every 6 months;
- 10.6.2 For jacks sent out of the shop for special work—inspected when sent out and inspected when returned; and
- 10.6.3 For jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.



S3NA-305-WI1 Chainsaw Safety Card

1.0 Objective / Overview

- 1.1 Available in a variety of types and capacities, chainsaws are one of the most powerful, yet dangerous cutting tools available.
- 1.2 Working safely with a chain saw begins with training.
- 1.3 Additional safety measures include proper training, good body mechanics and felling technique, wellmaintained equipment, and protective clothing.

2.0 Safe Operating Guidelines

- 2.1 A sharp chainsaw is safer than a dull one. Keep the saw clean, lubricated, and adjusted. Before starting work inspect and test the chain brake, chain catch, throttle lock, handles and guards, all nuts and bolts, spark arrestor, and muffler and air filter. The chain tension should be properly adjusted and the carburetor tuned. Never "drop start" the saw.
- 2.2 A chainsaw is not only dangerous to the operator but to those around him. Keep the saw close to the body. Bend from the knees, not the waist. Improper lifting techniques and poor posture contribute to injuries.

3.0 Potential Hazards

- 3.1 Kickback Sudden and violent reverse movement of the saw
- 3.2 Hand / arm vibration syndrome
- 3.3 Flying / falling debris
- 3.4 Severe cuts

4.0 Training Requirements

- 4.1 Review of Applicable SOPs
- 4.2 Demonstrated knowledge on the use of a chainsaw
- 4.3 Review of manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Debris Shield
- 5.2 Chainsaw Chaps
- 5.3 Leather Gloves
- 5.4 Hearing Protection

- 6.1 Always avoid standing on the log and making cuts with the saw between your legs; always cut with the saw to the outside of your legs.
- 6.2 Determine where the tree/limb will fall prior to cutting. Always ensure that personnel and equipment are not in the path the falling tree/log, and that you have time to move away. If necessary, flag/or fence off the area to prevent entry.







- 6.3 Always stand to one side of the limb you are to cut, never straddle it.
- 6.4 Always keep in mind where the chain will go if it breaks, never position yourself or other people in line with the chain.
- 6.5 Keep the chain out of the dirt, debris will fly, the teeth will be dulled and the chain life shortened.

S3NA-305-WI2 Circular Saw Safety Card

1.0 Objective / Overview

- 1.1 Among professionals, the circular saw is probably the most commonly used powered saw and perhaps the most commonly abused. Familiarity should not breed carelessness.
- 1.2 Safe measures include proper training, good body mechanics and felling technique, well-maintained equipment, and protective equipment.
- 1.3 The circular saw is used in cutting wood products (i.e., plywood, construction lumber, etc.).

2.0 Safe Operating Guidelines

- 2.1 Use sharp blades. Dull blades cause binding, stalling and possible kickback.
- 2.2 Use the correct blade for the application and check for proper operation before each cut.
- 2.3 Check often to ensure that guards return to their normal position quickly. Never defeat the guard to expose the blade.
- 2.4 Before starting a circular saw, be sure the power cord and extension cords are out of the blade path and are long enough to freely complete the cut. A sudden jerk or pulling on the cord can cause loss of control of the saw and a serious accident.
- 2.5 For maximum control, hold the saw firmly with both hands after securing the work piece.
- 2.6 Check frequently to be sure clamps remain secure.
- 2.7 Avoid cutting small pieces that can't be properly secured and material on which the saw shoe can't properly rest.
- 2.8 When you start the saw, allow the blade to reach full speed before contacting the work piece.

3.0 Potential Hazards

- 3.1 Kickback Sudden and violent reverse movement of the saw
- 3.2 Hearing loss
- 3.3 Flying debris
- 3.4 Severe cuts

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a circular saw.
- 4.3 Review and follow manufacturer's operating guidelines.







5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather Gloves
- 5.2 Hearing Protection

- 6.1 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.
- 6.2 Disconnect power supply before adjusting or changing the blade.
- 6.3 Do not place hand under or in front of the shoe or guard of the saw when operating.
- 6.4 Cut at the proper depth (¼ in.) below work surface (see picture).
- 6.5 Circular saw must be double-insulated or protected by a GFCI.

S3NA-305-WI3 Cut Off Saw Safety Card

Objective / Overview 1.0

- 1.1 Cut-off saws are high-speed cutting tools and very dangerous to operate. Therefore, it is very important to review the general safety rules, training, PPE and procedures for working with portable cut off saws.
- 1.2 Cut off saws are used in a variety of activities (i.e. concrete, piping, metal, etc.).

2.0 Safe Operating Guidelines

- 2.1 Starting - Start the saw on firm ground or other solid surface in an open area. Never attempt to dropstart the engine. Clear the working area. Avoid operating the saw if the terrain is wet and/or frozen.
- 2.2 Handling - Hold the saw firmly with two hands when the engine is running, and whenever the blade is rotating until it comes to a complete stop. Carry the saw with engine stopped, muffler away from your body, while protecting the cutting wheel from striking the ground or other objects.
- 2.3 Cutting - Begin cutting at full throttle and continue at full throttle until the cut is finished. Avoid standing in a direct line with the cutting wheel. Use only downward pressure on the saw, as lateral pressure may cause the blade to break and shatter. Do not change the direction of the cut once started, as this can also cause the blade to break and shatter. Do not use abrasive-type wheels for rough grinding. Do not cut above shoulder height.
- 2.4 Maintenance - Shut off the engine and remove the spark plug wire before adjusting or working on the saw.
- 2.5 Hearing loss
- 2.6 Flying debris
- 2.7 Severe cuts
- 2.8 Burns from engine
- 2.9 Fire Hazard from sparks and gasoline
- 2.10 Hand / arm vibration syndrome

Potential Hazards 3.0

- 3.1 Kickback - Sudden and violent reverse movement of the saw
- 4.0 **Training Requirements**
- 4.1 **Review of Applicable SOPs**
- 4.2 Demonstrated knowledge on the use of a cut off saw
- 4.3 Review and follow manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Face shield
- 5.2 Chainsaw Chaps
- 5.3 Leather gloves
- 5.4 Hearing protection: earplugs and/or earmuffs



02BA058 KN

Never drop-start saw



5.5 Respirator if required (concrete operations)

- 6.1 Keep flammable and combustible materials away from saw while cutting metal.
- 6.2 Make sure the fuel cap is properly secured.
- 6.3 Inspect the abrasive wheel for cracks and chips. If cracked or chip replace wheel before use.
- 6.4 Ensure guard is positioned properly prior to start-up (S3NA-411-PR Machine Guarding).
- 6.5 Never try to drop-start the engine (see picture).



S3NA-305-WI4 Hand-Held Grinder Safety Card

1.0 Objective / Overview

- 1.1 Hand held grinders are high-speed electric- or pneumatic-powered grinding tools used to shape or cut metal, and can be dangerous to operate.
- 1.2 Grinders are used in a variety of activities (i.e., piping installation/repair, metal, restoring, polishing, sharpening, etc.).

2.0 Potential Hazards

- 2.1 Kickback Sudden and violent reverse movement of the grinder.
- 2.2 Flying debris.
- 2.3 Severe cuts.
- 2.4 Fire Hazard from sparks igniting nearby debris or objects.
- 2.5 Hand / arm vibration syndrome.

3.0 Safe Operating Guidelines

- 3.1 Basic safety rules can help prevent hazards associated with the use of hand-held grinders:
- 3.1.1 Never carry the tool by the cord (or the hose for pneumatic tools).
- 3.1.2 Never yank the cord or the hose to disconnect the tool from the receptacle.
- 3.1.3 Keep cords and hoses away from heat, oil, and sharp edges.
- 3.1.4 Denergize tools when not in use, before servicing, and when changing accessories such as blades/bits/cutters.
- 3.1.5 All observers should be kept at a safe distance from the work area.
- 3.1.6 Always secure work with clamps or a vise, freeing both hands to operate the tool.
- 3.1.7 Avoid accidental starting; do not hold a finger on the trigger/switch while carrying a powered tool.
- 3.1.8 Tools should be maintained with care. They should be kept clean and sharp for the best performance. Follow instructions in the user's manual for lubricating and care instructions.
- 3.1.9 Be sure to keep your footing and maintain proper balance.
- 3.1.10 The proper apparel should be worn. Loose clothing or jewelry can become caught in moving parts.
- 3.1.11 Inspect the tool before every use. Damaged tools must be removed from use and tagged "DO NOT USE".

4.0 Training Requirements

- 4.1 Review applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a hand-held grinder.
- 4.3 Follow manufacturers operating guidelines, especially for proper grinding wheel attachment.

5.0 Personal Protective Equipment

- 5.1 Leather gloves
- 5.2 Safety glasses with sideshields
- 5.3 Hearing protection: earplugs and/or earmuffs
- 5.4 Other PPE as necessary for the worksite/activity







- 6.1 Keep flammable and combustible materials away from the grinder.
- 6.2 Have a fire extinguisher on hand while using grinder.
- 6.3 Inspect the abrasive wheel for cracks and chips. If cracked or chipped replace wheel before use.
- 6.4 Ensure safety guard(s) is positioned properly prior to start-up.
- 6.5 Never clamp a hand held grinder in a vice.

S3NA-305-WI5 Impact Wrench Safety Card

1.0 Objective / Overview

- 1.1 Impact wrenches are mainly used for tire changing but that does not limit their use. They can be used in all applications when a certain amount of torque is needed to loosen or tighten nuts and bolts.
- 1.2 The danger comes in to play when employees try to use the wrong sockets with an air wrench. Employees using air wrenches must have a general understanding of how to use them.

2.0 Safe Operating Guidelines

- 2.1 Drain water from air compressor tank and condensation from air lines.
- 2.2 Disconnect the tool from the air supply before lubricating or changing sockets. Impact wrench sockets and accessories must be used with this tool.
- 2.3 Do not use hand sockets and accessories. Select the required impact socket.
- 2.4 Connect tool to air hose of recommended size. The use of a quick connect set makes connecting easier.
- 2.5 Never use a wire, soft pin, or nail to hold the socket onto the square spindle of the impact wrench.
- 2.6 If the proper retaining device on the tool is broken, the tool should be repaired.
- 2.7 On applications where a low or critical level of torque is required, it is recommended that you impact each fastener lightly, and then perform the final tightening with a hand torque wrench.

3.0 Potential Hazards

- 3.1 Flying debris
- 3.2 Hearing loss
- 3.3 Cuts
- 3.4 Hand / arm vibration syndrome

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a electric drill.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves/anti-vibration gloves
- 5.2 Hearing protection

- 6.1 Be sure no one is below when using the tool in high locations.
- 6.2 The proper fastening torque may differ depending upon the kind or size of the bolt.
- 6.3 Check the torque with a torque wrench.



AECOM

S3NA-305-WI6 Nail Gun Safety Card

1.0 Objective / Overview

1.1 Nail guns are useful tools, but must be handled with care, and have been shown to be the cause of unnecessary injuries when the design of the gun places emphasis on speed, rather than safety.

2.0 Safe Operating Guidelines

- 2.1 Watch out for other crewmembers working near you.
- 2.2 Never let an inexperienced crewmember use a nail gun without supervised training.
- 2.3 Never use bottled gas as a power source for pneumatic tools.
- 2.4 Disconnect a nail gun before you service it.
- 2.5 Hold your hand a good 12 inches back from the ends of studs or joists when you are nailing.
- 2.6 Keep the gun properly aligned with your work both vertically and horizontally.
- 2.7 Never nail with the gun pointed toward you or anyone else on the job.
- 2.8 Never try to nail beyond your reach.

3.0 Potential Hazards

- 3.1 Flying debris/nails
- 3.2 Imbedded object
- 3.3 Puncture wounds

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a coring machine.
- 4.3 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves
- 5.2 Hearing protection

- 6.1 When you are moving about the work area keep your finger off the trigger until you are ready to fire. Make sure you have only placed the nose guard against the material you are going to nail together.
- 6.2 Never rest the gun against any part of your body, or try to climb a ladder with the gun cradled against your body.
- 6.3 Be aware of what is located behind the nailing surface. Never place hands or other body parts directly behind the nailing surface.
- 6.4 Use only for intended work.
- 6.5 Avoid nailing into knots as nail can splinter wood.
- 6.6 Never disable safety tip on gun.



S3NA-305-WI7 Pentak Vacuum Safety Card

1.0 Objective / Overview

- 1.1 Pentek's dustless decontamination system removes and packages surface contamination from concrete and steel structures.
- 1.2 The Pentek integrated suite of manually operated equipment (e.g., squirrel III, corner cutter, roto-peen, and crack chaser) is designed for the safe removal of radioactive materials, lead-based paints, PCBs, pesticides, chemical residues, and other contaminated coatings.
- 1.3 The Pentek system incorporates a high-performance vacuum and waste packaging unit, the VAC-PAC, in conjunction with pneumatically operated equipment to



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

remove contaminated material. Dust and debris are captured at the cutting tool surface. Supporting equipment required to operate the unit includes a 60 kW generator and an air compressor (minimum 350 ft³ capacity), as well as a drum grappler for drum handling activities.

2.0 Safe Operating Guidelines

- 2.1 Prior to use, a pre-operation inspection must be completed to determine if the unit is in safe working condition.
- 2.2 The vacuum unit should be placed a minimum of 50 feet away from the work area.
- 2.3 Once in position to begin work, apply the brake to stabilize the unit. When raising the VAC-PAC to insert/remove a drum, do not place your body or any extremity under the VAC-PAC while it is in the raised position.
- 2.4 Two workers should be used to maneuver the unit into place.
- 2.5 A minimum 10 ft clearance will be established around the unit while in operation.
- 2.6 Workers should be aware of their position in relation to the hoses and cable to minimize tripping hazards.
- 2.7 A competent person will train each worker in the operation of the unit.
- 2.8 Maintenance in excess of preventive maintenance activities (e.g., lubrication) will be performed by manufacturer personnel ONLY.

3.0 Potential Hazards

- 3.1 Hazardous noise
- 3.2 Vibration
- 3.3 Tripping hazard from cables and hoses
- 3.4 Hot surfaces (vacuum unit)
- 3.5 Electrical (high voltage)
- 3.6 Pinch hazard
- 3.7 Back strain
- 3.8 High pressure air

4.0 Personal Protective Equipment (Level D ensemble)

4.1 Leather gloves (maintenance)



- 4.2 Tyvek suit (with hood)
- 4.3 Vibration gloves (operation)
- 4.4 Hearing protection (plugs or muffs)

- 5.1 Always know where the emergency stop is located.
- 5.2 Operators of a motorized drum grappler must be trained IAW the powered industrial truck standard.
- 5.3 Review S3NA-302-PR Electrical, General prior to refueling the electrical generator and/or compressor.


S3NA-305-WI8 Power Drill Safety Card

1.0 Objective / Overview

- 1.1 Available in a variety of types and capacities, portable power drills are undoubtedly the most used power tools.
- 1.2 Because of their handiness and application to a wide range of jobs, drills often receive heavy use. For this reason, you'll need to carefully check your drill's capacity limitations and accessory recommendations.

2.0 Safe Operating Guidelines

- 2.1 Check carefully for loose power cord connections and frays or damage to the cord.
- 2.2 Replace damaged tool and extension cords immediately.
- 2.3 Be sure the chuck is tightly secured to the spindle. This is especially important on reversible type drills. Tighten the bit securely as described by the owner / operators manual.
- 2.4 The chuck key must be removed from the chuck before starting the drill.
- 2.5 A flying key can be an injury-inflicting missile.
- 2.6 Check auxiliary handles, if part of the tool. Be sure they are securely installed.
- 2.7 Always use the auxiliary drill handle when provided. It gives you more control of the drill, especially if stalled conditions occur.
- 2.8 Grasp the drill firmly by insulated surfaces.
- 2.9 Always hold or brace the tool securely. Brace against stationary objects for maximum control. If drilling in a clockwise -- forward -- direction, brace the drill to prevent a counter-clockwise reaction.
- 2.10 Don't force a drill. Apply enough pressure to keep the drill bit cutting smoothly. If the drill slows down, relieve the pressure. Forcing the drill can cause the motor to overheat, damage the bit and reduce operator control.

3.0 Potential Hazards

- 3.1 Electrical shock
- 3.2 Leaving chuck wrench in tool
- 3.3 Puncture wounds
- 3.4 Flying debris
- 3.5 Severe cuts
- 3.6 Fire
- 3.7 Burns (hot bits)
- 3.8 Sprains/strains (wrist)

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a power drill.
- 4.3 Review and follow manufacturers operating guidelines.



5.0 Personal Protective Equipment (Level D PPE)

5.1 Leather Gloves

6.0 Other Safety Tips

- 6.1 Electric drills must be double-insulated or plugged into a GFCI outlet.
- 6.2 Never carry tool by cord or yank it to disconnect from receptacle.
- 6.3 Keep cord away from sharp edges.

AECOM

S3NA-305-WI9 Pressure Washer Safety Card

1.0 Objective / Overview

- 1.1 High pressure washers can operate up to pressures of 5,000 psi and come in a variety of types ranging from gas operated to electrical. If not used correctly and safely, pressure washers can be dangerous piece of work equipment.
- 1.2 AECOM only allows trained, authorized personnel to operate the high pressure washers. Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Safe Operating Guidelines

- 2.1 The gun valve must always be pointed at the work area, NEVER point the gun valve at yourself or another person.
- 2.2 High pressure washers shall be used to clean or decontaminate equipment, surfaces or structures only.
- 2.3 High pressure washers WILL NOT be used to clean or decontaminate workers or personal protective equipment while it is being worn.
- 2.4 Always set the tripper safety lock when the gun valve is not in use.

3.0 Training Requirements

- 3.1 Review of Applicable SOPs
- 3.2 Demonstrated knowledge on the use of a pressure washer
- 3.3 Review of manufacturers operating guidelines

4.0 Potential Hazards

- 4.1 Kickback Sudden and violent reverse movement of the gun
- 4.2 Flying debris
- 4.3 Slips and trips on wet surfaces and hoses
- 4.4 Exhaust fumes/carbon monoxide (CO) in enclosed spaces
- 4.5 Severe cuts

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Hard hat with faceshield
- 5.2 Heavy gloves
- 5.3 Hearing protection
- 5.4 PVC (or equivalent) rain suit

6.0 Other Safety Tips

- 6.1 Never fill a pressure washer fuel tank with fuel while the engine is running or if the engine is still hot.
- 6.2 Non-operators must remain a minimum of 25 feet from the operator.
- 6.3 High pressure washing equipment should be cleaned often to avoid dirt buildup, especially around the trigger and guard area.





- 6.4 Always set the trigger safety lock when the gun valve is not in use.
- 6.5 Relieve the pressure in the system before coupling and uncoupling hoses.
- 6.6 Visually inspect the full length of high pressure discharge hose and inspect other high pressure fluidhandling components for abrasions or cuts, damage caused by exposure to chemicals and for damage caused by kinks in the hose.



S3NA-305-WI10 Reciprocating Saw Safety Card

1.0 Objective / Overview

- 1.1 The versatility of the reciprocating saw, in cutting metal, pipe, wood and other materials have made it a widely used tool.
- 1.2 By design, it is a simple tool to handle. Its demands for safe use, however, are very important.

2.0 Safe Operating Guidelines

- 2.1 Use sharp blades. Dull blades can produce excessive heat, make sawing difficult, result in forcing the tool, and possibly cause an accident.
- 2.2 Position yourself to maintain full control of the tool, and avoid cutting above shoulder height.
- 2.3 To minimize blade flexing and provide a smooth cut, use the shortest blade that will do the job.
- 2.4 The work piece must be clamped securely, and the shoe of the saw held firmly against the work to prevent operator injury and blade breakage.
- 2.5 Maintain firm contact between the saw's shoe and the material being cut.
- 2.6 When making a "blind" cut (you can't see behind what is being cut), be sure that hidden electrical wiring, or water pipes are not in the path of the cut.
- 2.7 If wires are present, they must be disconnected at their power source by a qualified person or avoided, to prevent the possibility of lethal shock or fire.
- 2.8 Water pipes must be drained and capped.
- 2.9 Always hold the tool by the insulated grouping surfaces. When making anything other than a through cut, allow the tool to come to a complete stop before removing the blade from the work piece. This prevents breakage of the blade, and possible loss of tool control.
- 2.10 Different work surfaces demand different blades.

3.0 Potential Hazards

- 3.1 Flying debris
- 3.2 Hearing loss
- 3.3 Cuts
- 3.4 Hand / arm vibration syndrome

4.0 Training Requirements

- 4.1 Review of Applicable SOPs
- 4.2 Demonstrated knowledge on the use of a reciprocating saw
- 4.3 Review and follow manufacturers operating guidelines

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather Gloves/anti-vibration gloves
- 5.2 Hearing protection



The correct way to hold the reciprocating saw while operating.



6.0 Other Safety Tips

- 6.1 Do not operate reciprocating saw in explosive atmospheres.
- 6.2 Do not overreach. Keep proper footing and balance at all times.
- 6.3 Do not use tool if switch is not operating correctly.
- 6.4 Check for misalignment or binding of moving parts, breakage or parts and any other condition that may affect the tool's operation.
- 6.5 Always use two hands to operate saw (see picture).

AECOM

Air Vents

Motor

Handle

Abrasive Sanding Belt

S3NA-305-WI11 Sander Safety Card

1.0 Objective / Overview

- 1.1 Sanders are commonly used at project sites for a variety of tasks.
- 1.2 Often times the hazards associated with sanders are overlooked; they don't appear threatening because they don't have sharp blades or bits. These misconceptions can be prevented through proper training and PPE selection.

2.0 Safe Operating Guidelines

- 2.1 Make sure the sander is switched "OFF" before connecting the power supply. Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector. Inspect sanding belts before using them.
- 2.2 Replace those belts that are worn or frayed. Install sanding belts that are the same widths as the pulley drum.
- 2.3 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.
- 2.4 Secure the sanding belt in the direction shown on the belt and the machine. Keep hands away from the sanding belt.
- 2.5 Use two hands to operate sanders one on the trigger and the other on the front handle knob.
- 2.6 Clean dust from the motor and vents on a regular basis.
- 2.7 Do not use a sander without an exhaust system or dust collector present that is in good working order.
- 2.8 Empty the collector when ¼ full.
- 2.9 Do not exert excessive pressure on a moving sander. The weight of the sander provides adequate pressure for the job.
- 2.10 Do not work on unsecured stock unless it is heavy enough to stay in place.
- 2.11 Do not overreach. Always keep proper footing and balance.
- 2.12 Do not cover air vents of the sander.
- 2.13 Check often to ensure that guards are in their normal position.
- 2.14 Before starting a sander, be sure the power cord and extension cords are out of the belt path and are long enough to freely complete the task. The sander must be either double insulated or connected to a GFCI.

Trigger Switch

Pulley Drum

3.0 Potential Hazards

- 3.1 Kickback Sudden and violent reverse of the sander
- 3.2 Hearing loss
- 3.3 Flying debris
- 3.4 Severe abrasive cuts
- 3.5 Electrocution
- 3.6 Explosion/fire hazard from the dust



4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Review and follow manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Hearing protection
- 5.2 Leather gloves



S3NA-305-WI12 Utility Knife Safety Card

1.0 Objective / Overview

- 1.1 Utility knives serve a variety of purposes at worksites, and can be a useful tool, when used safely and correctly.
- 1.2 Learning proper positioning and correctly using a utility knife will drastically reduce the potential of cut related injuries.

2.0 Safe Operating Guidelines

- 2.1 Always be sure that knives are sharp and not dull. A dull blade will require more force to cut, increasing the likelihood of slipping.
- 2.2 Be sure to blade is seated in the frame of the knife correctly, closed, and fastened together properly.
- 2.3 Always keep body parts away from the cut line, (e.g., fingers), and ensure that the material being cut is on firm ground and not against a body part (e.g. cutting rope against your leg).
- 2.4 Always pull the knife, never push the knife (the blade may break, and momentum could cause the body to come into contact with broken blade).
- 2.5 Always retract the blade when not in use.

3.0 Potential Hazards

- 3.1 Lacerations from direct contact with the blade
- 3.2 Lacerations from blade breaking or shattering
- 3.3 Ergonomics

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Review of client specific requirements.
- 4.3 Demonstrated knowledge on the safe use of a utility knives.
- 4.4 Review and follow manufacturers operating guidelines for specialized or unusual knives.

5.0 Personal Protective Equipment (Level D PPE)

5.1 Cut resistant gloves (Kevlar, thick leather, etc.).

6.0 Other Safety Tips

- 6.1 Purchase safety equipped utility knives with guarding or automatically retracting blades.
- 6.2 Replace dull blades When knife begins to tear rather than cut, it is a good indicator the blade is dull.
- 6.3 Always wear a cut resistant glove on your free hand.
- 6.4 Always use the right tool for the job NEVER use the blade as a screwdriver or prying tool.
- 6.5 When using a knife to cut thicker materials, use several passes. Increased force on the blade can cause it to stray from the intended cut path, or break the blade.
- 6.6 When changing blades, always handle from the non-sharp side. Cover blade with duct tape and dispose.
- 6.7 Use an alternate tool when possible (scissors, wire cutters, etc.).









S3NA-305-WI13 Wood Chipper Safety Card

1.0 Objective / Overview

- 1.1 Wood chippers should be used with extreme caution in order to prevent personal injury, as the wood chipper is open to receive tree branches and other wooden material.
- 1.2 AECOM only allows trained, authorized personnel to operate the wood chipper.
- 1.3 Along with training, other safety measures include: reviewing the manufacturers instructional booklet, proper maintenance of equipment, and personal protective equipment.

2.0 Safe Operating Guidelines

- 2.1 The operator must be completely familiar with the controls and proper use of the equipment.
- 2.2 Workers feeding material into self-feeding wood chippers are at risk of being fed through the chipper if they reach or fall into the infeed hopper or become entangled in braches feeding into the machine.
- 2.3 Prior to use, make sure all safety devices and controls, such as emergency shut-off devices, are tested and verified to be functioning properly.
- 2.4 Make sure two workers (buddy system) are in close contact with each other when operating the chipper.

3.0 Potential Hazards

- 3.1 Burns from contact with the hot muffler or engine
- 3.2 Flying debris
- 3.3 Noise exposure
- 3.4 Inhaling exhaust fumes
- 3.5 Entanglement in limbs and contact with chipper blades

4.0 Training Requirements

- 4.1 Review of Applicable SOPs.
- 4.2 Demonstrated knowledge on the use of a wood chipper.
- 4.3 Review of manufacturers operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves
- 5.2 Hearing protection
- 5.3 Debris shield
- 5.4 Long sleeve shirt (e.g. working near poison ivy, poison oak, etc.)

6.0 Other Safety Tips

- 6.1 Stand to the side of the chipper while inserting limbs into chipper, never stand directly in front.
- 6.2 Insert trunk portion of tree/limb first. This will prevent the branches from getting entangled with clothing, etc. and pulling you in with the tree/limb.





- 6.3 Bystanders should be kept at least 25 feet away when in operation.
- 6.4 Keep the area around the wood chipper free of tripping hazards.
- 6.5 Never wear loose clothing that may get caught on feed material or moving parts.
- 6.6 Always set the trigger safety lock when the gun valve is not in use.
- 6.7 Never fill the fuel tank while the engine is running or if the engine is still hot.



S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card

In accordance with 29 CFR 1910.266, the following safety precautions will be followed during site clearing and tree felling:

1.0 Hand Tools

- 1.1 All hand tools shall be in safe condition. Tools shall be inspected by the user daily.
- 1.2 Handles shall be sound, straight and tight-fitting.
- 1.3 Driven tools shall be dressed to remove any mushrooming.
- 1.4 Cutting tools shall be kept sharp and properly shaped.
- 1.5 All clearing activities shall terminate during electrical storms and periods of high winds.
- 1.6 Dead, broken or rotted limbs or trees (widow makers) shall be felled first.
- 1.7 Always wear the appropriate Personal Protective Equipment (PPE) when using hand tools, particularly eye and hand protection.
- 1.8 Use the right tool that is being used for the job to reduce chance of unexpected occurrences. Do not submit or use makeshift tools.
- 1.9 Defective tools shall not be used. They shall be taken out of service until repaired or replaced.
- 1.10 Check tools for damage or wear prior to each use to reduce chance of unexpected occurrences.
- 1.11 Replace cracked or broken handles on files, hammers, screwdrivers, or sledges.
- 1.12 Replace worn jaws on wrenches, pipe tools, and pliers
- 1.13 Redress burred or mushroomed heads on striking tools.
- 1.14 Sharpen cutting tools frequently to reduce chance of unexpected occurrences.
- 1.15 Store hand tools properly after each use.
- 1.16 Tools shall be clean and dry to avoid slippage when in use.
- 1.17 Never leave tools on ladders, scaffolds, or overhead work areas when they are not in use (a high number of injuries occur from objects/tools falling from overhead work areas in construction).
- 1.18 Always keep tools being used in overhead work areas in containers that will prevent them from falling.
- 1.19 Carry tools using a heavy belt or apron and hang tools at your sides.
- 1.20 Never carry tools in your pockets or hanging behind your back.
- 1.21 Avoid muscle strain and fatigue by doing the following:
 - Avoid using hand tools with your wrist bent.
 - Choose tools that allow you to keep your wrist straight when using them.
 - Always PULL on wrenches and pliers. Never push unless you hold the tool with your palm open.
 - Always cut away from yourself when using cutting tools.
- 1.22 Establish balance and stable footing when using a bar for prying. Pry bars can slip or break without warning.
- 1.23 Be aware of the presence of other personnel when using any tool, especially picks or axes.

2.0 Machete Use

- 2.1 A machete will only be used for its designated purpose; do not carelessly swing the machete when it is not needed.
- 2.2 To prevent lacerations, employees will wear Kevlar gloves and Kevlar chain saw chaps.



2.3 Machetes shall not be used when other employees are in the immediate work area.

3.0 Use of Weed Whips

- 3.1 Weed whips may be used to clear vegetation such as grass, light brush, briars and tree seedlings. The L-shaped weed whip cuts grass and weeds but is unstable for use on larger growth; the triangular-frame weed whip cuts briars and woody stems up to a half-inch in diameter. A "Suwannee" sling is a heavy duty weed whip that also has an axe blade. It does the same work as a weed whip, but can also cut through large materials. The heavier weight of this tool allows it to more easily cut off larger material than a weed whip.
- 3.2 When using weed whips, employees should follow these safety procedures:
- 3.2.1 Select the correct tool for the types and size of vegetation present across the landfill.
- 3.2.2 Employees will wear leather gloves when using weed whips.
- 3.2.3 Weed whips are meant to be swung back and forth with both hands. Avoid using a golf swing. The tool should be swung no higher than an employee's side.
- 3.2.4 Strong swings should be made to prevent the blade from bouncing or glancing off springy growth.
- 3.2.5 Screws hold the serrated double-edge blade in place. These screws can work loose so check them before each use.
- 3.2.6 At the end of the day, inspect the whips for damage. Clean, sharpen, and oil as necessary and store with a sheath in place.

4.0 Chain Saws

- 4.1 Hand Protection (leather gloves)
- 4.2 Eye Protection
- 4.3 Hearing Protection
- 4.4 Long sleeves and pants; no loose clothing
- 4.5 Chaps (full protection) or pants with full front protection as well as all around protection below the knee
- 4.6 As per manufacturer's instructions
- 4.7 The chainsaw shall:
- 4.7.1 Be in safe operating condition;
- 4.7.2 Have a chain that minimizes the possibility of a kickback; and
- 4.7.3 Have a device which will effectively stop the chain in the event of a kickback or when the engine is at idle.
- 4.8 Operate the chainsaw in accordance with manufacturer's instructions.
- 4.9 Hold the chainsaw firmly with two hands during operation.
- 4.10 Hold the chainsaw firmly when starting.
- 4.11 Have the chain stopped when not actually cutting.
- 4.12 Be sure that the chain brake is functioning properly and adequately stops the chain.
- 4.13 Check that the chain is sharp, has the correct tension and is adequately lubricated.
- 4.14 Start, hold, carry or store and use of the saw as directed by the manufacturer.
- 4.15 Do not use the chain saw for cutting above shoulder height.
- 4.16 Add fuel in a well-ventilated area and not while the saw is running or hot.
- 4.17 Use an approved safety container to contain the fuel used along with a proper spout or funnel for pouring.



- 4.18 Carry and transport the chain saw with the bar guard in place, the chain bar toward the back and the motor shut off.
- 4.19 Chain saws shall be inspected daily to assure that all handles and guards are in place and tight, that all controls function properly and that the muffler is operative.
- 4.20 Start the saw only on the ground or when otherwise firmly supported.
- 4.21 Clear brush which might interfere with clear footing before starting to cut.
- 4.22 Shut off the saw when carrying it for a distance greater than from tree to tree or when surface is slippery or heavy with underbrush. The saw shall be at idle speed when carried short distances.
- 4.23 Do not use the saw to cut directly overhead or a distance at which the operator no longer has a safe grip on the saw. Always use two hands to operate the saw.
- 4.24 Safety glasses with permanently attached side shields will be worn underneath a steel mesh face shield which will attach to standard hard hats. The brush shield is designed to protect the head and face from debris created by using a chain saw. Employees will wear Kevlar gloves and Kevlar chain saw chaps. Appropriate ear protection shall also be worn.

5.0 Felling Trees Manually

- 5.1 Before cutting begins, survey the work area for dead limbs, the lean of the tree to be cut, wind conditions and the location of other trees.
- 5.2 Remove lodged trees (tree has not fallen to the ground after being separated from its stump) as soon as possible. Never work under a lodged tree.
- 5.3 The distance between workers should be maintained at twice the height of the trees being felled.

6.0 Chipping Operations

- 6.1 Access covers and doors shall not be opened until the drum or disk is at a complete stop.
- 6.2 Infeed and discharge ports shall be designed to prevent employee contact with disc, knives and blower blades.

7.0 Cutting Tools

- 7.1 Wear safety glasses and protective gloves when using cutters.
- 7.2 Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.
- 7.3 Inspect the tool for proper working condition.
- 7.4 If tool is designed to have a guard, make sure guards are in place.
- 7.5 Cut materials straight across keep the material being cut at right angles to the cutting edges of jaws.
- 7.6 Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.
- 7.7 Keep cutting tools in good repair.
- 7.8 Adjust and lubricate cutter and moving parts daily if heavily used.
- 7.9 Sharpen jaws according to manufacturer's instructions.
- 7.10 Do not use a cutting tool until you are trained in its proper and safe use.
- 7.11 Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- 7.12 Do not use cutters which are cracked, broken or loose.
- 7.13 Do not exceed the recommended capacity of a tool.
- 7.14 Do not cut diagonally.
- 7.15 Do not rock cutters from side to side when cutting wire.

S3NA-305-WI14 Clearing and Grubbing Equipment Safety Card

Revision 0 01 March 2011

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- 7.16 Do not pry or twist with tool when cutting.
- 7.17 Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.
- 7.18 Do not expose cutters to excessive heat.

8.0 Selection and Use

- 8.1 Select tools that can be used without bending the wrist. Hand tools should allow the operator to grasp, hold, and use the tool with the wrist held straight.
- 8.2 Select the tool with the workplace layout and job design in mind. Sometimes a tool is correct for one operation and incorrect for another.
- 8.3 Use the right tool for the job. Confirm it is the right size and has sufficient power to do the job safely. When there is a choice, select a tool of a low weight.
- 8.4 Select low-vibrating tools, or choose tools with vibration-absorbing handles, like those covered with cork, rubber, plastic or plastic bonded to steel, to reduce hand-arm vibration.
- 8.5 Choose hand tools that have the center of gravity within or close to the handle.
- 8.6 Select tools with rounded and smooth handles that you can grip easily.
- 8.7 If they are available, choose hand tools with double handles to permit easier holding and better manipulation of the tool.
- 8.8 Select tools with a trigger strip, rather than a trigger button. This strip will allow you to exert more force over a greater area of the hand that, in turn, will reduce muscle fatigue.
- 8.9 Confirm that the trigger works easily to reduce the effort needed to operate it.
- 8.10 Confirm that your tool is well maintained and in good repair.
- 8.11 Frequently used tools that weigh more than 1 pound should be counter-balanced.
- 8.12 Hold the tool close to the body. Do not overreach.
- 8.13 Keep good balance and proper footing at all times. This will help operators to control the tool better, especially in response to unexpected situations.
- 8.14 Rest your hands by putting the tool down when you are not using it.
- 8.15 Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
- 8.16 Confirm that cutting tools, drill bits, etc., are kept sharp, clean, and well maintained.
- 8.17 Do not wear gloves, loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection to prevent hair from getting caught in moving parts of equipment (manufacturer's operating manual for recommended PPE and/or safety issues/concerns).
- 8.18 Do not use a tool unless you have been trained to use it safely and know its limitations and hazards.

9.0 Storage and Handling

- 9.1 All tools shall be stored in a manner to prevent damage and injury. Store tools in a dry, secure location when they are not being used.
- 9.2 Tools shall be properly put away after each use.
- 9.3 Sharp or pointed tools shall be handled only if the sharp/pointed edge is covered, carried in a tool box or other device designed for that purpose, or the sharp/pointed edge is pointed downward, away from the body.



S3NA-305-WI15 Pneumatic Tools Safety Card

1.0 General Requirements

- 1.1 Wear safety glasses.
- 1.2 Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.
- 1.3 Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.
- 1.4 Use only the attachments that the manufacturer recommends for the tools you are using.
- 1.5 Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.
- 1.6 Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.
- 1.7 Use the proper hose and fittings of the correct diameter.
- 1.8 Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.
- 1.9 Choose air-supply hoses that have a minimum working pressure rating of 150 psig or 150% of the maximum pressure produced in the system, whichever is higher.
- 1.10 Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.
- 1.11 Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.
- 1.12 Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).
- 1.13 Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.
- 1.14 Do not operate the tool at a pressure above the manufacturer's rating.
- 1.15 Turn off the air pressure to the hose when not in use or when changing power tools.
- 1.16 Do not carry a pneumatic tool by its hose.
- 1.17 Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.
- 1.18 Do not use compressed air to blow debris or to clean dirt from clothes.

2.0 Pneumatic Nailing and Stapling Tools

- 2.1 Permit only experienced and trained persons to operate pneumatic nailing and stapling tools.
- 2.2 Wear safety glasses or face a shield and, where necessary, use hearing protection.
- 2.3 Inspect a tool before connecting it to air supply:
- 2.3.1 Check tool safety mechanisms if applicable.
- 2.3.2 Tighten securely all screws and cylinder caps.
- 2.4 Check correct air supply and pressure before connecting a tool.
- 2.5 Check that the tool is correctly and securely connected to the air supply hose and that it is in good working order, with the safety mechanism operative, before using.
- 2.6 Always handle a tool as if it loaded with fasteners (nails, staples, etc.).
- 2.7 Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.
- 2.8 Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.



- 2.9 Disconnect a tool from the air supply when the tool is unattended and during cleaning or adjustment. Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool.
- 2.10 Use only fasteners recommended by the manufacturer.
- 2.11 Permit only properly trained people to carry out tool maintenance.
- 2.12 Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface.
- 2.13 Do not carry a tool with the trigger depressed.
- 2.14 Do not load a tool with fasteners while the trigger is depressed.
- 2.15 Do not overreach. Keep proper footing and balance.



S3NA-305-WI16 Manual Hand Tools Safety Card

1.0 Hammers

- 1.1 Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.
- 1.2 Choose a hammer with a striking face diameter approximately ½ inch larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
- 1.3 Ensure that the head of the hammer is firmly attached to the handle.
- 1.4 Replace loose, cracked or splintered handles.
- 1.5 Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.
- 1.6 Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with beveled faces are less likely to chip or spall).
- 1.7 Look behind and above you before swinging the hammer.
- 1.8 Watch the object you are hitting.
- 1.9 Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.
- 1.10 Do not use a hammer with a loose or damaged handle.
- 1.11 Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.
- 1.12 Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
- 1.13 Do not use a hammer for any purpose for which it was not designed or intended.
- 1.14 Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
- 1.15 Do not redress, grind, weld or reheat-treat a hammer head.
- 1.16 Do not strike with the side or cheek of the hammer.
- 1.17 Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
- 1.18 Keep pipe wrench teeth clean and sharp.
- 1.19 Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
- 1.20 Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.
- 1.21 Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
- 1.22 Do not use pipe wrenches on nuts and bolts.
- 1.23 Do not use a pipe extender for extra leverage. Get a larger pipe wrench.
- 1.24 Replace pipe cutter wheels which are nicked or otherwise damaged.
- 1.25 Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
- 1.26 Choose a cutting wheel suitable for cutting the type of pipe material required:
- 1.26.1 Thin wheel for cutting ordinary steel pipe.
- 1.26.2 Stout wheel for cutting cast iron.
- 1.26.3 Other wheels for cutting stainless steel, plastic and other materials.



- 1.27 Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.
- 1.28 Use a proper tap wrench (with a "T" handle) for turning a tap.
- 1.29 Use lubricant or machine cutting fluid with metals other than cast iron.
- 1.30 Do not permit chips to clog flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning – this may result in the tap breaking if you continue to apply pressure.
- 1.31 Do not use a conventional adjustable wrench for turning a tap it will cause uneven pressure on the tap that may cause it to break.
- 1.32 Do not attempt to thread hardened steel. This can chip or damage the die.
- 1.33 Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
- 1.34 Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

2.0 Pliers and Wire Cutters

- 2.1 Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
- 2.2 Choose pliers or wire cutters that have a grip span of $2\frac{1}{2} 3\frac{1}{2}$ inches to prevent your palm or fingers from being pinched when the tools are closed.
- 2.3 Use adjustable pliers that allow you to grip the work piece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
- 2.4 Use tools only if they are in good condition.
- 2.5 Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
- 2.6 Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the work piece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.
- 2.7 Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
- 2.8 Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.
- 2.9 Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
- 2.10 Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
- 2.11 Do not expose pliers or wire cutters to excessive heat.
- 2.12 Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.
- 2.13 Do not use pliers as a hammer.
- 2.14 Do not hammer on pliers or wire cutters to cut wires or bolts.
- 2.15 Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.
- 2.16 Do not use cushion grip handles for jobs requiring tools with electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
- 2.17 Do not use pliers on nuts and bolts; use a wrench.

3.0 Screwdrivers



- 3.1 Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
- 3.2 Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.
- 3.3 Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
- 3.4 For cross-head screws, use the correct size and type of screwdriver; a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozi-driv screwdriver.
- 3.5 Use a vise or clamp to hold the stock if the piece is small or moves easily.
- 3.6 Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
- 3.7 If work must be carried out on "live" electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
- 3.8 Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).
- 3.9 Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.
- 3.10 Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
- 3.11 Use a screwdriver that incorporates the following features when continuous work is needed:
- 3.11.1 A pistol grip to provide for a straighter wrist and better leverage.
- 3.11.2 A "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
- 3.11.3 A ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
- 3.12 File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.
- 3.13 Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
- 3.14 Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.
- 3.15 Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
- 3.16 Do not hammer screws that cannot be turned.
- 3.17 Do not grind the tip to fit another size screw head.
- 3.18 Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-flutted spline screw heads).
- 3.19 Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).
- 3.20 Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
- 3.21 Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.
- 3.22 Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
- 3.23 Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
- 3.24 Do not carry screwdrivers in your pockets.



4.0 Snips

- 4.1 Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.
- 4.2 Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.
- 4.3 Universal snips can cut in both straight and wide curves.
- 4.4 Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.
- 4.5 Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
- 4.6 Aviation snips have compound leverage that reduces the effort required for cutting.
- 4.7 Offset snips have jaws that are set at an angle from the handle.
- 4.8 Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).
- 4.9 Use only snips that are sharp and in good condition.
- 4.10 Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
- 4.11 Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
- 4.12 Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
- 4.13 Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.
- 4.14 Keep the nut and the pivot bolt properly adjusted at all times.
- 4.15 Oil the pivot bolt on the snips occasionally.
- 4.16 Do not try to cut sharp curves with straight cut snips.
- 4.17 Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.
- 4.18 Do not hammer or use your foot to exert extra pressure on the cutting edges.
- 4.19 Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
- 4.20 Do not attempt to re-sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

5.0 Wood Chisels

- 5.1 Wear safety glasses.
- 5.2 Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.
- 5.3 Use the right size of chisel for the job.
- 5.4 Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.
- 5.5 Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.
- 5.6 Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.
- 5.7 Clamp stock so it cannot move.



- 5.8 Adjust your stance so that you do not lose your balance if the tool slips.
- 5.9 Chip or cut away from yourself.
- 5.10 Keep your hands and body behind the cutting edge.
- 5.11 Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.
- 5.12 Make finishing or paring cuts with hand pressure alone.
- 5.13 Place chisels safely within the plastic protective caps to cover cutting edges when not in use.
- 5.14 Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.
- 5.15 Store chisels in a "storage roll," a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.
- 5.16 Replace broken or splintered handles.
- 5.17 Sharpen cutting edges as often as necessary.
- 5.18 Do not use a wood chisel as a pry or a wedge.
- 5.19 Do not use a wood chisel on metal.
- 5.20 Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.
- 5.21 Do not use a grinder to redress heat-treated tools. Use a whetstone.
- 5.22 Do not use a dull chisel.

6.0 Wrenches

- 6.1 Use the correct wrench for the job pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.
- 6.2 Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).
- 6.3 Select the correct jaw size to avoid slippage.
- 6.4 Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.
- 6.5 Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
- 6.6 Ensure that the jaw of an open-ended wrench is in full contact (fully seated, "flat," not tilted) with the nut or bolt before applying pressure.
- 6.7 Face an adjustable wrench "forward," adjust tightly and turn the wrench so pressure is against the permanent or fixed jaw.
- 6.8 Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.
- 6.9 Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.
- 6.10 Support the head of the ratchet wrench when socket extensions are used.
- 6.11 Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.
- 6.12 Stand aside when work is done with wrenches overhead.
- 6.13 Make sure adjustable wrenches do not "slide" open during use.
- 6.14 Keep tools well maintained (cleaned and oiled).
- 6.15 Clean and place tools and wrenches in a tool box, rack or tool belt after use.
- 6.16 Do not push on a wrench losing your balance is more likely if the wrench slips.
- 6.17 Do not use a wrench that is bent or damaged.

S3NA-305-WI16 Manual Hand Tools Safety Card

Revision 0 01 March 2011

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- 6.18 Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.
- 6.19 Do not pull on an adjustable wrench that is loosely adjusted.
- 6.20 Do not use pipe wrenches on nuts or bolts.
- 6.21 Do not use pipe wrenches for lifting or bending pipes.
- 6.22 Do not use a wrench on moving machinery.
- 6.23 Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.
- 6.24 Do not use a makeshift wrench.
- 6.25 Do not insert a shim in a wrench for better fit.
- 6.26 Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
- 6.27 Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
- 6.28 Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

7.0 Files/Rasps

- 7.1 Personnel will not use a file as a pry bar, hammer, screwdriver, or chisel.
- 7.2 When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.
- 7.3 Personnel will not hammer on a file.

8.0 Chisels

- 8.1 Personnel will not use a chisel that has a dull cutting edge.
- 8.2 Personnel will not use chisels that have "mushroomed" striking heads.
- 8.3 Hold a chisel by using a tool holder if possible.
- 8.4 Clamp small work pieces in the vise and chip towards the stationary jaw when working with a chisel.

9.0 Vises

- 9.1 When clamping a long work piece in a vise, support the far end of the work piece by using an adjustable pipe stand, saw horse or box.
- 9.2 Position the work piece in the vise so that the entire face of the jaw supports the work piece.
- 9.3 Personnel will not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
- 9.4 Personnel will not slip a pipe over the handle of a vise to gain extra leverage.

10.0 Clamps

- 10.1 Personnel will not use the C-clamp for hoisting materials.
- 10.2 Personnel will not use the C-clamp as a permanent fastening device.

11.0 Jacks

- 11.1 Personnel will not exceed the jack's rated lifting capacity as noted on the label of the jack.
- 11.2 Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.



S3NA-305-WI17 Small Engine Safety Card

1.0 Objective / Overview

- 1.1 Operate small-engine machines, such as push mowers, weed trimmers, and leaf blowers, in a safe manner.
- 1.2 You should know how to operate and maintain them in a safe manner.
- 1.3 If possible, read the operator's manual. It will contain detailed information on the safe operation and maintenance of the machine. If you do not have a manual, ask if one can be ordered from the manufacturer.

2.0 Safe Operating Guidelines

- 2.1 Do not wear loose or baggy clothing around tools with rotating parts.
- 2.2 Never run the engine indoors, in poorly ventilated areas, or in a location where the exhaust could be drawn into a building through an opening.
- 2.3 Never store engine with fuel in fuel tank inside a building with potential sources of ignition such as hot water and space heaters, clothes dryers, electric motors, etc.
- 2.4 Never remove fuel cap or add fuel when engine is running.
- 2.5 Never start or operate the engine with the fuel fill cap removed.
- 2.6 Refuelling: allow engine to cool; fill in well-ventilated area; and do not smoke while re-fuelling.
- 2.7 Use only properly labelled, CSA approved red gasoline containers to store and dispense fuel.
- 2.8 Do not pour fuel from engine or siphon fuel by mouth.
- 2.9 Never leave the engine unattended while it is running.
- 2.10 Never operate the engine with an unguarded engine shaft.
- 2.11 Do not modify the engine or tamper with the factory setting of the engine governor.
- 2.12 Never operate the engine without a muffler guard in place and avoid touching hot areas of the engine.
- 2.13 Keep all flammable materials away from the muffler and the rest of the engine; do not idle or park the engine in dry grass or ground cover.
- 2.14 When working on the equipment, avoid accidentelstarts by removing the ignition key, turn off all engine switches, disconnect the battery and disconnect the spark plug, keeping it away from metal part.
- 2.15 Always wear hearing protection when operating an engine.

3.0 Training Requirements

- 3.1 Review of Applicable SOPs.
- 3.2 Demonstrated knowledge on the use of small engine equipment.
- 3.3 Review and follow manufacturers operating guidelines.

4.0 Personal Protective Equipment (Level D PPE)

- 4.1 Always wear safety goggles with shields
- 4.2 Leather or cotton gloves
- 4.3 Long pants and long sleeve shirt
- 4.4 Safety toe work boots



4.5 Hearing protection (earmuffs or earplugs)

5.0 Potential Hazards

- 5.1 Flying debris
- 5.2 Hearing loss
- 5.3 Cuts
- 5.4 Burns



S3NA-305-WI18 Electric and Battery Hand Tools Safety Card

All electrical tools and equipment must be operated in accordance with the requirements of S3NA-302-PR Electrical, General.

1.0 Safe Work Practices

- 1.1 Maintain all electrical tools and cords in good condition and not overloaded.
- 1.2 Do not wear loose or baggy clothing around tools with rotating parts.
- 1.3 The switch on the tool must be in the OFF position before connecting it to a power source.
- 1.4 Verify that the power source is the same voltage and current as indicated on the nameplate of the tool. Using a higher voltage can cause serious injury to the operator as well as burn out the tool.
- 1.5 The tool must have an approved three-wire cord with a three-prong plug so that it can be used only in a properly grounded three-hole receptacle, unless the tool is double insulated to protect the operator from electrical shock.
- 1.6 All outdoor receptacles must be protected by means of a ground fault circuit interrupter* (GFCI or GFI) available in portable or fixed models. Do not use any electric power tools outdoors in a receptacle that is not properly protected.
- 1.7 Report all shocks and/or sparks from electrical tools, no matter how minor. The tool in question should be tagged out and not be used until it has been checked for ground fault.
- 1.8 Maintain electrical cords and appliances in good working order.
- 1.8.1 Cords and appliances must be CSA approved.
- 1.8.2 Never carry an electric tool by the cord or disconnect the plug by pulling or jerking on the cord (can damage, loosen, or separate connections).
- 1.8.3 Check cords frequently for such damage such as kinks, cuts, and cracked or broken outer jackets (any cord that feels more than comfortably warm to the touch should be checked by an electrician for overloading).
- 1.9 Store electrical cords in a clean, dry area off the ground to prevent damage to cord.
- 1.10 Equipment must have proper guards or shields and they must remain in place. If, due to damage or deterioration, the original guard provided on a piece of equipment cannot be put in place, the tool must be removed from service.
- 1.11 Do not modify, remove, or disable any machine guards.
- 1.12 Stand to one side when engaging or disengaging an electrical circuit breaker to avoid electrical flash backs.
- 1.13 It's strongly advisable to use GFCI with all portable electric tools at any time.
- 1.14 A cord should not be pulled or dragged over nails, hooks, or other sharp objects that may cause cuts in the insulation. In addition, cords should never be placed on radiators, steam pipes, walls, and windows. Particular attention should be placed on connections behind furniture, since files and bookcases may be pushed tightly against electrical outlets, severely bending the cord at the plug.
- 1.15 Disconnect electrical equipment before cleaning, adjusting, or applying flammable solutions. If a guard is removed to clean or repair parts, replace it before testing the equipment and returning the machine to service.
- 1.16 Only authorized persons are permitted to activate, de-activate or lockout electrical equipment.
- 1.17 Where there is or may be a danger to a worker, from the inadvertent operation of electrical equipment, then that equipment must be locked out and tagged prior to commencing work.



- 1.17.1 Switch off all appropriate devices (MCC, Distribution Panel, Disconnect).
- 1.17.2 Lock and tag Electrical Supply devices in the "OFF" position.
- 1.17.3 Test to be sure the equipment cannot be operated at the STOP-START switch.
- 1.17.4 Test to be sure electrical equipment is de-energized.
- 1.17.5 After completion of task, remove padlocks and destroy tags.

2.0 Inspection

- 2.1 Inspect tools for any damage prior to each use.
- 2.2 Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.
- 2.3 Ensure that the tools are properly grounded using a 3-prong plug, are double-insulated (and are labeled as such), or are powered by a low-voltage isolation transformer; this will protect users from an electrical shock.
- 2.4 Check electric tools to ensure that a tool with a 3-prong plug has an approved 3-wire cord and is grounded. The 3-prong plug should be plugged in a properly grounded 3-pole outlet. If an adapter must be used to accommodate a 2-hole receptacle, the adapter wire must be attached to a known, functioning ground. Never remove the third, grounding prong from a plug.
- 2.5 Check the handle and body casing of the tool for cracks or other damage.
- 2.6 If the tool has auxiliary or double handles, check to see that they installed securely.
- 2.7 Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
- 2.8 Any tool with a spring-operated trigger switch shall be fully functional.
- 2.9 Check for damaged switches and ones with faulty trigger locks.
- 2.10 Inspect the plug for cracks and for missing, loose or faulty prongs.
- 2.11 If a tool is defective, remove it from service, and tag it clearly "Out of service for repair." Replace damaged equipment immediately do not use defective tools "temporarily." DO NOT ATTEMPT FIELD REPAIRS.

3.0 Battery Powered Tools

- 3.1 Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.
- 3.2 Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.
- 3.3 Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.
- 3.4 Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting out the battery and possibly cause sparks, fires or burns.

4.0 Using Electric Tools

- 4.1 Switch off the tools before connecting them to a power supply.
- 4.2 If a power cord feels more than comfortably warm or if a tool is sparking excessively, have it checked by an electrician or other qualified person.
- 4.3 Disconnect the power supply before making adjustments or changing accessories.
- 4.4 Remove any wrenches and adjusting tools before turning on a tool.



- 4.5 Inspect the cord for fraying or damage before each use. Tag defective tools clearly with an "Out of Service" tag and replace immediately with a tool in good running order.
- 4.6 During use, keep power cords clear of tools and the path that the tool will take.
- 4.7 Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.
- 4.8 Use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.
- 4.9 For outdoor work, use outdoor extension cords marked "W-A" or "W."
- 4.10 Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
- 4.11 Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.
- 4.12 Pull the plug not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug an electrical shock to the operator may result.
- 4.13 Keep power cords away from heat, water, oil, sharp edges and moving parts. They can damage the insulation and cause a shock.
- 4.14 Avoid accidental starting by ensuring the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.
- 4.15 Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.
- 4.16 Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.
- 4.17 Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.
- 4.18 Do not use electric tools in wet conditions or damp locations unless tool is connected to a ground fault circuit interrupter (GFCI).
- 4.19 Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood for getting an electric shock.
- 4.20 Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.
- 4.21 Do not plug several power cords into one outlet by using single-to-multiple outlet adapters or converters ("cube taps").
- 4.22 Do not use light duty power cords.
- 4.23 Do not connect or splice extension cords together to make a longer connection: the resulting extension cord may not be able to provide sufficient current or power safely.
- 4.24 Do not carry electrical tools by the power cord.
- 4.25 Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.
- 4.26 Never break off the third prong on a plug: replace broken 3-prong plugs and make sure the third prong is properly grounded.
- 4.27 Never use extension cords as permanent wiring; use extension cords only as a temporary power supply to an area that does not have a power outlet.
- 4.28 Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.
- 4.29 Do not brush away sawdust, shavings or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.
- 4.30 Do not operate tools in an area containing explosive vapors or gases.
- 4.31 Do not clean tools with flammable or toxic solvents.

S3NA-305-WI18 Electric and Battery Hand Tools Safety Card

Revision 0 01 March 2011

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4.32 Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.

5.0 Belt Sanders

- 5.1 Wear safety glasses.
- 5.2 Make sure the sander is switched "OFF" before connecting the power supply.
- 5.3 Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.
- 5.4 Inspect sanding belts before using them. Replace those belts that are worn or frayed.
- 5.5 Install sanding belts that are the same widths as the pulley drum.
- 5.6 Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.
- 5.7 Secure the sanding belt in the direction shown on the belt and the machine.
- 5.8 Keep hands away from a sanding belt.
- 5.9 Use two hands to operate sanders one on a trigger switch and the other on a front handle knob.
- 5.10 Keep all cords clear of sanding area during use.
- 5.11 Clean dust from a motor and vents at regular intervals.
- 5.12 Do not use a sander without an exhaust system or a dust collector present that is in good working order. Empty the collector when 1/4 full. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.
- 5.13 Do not exert excessive pressure on a moving sander. The weight of the sander supplies adequate pressure for the job.
- 5.14 Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stock into place or use a "stop block" to prevent movement.
- 5.15 Do not overreach. Always keep proper footing and balance.
- 5.16 Do not cover the air vents of the sander.

6.0 Drills

- 6.1 Wear safety glasses.
- 6.2 Keep drill air vents clear to maintain adequate ventilation.
- 6.3 Always keep drill bits sharp.
- 6.4 Keep all cords clear of the cutting area during use. Inspect for frays or damage before each use.
- 6.5 Disconnect power supply before changing or adjusting bit or attachments.
- 6.6 Tighten the chuck securely. Remove chuck key before starting drill.
- 6.7 Secure workpiece being drilled to prevent movement.
- 6.8 Slow the rate of feed just before breaking through the surface.
- 6.9 Drill a small "pilot" hole before drilling large holes.
- 6.10 For small pieces, clamp stock so work will not twist or spin. Do not drill with one hand while holding the material with the other.
- 6.11 Do not use a bent drill bit.
- 6.12 Do not exceed the manufacturer's recommended maximum drilling capacities.
- 6.13 Do not use a hole saw cutter without the pilot drill.
- 6.14 Do not use high speed steel (HSS) bits without cooling or using lubrication.
- 6.15 Do not attempt to free a jammed bit by starting and stopping the drill. Unplug the drill and then remove the bit from the work piece.

S3NA-305-WI18 Electric and Battery Hand Tools Safety Card Revision 0 $\,$ 01 March 2011

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- 6.16 Do not reach under or around stock being drilled.
- 6.17 Do not overreach. Always keep proper footing and balance.
- 6.18 Do not raise or lower the drill by its power cord.

7.0 Planers

- 7.1 Wear safety glasses.
- 7.2 Disconnect the planer from the power supply before making any adjustments to the cutter head or blades.
- 7.3 Use blades of the same weight and set at the same height.
- 7.4 Ensure that the blade-locking screws are tight.
- 7.5 Remove adjusting keys and wrenches before turning on power.
- 7.6 Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.
- 7.7 Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.
- 7.8 Start a cut with the infeed table (front shoe) resting firmly on the stock and with the cutter head slightly behind the edge of the stock.
- 7.9 Use two hands to operate a planer one hand on the trigger switch and the other on a front handle.
- 7.10 Do not put your finger or any object in a deflector to clean out chips while a planer is running.
- 7.11 Disconnect the power supply when stopping to dump out chips.
- 7.12 Do not set a planer down until blades have stopped turning.
- 7.13 Keep all cords clear of cutting area.

8.0 Routers

- 8.1 Wear safety glasses.
- 8.2 Disconnect the power supply before making any adjustments or changing bits.
- 8.3 Ensure that the bit is securely mounted in the chuck and the base is tight.
- 8.4 Put the base of the router on the work, template or guide. Make sure that the bit can rotate freely before switching on the motor.
- 8.5 Secure stock. Never rely on yourself or a second person to support or hold the material. Sudden torque or kickback from the router can cause damage and injury.
- 8.6 Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.
- 8.7 Keep all cords clear of cutting area.
- 8.8 Always hold both hands on router handles, until a motor has stopped. Do not set the router down until the exposed router bit has stopped turning.
- 8.9 Do not overreach. Keep proper footing and balance.
- 8.10 When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower the bit to two times the required depth.
- 8.11 When routing outside edges, guide the router counter clockwise around the work.
- 8.12 When routing bevels, moldings and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.
- 8.13 Feed the router bit into the material at a firm, controlled speed.
- 8.14 With softwood, you can sometimes move the router as fast as it can go. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.



- 8.15 The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise.
- 8.16 When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.
- 8.17 To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

9.0 Circular Saws

- 9.1 Wear safety glasses and hearing protection.
- 9.2 Check the retracting lower blade guard to make certain it works freely.
- 9.3 Ensure that the blade that you have selected is sharp enough to do the job. Sharp blades work better and are safer.
- 9.4 Check the saw for proper blade rotation.
- 9.5 Set the depth of the blade, while the saw is unplugged, and lock it at a depth so that the lowest tooth does not extend more than about 1/8 inch beneath the wood.
- 9.6 Keep all cords clear of cutting area.
- 9.7 Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.
- 9.8 Check the retracting lower blade guard frequently to make certain it works freely. It should enclose the teeth as completely as possible, and cover the unused portion of the blade when cutting.
- 9.9 Check that the retracting lower blade guard has returned to its starting position before laying down the saw.
- 9.10 Keep upper and retracting lower blade guard clean and free of sawdust.
- 9.11 Disconnect power supply before adjusting or changing the blade.
- 9.12 Allow the saw to reach full power before starting to cut.
- 9.13 Use two hands to operate saws one on a trigger switch and the other on a front knob handle.
- 9.14 Keep the motor free from accumulation of dust and chips.
- 9.15 Select the correct blade for stock being cut and allow it to cut steadily. Do not force it.
- 9.16 Secure work being cut to avoid movement.
- 9.17 Do not hold or force the retracting lower guard in the open position.
- 9.18 Do not place your hand under the shoe or guard of the saw.
- 9.19 Do not over tighten the blade-locking nut.
- 9.20 Do not twist the saw to change, cut or check alignment.
- 9.21 Do not use a saw that vibrates or appears unsafe in any way.
- 9.22 Do not force the saw during cutting.
- 9.23 Do not cut materials without first checking for obstructions or other objects such as nails and screws.
- 9.24 Do not carry the saw with a finger on the trigger switch.
- 9.25 Do not overreach. Keep proper footing and balance.
- 9.26 Do not rip stock without using a wedge or guide clamped or nailed to the stock.

10.0 Other Saws

- 10.1 Wear safety glasses.
- 10.2 Disconnect power supply before changing or adjusting blades.

S3NA-305-WI18 Electric and Battery Hand Tools Safety Card

Revision 0 01 March 2011

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- 10.3 Use lubricants when cutting metals.
- 10.4 Keep all cords clear of cutting area.
- 10.5 Position the saw beside the material before cutting and avoid entering the cut with a moving blade.
- 10.6 Make sure guards, if present, are installed and are working properly.
- 10.7 Remember sabre saws cut on the upstroke.
- 10.8 Secure and support stock as close as possible to the cutting line to avoid vibration.
- 10.9 Keeps the base or shoe of the saw in firm contact with the stock being cut.
- 10.10 Select the correct blade for the material being cut and allow it to cut steadily. Do not force it. Clean and sharp blades operate best.
- 10.11 Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.
- 10.12 Do not start cutting until the saw reaches its full power.
- 10.13 Do not force a saw along or around a curve. Allow the machine to turn with ease.
- 10.14 Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.
- 10.15 Do not put down a saw until the motor has stopped.
- 10.16 Do not reach under or around the stock being cut.
- 10.17 Maintain control of the saw always. Avoid cutting above shoulder height.

10.18 External Cuts

- 10.18.1 Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.
- 10.18.2 Hold the saw firmly down against the material and switch the saw on.
- 10.18.3 Feed the blade slowly into the stock, maintaining an even forward pressure.

10.19 Internal Cuts

- 10.19.1 Drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade in the hole until the shoe rests firmly on the stock.
- 10.19.2 Do not let the blade touch the stock until the saw has been switched on.



S3NA-306-PR Highway and Road Work

1.0 Purpose and Scope

- 1.1 To address potential hazards that may occur during highway construction and during work within the right of way of a public or private roadway.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Personal Protective Equipment (PPE)**: Safety clothing and equipment worn by workers in traffic areas to provide protection and heightened visibility from physical hazards including moving vehicles and construction equipment.
- 2.2 **Traffic areas**: Any work area where workers are located within 20 feet of moving traffic, existing or anticipated.
- 2.3 **Traffic Control Plan**: A written document containing drawings and text that describes the physical controls to be established to isolate workers from moving vehicles.
- 2.4 **WOF:** Workers on foot.

3.0 Attachments

3.1 S3NA-306-FM Equipment Checklist

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Project/Lead Manager or Resident Engineer** is responsible for administering the procedure and for determining the measures and configuration of the temporary traffic control zone in accordance with specifications for workers, motorists, and pedestrians and the protection of AECOM employees within the contract. The Lead Manager will also see that employees assigned to work in traffic areas are trained in the use of traffic control systems and PPE.
- 4.1.2 **Site Safety Coordinator** is responsible to the lead manager for the implementation of safety and the internal traffic control plan within a highway construction/demolition worksite. The Site Safety Coordinator will
 - Be responsible for traffic safety coordination on office projects.
 - Be appointed by each office that has any field work involving AECOM staff working in or near traffic. This is not a dedicated role and may be a committee member.
 - Receive training in the requirements of the governing transportation authority and the applicable OH&S legislation through training sanctioned by the respective authorities.
 - Be involved in conducting hazard assessments, developing the mitigating strategies and Safe Job Procedures, and reviewing their implementation for any project where traffic is identified as a hazard to our team members.

4.2 Personal Protective Equipment

- 4.2.1 High visibility safety vest /apparel
- 4.2.2 Retro-reflective stripes (for night work)
- 4.2.3 Protective headwear (hard hat)
- 4.2.4 Two-way radio or other means of effective communication
- 4.2.5 Traffic Accommodation equipment, as required by the traffic protection plan:



- A rooftop beacon light for the vehicle, where required
- Pylons, Glo-posts, flags, barricades and/or flagging tape, warning lights, flashing light boards
- Signage
- Flagging equipment, as required:
 - o Daytime:
 - Flag person's "Stop and Slow" paddle
 - A blaze orange flag person's vest over white coveralls
 - Safety head protection (hard hat)
 - Drinking water
 - Bug repellent and/or sun screen as conditions warrant
 - Optional radio communication (if required)
 - Night time (additional requirements):
 - A retro-reflective "Stop and Slow" paddle
 - A flashlight fitted with a red signaling baton
 - Flashing yellow beacons set up in advance of the flag person

4.3 Restrictions

- 4.3.1 Applicable legislated requirements governing all aspects of traffic safety, including directing traffic, signage, PPE, traffic control devices in temporary construction, maintenance and utility work zones, will be reviewed in preparation for the site-specific traffic accommodation.
- 4.3.2 No personnel will be allowed onto the site without first reviewing the project-specific traffic protection plan.

4.4 Training

- 4.4.1 All staff will receive on-site orientation to the hazards and controls.
- 4.4.2 Only staff with appropriate flag person training will act as a flag person.

4.5 Traffic Control Plan

- 4.5.1 Transportation incidents and workers struck by vehicles or mobile equipment account for many fatal construction work injuries. Workers in highway construction activities including flagging, demolition, surveying, utility, clean-up, emergency responders, and others in areas where traffic exists are exposed to being struck by moving vehicles. Work zones are used to move traffic in an approved direction and are typically identified by signs, cones, barrels, and barriers.
- 4.5.2 The procedures appropriate for work in traffic areas will vary depending on the work environment. Very simple procedures are needed in an inactive parking lot, and more complex procedures are needed when working in a construction zone on a highway. Each AECOM project team shall prepare a project HASP or SWP addressing traffic controls and worker protection appropriate for the team's project and exposures. Plans shall address the following if applicable:
 - Attenuator vehicles
 - Closures within a closure
 - Communications
 - Driving: seatbelts and rollover protection should be used on equipment and vehicles as stated by the manufacturer
 - Night operations and work within traffic controls
 - PPE
 - Sanitation



3 of 7

- Traffic control plans and permits
- Training
- Work zone protections: various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck mounted attenuators are available to limit motorist intrusions into the construction work zone
- Worker: heavy equipment interface
- 4.5.3 A Traffic Control Plan will be completed for the movement of vehicles in areas where workers are conducting other tasks.
- 4.5.4 Drivers, workers on foot (WOF), and pedestrians will be able to see and understand the routes they are to follow.
- 4.5.5 Where there are several projects, coordinated vehicle routes and communication between contractors will reduce vehicular struck-by incidents.
- 4.5.6 Hazard identification and plan development shall be performed in accordance with this procedure. The plans shall include the identification of the responsibility for personnel and implementation of the safety program under highway construction activities.
- 4.5.7 Other requirements for supporting activities such as excavations, heavy equipment usage, personal protective equipment, etc. shall be applicable and addressed in accordance with other Standard Operating Procedures.
 - A traffic protection plan will be an integral part of the Health and Safety Plan (HASP) or Safe Work Plan (SWP) whenever staff will be exposed to the hazards of vehicular traffic during project work (this may include surveys, drilling and soils inspections, bridge or overpass inspections, inspection of roadway construction projects).
 - Work duration, road width, and traffic volume are some of the key considerations to be contemplated when designing a traffic protection plan. The traffic protection plan will address the specific vehicular hazards and describe the measures that will be implemented to protect employees.
 - Traffic accommodation plans will be developed in consultation with a qualified supervisor or manager experienced in traffic control. In addition, a supervisor will be designated to oversee the implementation of the protection plan until work is completed.
 - OH&S regulations and associated standards or guidebooks provide instruction on the use of traffic control devices in temporary construction, maintenance, and utility work zones for worker and motorist safety and to minimize the disruption of traffic flow.
 - Schedule work to avoid periods of heavy traffic.
 - Alert traffic of work ahead, by placing signs or cones well ahead of the work area.
 - If the work area is being managed under a Traffic Control Plan or Traffic Accommodation Plan, obtain copies of these plans before commencing work.
 - Traffic accommodation that is adequate in good weather conditions and daylight may not be adequate under adverse weather conditions and/or hours of darkness. Reassess the accommodation based on conditions.
 - Traffic accommodation will be planned to provide safe conditions for the protection and safe passage of motorists, pedestrians, and employees at all work sites. It will include all areas located within the traveled portion of a roadway including shoulders, ditches, and boulevards.

4.6 Short-Term Traffic Protection

- 4.6.1 Always wear the appropriate PPE to maintain your visibility to vehicular traffic. Wear a tear-away fluorescent reflective vest (and retro-reflective stripes on the arms and legs for night work or during periods of limited visibility) at all times.
- 4.6.2 Pull your vehicles off as far to the right of the traveled portion of the road as possible. Confirm that the shoulder of the highway or street where you will park your vehicle is wide enough to allow for safe access to and egress from the vehicle.
- 4.6.3 Always park your vehicle at least 30 metres from the flag person station. The vehicle should be positioned between the flag person and the work crew.


- 4.6.4 Activate the four-way flashers for your vehicle prior to exiting the vehicle.
- 4.6.5 Plan an escape route prior to exiting the vehicle.
- 4.6.6 Load and unload materials or equipment from the passenger side of the vehicle.
- 4.6.7 Avoid turning your back to oncoming traffic.
- 4.6.8 Be aware of mobile equipment that may be operating in the work area.
- 4.6.9 Do not enter onto the traveled portion of the road except to cross the road. Road crossings should be made at a 90 degree angle to the direction of the road.

4.7 Long-Term Traffic Protection

- 4.7.1 Traffic accommodation will be provided BEFORE the work starts and will be maintained until the work is completed. This may mean 24 hours a day, 7 days a week.
- 4.7.2 Generally, for long-term duration work activities that are performed at construction projects, the Constructor for the project is required to develop a traffic protection plan.
- 4.7.3 If AECOM has assumed the role of Constructor for the project, the traffic protection plan will be developed and implemented prior to the commencement of work activities at the project.
- 4.7.4 If AECOM is not the Constructor for the project, the traffic protection plan for the project will be developed by our Client or a Constructor designated by the Client.
- 4.7.5 The traffic protection plan should be reviewed with AECOM employees during orientation to the Project. If the traffic protection plan is not discussed at the project-specific orientation, employees should discuss the issue with the Site Supervisor or Client contact for the Project.

4.8 Signage

- 4.8.1 Standard highway signs for information, speed limits, and work zones will assist drivers in identifying designated traffic paths.
- 4.8.2 Provide appropriate instructional signage such as: EVACUATION ROUTE; DO NOT ENTER; REDUCED SPEED AHEAD; ROAD CLOSED; and NO OUTLET.
- 4.8.3 Using standard highway signs for internal construction worksite traffic control will assist workers in recognizing the route they are to use at the construction site.
- 4.8.4 Traffic Signs
 - Signage will be of acceptable standards, in good condition, clean, legible, and suited to the purpose.
 - Signage will be secured or weighted.
 - Routinely inspect signage for placement, cleanliness, and physical damage.
 - Cover road traffic control signage when no activity is present.

4.9 Traffic Control Devices

- 4.9.1 Standard traffic control devices, signals, and message boards will instruct drivers to follow a path away from where work is being done.
- 4.9.2 The authority in charge will determine the approved traffic control devices such as cones, barrels, barricades, and delineator posts that will be used as part of the traffic control plan.
- 4.9.3 These standard devices should also be used inside the work zone.

4.10 Work Zone Protections

- 4.10.1 Various styles of concrete, water, sand, collapsible barriers, crash cushions, and truck-mounted attenuators shall be used to limit motorist intrusions into the construction work zone, as appropriate.
- 4.10.2 All AECOM staff shall be made aware of controls established by the Contractor.
- 4.10.3 AECOM staff shall wear the required safety equipment at all times including a hard hat, work boots, eye protection, and a high-visibility safety vest as a minimum and shall observe all project rules and requirements.



- 4.10.4 In the absence of a contractor, when AECOM staff are in the field alone—e.g., investigations, surveys—all appropriate DOT traffic control standards and devices shall be observed and placed in position.
- 4.10.5 The work zone shall be made safe by its separation from traffic.

4.11 Flagging

- 4.11.1 Flaggers and others providing temporary traffic control will wear high visibility clothing with a background of fluorescent yellow-green or orange-red and white, silver, yellow-green, orange, or yellow retro-reflective material.
- 4.11.2 In areas of traffic movement, PPE will make the worker visible for at least 1,000 feet so that the worker can be seen from any direction and will make the worker stand out from the background. Check the label or packaging to confirm that the garments are performance Class 2 or 3 (class requirement may be project-specific).
- 4.11.3 Drivers should be warned in advance with signs that there will be a flagger ahead.
- 4.11.4 Flaggers should use STOP/SLOW paddles, paddles with lights, or flags (flags should be used only in emergencies.). The STOP sign should be octagonal with a red background and white letters and border. The SLOW sign should be octagonal with an orange background and black letters and a border.
- 4.11.5 Flag Persons
 - A traffic control person (flag person) will stand in a safe position, preferably on the driver's side of the lane under control, be clearly visible, have an unobstructed view of approaching traffic, and be positioned at least 25 m (80 ft) away from the work area unless circumstances or space requirements, such as working at or near an intersection, dictate otherwise.
 - Flag persons will be trained and competent and will use appropriate PPE.
 - Flag persons will be instructed in traffic control and flagging procedures, will be provided with sufficient breaks, and will not be permitted to work alone for extended periods as per local regulations.
 - Flag persons will not get involved in needless conversation and will stay alert at their points of duty until relieved.
 - Except for brief flagging operations, or in an emergency, "Flag Person Ahead" signs will be
 posted in advance of each flag person's station. Such signs will be removed promptly when the
 flagging operation terminates.

4.12 Lighting

- 4.12.1 Flagger stations should be illuminated. Lighting for workers on foot and equipment operators is to be at least 5 foot-candles or greater.
- 4.12.2 Where available lighting is not sufficient, flares or chemical lighting should be used.
- 4.12.3 Glare affecting workers and motorists should be controlled or eliminated.

4.13 Training

- 4.13.1 Flaggers should be trained/certified and will use the signaling methods required by the authority in charge.
- 4.13.2 WOF, equipment operators, and drivers in internal work zones need to know the routes that construction vehicles will use.
- 4.13.3 Equipment operators and signal persons need to know the hand signals used on the worksite.
- 4.13.4 Operators and WOF need to know the visibility limits and the "blind spots" for each vehicle on site.
- 4.13.5 WOF should wear high visibility safety garments designated as Class 1, 2 or 3.
- 4.13.6 Workers should be made aware of the ways in which shift work and night work may affect their performance.



4.14 Driving

- 4.14.1 Seatbelts and rollover protection will be used on equipment and vehicles as stated by the manufacturer.
- 4.14.2 When pulling off to the side of the road, AECOM personnel will park their vehicles at minimum of 20 feet or the width of two traffic lanes from moving traffic.

4.15 Night Operations and Work Within Traffic Controls

- 4.15.1 Night work on roadways should not be done unless absolutely necessary and unless the work area is adequately lit.
- 4.15.2 Operations with night activities will have a written plan that addresses the safety issues of working at night. The plan will address, but is not limited to:
 - Reflectivity
 - All equipment used in the work zone shall have DOT-approved reflective material placed to increase the visibility of the equipment.
 - All reflective surfaces shall be cleaned as required so that the reflectivity of the material is not degraded. Any areas of reflective surface that is damaged or obscured will be replaced.
 - Personnel working at night will have reflective tape on their hardhats and will wear retro-reflective vests at a minimum. The reflective bands on vests will be vertical and horizontal around the entire upper body.
 - Additional measures such as white disposable coveralls, reflective bands, and personal battery-operated strobe lights may be used when practical.
 - Illumination
 - Whenever feasible and practical, light plants will be used to illuminate the work area.
 - On mobile operations, additional lighting on equipment may be used to illuminate the work area.
 - All equipment shall, at a minimum, have working strobe or warning beacon lights.
 - o All equipment shall have working lights confirmed through daily visuals.
 - All flag persons will be placed in illuminated areas only.
 - All lighting is to be checked after setup to confirm that it is not blinding approaching traffic or other equipment in the work zone.
 - Hazard Analysis and Communication
 - Prior to the start of any night operation, a detailed Hazard Analysis will be made addressing the possible hazards of night work. The Hazard Analysis will be reviewed with the crews and updated as needed. At the start of each shift, the Daily Safety Reminder will be used to reaffirm the provisions of the night work requirements as found in the hazard analysis and this policy.
 - The hazard analysis should also provide for:
 - The selection of a competent person responsible for maintaining surveillance on the work area to alert other workers of vehicles encroaching on the work zone.
 - A method to signal workers when vehicles encroach on the work zone.
 - A system to account for workers at all times, which may include a buddy system.
 - Emergency communication or warning signals used by a worker such as a radio, signal horn, or whistle, which will be used to call for help.

4.16 Attenuator Vehicles

- 4.16.1 Although not required, it is good construction practice to place an attenuator truck or pick-up truck (minimum) immediately ahead of workers in a work zone.
- 4.16.2 The vehicle of choice should be placed to provide the best protection for workers.
- 4.16.3 The tires should be placed so that when struck the vehicle will turn away from workers.



4.17 Closures within a Closure

- 4.17.1 On occasion, satellite operations may be performed under full freeway traffic closures. For this type of work, special precautions referred to as a "closure within a closure" is to be implemented in accordance with the following:
 - Posted speed limits within closures should be set at 15 miles per hour.
 - Signs are to be installed approximately 250 feet in advance of and behind the work zone to alert drivers who may approach from either direction of the upcoming work zone.
 - The work area is to be completely delineated with Type 1 barricades (candlesticks).
 - Any vehicle used for AECOM field work shall be equipped with a functioning rotating beacon placed on the roof of the vehicle.

5.0 Records

5.1 Traffic Protection Plans and completed Equipment Checklists will be maintained in project files.

6.0 References

6.1 The following standards apply to traffic accommodation equipment.

Association	Standard
Transportation Association of Canada	Manual of Uniform Traffic Control Devices for Canada (1998)



S3NA-306-FM Equipment Checklist

Name of Contractor:						
Location:		Project	:#:			
Date:	Time:	Weath	er:			
Person Conducting Inspec	tion:	Title:				
Note: As you conduct your with a YES . If the answer a as soon as possible.	r inspection you should be able to and to any question is NO, this deficiency	swer eac should l	ch questi be corre	ion cted	DC	eficiency orrected?
			YES	NO	OK	N/A
Are accident prevention sig	gns, tags clearly visible?					
Are danger signs used whe	ere immediate hazards exist?					
Are caution signs used to v to caution against unsafe p	warn against potential hazards or practices?					
Are exit signs posted at all	exit locations?					
Are proper visual warning the work area?	signs posted prior to (in advance of)					
Are flaggers provided with to provide the necessary p	signs, signals, and barricades rotection?					
Are flaggers using red light darkness?	ts when signaling during periods of					
Are flaggers wearing highly	y visible warning garments?					
Are the flaggers trained in	proper flagging procedures?					
Are warning garments wor	n at night reflectorized?					
Are highly visible flags use	d by the flaggers at least 18 inches s	quare?				
Are barricades used to tota vehicles to protect the work	ally obstruct the passage of people ar k area?	nd				
Do barricades meet the red Manual of Uniform Traffic (quirements set forth in the Control Devices? (MUTCD)					
COMMENTS:						



S3NA-307-PR Housekeeping, Worksite

1.0 Purpose and Scope

- 1.1 This procedure provides AECOM's work practices as well as personal hygiene and work site sanitation standards for housekeeping.
- 1.2 Applies to all AECOM North America-based staff and field worksites.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Project Manager (Field Task Manager, Supervisor)** is responsible for the procedure's implementation and the details of addressing housekeeping policy within the construction/demolition worksite.
- 4.1.2 **SH&E Department** personnel will monitor, assess, and report on project housekeeping when visiting locations.
- 4.1.3 **Employees** are responsible for reporting any areas of concern to the Site Supervisor for prompt resolution as well as for maintaining worksites that are free from debris, clutter, and slipping or tripping hazards.

4.2 Smoking, Eating, and Drinking

- 4.2.1 Eating and drinking will be permitted in designated areas at AECOM project sites and as specified on client sites. Smoking will be permitted only in areas designated in compliance with applicable local laws, regulations, legislation, and ordinances, by the Field Supervisior and situated in locations that are not in the immediate vicinity of activities associated with work site activities. Additionally, Field Supervisior will designate each smoking area giving primary consideration to those personnel who do not smoke.
- 4.2.2 Personnel involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g., HAZWOPER-controlled work areas).
- 4.2.3 Site personnel will first wash hands and face after completing work activities and prior to eating or drinking.

4.3 Water Supply

- 4.3.1 Water supplies will be available for use on site and will comply with the following requirements:
- 4.3.2 Potable Water: An adequate supply of drinking water will be available for site personnel consumption. Potable water can be provided in the form of approved well or city water, bottled water, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from nonpotable water sources.
- 4.3.3 Nonpotable Water: Nonpotable water will not be used for drinking purposes. Nonpotable water may not be used for hand washing or other personal hygiene activities but may be used for other types of cleaning activities. All containers/supplies of nonpotable water used will be properly identified and labeled as such.

4.4 **Toilet Facilities**

4.4.1 Toilet facilities will be available for site personnel and visitors. Should subcontractor personnel be located on-site for extended periods, it may become necessary to obtain temporary toilet facilities.



Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

- 4.4.2 A minimum of one toilet will be provided for every 20 site personnel, with separate toilets maintained for each sex, except where there are less than five total personnel on site. For mobile crews where work activities and locations permit use of nearby toilet facilities (e.g., gas station, or rest stop), on-site facilities are not required.
- 4.4.3 Washing Facilities
- 4.4.4 Hand and Face: Site personnel will wash hands and face after completing work activities and prior to breaks, lunch, or completion of workday.
- 4.4.5 Personal Cleaning Supplies: Cleaning supplies at AECOM project sites will consist of soap, water, and disposable paper towels or items of equal use/application (e.g., anti-bacterial gels, wipes, etc.).

4.5 Clothing and Personal Protective Equipment (PPE)

4.5.1 All PPE will be kept clean at all times and maintained in accordance with the manufacturer's, AECOM's. and applicable regulatory, legislative, or provincial requirements.

4.5.2 General Work Areas

- 4.5.3 At all times work areas will be kept free of dirt and debris that may impact the safety of site personnel and visitors. All trash receptacles will be emptied regularly.
- 4.5.4 Break Areas and Lunchrooms

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

- 4.5.5 All food and drink items will be properly stored when not in use.
- 4.5.6 Food items will not be stored in personal lockers for extended periods in order to prevent the potential for vermin infestation.
- 4.5.7 Perishable foods will be refrigerated whenever possible.
- 4.5.8 All waste food containers will be discarded in trash receptacles.
- 4.5.9 All tables, chairs, counters, sinks, and similar surfaces will be kept clean and free of dirt, waste food, and food containers at all times.
- 4.5.10 Refrigerators used to store food items will be maintained at 45 degrees Fahrenheit and emptied of all unclaimed food items weekly. Refrigerators used to store food will be labeled as such so that only food and drinks are stored within the refrigerator.
- 4.5.11 Routine cleaning of refrigerators will also be performed on a regular basis.

4.6 Vermin Control

- 4.6.1 Every enclosed workplace shall be constructed, equipped, and maintained, so far as reasonably practicable, to prevent the entrance or harborage of rodents, insects, and other vermin.
- 4.6.2 A continuing and effective extermination program shall be instituted where the presence of rodents, insects, or other vermin is detected.

4.7 General Housekeeping

- 4.7.1 All work areas shall be kept clean to the extent that the nature of the work allows.
- 4.7.2 Every work area shall be maintained, so far as practicable, in a dry condition. Where wet processes are used, drainage shall be maintained and platforms, mats, or other dry standing places shall be provided, where practicable, or appropriate waterproof footgear shall be provided.
- 4.7.3 Protruding objects or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip, and fall hazards to a minimum.
- 4.7.4 Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal.
- 4.7.5 At no time will debris or trash be intermingled with waste PPE or contaminated materials.



- 4.7.6 Material and equipment must be placed, stacked, or stored in a stable and secure manner. Stacked material or containers must be stabilized as necessary by interlocking, strapping, or other effective means of restraint to protect the safety of workers.
- 4.7.7 An area in which material may be dropped, dumped, or spilled must be guarded to prevent inadvertent entry by workers or protected by adequate covers and guarding.
- 4.7.8 Floors, platforms, ramps, stairs, and walkways available for use by workers must be maintained in a state of good repair and kept free of slipping and tripping hazards. If such areas are taken out of service, the employer must take reasonable means for preventing entry or use.
- 4.7.9 Hazardous areas not intended to be accessible to workers must be secured by locked doors or equivalent means of security and must not be entered unless safe work procedures are developed and followed.

4.8 Worksite Offices and Trailers

Worksite offices and trailers will be maintained in accordance with S3NA-103-PR Housekeeping, Office.

5.0 Records

5.1 None

6.0 References

6.1 None



S3NA-308-PR Manual Lifting, Field

1.0 Purpose and Scope

- 1.1 This procedure provides the requirements for use when performing manual materials handling activities (e.g., lifting/handling of items or materials).
- 1.2 This procedure applies to all field staff for AECOM North America-based operations.

2.0 Terms and Definitions

- 2.1 **Manual Materials Handling:** Moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining.
- 2.2 **Team Handling:** Team handling occurs when more than one person is involved during the lift.

3.0 Attachments

3.1 S3NA-308-WI Manual Lifting Safe Work Practices

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 The **Project Manager** will effectively implement the procedure, providing resources as required, and providing direction on proper lifting/handling techniques.
- 4.1.2 The **Region SH&E Manager** will assist in identifying activities with a high potential for lifting/handling strains/injuries as well as the associated mitigation strategies and training on proper lifting/manual materials handling techniques.
- 4.1.3 **Employees** are responsible for reviewing and following S3NA-308-WI Manual Lifting Safe Work *Practices*.

4.2 Mechanical Controls

- 4.2.1 Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are preferable to be used whenever possible rather than the employee physically moving materials.
- 4.2.2 Mechanical assistance will be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists.
- 4.2.3 Objects to be moved will be secured to prevent falling and properly balanced to prevent tipping.

4.3 Administrative Controls

- 4.4 When significant, sustained lifting work is required, it is desirable to rotate employees to spread the work load among several people and thereby avoid fatigue.
- 4.5 Rotation is not simply performing a different job but instead is performing a job that utilizes a completely different muscle group from the ones that have been overexerted.

5.0 Records

5.1 None

6.0 References

- 6.1 OSHA Technical Manual: http://www.osha.gov/dts/osta/otm/otm_vii/otm_vii_1.html
- 6.2 National Safety Council: www.nsc.org



S3NA-308-WI Manual Lifting Safe Work Practices

1.0 General

1.1 Before Performing a Lift:

- 1.1.1 Check to see if mechanical aids such as hoists, lift trucks/dollies, or wheelbarrows are available.
- 1.1.2 Do not lift if you are not sure that you can handle the load safely.
- 1.1.3 Confirm that, based on your own physical capabilities and medical limitations, you can lift the load without overexertion. Get help with heavy or awkward loads.
- 1.1.4 Confirm that the load is "free" to move.
- 1.1.5 Check that the planned destination of the load is free of obstacles and debris.
- 1.1.6 Confirm that the path to the planned destination of the load is clear. Grease, oil, water, litter, and debris can cause slips and falls.
- 1.1.7 Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, and sheet materials like metal or glass). See Section 2.0 for additional guidance.

1.2 General Tips for Lifting

- 1.2.1 Prepare for the lift by warming up the muscles.
- 1.2.2 Make certain that your balance is good. Feet should be shoulder width apart, with one foot beside and the other foot behind the object that is to be lifted.
- 1.2.3 Bend the knees; do not stoop. Keep the back straight, but not vertical. There is a difference. Tucking in the chin straightens the back.
- 1.2.4 Grip the load with the palms of your hands and your fingers. The palm grip is much more secure. Tuck in the chin again to make certain your back is straight before starting to lift.
- 1.2.5 Use your body weight to start the load moving, then lift by pushing up with the legs. This makes full use of the strongest set of muscles.
- 1.2.6 Keep the arms and elbows close to the body while lifting.
- 1.2.7 Carry the load close to the body. Do not twist your body while carrying the load. To change direction, shift your foot position and turn your whole body.
- 1.2.8 Watch where you are going!
- 1.2.9 To lower the object, bend the knees. Do not stoop. To deposit the load on a bench or shelf, place it on the edge and push it into position. Confirm that your hands and feet are clear when placing the load.

1.3 Engineering Controls:

- 1.3.1 Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.
- 1.3.2 Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body—such as adjusting the height of a pallet or shelf.
- 1.3.3 Work methods and stations should be designed to minimize the distance between the person and the object being handled.
- 1.3.4 High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.
- 1.3.5 Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported seated posture. Bending the upper body and spine to reach into a bin or container is highly



undesirable. The bins should be elevated, tilted, or equipped with collapsible sides to improve access.

- 1.3.6 Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors.
- 1.3.7 Store heavy objects at waist level.
- 1.4 Whenever possible, utilize hand holds or other lifting attachments on objects being handled:



- 1.4.1 Use the "hook grip" on loads with cut-out handholds.
- 1.4.2 Curl your fingers around the edge.
- 1.4.3 Do not hold the load with your fingertips.
- 1.4.4 Use containers with handles located more than halfway up the side of the container.
- 1.4.5 Use the "ledge grip" to handle regularly shaped objects without handles.



- 1.4.6 Use vacuum lifters to handle sheet materials or plates.
- 1.4.7 Hold the object with hands placed diagonally.
- 1.4.8 Wear gloves where practical.

2.0 Specific Handling Techniques

The following guidance will be used when performing manual materials handling for various types of materials.

2.1 Square or Rectangular Objects

- 2.1.1 Place one foot slightly in front of the other.
- 2.1.2 Squat as close to the object as possible.
- 2.1.3 Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.
- 2.1.4 Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight, and tuck in the chin.
- 2.1.5 Test to confirm that the object is loose from floor and will lift without snagging.
- 2.1.6 Straighten the legs, keeping the backbone straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.



- 2.1.7 If turning or change of direction is required, turn with feet without twisting the torso and step in the direction of travel.
- 2.1.8 To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

2.2 Cylindrical Objects

- 2.2.1 When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible. Rolling must be controlled by chute, tagline, or other means of limiting acceleration. Workers must not be positioned downhill from rolled objects. Use of the legs for pushing and tagline control of rolled objects must be stressed.
- 2.2.2 Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus maintaining balance and a steady, controlled, forward motion. Motion must be controlled so that ceasing to walk and moving the hands will stop forward motion.
- 2.2.3 Use carts or tracks to transport cylinders. Make sure that two people transport a cylinder if carts cannot be used, use lifting straps to improve grip.
 - Technique for one person lifting a cylinder onto a platform:
 - Roll the cylinder to within 3 feet of the platform.
 - Position the forward foot around the cylinder, the back foot about 1 foot behind the cylinder.
 - o Bend knees slightly.
 - Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot from the ground.
 - Tilt the cylinder onto the thigh of the back leg.
 - Balance the cylinder on the thigh by pressing down with the back hand while lifting the cylinder with the forward hand.
 - Extend both knees to initiate forward movement of the cylinder and continue by pushing up and forward with the arms until the cylinder is located on the platform.
 - o 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.
 - o Lean forward and straighten the knees to set the cylinder upright.

2.3 Bags and Sacks

- 2.3.1 The best way to handle a bag depends on its size, weight, and how far it is to be carried. When lifting, remember to
 - Straddle the end of the bag.
 - Bend the hips and knees.
 - Keep the back straight.
 - Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.
 - Lean forward, straightening the knees to set the bag upright.
 - Readjust the straddle position moving feet closer to the bag.
 - Readjust the grasp, with one hand clasping the bag against the body and the other under it.
 - Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
 - Thrust the bag up with the knee while straightening the body.
 - Put the bag on the shoulder opposite the knee used to thrust the bag up.
 - Stabilize the bag on the shoulder.



- Move off without bending sideways.
- 2.3.2 Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a coworker.
 - Stand close to the platform.
 - Place one foot in front of the platform.
 - Bend hips and knees.
 - Keep the back straight.
 - Ease the bag off the shoulder and put it upright on the platform.
 - Pull the bag slightly over the edge of the platform.
 - Stand close to the platform with the bag touching the chest.
 - Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
 - Step back.
 - Bend hips and knees, keeping back straight.
 - Ease the bag onto the floor.
- 2.3.3 Bulkier sacks are easier to carry on your back. Lift the sack onto your back from a platform:
 - Move the sack to the edge of the platform.
 - Put your back against the sack.
 - Grasp with both hands on the upper corners of the sack.
 - Ease the sack onto the back, bending hips and knees before taking the weight.
 - Keep the back straight.
 - Stand up and straighten the hips and knees.
 - Stabilize the sack.
 - Move away without bending sideways.
- 2.3.4 Two-person handling of a sack:
 - Position one person on either side of the sack.
 - Squat with one foot balancing behind the sack.
 - Keep back straight.
 - Grasp with the outer hand on the upper corner, the other hand holding the bottom of the sack.
 - On one person's command:
 - Stand up and straighten the hips and knees.
 - Move toward the stack.
 - Put the sack on the stack.

2.4 Sheet Materials

- 2.4.1 When lifting sheet materials:
 - Stand close to the pile of sheets in a walking stance.
 - Grasp sheet firmly at the midpoint of its long side with the closer hand.
 - Pull sheet up and toward the body.
 - Change grip using your other hand and put your fingers on top of the sheet.
 - Pull sheet up to the vertical position and to the side until one half is off the pile.
 - Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
 - Stand up without bending or twisting body.

S3NA-308-WI Manual Lifting Safe Work Practices

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• Whenever moving sheet materials, be cognizant of wind conditions.

2.4.2 To carry sheets:

- Use drywall carts to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.
- 2.4.3 Use team lifting and carrying where other solutions are inappropriate.
 - Remember that the combined strength of the team is less than the sum of individual strength.
 - Select team members of similar height and strength.
 - Assign a leader to the team.
 - Determine a set of commands to be used such as "lift," "walk," "stop," and "down." Make sure that everyone knows what to do when they hear the command.
 - Follow the commands given by the team leader.
 - Practice team lifting and carrying together before attempting the task.

2.5 Material Storage

- 2.5.1 When storing materials on site:
 - Store materials at a convenient height.
 - Leave the lowest shelf unused if necessary.
 - Use vertically mobile shelves to avoid bending and overhead reaching.
 - Use bin racks for storing small items.
 - Store heavy and frequently used materials at waist height.
 - Do not store materials at floor level.
 - Use hand trucks with elevating devices in storage and loading areas.
 - Use trucks with a tilting device to avoid bending.
 - Use elevating platforms to avoid overhead reaching.



S3NA-309-PR Mobile or Heavy Equipment

1.0 Purpose and Scope

- 1.1 Outline the safe working requirements for working with and near mobile equipment and heavy equipment operation.
- 1.2 This procedure applies to all AECOM North America based employees and operations.

2.0 Terms and Definitions

- 2.1 **Heavy equipment:** All excavating equipment include scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.
- 2.2 **Operator:** Any person who operates the controls while the heavy equipment in is motion or the engine is running.
- 2.3 **Ground personnel/workers:** Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 Attachments

- 3.1 S3NA-309-FM1 Certification of Machinery and Mechanized Equipment
- 3.2 S3NA-309-FM2 Heavy Machinery Pre-Operation Checklist
- 3.3 S3NA-309-WI Brokk180 Safety Card

4.0 Procedure

- 4.1 For work under AECOM's control, Project Managers are responsible for ensuring all equipment is in good working order and all equipment operators are qualified on the piece of machinery they are assigned.
- 4.2 Staff will confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- 4.3 The operator of mobile equipment is the only worker permitted to ride the equipment unless the equipment is a worker transportation vehicle.
- 4.4 A person will not operate mobile equipment unless the person has received adequate instruction and training in the safe use of the equipment, has demonstrated to a qualified supervisor or instructor competency in operating the equipment.
- 4.5 The operator of mobile equipment will operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment

4.6 **Communication**

- 4.6.1 Communication between site supervisors/managers, heavy equipment operators, and other site personnel is a key method of preventing serious injury or death during heavy equipment operations.
- 4.6.2 The following outline the communication requirements during heavy equipment operations:
 - Site supervisors/managers shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.
 - Site supervisors/managers shall inform all ground personnel before changes are made in the locations of designated work areas.
 - Prior to work initiating onsite the site supervisor/manager is to confirm all operators and ground
 personnel are trained on the hand signals that will be used to communicate between operators
 and ground personnel.
 - Personnel working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.



- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (i.e., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a guide shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.7 Ground Personnel

- 4.7.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.
- 4.7.2 The following outline the clearance requirements during heavy equipment operations:
 - Ground personnel shall always yield to heavy equipment.
 - Ground personnel shall maintain a suitable "buffer" area of clearance from all active heavy equipment.
 - A job-specific hazard analysis that identifies any special precautions shall be completed and communicated to all AECOM personnel.
 - Site supervisors/managers shall designate areas of heavy equipment operation and confirm that all ground personnel are aware of designated areas. Designated areas shall include boundaries and travel routes for heavy equipment. Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
 - When feasible, site supervisors/managers shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and confirm that unauthorized ground personnel do not enter such areas.
 - Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
 - Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
 - Ground personnel shall never stand between two pieces of heavy equipment or other objects (i.e., steel support beams, trees, buildings, etc.).
 - Ground personnel shall never stand directly below heavy equipment located on higher ground.
 - If working near heavy equipment, ground personnel shall stay out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
 - Ground personnel shall never work near heavy equipment.
 - Personnel shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
 - Personnel shall not talk on a cell phone while standing or walking on a roadway or other mobile equipment path.
- 4.7.3 At a minimum, all ground personnel and operators outside of heavy equipment shall wear the following:
 - High visibility, reflective (Class 2) safety vest that is visible from all angles and made of fluorescent material and orange, white, or yellow reflective material (confirm that vest is not faded or covered with outer garments, dirt, etc.).
 - Retro-reflective striping for arms and legs (night work)
 - ANSI-CSA approved hard hat
 - ANSI-CSA approved safety glasses with side shields
 - ANSI-CSA approved work boots (unless project requirements are more stringent)
 - ANSI-CSA approved hearing protection as needed
 - Appropriate work clothes (i.e., full length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).



4.8 **Prior to work commencing**

- 4.8.1 All mobile equipment will be regularly inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.
- 4.8.2 The operator will report defects and conditions affecting the safe operation of the equipment to the supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.
- 4.8.3 Exposed moving parts on mobile equipment which are a hazard to the operator or to other workers will be guarded and if a part will be exposed for proper function it will be guarded as much as is practicable consistent with the intended function of the component.
- 4.8.4 An approved Underwriter's Laboratories (UL) 4A40BC fire extinguisher should be present on all mobile equipment.
- 4.8.5 Inform the operators of the equipment that AECOM employees are in the area and inquire if there are any restricted areas or specific rules or requirements. In some industrial facilities, mobile equipment has the 'right of way'.
- 4.8.6 Where the operator will not have a full view of the path of travel, a signal person will be used on the ground that has a full view of the load, the operator, and the path.
- 4.8.7 Mobile equipment in which the operator cannot directly or by mirror or other effective device see immediately behind the machine will have an automatic audible warning device which activates whenever the equipment controls are positioned to move the equipment in reverse, and if practicable, is audible above the ambient noise level.

4.9 **Operation**

- 4.9.1 The operator of mobile equipment will operate the equipment safely, maintain full control of the equipment, and comply with the laws governing the operation of the equipment.
- 4.9.2 A supervisor will not knowingly operate or permit a worker to operate mobile equipment which is, or could create, an undue hazard to the health or safety of any person.
- 4.9.3 The operator of mobile equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement such as by setting the parking brake, placing the transmission in the manufacturer's specified park position, and by chocking wheels where necessary.
- 4.9.4 The operator will maintain the cab, floor and deck of mobile equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.
- 4.9.5 If mobile equipment has seat belts required by law or manufacturer's specifications, the operator and passengers will use the belts whenever the equipment is in motion, or engaged in an operation which could cause the equipment to become unstable.
- 4.9.6 When approaching or crossing the intended path of travel of mobile equipment, establish eye contact with the operator of the mobile equipment and confirm that it is safe to proceed.
- 4.9.7 Have vehicle headlights on at all times when driving in the area.
- 4.9.8 Park motor vehicles off the haul roads, or away from the work areas.
- 4.9.9 Do not wear loose clothing where there is a danger of entanglement in rotating equipment.
- 4.9.10 Do not enter the swing area of machines such as cranes, mobile drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so.
- 4.9.11 Stay out of the blind areas around mobile equipment and never assume that the equipment operators have seen them or are aware of their presence.
- 4.9.12 Maintain a distance of 60 cm (2 ft.) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, the area will be barricaded or guarded to prevent access.
- 4.9.13 Vibration from moving traffic or mobile equipment can cause excavations or spoil piles to become unstable. Be aware of the risk and keep clear.
- 4.9.14 All heavy equipment shall be operated in a safe manner that will not endanger persons or property.
- 4.9.15 All heavy equipment shall be operated at safe speeds.



- 4.9.16 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.
- 4.9.17 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.
- 4.9.18 When feasible, operators shall travel with the "load trailing", if the load obstructs the forward view of the operator.
- 4.9.19 Slow down and sound horn when approaching a blind curve or intersection. Flagmen equipped with 2-way radio communications may be required to adequately control traffic.
- 4.9.20 Operators shall remain in cab while heavy equipment is being loaded.
- 4.9.21 Equipment shall be shut down prior to and during fueling. Do not smoke or use electrical devices while fueling. Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.
- 4.9.22 Turn off heavy equipment, place gear in neutral and set parking brake prior to leaving vehicle unattended. Buckets and blades are to be placed on the ground and with hydraulic gears in neutral. Heavy equipment parked on slopes shall have the wheels chocked.
- 4.9.23 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.
- 4.9.24 Never exit heavy equipment while it is in motion.
- 4.9.25 Passengers shall only ride in heavy equipment designed for occupancy of passengers.
- 4.9.26 Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).
- 4.9.27 Site vehicles will be parked in a designated parking location away from heavy equipment.
- 4.9.28 Operators shall never push/pull "stuck" or "broken-down" equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.
- 4.9.29 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
- 4.9.30 Equipment left unattended at night adjacent to traveled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (or the regulatory requirement for the work location) to the active roadway.
- 4.9.31 Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.
- 4.9.32 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not exceeded.
- 4.9.33 Steering or spinner knobs shall not be attached to steering wheels.
- 4.9.34 High lift rider industrial trucks shall be equipped with overhead guards.
- 4.9.35 When ascending or descending grades in excess of 5%, loaded trucks shall be driven with the load upgrade.
- 4.9.36 All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.
- 4.9.37 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.
- 4.9.38 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.
- 4.9.39 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.
- 4.9.40 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.10 Utilities



- 4.10.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc.
- 4.10.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:
 - Always be aware of surrounding utilities.
 - Confirm all equipment (i.e., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath of aboveground utilities.
 - Confirm utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work. Confirm documentation of the contact is made; date, number; contact name, organization, etc.

4.11 Training

- 4.11.1 The operator or other qualified supervisor will provide all on-site personnel with an orientation to the mobile equipment and its associated hazards and controls.
- 4.11.2 Only designated, qualified personnel shall operate heavy equipment.
- 4.11.3 Operators shall have all appropriate local, state, or federal licenses or training to operate a designated piece of heavy equipment.
- 4.11.4 Operators shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is needed. Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.12 Inspection and Maintenance

- 4.12.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel during work hours.
- 4.12.2 Maintenance records will be maintained on the site or project for mobile equipment.
- 4.12.3 Servicing, maintenance and repair of mobile equipment will not be done when the equipment is operating, unless continued operation is essential to the process and a safe means is provided.
- 4.12.4 All heavy equipment shall have a documented inspection and if necessary, repaired prior to use. Operators shall not operate heavy equipment that has not been cleared for use. All machinery and mechanized equipment will be certified to be in safe operating condition (certification form attached) by a competent individual seven days prior to on-site operation, and is valid for one year.
- 4.12.5 All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the site supervisor/manager immediately. Inspection records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use the Heavy Equipment Pre-Operation Inspection Checklist (attached).
- 4.12.6 Defective heavy equipment shall be immediately taken out of service until repaired.

4.13 Fueling and batteries

- 4.13.1 A well-ventilated area shall be used for refueling.
- 4.13.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.
- 4.13.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.
- 4.13.4 No one shall spill fuel on hot surfaces. Any spillage should be cleaned before starting an engine.
- 4.13.5 Spilled fuel shall be cleaned with cotton rags or cloths; do not use wool or metallic cloth.
- 4.13.6 Open flames, lighted smoking materials, or sparking equipment shall remain well away from the fueling area.
- 4.13.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.
- 4.13.8 Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.



- 4.13.9 The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- 4.13.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.
- 4.13.11 Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent buildup of a static charge.
- 4.13.12 Batteries shall be serviced in a ventilated area while wearing appropriate PPE.
- 4.13.13 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first.
- 4.13.14 When installing a battery, the battery shall be connected ground post last.
- 4.13.15 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.
- 4.13.16 When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.
- 4.13.17 Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water.
- 4.13.18 Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention sought immediately.
- 4.13.19 To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around battery by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least 25 feet away from battery-charging stations.

5.0 Records

5.1 Inspection records shall be maintained with the equipment.

6.0 References

6.1 S3NA-205-PR Equipment Inspections & Maintenance



S3NA-309-FM1 Certification of Machinery and Mechanized Equipment

1.0 General Guidelines

1.1 Subcontractor equipment shall comply with all applicable requirements for motor vehicles and material handling heavy equipment contained in 29 CFR 1926 Subpart O. Heavy equipment includes, but is not limited to, drill rigs, front end loaders, backhoes, trackhoes, bulldozers, forklifts, and similar equipment used for the implementation of the project Statement of Work.

2.0 Equipment Safety Inspections

- 2.1 The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all-inclusive.
- 2.1.1 All machinery and mechanized equipment will be certified to be in safe operating condition (using the attached form) by a competent individual seven days prior to onsite operation. This certification is valid for one year.
- 2.1.2 Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.
- 2.1.3 Inspections shall include, but are not limited to, all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.
- 2.1.4 Drill rigs and related support equipment and vehicles shall be inspected by the driller in charge on a daily basis. These inspections shall be recorded on the Daily Drill Rig Checklist or on equivalent subcontractor forms.
- 2.1.5 Exhaustive preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or the subcontractor's internal policies, schedules, and equipment SOPs.
- 2.1.6 Only designated qualified persons shall operate machinery and mechanized equipment.
- 2.1.7 The contractor shall maintain records of tests and inspections at the site and shall make the records available upon request of the designated authority; the records shall become part of the official project file.
- 2.1.8 Equipment found to not be in safe operating condition or to have a deficiency that affects the safe operation of the equipment shall immediately be taken out of service and its use shall be prohibited until safe conditions have been corrected.
- 2.1.9 All equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
- 2.1.10 Equipment with an obstructed rear view must have an audible alarm that sounds when equipment is moving in reverse.



TO: AECOM

DATE:

FROM:

Project Name:

Project Location:

1. This form provides certification of machinery and mechanized equipment to be used on the referenced project for the following work:

Description of equipment work:	
Project site:	
Subcontractor providing equipment:	
Address:	
Dates (duration) of equipment work:	

2. Inspection and certification of machinery and mechanized equipment, as required by AECOM, has been made prior to but within seven calendar days in advance of use on the project site. Recertification will be required for equipment that is used on the project site for more than one year.

Identificat	ion 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 <u>CERTIFIED</u> TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Name	Title	
Company		
Signature	Date	

4. If there are any questions regarding this certification, please contact the following AECOM representative:

S3NA-309- FM2 Heavy Equipment Pre-Operation Checklist

Project Name/Location:															
Number/Name:						Make/Model:									
Hour meter reading:															
Check the following as	Oper	ator Name/	Date	Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date		
appropriate															
	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A
1. Operator qualified															
2. Overhead guard (ROPS)															
3. Horn															
4. Lights															
5. Parking brake															
6. Service brakes															
7. Steering															
8. Oil level															
9. Hydraulic oil level															
10. Radiator fluid level															
11. Major fluid leaks															
12. Windows															
13. Backup alarm															
14. Tires (visual)															



15. Seat belts								
16. Fuel leaks								
17. Fire extinguisher								
18. Fuel lines secure								
19. Electrical lines								
20. Exhaust components								
Comments/Remarks:								

S3NA-309-WI Brokk180 Safety Card

1.0 Objective/Overview

The Brokk 180 is an electric-powered hydraulic device used for demolishing concrete structures and refractory linings as well as excavating. This machine includes attachments designed exclusively for demolishing work (e.g., grapple, bucket, hydraulic hammer, etc.). By using the remote control unit, an operator can move the machine and attachments in different directions and speeds from afar.



2.0 Safe Operating Guidelines

- 2.1 Prior to use, complete a pre-operation inspection to determine if the unit is in safe working condition.
- 2.2 Position the unit to safely perform the intended task, then deploy the outriggers to stabilize the unit.
- 2.3 Confirm that the operator knows what the lifting capacity is; do not exceed the lifting capacity.
- 2.4 Complete a subsurface utility clearance prior to excavating.
- 2.5 Establish a minimum 15-foot clearance around the unit.
- 2.6 Do not allow debris to build-up around the unit. Maintain good housekeeping practices.
- 2.7 Prior to removing debris from under the boom, stop, disengage the unit, and position the boom so that the attachment is at rest on the ground.
- 2.8 Personnel operating the unit with the remote control device will be properly trained and certified by a competent person.
- 2.9 The operator will be able to maintain line of sight visual contact with the unit at all times to assess hazards and site security.
- 2.10 Maintenance in excess of preventive maintenance activities (e.g., lubrication, replenishing fluids, etc.) will be performed by manufacturer personnel ONLY.
- 2.11 All operations will comply with the manufacturer's recommended policies.

3.0 Potential Hazards

- 3.1 Flying debris.
- 3.2 Crush/impact/pinch from extendable boom, tracks, and tipping over.
- 3.3 Electrocution from subsurface utilities (when excavating).
- 3.4 Hearing loss.

4.0 Training Requirements

- 4.1 Review of applicable SOPs.
- 4.2 Complete knowledge and understanding of remote control functions.
- 4.3 Review and follow manufacturers' recommended policies and practices.



5.0 Personal Protective Equipment (Level D ensemble)

- 5.1 Reflective traffic safety vest.
- 5.2 Hearing protection (ear plugs and/or ear muffs).
- 5.3 Leather gloves.

6.0 Other Safety Tips

- 6.1 Never stand under a raised boom.
- 6.2 Maintain a clearance of 15 feet around the unit while operating.
- 6.3 Pay close attention to power cords for potential tripping hazard and equipment entanglement.
- 6.4 Maintain line of sight visual contact with unit at al times (especially when operating from a distance).



S3NA-313-PR Wildlife, Plants and Insects

1.0 Purpose and Scope

- 1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as "biological hazards".
- 1.2 This procedure applies to all AECOM North America (NA) based employees and operations.

2.0 Terms and Definitions

- 2.1 **Field Work**: Field work is defined as any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance (OM&M), biological surveys, and other work that meets the definition of field work.
- 2.2 **Poisonous:** Capable of harming or killing by or as if by poison; toxic or venomous.
- 2.3 Phase I Environmental Site Assessment: Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of CERCLA defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called "All Appropriate Inquiry" or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.
- 2.4 **Phase II Environmental Site Assessment:** Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 Attachments

- 3.1 S3NA-313-FM Tick Test Request Form
- 3.2 S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart
- 3.3 S3NA-313-WI2 Ticks
- 3.4 S3NA-313-WI3 Poisonous Spider Identification
- 3.5 S3NA-313-WI4 Mosquito Borne Diseases
- 3.6 S3NA-313-WI5 Plants of Concern
- 3.7 S3NA-313-WI6 Wild Parsnip Identification
- 3.8 S3NA-313-WI7 Configuration Clothing for Protection against ticks and insects
- 3.9 S3NA-313-WI8 Insect Repellent Active Ingredient Product Information
- 3.10 S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application
- 3.11 S3NA-313-WI10 Bird Droppings Safe Work Practices
- 3.12 S3NA-313-WI11 Large Carnivores
- 3.13 S3NA-313-WI12 Bear Safety
- 3.14 S3NA-313-WI13 Small Mammals
- 3.15 S3NA-313-WI14 Snakes
- 3.16 S3NA-313-WI15 Alligators



4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 Project Managers and Supervisors

- Project Managers and Supervisors responsible for managing field work will work with employees conducting the work to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- If biological hazards are identified as an exposure risk in the workplace, control measures that may be applied at the project site will be implemented to reduce the potential for employees to be exposed to injuries and illnesses while working.
- If the exposures cannot be eliminated or managed with engineering controls, the **Project Manager** or **Supervisor** will approve the use of PPE and protective repellents and lotions and ensure that exposed employees have and use these products.

4.1.2 District Operations Manager

- Approve the costs associated with the PPE and materials necessary to protect employees from the biological hazards covered by this Procedure.
- During the performance of project site visits, managers will assess the precautions being taken against the requirements of this Procedure.

4.1.3 Region SH&E Manager

- Participate in incident reporting and investigations when appropriate.
- Work with office SH&E Department and project Safety Professionals, provide training and guidance to employees consistent with this procedure.
- Assist project teams in identifying hazards and selecting appropriate control measures.

4.1.4 Operational Managers

- Assure implementation of this procedure in their regions and offices.
- Participate in incident reporting and investigations when appropriate.

4.1.5 Employees

- Participate in required training on this procedure.
- Participate in the development of THAs for the project, identify control measures to limit exposure and request PPE, repellents, and protective lotions required by this Procedure.
- Obtain approval from **Project Managers** and/or **Supervisors** to purchase selected PPE prior to purchasing.
- Implement the precautions appropriate to prevent exposure to the hazardous wildlife, insects and plants.
- Observe requirements for reporting as detailed within the Procedure.
- Participate in incident reporting and investigations when appropriate.

4.2 Overview

- 4.2.1 The procedures discussed below are detailed because these hazards have historically posed the most significant risk to AECOM **employees**. Note that this discussion is not a fully encompassing list of hazards and as part of the Task Hazard Analysis conducted by the project team, additional consideration must be given to other biological hazards.
- 4.2.2 Departments of Public Health local to the worksite, as well as the Centers for Disease Control (CDC) can serve as a resource for identifying biological hazards not discussed in this Procedure.
- 4.2.3 If additional biological hazards are identified, the project team should contact the **Region SH&E Manager** to discuss the hazards and identify effective control measures that can be implemented at the project site.



4.3 Planning and Hazard Assessment

- 4.3.1 The AECOM project team shall ensure that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this SOP are integrated into the project planning process and conveyed to AECOM employees conducting the field work. This information shall be communicated in the site specific Safe Work Plan (SWP), Health and Safety Plan (HASP), the THA, pre-project kickoff meetings, and tailgate meetings at the project site.
- 4.3.2 It is important to note that the precautions to be taken by AECOM **employees** to decrease the risk of exposure to biological hazards can directly increase the risk of heat-related illness due to thermal stresses. Therefore, heat stress monitoring and precautions shall be included as a critical component of the project-specific hazard assessments in accordance with S3NA-511-PR Heat Stress.
- 4.3.3 During the preparation of the project specific Safe Work Plan (SWP), HASP and project specific THA, **Project Managers, Supervisors**, and the project staff will determine what biological hazards might be encountered during the project and will prescribe the precautions to be taken to reduce the potential for exposure and the severity of resulting illnesses. Consideration will be given to conditions such as weather, proximity to breeding areas, host animals, and published information discussing the presence of the hazards.
- 4.3.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40°F for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.
- 4.3.5 The hazard assessments must also consider the additional hazards posed by vegetative clearing such as the increased risk of coming in contact with poison ivy, oak or sumac and hazards associated with the use of tools and equipment to remove vegetation.
- 4.3.6 **Employees** in the field where biological hazards exist will not enter the hazard areas unless they are wearing the appropriate protective clothing, repellents, and barrier creams specified below. If the hazard is recognized in the field but was not adequately assessed during the THA, the affected employees shall stop work and not proceed until the THA has been amended and protective measures implemented.
- 4.3.7 A decision flow chart and table for determining the potential for biological hazards in US states has been provided in S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (US States).

4.4 Restrictions

4.4.1 Staff with life-threatening reactions shall not undertake work in areas infested with the allergen (e.g., wasps, poison ivy), unless precautions are met which satisfy a medical practitioner's requirements.

4.5 Employee Sensitivity

- 4.5.1 Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin, therefore it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Staff should be aware that there are a large number of organisms capable of causing serious irritations and allergic reactions. Some reactions will only erupt if a secondary exposure to sunlight occurs. Depending on the severity of the reaction, the result can be severe scarring, blindness or even death.
- 4.5.2 **Employees** also need to consider whether they are sensitive to the use of insect repellents.

4.6 Personal Protective Equipment

- 4.6.1 The selection of Personal Protective Equipment is dependent on the hazard present and a PPE Hazard Analysis should be conducted to determine situation specific PPE required. (refer to SOP S3NA-208 Personal Protective Equipment Program)
- 4.6.2 At a minimum, in addition to any project specific PPE, long sleeves and pants should be worn on field projects where the risk of biological encounter exists.
- 4.6.3 PPE for insects should include sunscreen, bug nets, bug jackets, or insect repellent. Socks should be pulled over pant legs and rubber boots should be worn where the threat of exposure is anticipated.



4.6.4 Epi-pens¹ or other personal medication should be carried by those staff that are aware that anaphylactic shock is a possibility for them.

4.7 Remedies

- 4.7.1 If you suspect exposure to an irritant, identify the cause including obtaining a specimen if possible. Document the occurrence as a safety precaution if the exposure should lead to complications.
- 4.7.2 Go to a doctor or call WorkCare for advice if necessary.

4.8 Training

- 4.8.1 Field staff must learn to recognize organisms that represent a threat in the regions in which they work - experienced field staff must provide on the job training to assist staff with hazard recognition.
- 4.8.2 Staff who have severe allergic reactions are strongly recommended to notify their project manager, field supervisor, and co-workers of the potential for a reaction and demonstrate what medication they might need and how it is administered.

4.9 Insects

- 4.9.1 Insects for which precautionary measures should be taken include but are not limited to: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, Fire Ants and European Fire Ants.
- 4.9.2 Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- 4.9.3 Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will insert mouthparts to drink blood. The most serious concern is a possibility of contracting Lyme disease which is spread by the Black-legged or Deer Tick. The larger Wood Ticks are widespread in the west but these rarely carry diseases. Occasionally a tick can cause Tick Paralysis if it is able to remain feeding for several days. Full recovery usually occurs shortly after the tick is removed.
- 4.9.4 The Fire Ant (southern and western US) and the European Fire Ant (northeastern US and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

Ticks 4.10

- 4.10.1 Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and therefore most related illnesses.
- 4.10.2 The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in S3NA-313-WI2 Ticks along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.
- 4.10.3 When working in areas where ticks may occur, it is recommended that clothes are turned inside out and shaken at the end of day; do not wear the same clothes two days in a row.
- 4.10.4 To remove ticks that are embedded in skin, use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out.

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. S3NA-313-PR Wildlife, Plants and Insects Revision 0 01 March 2011



- 4.10.5 Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If noted, report to medical help for inoculation.
- 4.10.6 If possible, submit any ticks found or captured to the following laboratories for species identification.
 - Canada National Microbiology Laboratory (NML) (Phone: (204) 789-2000; email: ticks@phac-aspc.gc.ca). The NML will conduct diagnostic testing for the Lyme disease agent as well as several other disease-causing agents. The NML results will not only benefit anyone bit by the tick, but will also assist the NML in their goal to accurately map the distribution of the tick species and associated diseases in Canada.
 - US IGeneX, Inc. (Phone: (800) 832-3200; www.igenex.com). IGeneX will test the tick for the presence of the Lyme bacteria. They also test ticks for *Babesia microti* and/or *Babesia duncani* (formerly WA-1), Ehrlichia, Bartonella henselae and Rickettsia (Rocky Mountain Spotted Fever). These diseases are also carried by ticks. The testing request form is attached as *S3NA-313-FM Tick Test Request Form*.
- 4.10.7 If you experience symptoms such as fever, headache, fatigue, and a skin rash, you should immediately visit a medical practitioner as Lyme disease is treated easily with antibiotics in the early stages, but can spread to the heart, joints, and nervous system if left untreated.

4.11 Chiggers

- 4.11.1 Chiggers are mite larvae, approximately ½ mm in size, and typically invisible to the naked eye. While chiggers are not known to carry infectious diseases, their bites and resulting rashes and itching can lead to dermatitis and a secondary infection.
- 4.11.2 Chiggers are typically active from the last hard freeze in the winter or spring to the first hard freeze. They are active all year in the Gulf Coast and tropical areas.

4.12 Spiders

- 4.12.1 Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- 4.12.2 Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the US and others outside the US inject a toxin that causes extensive tissue damage and intense pain.
- 4.12.3 Additional information on spider identification can be found in attachment S3NA-313-WI3 Poisonous Spider Identification.

4.13 Mosquitoes

- 4.13.1 Mosquitoes can transmit the West Nile Virus and other forms of encephalitis after becoming infected by feeding on the blood of birds which carry the virus. Positive cases of West Nile Virus have been confirmed throughout North America since 2007.
- 4.13.2 Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death ,so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus.
- 4.13.3 When a mosquito bites, it injects an enzyme that breaks down blood capillaries and acts as an anticoagulant. The enzymes induce an immune response in the host that results in itching and local inflammation. The tendency to scratch the bite sites can lead to secondary infections.
- 4.13.4 CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk to employees working in outdoor environments. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:
 - Eastern Equine encephalitis (EEE)
 - Western Equine encephalitis (WEE)
 - West Nile Virus
 - St. Louis encephalitis (SLE)
 - La Crosse (LAC) encephalitis

4.13.5 Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3NA-313-WI4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.14 Bees and Hornets

- 4.14.1 Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, and even on open ground. The flying/stinging insects are not specifically included in the scope of this procedure and the PPE and other protective measures are not normally effective against aggressive, flying insects. Avoid reaching into areas where visibility is limited.
- 4.14.2 If stung by a wasp or bee or hornet, notify a co-worker or someone who can help should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.
- 4.14.3 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. AECOM highly recommends that employees with known allergies inform their co-workers of the allergy and the location of the medications they might carry for the allergy.

4.15 **Poisonous Plants**

- 4.15.1 Poisonous plants including poison ivy, oak and sumac, which contain the oil urushiol that produces a rash, can lead to dermatitis and infections. Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the affected area, increasing susceptibility for an infection. It should be noted that each time an employee is exposed to urushiol the severity of the reaction increases. In cases that involve severe rashes, medical treatment may be necessary to control the rash.
- 4.15.2 Wild parsnip is found throughout the U.S. and contains a poison that produces a rash similar to poison oak and ivy. Unlike poison oak and ivy, the active oil will not be present on unbroken leaves. See S3NA-313-WI6 Wild Parsnip Identification for additional information and photos of wild parsnip.
- Plants that field staff should recognize and take precautions to avoid include: Poison Sumac, Poison lvy (terrestrial and climbing), Poison Oak, Giant Hogweed² (or Giant Cow Parsnip), Wild Parsnip, Devil's Club and Stinging Nettle. Many others are extremely poisonous to eat (e.g., Poison Hemlock; Water Parsnip) do not eat anything that has not been identified.
- 4.15.4 See S3NA-313-WI5 Plants of Concern for information on locations where some of these poisonous plants are found in the US.
- 4.15.5 Of the toxic plants in the cashew family, Poison Ivy (*Rhus radicans*) is most widespread occurring across southern Canada. It is usually a low sprawling shrub or ground cover but in southwestern Ontario it also grows as a thick woody vine that grows high into the tree canopy. Poison Oak (*Rhus diversiloba*) is a low shrub that grows only in southwestern British Columbia and Poison Sumac (*Rhus vernix*) is a tall shrub that grows in southern Ontario but is quite rare. All of these plants possess urushiol oils in nearly all parts of the plant. Touching the plant causes an itchy skin rash that shows up several days following contact. People have a wide range of reactions which in severe cases can lead to oozing blisters on large parts of the body. Some people apparently never react and others may develop an allergy after no reaction after years of frequent contact.
- 4.15.6 Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the Giant Hogweed (*Heracleum mantegazzianum*), a garden that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 5 m in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by Meadow Parsnip (*Pastinaca sativa*) and Cow Parsnip (*Heracleum lanatum*). Meadow Parsnip can be very abundant on disturbed sites.
- 4.15.7 Nettles, particularly Stinging Nettle (*Urtica dioica*) and Wood Nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.

 ² Phytodermatisi producer: keep skin covered and wash well after exposure S3NA-313-PR Wildlife, Plants and Insects Revision 0 01 March 2011



- 4.15.8 Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. Fragile Prickly Pear cactus (*Opuntia fragilis*) is common in semi arid areas of the southern Prairie Provinces and interior British Columbia. Pieces will break off and imbed into one's ankle by scarcely brushing them. Devils Club (*Oplopanax horridum*) can form dominant understorey in humid forests among the western mountains. It contains semi-soft spines on the stems that will break off in the skin causing considerable irritation for days. In some areas of Ontario, Prickly-ash (*Zanthoxylon americanum*) a tall shrub with sturdy spines, sometimes forms dense single stands that are nearly impenetrable.
- 4.15.9 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying not to eat any berries or plants if you are not absolutely sure of their identity.
- 4.15.10 Of all the plants, Giant Hogweed presents the most serious health risk. Field staff should learn to recognize and avoid it if encountered.
- 4.15.11 Employees who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their **Supervisor** or **Project Manager** who will then forward the report to the **Regional SH&E Manager**.

4.16 Additional Biological Hazards

- 4.16.1 Additional Work Instructions are provided for protection and prevention from the following:
 - S3NA-313-WI11 Large Carnivores
 - S3NA-313-WI12 Bear Safety
 - S3NA-313-WI13 Small Mammals
 - S3NA-313-WI14 Snakes
 - S3NA-313-WI15 Alligators

4.17 Habitat Avoidance, Elimination, and/or Control

- 4.17.1 Ticks, Spiders and Insects
 - The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the project site of brush, high grass and foliage reduces the potential for exposure to biological hazards. Clearing will not eliminate the exposure to flying insects and there might be an increased exposure to ticks, spiders, and poisonous plants during the clearing process.
 - AECOM projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the AECOM project manager shall either request that the client eliminate vegetation, or request approval from the client to have vegetation clearing added to the scope of work.
 - When projects must be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures outlined in this SOP shall be prescribed.
 - Mosquitoes breed in stagnant water and typically only travel a quarter mile from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. Project Managers and client site managers should be contacted to determine whether water can be drained and the most appropriate method for draining containers, containment areas, and other objects of standing water.
 - If water cannot be drained, products similar to Mosquito Dunks® can be placed in the water to control mosquitoes. Once wet, the Mosquito Dunks® kill the immature, aquatic stage of the mosquito. The active ingredient is a beneficial organism that is lethal to mosquito larvae, but harmless to fish, humans, and other animals. Mosquito Dunks® provide long-term protection for 30 days or more.

4.17.2 Poisonous Plants

• If poisonous plants are identified in the work area, **employees** will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other **employees** to avoid the designated area. If **employees** decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the **Project Manager** and/or Client to gain approval.



- If removal of the plants is considered, it should be subcontracted to a professional landscaping service that is capable and experienced in removing the plant. If herbicides are considered for use, a discussion will need to occur with the **Project Manager** and Client to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- AECOM employees shall not attempt to physically remove poisonous plants from the work area unless a clearing procedure including PPE is prepared in advance and approved by the Region SH&E Manager. If a SWP or HASP is prepared for the project, the clearing procedure should be included and the required PPE specified.

4.17.3 Bird Droppings

• Bird excrement may be encountered due to the nesting of pigeons and other birds and winged animals (e.g., bats) on or in structures. Substantial accumulations of droppings can pose physical and health risks as slippery surfaces (if wet) and if the material is disturbed and becomes airborne, it can be inhaled or ingested if personal hygiene practices are not implemented. Inhalation of airborne droppings can cause diseases such as histoplasmosis. Exposure to surfaces with bird droppings shall be safeguarded by implementing proper work practices, training employees for awareness and using PPE. See S3NA-313-WI10 Bird Droppings Safe Work *Practices*.

4.18 Personal Precautions and Personal Protective Measures

4.18.1 Precautions

- Be aware of the potential irritants in your area and know how to recognize them.
- Modify activities to avoid encounters (diurnal rhythms, seasonal rhythms).
- Wear protective clothing.
- When working in areas where there may be small insects that "hitchhike" (e.g., ticks, spiders, scorpions), it is recommended that clothes are turned inside out and shaken at the end of day; do not wear same clothes two days in a row.
- Staff should always be aware of where they are placing their hands, or where they are sitting in order to avoid contact with potential toxins.

4.18.2 PPE

- The following recommendations may be considered by the project team to determine if the use of PPE is necessary for the type of work planned: Disposable gloves may be cotton, leather, or synthetic materials and must not be reused after removing.
- Clearing activities present the greatest risk of employee exposure but reduce the risks once completed. Recommendation – AECOM employees actively participating in clearing will use full protection from ticks and insects during the clearing activities including insect repellents, Tyvek® coveralls, and gloves.
- If the foliage being cleared includes poisonous plants, exposed skin will be treated with a dermal barrier cream such as Tecnu®'s Oak 'n Ivy Armor or Enviroderm's Ivy Block and either a full face respirator or a half face respirator (with goggles) fitted with a P-100 (HEPA) dust filter.
- Work in habitats with direct exposure to ticks, mosquitoes, and poisonous plants is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from biological hazards including insect repellents, Tyvek® coveralls or full length clothing, poisonous plant barrier creams and wipes, and gloves.
- Work in habitats with direct exposure to ticks and mosquitoes and no exposure to poisonous
 plants is likely and the scope of work typically does allow for worksite control measures like
 vegetative clearing: Recommendation Protection including insect repellents and Tyvek®
 coveralls or full length clothing.
- Work in habitats with direct exposure to poisonous plants and no exposure to ticks or insects is likely and the scope of work does not allow for worksite control measures like vegetative clearing: Recommendation – Full protection from poisonous plants including insect repellents, Tyvek® coveralls or full length clothing, poisonous plant barrier creams and wipes, and gloves.
- Industrial/Commercial/Office Facilities Direct contact with biological hazards is considered unlikely or low risk: Recommendation – PPE for biological hazards are not required; however, Tyvek coveralls and insect repellentrepellent should be available if exposure to spiders, flying insects, or other biological hazards is encountered.
- Work in areas where no biological hazards are expected because of the local environment, winter weather, or property development: Recommendation – PPE for biological hazards is not required;



however, Tyvek® coveralls and insect repellentrepellent should be available if exposures to spiders, flying insects, or other biological hazards are encountered.

- The following precautions and protective measures shall be implemented by AECOM employees conducting field work where the biological hazards covered by this SOP exist:
- 4.18.3 Insects, Spiders, and Ticks
 - Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
 - Application of insect repellent to clothing and/or exposed skin.
 - Routine personal checks.
 - Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If stung by an insect or bitten by a spider or tick, attempt to identify the attacker and notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite, or any swelling or numbness beyond the site of the bite.
 - Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the Centers for Disease Control and Prevention for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
 - Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, **employees** can apply DEET to their skin and let dry prior to putting FRC on, or use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work.
- 4.18.4 Poisonous Plants
 - Employees working in areas where poisonous plants exist shall wear either long sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. Employees must not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants will be treated as contaminated, removed from the body in a manner that the contamination is not spread, and placed in plastic bags for disposal.
 - Personal clothing that has been exposed to poisonous plants shall be decontaminated with a poisonous plant cleanser such as Tecnu® or removed in a careful manner, bagged and washed separately from other clothing to remove urushiol.
 - Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
 - Remember that in the fall and winter the hazard still exists in the form of stubble and roots.
 - Employees who develop a rash as a result of exposure to poisonous plants shall report the exposure immediately to their **Supervisor** or **Project Manager** who will forward the report to the RSHEM.
 - For dermatitis caused by Poison Ivy, Poison Oak, or Poison Sumac, calamine lotion is effective.

4.19 Selection and Configuration of Field Clothing

- 4.19.1 At a minimum, **employees** will wear long legged pants and long sleeve shirts or Tyvek® coveralls to reduce the amount of exposed skin when biological hazards are identified at the work site. Gloves will also be worn consistent with the recommendations of the site-specific SWP, HASP and/or THA to minimize hand exposure.
- 4.19.2 Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically-treated clothing will be taped to the work boots.
- 4.19.3 See S3NA-313-WI7 Configuration Clothing for Protection against ticks and insects for illustrations and instructions for configuring, taping, and tucking clothing.
- 4.19.4 Chemical Treatment of Field Clothing
 - Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the Centers for Disease Control and Prevention for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
 - Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, **employees** can apply DEET to their skin prior to putting FRC on, or use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work.



4.19.5 Permethrin

- When selected as part of a project's PPE requirements, the AECOM **Project Manager** shall ensure that field teams wear clothing treated with the chemical Permethrin, which is an insecticide with repellent properties registered with the U.S. Environmental Protection Agency (EPA), and recommended by the CDC. Information regarding the toxicity and product safety of Permethrin is provided in *S3NA-313-WI8 Insect Repellent Active Ingredient Product Information*. Permethrin is highly effective in preventing tick bites when applied to clothing, but is not effective when applied directly to the skin. Two options are available for Permethrin treatment of clothing worn during field work: 1) pre-treatment of fabric by the clothing manufacturer; or 2) employee treatment of their personal clothing using 0.5% Permethrin spray. AECOM strongly recommends the first option (employees obtaining pre-treated clothing) to avoid the time required, potential risk, and housekeeping issues involved with manually treating the clothing with spray. Purchase pre-treated clothing in accordance with *S3NA-208-PR Personal Protective Equipment Program* and with the approval of your **Supervisor**. For more information visit the AECOM NA SH&E website.
- The Permethrin pre-treatment is odorless and retains its effectiveness for approximately 25 washings. After 25 washings, the pre-treated clothing will be considered no longer effective and removed from service. Clothing that has been manually treated by employees will be considered effective for 5 wash cycles.
- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that must be applied directly to the skin.. Costs for clothing shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as a department expense. **Supervisor** or **Department Manager** approval is required prior to purchase.
- If an employee opts not to utilize chemically pre-treated clothing while potentially exposed to
 insects, spiders and/or ticks, they must either: 1) wear Tyvek® coveralls taped to the boots, 2) full
 length clothing consisting of long legged pants and long sleeved shirts treated with an insect
 repellent containing Permethrin, DEET, or an organic alternative to their work clothing.

4.19.6 Manual Treatment of Field Clothing

If clothing pre-treated with Permethrin is not available or not purchased prior to field work, employees may manually treat their clothing with Permethrin spray. The outer surfaces of all external clothing to be worn during field work should be treated with 0.5% Permethrin spray a minimum of 2 to 4 hours prior to field work (boots, trousers, shirt, jackets, rain gear; refer to Section 4.16 for selection of field clothing) in accordance with recommendations provided by the New York State Department of Health presented in S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application. This will likely require treatment at home or the office prior to field mobilization. Caution should be used when applying Permethrin as it is highly toxic to fish and house cats. Clothing treatment will last for approximately 5 wash cycles (check the specific instructions for the product used.)

4.19.7 Lemon Eucalyptus

 Lemon Eucalyptus is a plant-based insect repellent on the market as Repel Lemon Eucalyptus. The products have been proven to be effective against mosquitoes, deer ticks, and no-see-ums for up to six hours. Derived from Oil of Lemon Eucalyptus, this non-greasy lotion or spray has a pleasant scent and is not known to be toxic to humans. The spray or lotions will be effective for approximately two to six hours and should be reapplied every two hours to sustain protection. Lemon Eucalyptus products cannot be applied to fire retardant clothing.

4.19.8 Purchase of PPE and Repellents and Lotions

- Costs for clothing, repellents, lotions, and other PPE shall be charged to projects as a consumable item. If charging to the project is not possible, the charges should be managed as a department expense. **Supervisor** or **Department Manager** approval is required prior to purchase.
- Material Safety Data Sheets (MSDS) for the repellents, lotions, and cleansers discussed in this
 Procedure are not required because the repellents, lotion, and clothing are consumer products
 used in the manner intended for the general public. Although not required, a MSDS should be
 obtained for the products used and placed into the office MSDS library and site-specific health
 and safety plans. Selected MSDSs are available on the AECOM NA SH&E web site.


4.20 Personal Hygiene and Body Checks

- 4.20.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.
- 4.20.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.
- 4.20.3 **Employees** will shower as soon as practical after working in the field and examine their bodies for the presence of ticks, insect bites, rashes, or swollen areas. If imbedded ticks are found, they should be removed using the technique described in *S3NA-313-Wl2 Ticks*, the tick should be preserved with the date and location of the bite noted, and retained for identification if medical treatment is needed as described in Section 4.13.1 of this Procedure.
- 4.20.4 The presence of an imbedded tick, rash, or abnormal reactions will be reported as an SH&E Incident to the **Project Manager** or **Supervisor** who will forward the report to the **RSHEM** for follow up.

5.0 Records

5.1 None

6.0 References

- 6.1 Public Health Agency of Canada (http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php) on Ticks and Lyme Disease in Canada
- 6.2 Public Health Agency of Canada (http://www.phac-aspc.gc.ca/wn-no/index-eng.php) on West Nile Virus
- 6.3 United States Center for Disease Control (CDC) (http://www.cdc.gov/ncidod/dvbid/lyme/index.htm) on Lyme Disease
- 6.4 New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents. http://www.health.state.ny.us/nysdoh/westnile/pdf/2737.pdf
- 6.5 Spectrum Brands, 2007. Personal Insect Repellent Products. http://www.spectrumbrandshomeandgarden.com/CorpNav/AboutSpectrum/ProductCategories/insect _repellent.htm
- 6.6 U.S. Centers for Disease Control and Prevention, 2004. Tick Management Handbook. http://www.cdc.gov/ncidod/dvbid/lyme/resources/handbook.pdf
- 6.7 U.S. Environmental Protection Agency, 2006. Permethrin Facts: Preregistration Eligibility Decision Fact Sheet. http://www.epa.gov/oppsrrd1/reregistration/REDs/factsheets/permethrin_fs.htm
- 6.8 U.S. National Pesticide Information Center, 1997, National Pesticide Telecommunications Network Fact Sheet for Permethrin. http://npic.orst.edu/factsheets/permethrin.pdf
- 6.9 U.S. Environmental Protection Agency, 2005. New Pesticide Fact Sheet, Picaridin http://www.epa.gov/opprd001/factsheets/picaridin.pdf

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S3NA-313-FM Tick Test Request Form

Igx®	IGeneX, Inc. 795 San Anto Palo Alto, C. 800/832-320 www.igenex.c	onio Road A 94303 90 com		TICK TEST REQUEST FORM Revised: JUNE 2008
TO SEND A T Place tic Place con Fill out le Place for Send to I GeneX local Vec Once you For Mul	'ICK: ks (up to 20) in a sma ntainer in a sealed pla ower portion of this fo m, check and sealed p GeneX, Inc. and mar does not "TYPE" or tor Control Center. ur tick(s) have been p tiple Ticks: up to 20 (ll tube or plastic baggy with a astic bag. orm. olastic bag in padded envelope k front of envelope or box with determine the species of the tic processed, the tick can not be re- icks will be tested together at	small piece of moist cot or box. "TT". cks. If you want to "TY eturned to you. one time unless indicat	tton. PE" your tick, please contact your ed otherwise.
If ticks a	re tested separately,	the charge is per tick. Pleas	e test my ticks separate	ely. Yes
Please test	the tick by PCR	for:		
	Test 140	Lyme Disease (B. burg	dorferi)	\$65.00
	Test 689	Babesiosis (B microti a	nd/or B duncani)	\$65.00
	Test 148	Ehrlichiosis (Ehrlichia)		\$65.00
	Test 290	Bartonella henselae		\$65.00
	Test 975	Rickettsia		\$65.00
Name and A	ddress of Sen	der:	If you would lik indicate below. mailed by USPS	ce results faxed or called, please Otherwise, results will be S.
1			Please f	fax my completed results to:)
Phone: ()		Please ca (ll me with my results at:
	Check	enclosed payable to I	IGeneX, Inc.	
	Please	charge my credit car	d for the above	tests:
	Uis Vis	sa 🔲 Mastercard	Discover	
	Card	Number:		
	Exp. I	Date		
	Signat	ure		







* 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.

S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (US States) Revision 0 01 March 2011

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
	No Risk	Low Risk	No Risk
Idaho		March - November	
Illinois	March - November	March - November	March - November
Indiana	March - November	March - November	March - November
lowa	March - November	March - November	March - November
Kansas	Low Risk	March - November	March - November
Kentucky	March - November	March - November	March - November
Louisiana	Year Round	Year Round	Year round
Maine	March - November	March - November	March - November
Maryland	March - November		March - November
Massachusetts	March - November	March - November	March - November
Michigan	March - November	March - November	March - November
Minnesota	March - November	March - November	March - November
Mississioni	Year Round	Year Round	Year round
Missouri	March - November	March - November	March - November
IVII350UTT	Low Risk		No Pisk
Montana	March - July	March - July	
Nebraska	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
Pennsvlvania	March - November	March - November	March - November
Puerto Rico	???	Low Risk	Year round
	March - Novembor	March - November	March - Novembor
Rhode Island		March - November	
South Carolina	March - November	Low Risk March - November	March - November

State by State Guideline for Exposure

S3NA-313-WI1 Biological Hazard Assessment Decision Flow Chart Hazard Assessment (US States) Revision 0 01 March 2011



States	Tick-Borne	Mosquito-	Poisonous Plants
	Diseases	Borne Diseases	
South Dakota	Low Risk	March - November	March - November
	March - November		
Tennessee	March - November	March - November	March - November
Texas	Year Round	Year Round	Year round
	Low Risk		
Utah	Low Risk	Low Risk	No Risk
	March - July	March - July	
Vormont	March - November	Low Risk	March - November
vermont		March - November	
Virginia	Low Risk	March - November	March - November
virgina	March - November		
Washington	Low Risk	Low Risk	March - November
	March - November	March - November	
West Virginia	Low Risk	March - November	March - November
	March - November		
Wisconsin	March - November	March - November	March – November
Wyoming	No Risk	Low Risk	No Risk
vvyorning	March - July	March - July	

S3NA-313-WI2 Ticks

1.0 Background

- 1.1 The Public Health Agency of Canada (PHAC) works with the provinces, health authorities and other experts on research to define and monitor the occurrence of the ticks that carry *Borrelia burgdorferi*, the bacterium that causes Lyme disease. In Canada, the blacklegged tick (*Ixodes scapularis*; often referred to as a deer tick) and the western blacklegged tick (*Ixodes pacificus*) are the species known to transmit this disease-causing agent, as well as other less common agents.
- 1.2 In Quebec, blacklegged tick populations are becoming established in parts of the Monteregie and Estrie regions in the southeast of the province. In Ontario, populations can be found in Long Point; Point Pelee National Park; Rondeau Provincial Park; Turkey Point; Prince Edward Point National Wildlife Area and St. Lawrence Islands National Park in the Thousand Islands region of eastern Ontario. In Nova Scotia, blacklegged tick populations are found in the Lunenburg, Bedford and Shelburne areas. An established population has also been found in the southeastern corner of Manitoba. Western blacklegged ticks, on the other hand, are found in British Columbia; they are fairly widely distributed but populations are largest in the lower mainland, on Vancouver Island, and in the Fraser Valley.
- **1.3** Although the distribution of blacklegged ticks in Canada appears to be limited, surveillance indicates that some of the established populations are spreading within certain areas of southern Canada. The potential expansion of localized tick populations makes it difficult to precisely define the geographic limits of any given population; however, people living in or visiting areas adjacent to established tick populations may have a greater chance of contact with blacklegged ticks. Although current evidence does not suggest a widespread distribution of blacklegged tick populations in Canada, the establishment of new populations appears to be an ongoing process. Hence, it is desirable to continue surveillance and to take precautions to reduce tick contact.
- 1.4 The rate of infection of ticks with the bacterium that causes Lyme disease varies. Infection rates are typically higher in adult ticks compared to the other stages (nymphs and larvae). Despite the lower rates of infection, people are most likely to acquire Lyme disease from a nymph because this stage is so small (see Figure 2) and thus more likely to go unnoticed and feed for a sufficient amount of time for the Lyme disease bacterium to be transmitted (24-36 hours). Infection rates are often greater in tick populations that have been established for long periods of time (such as Long Point) compared to newly established ones. As many as 60 percent of the adult ticks at Long Point are infected; however, infection rates in adults are more often between 10 and 25 percent at the other localities where ticks are established. Partly because of differences in the types of hosts that they feed upon, infection rates of the Lyme disease agent in *Ixodes pacificus* are much lower (1-3 percent) than *Ixodes scapularis*.
- **1.5** While there is a higher risk of coming in contact with infected blacklegged ticks in areas where populations are established, there is also a low risk of Lyme disease being contracted almost anywhere in Canada because migratory birds transport infected ticks over large geographic distances. Surveillance data indicates that about 12 percent of the ticks detected outside of areas where tick populations are established, and likely transported there on migratory birds, are infected with the agent of Lyme disease.
- 1.6 Source: http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php



Figure 1





Lyme disease patients are most likely to have illness onset in June, July, or August and less likely to have illness onset from December through March.

Lyme disease likelihood = April through November http://www.cdc.gov/ncidod/dvbid/lyme/ld_rptmthofill.htm

2.0 Tick removal tips from CDC

http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm

3.0 To Remove Attached Ticks





- 3.1 Use fine-tipped tweezers or notched tick extractor, and protect your fingers with a tissue, paper towel, or latex gloves (see figure). Persons should avoid removing ticks with bare hands.
- 3.2 Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your health care provider if illness occurs.)
- 3.3 After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- 3.4 Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms. Skin accidentally exposed to tick fluids can be disinfected with iodine scrub, rubbing alcohol, or water containing detergents.
- 3.5 Save the tick for identification in case you become ill. This may help your doctor make an accurate diagnosis of potential diseases by determining what type of tick it is. Place the tick in a sealable plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.



4.0 Devices Designed for Removing Ticks

4.1 <u>The Tick Tool - http://www.ticktool.com/index.html</u>

5.0 Folklore Remedies Don't Work

5.1 Folklore remedies, such as the use of petroleum jelly or hot matches, do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva or regurgitate gut contents, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided.



Information Regarding Common Tick-Borne Diseases and Tick Removal Procedures

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

 Table 1

 Common Tick-Borne Diseases in the U.S. and Information Resources

6.0 Distribution

Figure 2 Distribution Map for Lyme Disease Risk, U.S.



Note: This map demonstrates an approximate distribution of predicted Lyme disease risk in the United States. The true relative risk in any given county compared with other counties might differ from that shown here and might change from year to year. Risk categories are defined in the accompanying text. Information on risk distribution within states and counties is best obtained from state and local public health authorities.

Source: CDC, http://www.cdc.gov/ncidod/dvbid/lyme/riskmap.htm





Source: CDC, http://www.cdc.gov/ncidod/dvrd/ehrlichia/Q&A/Q&A.htm



Data for calendar year 2002

Source: CDC, http://www.cdc.gov/ncidod/dvrd/rmsf/Epidemiology.htm

AECOM

S3NA-313-WI3 Poisonous Spider Identification

Black Widow Spider

- Abdomen usually shows hourglass marking.
- The female is 3-4 centimeters in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

- Central and South U.S., although in some other areas, as well.
- ¹/₄-to-¹/₂-inch-long body and the size of silver dollar.
- Hides in decaying wood, baseboards, ceilings, cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.







Exercise care when collecting samples and avoid reaching into areas where visibility is limited. If bitten by a spider, attempt to identify the spider, notify a co-worker or someone who can help should the bite site become painful, discolored, or swollen. Stay calm and treat the area with ice or cold water. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or any swelling or numbness beyond the site of the bite.

Additional USA Spider Identification charts are available at http://www.termite.com/spider-identification.html



S3NA-313-WI4 Mosquito-Borne Diseases

1.0 Background

- 1.1 CDC data indicates that mosquito-borne illnesses, including encephalitis, are a health risk to employees working in outdoor environments.
- 1.2 Mosquitoes pose a risk of causing infection with various forms of encephalitis and other diseases in AECOM employees. This section will focus on the transmission of encephalitis. West Nile encephalitis is an infection of the brain that is caused by a virus known as the West Nile virus.
- 1.3 If other mosquito-borne diseases are identified in the project area, the local Public Health Department and CDC should be consulted to determine what diseases are present and exposure prevention recommendation.
- 1.4 According to the CDC, arboviral encephalitis is a virus that is "maintained in nature through biological transmission between susceptible vertebrate hosts by blood feeding arthropods", e.g., mosquitoes. It exists in various forms in global distribution, and in four primary forms in the U.S.: 1) eastern equine encephalitis (EEE), 2) western equine encephalitis (WEE), 3) St. Louis encephalitis (SLE), and 4) La Crosse (LAC) encephalitis; all of which are transmitted by mosquitoes.
- 1.5 Mosquitoes are known to breed in standing water; therefore, when standing water is found at a job site, actions should be taken to drain the water. Typically, mosquitoes will fly only a quarter of a mile (400 meters) from their breeding location.

2.0 Distribution



Figure 1
Distribution Map for EEE Cases

Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/EEE_Map.jpg







Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/WEE_Map.jpg

Figure 3 Distribution Map for SLE Cases



Source: http://www.cdc.gov/ncidod/dvbid/arbor/images/SLE_Map.jpg





Figure 4 Distribution Map for LAC Cases

*The majority of reported California serogroup cases are La Crosse virus (LAC).

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.

AECOM



S3NA-313-WI5 Plants of Concern

1.0 Background

- 1.1 Poison ivy, oak and sumac (poisonous plants) pose a significant threat to AECOM employees due to the dermatitis that results from exposure to the oil on these plants, called urushiol.
- 1.2 Exposure to urushiol produces a rash that can be irritating and cause the exposed employee to scratch the infected area, increasing susceptibility for an infection to result from the rash.
- 1.3 It should be noted that each time an employee is exposed to urushiol, it increases the severity of the reaction they will have in subsequent exposures.

2.0 Treatment

- 2.1 In cases that involve severe rashes, medical treatment may be necessary to control the rash.
- 2.2 Employees that develop a rash as a result of exposure to poison ivy, oak or sumac should report the exposure immediately to their Supervisor, Project Manager and RSHEM.



Figure 1 Distribution Map for Poison Ivy





Figure 2 Distribution Map for Poison Oak

Figure 3 Distribution Map for Poison Sumac



Source for Figures 1, 2, and 3: http://www.tecnuextreme.com/plant-map.htm



S3NA-313-WI6 Wild Parsnip Identification

1.0 Background

- 1.1 Wild Parsnip (also known as Poison Parsnip) looks similar to a large carrot plant and is found in open places along roadsides and in waste places throughout the United States and Canada.
- 1.2 This plant produces a compound that causes severe blistering and discoloration after being exposed to sunlight—a condition known as photodermatitis. That is, when the skin comes in contact with this plant's juice and then is exposed to UV light, a severe burn develops.

2.0 Hazard

- 2.1 Everyone can get burned by wild parsnip. Unlike poison ivy, you don't need to be sensitized by a prior exposure. However, wild parsnip is only dangerous when the juice from broken leaves or stems gets on your skin—therefore, you can touch and brush against the undamaged plant without any danger.
- 2.2 If one gets some of the sap of Hogweed (or Meadow Parsnip or Cow Parsnip) in contact with skin, it is critical that they stay out of the sun for 8 hours. If one needs to remove the plant they should be completely covered with overalls, gloves, hat and safety glasses.

More information can be found at www.co.becker.mn.us/dept/soil_water/wild_parsnip.aspx





S3NA-313-WI7 Configuration Clothing for Protection Against Ticks and Insects

1.0 Configuration of Clothing

1.1 Loose-cuff trousers must be tucked into socks, wrapped with duct tape (or equivalent) completely around the cuff of the sock up on to the surface of the pant leg to prevent entry of insects between the sock and pants, and preferably reverse-wrapped with "sticky" side out (see figure below).





S3NA-313-WI8 Insect Repellent Active Ingredient Product Information

1.0 Application of Insect Repellent

- 1.1 Immediately prior to the commencement of work in the field, an AECOM-approved insect repellent shall be applied to exposed skin, and to the outer surface of pant leg cuffs tucked into socks, shirt tails tucked into pants at the waist, and shirt cuffs.
- 1.2 Table 1 provides a list of AECOM-approved insect repellent active ingredients; employees may utilize any brand containing the minimum concentration of active ingredients as listed.
- 1.3 All products are registered with the EPA and recommended by the CDC.
- 1.4 Employees should select the AECOM approved repellent which is best for them based on skin sensitivity/allergies, and personal preference, but be aware that reapplication frequency will be greater for Picaridin and lemon eucalyptus products.
- 1.5 Employees shall carefully read and comply with manufacturer recommendations and instructions on product labels prior to application. Repellent shall not be applied beneath clothing to minimize the potential for irritation and/or allergic reaction.
- 1.6 The chemical N,N-diethyl-*m*-toluamide (DEET) shall not be applied to Nomex[™] fire retardant clothing as it reduces the effectiveness of the fabric.

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

	Table 1
Approved	Insect Repellents

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.



Insect Repellent Active Ingredient Product Information

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

Permethrin





DEET



Lemon Eucalyptus





S3NA-313-WI9 New York Department of Health Recommendations for Permethrin Application

1.0 Application Recommendations

- 1.1 Source: New York State Department of Health, 2007. Health Advisory, Tick and Insect Repellents. http://www.health.state.ny.us/nysdoh/westnile/pdf/2737.pdf
- 1.2 Products containing permethrin are for use on clothing only—not on skin. Permethrin kills ticks and insects that come in contact with treated clothes. It is effective for two weeks or more if the clothing is not laundered.

2.0 Treat Clothing Only– DO NOT APPLY TO SKIN.

- 2.1 Read carefully and follow manufacturer's recommendations for application.
- 2.2 If you accidentally get the product on your skin, immediately wash with soap and water.
- 2.3 Apply to clothing in a well-ventilated outdoor area, protected from wind.
- 2.4 Only spray Permethrin products on the outer surface of clothing and shoes before you put them on do not apply to clothing while it is being worn. Only spray enough product to lightly moisten the outer surface of the fabric causing a slight color change or darkening; do not saturate clothing. Do not exceed recommended spraying times. Pay special attention while treating socks, trouser cuffs and shirt cuffs to ensure proper coverage. Hang the treated clothing outdoors and allow clothing to dry for at least two hours (four hours under humid conditions) before wearing.
- 2.5 Do not treat clothing more than once every two weeks. Launder treated clothing separately from other clothing at least once before retreating.
- 2.6 Keep treated clothes in a separate bag. Those who frequent tick or mosquito habitats should consider having a set of clothes, preferably long-sleeved shirt, pants and socks that are used only in such settings. These clothes can be treated with a Permethrin-containing product according to the label directions, worn only when needed, and then placed in a separate bag when not in use. In hot weather, when long-sleeved shirt and pants may be uncomfortable, pants and jackets made of insect netting (either untreated or treated with repellent) can be worn. Such clothes are available in some sporting good stores and through outdoor equipment catalogs.
 - 1. U. S. Environmental Protection Agency. 1999. Office of Pesticide Programs List of Chemicals Evaluated for Carcinogenic Potential-August 25, 1999. Office of Pesticide Programs. Washington, DC.



S3NA-313-WI10 Bird Droppings Safe Work Practices

1.0 Background

- 1.1 According to the National Institute for Occupational Safety and Health (NIOSH), histoplasmosis is an infectious disease caused by inhaling spores of a fungus called *Histoplasma capsulatum* (abbreviated *H. capsulatum*) that may inhabit accumulated masses of pigeon droppings and excrement of other birds and flying animals. Its symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. This form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated. The acute respiratory disease form of histoplasmosis is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or non-productive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years. If symptoms occur, they may start within 3 to 17 days of exposure, with an average of 10 days. On a positive note, histoplasmosis is not contagious.
- 1.2 Psittacosis, although primarily a respiratory disease, can cause a wide variety of clinical manifestations. Generally, about 10 days after infection occurs, the clinical illness begins abruptly with fever, chills, weakness, fatigue, muscle pain, anorexia, nausea, vomiting, excessive sweating and difficulty with breathing, headache, backache, and sensitivity to light.
- 1.3 Hypersensitivity pneumonitis is also known as pigeon breeder's disease.

2.0 Symptoms

2.1 The acute form of hypersensitivity pneumonitis is clinically characterized by chills, fever, cough, breathlessness without wheezing, and malaise 4-10 hours after exposure. In general, an acute attack subsides after 18 to 24 hours.

3.0 Treatment

3.1 If a person should develop any of the symptoms as noted above, or others, it is important to see a physician and inform him of an exposure to pigeon/bird or bat excrement. A failure to diagnose the preceding conditions could occur if a treating physician is unaware of a patient's exposure to pigeon/bird or bat excrement.

4.0 Prevention

- 4.1 Prior to work in any area where pigeons or other flying animals may nest, a written statement from the client shall be obtained in regards to the potential for, and extent of, accumulation of excrement on/in the structure from pigeons and other winged animals.
- 4.2 The client shall be asked to provide appropriate details as to the basis for their statement (e.g., date of last visual survey for pigeon/bird or bat excrement accumulation, date of last excrement removal effort, etc.).
- 4.3 In no case will an AECOM employee or contract employee be permitted to commence structure inspection procedures without project management having received and evaluated the aforementioned written statement from the client.
- 4.4 According to NIOSH, the best way to prevent exposure to *H. capsulatum* spores during survey and inspection work is to avoid situations where excrement and other potentially-contaminated material can become airborne and inhaled. Therefore, it is preferable that the efforts to determine if, and to what extent, there is an accumulation of pigeon/bird or bat excrement on/in structures, <u>or</u> the efforts to clean-up/removal/disposal of such contaminated material, be left to the client or subcontracted out.

5.0 Safe Work Practices

5.1 In those cases where AECOM employees or contract employees are contracted by the client to determine the extent of accumulation of animal excrement in/on structures, the following minimum safety and health precautions shall be taken. (NOTE: precautionary measures are based on



recommendations and best practices prescribed in the NIOSH 2004 public document titled *Histoplasmosis – Protecting Workers at Risk*).

- 5.2 All workers shall wear disposable protective clothing (Tyvek® coveralls). Disposable overalls with hoods shall be donned when working in areas where *H. capsulatum* spore-contaminated material is likely to fall from overhead.
- 5.3 All workers shall wear disposable shoe coverings fitted with ridged soles made of slip-resistant material to reduce the likelihood of slipping on wet or dusty surfaces. Gloves shall be worn.
- 5.4 All workers shall wear a full facepiece air purifying respirator fitted with P100 (HEPA) cartridges. If entering an enclosed area in which the extent of excrement contamination is unknown, additional protective measures shall be taken such that workers shall wear a <u>powered</u> air-purifying respirator (APR) with full facepiece fitted with P100 (HEPA) cartridges. Any variance from these requirements must be approved by the Regional SH&E Manager. Workers donning APRs shall be medically screened, cleared, and trained in their proper use in accordance with AECOM safety program standards.
- 5.5 If contaminated material must be disturbed for purposes of removal/disposal or during the structure inspect process, it shall be wetted down prior to all work and will be rewetted as necessary to minimize airborne dusting.
- 5.6 After working in *H. capsulatum* spore-contaminated areas and before removing any respiratory protective equipment, workers shall remove all protective clothing and shoe coverings and seal them in a heavy-duty plastic bag for disposal.
- 5.7 Workers shall observe a high degree of personal hygiene, even if the exposure is casual. Special care shall be taken to wash hands, face, and other areas of exposed skin thoroughly before eating, drinking or smoking.



S3NA-313-WI11 Large Carnivores

1.0 Hazard

- 1.1 Most wild carnivores in the feline family (cougars, lynx, and bobcat) or the canine family (wolves and coyotes) are more predictable than bears and are not predatory towards humans; however, all wild animals can be dangerous if they feel threatened or if they are sick or starving.
- 1.2 Most ungulates (deer, moose, elk, and caribou) will avoid humans and will flee as soon as a human is sighted; however, females with young (during May and June) and males during the mating season (September to November) can be very aggressive, especially if provoked.

2.0 Personal Protective Equipment

- 2.1 Noise makers such as bear bangers, whistles and bells can be used as deterrents for an approaching animal.
- 2.2 Pepper (bear) spray can be used to ward off an imminent attack.

3.0 Safe Work Practice

- 3.1 Most negative encounters with ungulates or carnivores can be avoided with a few key preventative measures:
- 3.1.1 When working in wilderness isolation, always travel in pairs and make lots of noise.
- 3.1.2 Always store food in air-tight containers away from sleeping areas (if camping) and never carry strong smelling foods which could attract animals.
- 3.1.3 Keep your eyes open for fresh animal signs which may indicate a dangerous situation:
 - Extensive fresh rubbing on branches in the fall might indicate the presence of a rutting male ungulate that may become aggressive to defend a potential mate.
 - A fresh kill or carcass which might indicate the presence of a carnivore that may become aggressive to defend its food.
- 3.2 Maintaining a distance of at least 30 metres (100 feet) allows large animals an escape route. If you notice any signs of aggression or behavioral changes, you should move away to a safe location. Wildlife should not be enticed by reaching out or simulating calls.
- 3.3 Pets should be kept secure and away from wildlife as their actions can provoke an attack. Moose, deer and other wildlife may appear quite docile; however, if a dog makes them feel threatened, their behavior can become unpredictable.
- 3.4 If you are approached by a carnivore (wolf, coyote, or cougar):
- 3.4.1 Pick up small children immediately.
- 3.4.2 Try to appear bigger, hold your arms or an object over your head.
- 3.4.3 Face the animal and retreat slowly. Do not run or play dead.
- 3.4.4 Maintain steady eye contact with the animal.
- 3.4.5 If the animal continues to approach, deter an attack by yelling, waving a stick or throwing rocks.
- 3.4.6 If you are attacked, fight back. Hit the animal with a heavy stick or rock.
- 3.5 If you are approached by an ungulate (moose, elk, deer, bison or caribou):
- 3.5.1 An angry moose, elk or deer will face you with its head and ears lowered.
- 3.5.2 Back away slowly.
- 3.5.3 Look for something to get behind like a tree or a car. You can go faster around an obstacle than the ungulate can.



- 3.5.4 An ungulate is more likely to bluff charge but if it continues the charge and you are attacked in the open, curl up in a ball on the ground. Always protect your head with your arms and lie still.
- 3.5.5 Stay still after the attack until the ungulate moves away.



S3NA-313-WI12 Bear Safety

1.0 Hazard

- 1.1 An encounter with a bear of any species can have a wide variety of outcomes, ranging from a simple sighting, to a false charge, to a serious mauling or even death. Consequently, the risk of a bear encounter must be taken very seriously.
- 1.2 The hazard or risk associated with a bear encounter varies significantly depending on the location. It is important to research the project area before field work commences to determine the expected probability of encountering a bear. Remoteness from urbanized areas should not be a criterion, as bears have been encountered within city limits, especially near landfills.
- 1.3 The risk associated with a bear encounter also varies with the species of bear, the season, and the circumstances under which the bear is encountered.
- 1.4 Preparing staff for any type of encounter is key to managing the risk.

2.0 Personal Protective Equipment

2.1 The best deterrent of a "bad bear encounter" is knowledge: a good understanding of the ecology and the behavior of the bears that will likely be encountered.

2.2 Bear Spray and Bear Bangers

- 2.2.1 Staff must have hands-on training for the safe use of bear spray (a pre-season practice run is a good use of expired bear spray).
- 2.2.2 Prior to work commencing, staff must ensure that the bear spray they are carrying is still valid and not past its expiration date.
- 2.2.3 During travel, bear spray must be sealed in an airtight container or bag and must not travel in the cab of a vehicle, aircraft, or helicopter.

2.3 Firearms

- 2.3.1 Environments and conditions which pose a high risk of bear encounters, may warrant the use of an armed wildlife monitor. Project managers, in consultation with appropriate project staff and SH&E Management, are responsible for determining the level of risk for their projects and whether or not such measures are required.
- 2.3.2 A person hired as an armed bear monitor must be properly trained in wildlife monitoring as well as certified in the expert usage of firearms.
- 2.3.3 The usage of an armed bear monitor is intended only as an additional precautionary measure to be used in specific environments to ensure the protection of field staff; staff should still be equipped and trained appropriately for the risk.

3.0 Restrictions

- 3.1 Staff must not work alone in areas where there is a medium or high risk of a bear encounter.
- 3.2 Generally, AECOM personnel shall not carry a firearm and attempt to function as a wildlife monitor and/or perform their professional duties. This can only be over-ridden with expressed permission of Regional Management.

4.0 Training

- 4.1 In-house Bear Awareness training must be undertaken by all field staff who work in bear country every three years at a minimum, or more often as required.
- 4.2 The Bear Awareness training involves testing and improving the employee's knowledge about bear encounters, watching videos regarding bear awareness and behavior, and participating in group discussions about how to avoid and how to respond to bear encounters.
- 4.3 Specific considerations are given to black bear, grizzly bear, and polar bear encounters.



5.0 Safe Work Practice

5.1 Staff must be aware of wildlife signs and avoid wildlife encounters.

5.2 Bear Sign

- 5.2.1 **Fresh tracks**: It is often better to see the bear's tracks than to see the actual bear. If you can tell the direction that the bear is travelling in, it is prudent to change your course of direction. Bears will travel down the same pathways as people or other large animals use. If you have a clear track you can determine which type of bear has passed through the area. If you see more than one track, you can tell that it is possibly a female with cubs. Avoid females with cubs!
- 5.2.2 **Scat:** Bear scat will look different depending upon the bear's diet. Close examination of bear scat can sometimes give you an indication of what the bears have been eating at that time of year. If the scat contains remnants of human garbage, there is a human food conditioned bear in the area. These bears associate people with food and can be the most dangerous type of bear to encounter.
- 5.2.3 Animal carcasses: IF YOU COME ACROSS A CARCASS, LEAVE THE AREA IMMEDIATELY. Grizzly bears will often cover their kills for a few days and let it rot, then come back and eat it. THE BEAR WILL STAY CLOSE BY. Grizzly bears will defend their kill and this is a situation that could prompt a defensive attack by a bear.
- 5.2.4 **Torn-Up Logs and Stumps**: Bears will forage for insects in dead logs and rotting trees. You will often see torn up logs and stumps, evidence of their foraging.
- 5.2.5 **Evidence of Digging**: Holes dug into the ground are often made by grizzly bears digging for roots or ground squirrels. In particular Grizzlies will dig for food in the early spring soon after they leave their dens.
- 5.2.6 **Claw Marks on Trees**: Claw marks can be left on trees by black bears when they have climbed up a tree. Grizzly bears will also leave claw marks on trees and on the ground. Bears will often chew a small tree or a sign-post, so watch for signs of chew marks along the trail.
- 5.2.7 **Hair on Trees**: Bears will rub against trees, usually trees with rough bark, to scratch themselves. You can find evidence of bears by the hair left in the tree's bark. The higher the hair left on the tree, the bigger the bear. Remember that the bear will often stand on its back legs to scratch its back on the tree.
- 5.2.8 **Daybeds:** Bears will be most active in the early morning and in the evening. It would be prudent for field staff to restrict their field activities during the bear's most active foraging times as much as possible. During the heat of the day, bears will rest in daybeds. These can be shallow depressions of piled up leaves in the forest, trampled vegetation, a shallow scrape or a hole. Daybeds are usually located in cool places. Bears will make daybeds along streams and rivers. Daybeds are often associated with feeding places and therefore should be avoided.

5.3 **Prevention**

- 5.3.1 Your best defense against bears is to actively practice bear avoidance techniques when working in the field. You can prevent chance encounters by taking the following precautions:
 - Know the areas and habitats bears use at different times of the year, and attempt to avoid such areas or be extremely cautious if you have to travel through them.
 - Contact the local Fish & Wildlife Office to get current information on the bears in the area. Ask
 what other camps are in the area and if they are following good bear avoidance practices. (i.e., do
 they keep a clean camp?) If there are nearby human food sources available, e.g., an open
 dumpsite, the local bears may not be afraid to approach your camp.
 - Always be aware of your surroundings. Stay alert. Watch for signs of bears along your route.
 - Use binoculars to look around for bears when you are in open terrain.
 - Never approach a bear if you see one feeding in the distance.
 - Note the behavior of other wildlife in the area. Flocks of ravens can alert you to a possible animal carcass, and perhaps a bear. The area should be avoided. Bird or squirrel alarm calls might be telling you that a bear is near.
 - Whenever possible, travel in daylight and try to avoid areas with restricted visibility. (dense brush)



- Make lots of noise, especially when travelling in dense vegetation. Sing, shout, or talk loudly. You can carry portable air horns or cans of rocks. (Please note that bear bells are not effective they do not make enough noise to warn a bear that you are approaching. You need to be loud so the bear can hear you coming!) Remember that the noise you make can be masked by loud natural sounds such as the wind or water. Therefore it is possible that the noise you make every attempt not to surprise a bear. In areas of loud natural noise, be louder!
- Stay together and travel in groups. Bears are less likely to attack groups of people. When travelling in groups, stay close together. Being in a group doesn't help if the individuals have spread apart along the trail!
- Pets should not accompany you when you are travelling in bear country. If you must take your pet, keep the animal on a short leash at all times. Unleashed dogs will harass bears and once scared, run back to their owner with an angry bear in pursuit.
- Do not wear perfumes or cosmetic products when you are travelling in bear country. Do not mask your human scent.
- Women should use internal sanitary protection, (i.e. tampons) when menstruating and burn all used sanitary products after usage. Keep all used sanitary supplies in sealed bags until you have a chance to burn.
- Children should be kept very close by in bear country.
- Carry bear deterrents and know their limitations. Be familiar with how to use the deterrents, how to transport the deterrent safely and under what conditions it is most effective. Carry the deterrent in a belt, out in front and ready to grab at a moment's notice, never in your backpack.

5.4 Field Workers: Precautions in Bear Country

- 5.4.1 Field workers should take extra precautions when working in bear country.
- 5.4.2 Make every effort to go out into the field with another person; you should not be working alone in the field. One person can act as a lookout for the other. Keep watch for bear signs.
- 5.4.3 Never approach a bear.
- 5.4.4 Report where you are going and when you will return every time you leave camp. Have a plan of action if someone does not report back to camp at a specified time.
- 5.4.5 Bears do get used to a camp's schedule and you will have fewer surprise encounters if everyone in the camp comes and goes at the same time every day.
- 5.4.6 Take a two-way radio with you when you go out into the field.
- 5.4.7 Always carry bear deterrents with you in the field and understand each deterrent's limitations. Carry your deterrents on a belt, out in front and ready to use instantly. Do not carry your deterrents in your backpack.
- 5.4.8 Keep any food that you take with you sealed in odor-proof/bear proof containers. Make every attempt to take odorless food with you, not something with a heavy scent.
- 5.4.9 Pack out any garbage in odor-proof containers and burn once you return to camp.
- 5.4.10 The noise of an ATV or skidoo can scare off a bear. Starting the machine and revving it up can scare off a curious bear. DO NOT CHASE A BEAR WITH AN ATV OR SKIDOO. You may need to drive the ATV around in circles to scare off the bear, but do not chase the bear.
- 5.4.11 Take extra precautions when travelling along lakes or stream beds; bears use streams and river beds as travel routes. Be sure to carry noise makers.
- 5.4.12 Limit your workday so you are not out in the early morning or evening when bears are most likely to be foraging.
- 5.4.13 All Field Workers should be proficient in First Aid. Do not go out into the field without first aid training.
- 5.4.14 All Field Camps should have a First Aid Kit.
- 5.4.15 All Field Camps should have means of communication with local ambulance or Air-ambulance personnel.
- 5.4.16 A person's best defense against bears is to avoid them. If this is not possible, then being heard, smelled, or seen may lessen your chances of surprising a bear and/or provoking an attack.



- 5.4.17 All wildlife should be respected, avoided, and not harassed at any time.
- 5.4.18 Cooking in remote areas should be avoided. Any food should be stored in airtight containers and all garbage should be managed appropriately: "pack it in, pack it out".
- 5.4.19 A bear in camp or within human structures is not a chance encounter. If this bear challenges you, you must fight, scream, and do whatever is necessary to live, no matter what species the bear is!
- 5.4.20 In general, there are two types of bear encounters: Defensive and Non-defensive for grizzly bears and black bears. Your response will vary based on your assessment of the situation (your training will help you in identifying these situations and the appropriate response).

6.0 Encounters

6.1 General Recommendations When Encountering a Bear

- 6.1.1 Consider your surroundings and assess the situation before you act.
- 6.1.2 Remain calm. Do not turn your back to a bear.
- 6.1.3 DO NOT RUN You will trigger the bear's natural response to chase you. Bears are extremely fast and you cannot outrun a bear. (They are as fast as an Olympic sprinter, so if you are not faster than an Olympic sprinter, don't run! They can run 40 km/hr and you can't!) You cannot outswim a bear either.

6.2 Bear Encounters in the Field

- 6.2.1 Your response will depend upon the type of encounter.
- 6.2.2 There are several different encounters listed.
- 6.2.3 Bears are more predictable than once believed and you can determine your best course of action in a confrontation by understanding the bear's characteristics and motivation. There are two pieces of information you should be aware of in any bear encounter:
 - The type of bear you are dealing with; and
 - The reason for the encounter.
- 6.2.4 Some people believe that when you stand your ground against a predatory black bear attack, the bear will feel threatened and leave. This has been effective in some cases. HOWEVER, it is not effective against a grizzly bear predatory attack and it is very difficult to know when it will be effective against black bears. Polar bears do not follow the same behavioral patterns as grizzly and black bears, they are almost always aggressive and will not back down. Special considerations must be given to projects where polar bear encounters are anticipated.

6.3 If you can leave undetected:

- 6.3.1 Leave the area quietly in the same direction that you came from.
- 6.3.2 Move while the bear's head is down. Stop moving when the bear lifts its head to check its surroundings.
- 6.3.3 Stay downwind so the bear will not pick up your scent.
- 6.3.4 When you have moved a safe distance away, you can either watch and wait until the bear leaves or make a wide detour around the bear.
- 6.3.5 If the bear is unaware of you and approaching: Allow the bear the right of way.

6.4 If you cannot leave undetected:

- 6.4.1 Let the bear know that you are present by smell first; therefore move upwind so they can pick up your scent.
- 6.4.2 If it is possible, try to keep the bear in your sight. Watch to see if the bear leaves when it smells that a person is nearby.
- 6.4.3 Attempt to move out of the way without being noticed by the bear. If you cannot do this, talk loudly to let the bear know where you are.



6.5 If the bear is aware of you but in the distance:

- 6.5.1 Remain calm.
- 6.5.2 Continue walking slowly in the same general direction, but head away from the bear.
- 6.5.3 DO NOT RUN. The bear can quickly outrun you if it is so inclined.
- 6.5.4 If the bear begins to follow you, drop your pack or some article, (not food) to distract the bear. This may distract the bear long enough for you to escape. If you drop food for the bear you will help the bear associate food with humans and teach it that aggressive behaviour will be rewarded with food.
- 6.5.5 If it is a grizzly following you, climb a tree if there is a large tree around. Although grizzlies can climb trees, they are often not motivated enough to try. Very large grizzlies are not able to climb trees well. If grizzlies climb, they can go 3 to 4 meters. Grizzlies will try and push trees over so do not climb a small tree.

6.6 If the bear is aware of you and close:

- 6.6.1 A bear will feel threatened in a close confrontation. The bear's natural tendency will be to reduce or to remove the threat. Assist the bear by acting as non-threatening as possible.
- 6.6.2 Do not make direct eye contact with the bear.
- 6.6.3 Do not make any sudden moves.
- 6.6.4 Do not run!
- 6.6.5 The bear needs to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- 6.6.6 Attempt to give the bear an opportunity to leave. Be sure the bear has an open escape route. Do not corner a wild animal.
- 6.6.7 Try to back away slowly and/or climb a tree if appropriate.
- 6.6.8 Attempt to deter the bear if you are in a safe position.

6.7 If the bear is close and threatening:

- 6.7.1 If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the bear is. Try to scare the bear off.
- 6.7.2 If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- 6.7.3 Talk to the bear in a calm authoritative tone of voice.
- 6.7.4 Do not startle or provoke the bear by making sudden moves.
- 6.7.5 Never imitate the bear's aggressive sounds, signals or posture. The bear is attempting to establish dominance and imitating its moves is a challenge to its dominance.
- 6.7.6 Back slowly away from the bear and drop a pack or some other article in order to distract the bear momentarily.
- 6.7.7 Remember that the bear may be defending cubs that you have not yet seen or they have a food cache nearby. Attempt to look as non-threatening as possible.

6.8 If the bear is very close and approaching:

- 6.8.1 A distance of less than 50 meters in an open area and closer in a forested area.
- 6.8.2 If the bear continues to approach, use your deterrent.
- 6.8.3 If the bear does not respond to the deterrent you must now STAND YOUR GROUND!
- 6.8.4 If the bear continues to approach and is acting aggressive, YOU MAY HAVE TO SHOOT if you are carrying a firearm.

6.9 If the Bear Charges!

- 6.9.1 A bear will charge you at high speed down on all four legs and often crouched low to the ground.
- 6.9.2 Bears do not charge when standing up on its hind legs.



- 6.9.3 Many charges are bluffs and the bear will often stop or veer off just at the last minute. It is difficult to know if the bear is bluff charging or not until it gets very close.
- 6.9.4 When faced with a charging bear you have two options:
 - Use your bear deterrent; or
 - Roll into a ball and cover your neck and head with your arms if you are unarmed and have no other choice.

6.10 Playing Dead:

- 6.10.1 Note: Playing dead is a very controversial topic among seasoned field personnel. Some will tell you to never play dead in any situation, others will swear that it is the only thing you should do. Playing dead is a personal choice that you will have to make.
- 6.10.2 If you play dead it is possible that you can prevent serious injuries if a chance encounter with a bear results in an attack. Playing dead may reduce the threat that you represent to the bear.
- 6.10.3 If you decide to play dead, it is important to protect your vital areas. The older information that is still found online states that the person should roll into a ball to protect their vital organs. This has been replaced and you are now advised to lie in the prone position. Lie flat on your stomach and lace your fingers behind your neck (to protect it), Spread your legs apart to provide stability if the bear tries to turn you over. Stay in this position. If the bear manages to roll you over, immediately roll back onto your stomach to protect your face, neck and vital areas. Do not try to resist or struggle as this will intensify or prolong the attack. Once the attack is over, DO NOT MOVE until the bear has left the area. Look around and be very sure that the bear is gone before moving. (If the bear is a female with cubs, she will leave and move her cubs to safety.) If the bear covers you with leaves and vegetation, it probably thinks you are dead. Grizzly's will often cover their prey with vegetation and leave the carcass to ripen for a few days.
- 6.10.4 It is important to note that if the bear attack is prolonged or if the bear begins to eat you, the attack has changed from what you may have first believed to be a defensive attack, to a predatory attack. Fight back in a predatory attack. Concentrate your efforts on the face, eyes and nose of the bear.

AECOM

S3NA-313-WI13 Small Mammals

1.0 Hazard

- 1.1 Working in the field either directly or indirectly with small mammals has inherent risks of injury or exposure to zoonotic diseases (infectious diseases that can be transmitted from animals to humans) that all field staff need to protect themselves against.
- 1.2 The risks are usually higher when there is direct contact with a wild animal, either through a break in the skin (blood), saliva, or excrement; however, there are also risks through air-borne diseases (e.g., Hantavirus).
- 1.3 Obviously, wildlife biologists directly handling wildlife, dead or alive, or working with wildlife feces or in enclosed habitats (such as caves), have an increased risk of exposure to a wider range of zoonotic diseases and should take extra precautions.

2.0 Personal Protective Equipment

- 2.1 Full-length clothing (long sleeves and pants).
- 2.2 Insect repellent.
- 2.3 Respiratory equipment (when directly handling wildlife).
- 2.4 Gloves (when directly handling wildlife).

3.0 Restrictions

3.1 Wildlife handling must only be completed under direct supervision of an experienced individual.

4.0 Training

4.1 Any staff that will be handling wildlife must be adequately trained and/or supervised by a wildlife biologist experienced in the job task.

5.0 Safe Work Practice

- 5.1 Wild animals can carry a variety of diseases that humans can contract: viral, parasitic, bacterial, and protozoal. Basic PPE such as full-length clothing, gloves and a respiratory mask will greatly reduce the risk of exposure.
- 5.2 Whenever a wild animal must be handled, the procedure must be accomplished as safely and quickly as possible.
- 5.3 Proper techniques must be employed to avoid or minimize the risk of personal injury while, at the same time, avoiding or minimizing injury to the animal.
- 5.4 Gloves, catch sticks, caging, and other appropriate equipment may be necessary when handling a wild animal. Most of these animals will be extremely stressed, resisting every restraint attempt.
- 5.5 In the unfortunate circumstance that a person is bitten or scratched, he or she should cleanse the wound thoroughly with soap and flush with water immediately, providing for a mechanical removal of potentially infective organisms. This should be followed by cleansing under medical supervision and consultation with a physician to consider the potential exposure to the rabies virus.

6.0 Rabies

6.1 You will not be able to accurately determine if an animal has rabies simply by observation as traditional symptoms of rabies (foaming at the mouth, biting, etc.) do not occur in all animals nor at all stages. There are some mammals that are at a higher risk than others for the rabies virus, such as raccoons, skunks, stray cats and dogs, foxes, coyotes, rodents. and bats; however, any mammal can contract the virus.

- 6.2 Rabies is contracted by contact of an infected animal's saliva with an open wound a bite or a scratch.
- 6.3 Symptoms of rabies in humans usually do not present themselves for a minimum of 10 days to a year or longer (the average is 30 to 50 days). Symptoms are typical of a flu, including malaise, loss of appetite, fatigue, headache, and fever. Over half of all patients have pain (sometimes itching) or numbness at the site of exposure. They may complain of insomnia or depression. Two to 10 days later, signs of nervous system damage appear; hyperactivity and hypersensitivity, disorientation, hallucinations, seizures, and paralysis.
- 6.4 Because rabies is so difficult to detect and positively identify, it is very important to consult a physician immediately. If rabies is a possibility, begin treatment with the rabies vaccine as soon as possible (unlike other vaccines, rabies vaccination begins after exposure because the virus takes a comparatively long time to induce disease).

7.0 Hantavirus

- 7.1 Rodents can carry a variety of diseases; of notable concern is the North American hantavirus which can cause Hantavirus Pulmonary Syndrome (HPS).
- 7.2 A common host of the hantavirus is deer mouse and related species (*Peromyscus spp.*), which are common throughout much of North America.
- 7.3 Although infection is rare, it can be fatal and; therefore, it is necessary that risk of exposure be minimized. Infection can be spread to humans when they:
- 7.3.1 Breathe air contaminated by deer mouse saliva, urine or feces containing infectious hantaviruses; or
- 7.3.2 Accidentally rub eyes, mouth or broken skin with hantavirus-infected deer mouse saliva, urine or feces.
- 7.4 The following precautions will be taken for all field operations:
- 7.4.1 Limit exposure to soils handling and use gloves where appropriate.
- 7.4.2 Wash or sanitize hands often throughout the day and before meals.
- 7.4.3 Equipment bags, storage areas, and vehicles will be inspected daily for signs of deer mouse infestation.
- 7.4.4 Rodent-proof storage containers will be used when practical.
- 7.4.5 Do not enter buildings infested with deer mice without adequate respiratory protection.
- 7.4.6 Droppings should never be removed by vacuuming or sweeping. Wetting down an area with a mixture of 1:9 household bleach and water solution will reduce risk of airborne exposure.
- 7.5 If flu-like symptoms develop three days to six weeks after exposure to rodents, a doctor should be contacted immediately (mechanical ventilation is the primary method of treatment).

8.0 References

8.1 Trapping and Tagging Small Mammals. A RIC Standard for British Columbia. 1993. Dr. Todd Zimmerling.



S3NA-313-WI14 Snakes

1.0 Hazard

1.1 **Snakes have the ability to inject venom.** A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency.

2.0 Personal Protective Equipment

- 2.1 Long pants and shirts.
- 2.2 Heavy gloves if staff will be handling debris or be close to the ground.
- 2.3 Rubber boots, or boots that fully cover the foot (not sandals!) and preferably are at least 10" high.
- 2.4 Snake Chaps that cover at least the shin.
- 2.5 Personal first aid kit.

3.0 Restrictions

3.1 Staff must not work alone in areas where the risk of a snake encounter is high.

4.0 Training

4.1 Staff must be notified of the hazard before work commences.

5.0 Safe Work Practice

- 5.1 Staff working in areas known to be inhabited by venomous snakes should take extra precautions, be able to identify the local snake species, and understand the best practices for administering first aid.
- 5.2 Most snakes in Canada are non-venomous; and most snake bites are not fatal, only painful. Learning to identify snake species will assist you in responding appropriately to an encounter, and will assist medical professionals in determining if antivenin needs to be administered if anyone is bit.
- 5.3 Most snakes are non-aggressive and will only attack if immediately threatened.

5.4 **Prevention**

- 5.4.1 Before venturing out into the wilderness, familiarize yourself with the snakes in your area, both venomous and non-venomous species.
- 5.4.2 Learn which habitats the venomous species in your region are likely to be encountered in, and use caution when in those habitats.
- 5.4.3 Try as much as possible not to take a snake by surprise.
- 5.4.4 Stay on trails where possible, and watch where you place your hands and feet, especially when climbing or stepping over fences, large rocks, and logs, or when collecting firewood. Take care when overturning any objects on the ground when in snake country.
- 5.4.5 If you see a snake, give it as much room as possible. Most snakes have a strike distance that is only half the length of their body.
- 5.4.6 If you get very close to a rattlesnake, hold very still until it calms down and starts to move away. Then slowly move backwards until you are at least one snake-body length away.

5.5 Treatment

5.5.1 Venomous snakebites are rare, and they are rarely fatal to humans. Of the 8,000 snakebite victims in the United States each year, only about 10 to 15 die. In Canada the number of snake bites each year is very small. However, for any snakebite the best course of action is to get medical care as soon as possible.



- 5.5.2 Try to keep the snakebite victim still, as movement helps the venom spread through the body.
- 5.5.3 Keep the injured body part motionless and just below heart level.
- 5.5.4 Keep the victim warm, calm, and at rest, and transport him or her immediately to medical care.
- 5.5.5 Do not allow him to eat or drink anything.
- 5.5.6 If medical care is more than half an hour away, wrap a bandage a few inches above the bite, keeping it loose enough to enable blood flow (you should be able to fit a finger beneath it). Do not cut off blood flow with a tight tourniquet. Leave the bandage in place until reaching medical care.
- 5.5.7 If you have a snakebite kit, wash the bite, and place the kit's suction device over the bite. (Do not suck the poison out with your mouth.) Do not remove the suction device until you reach a medical facility.
- 5.5.8 Identify the snake that caused the bite to determine if it is venomous, and if antivenin needs to be administered. Do not waste time or endanger yourself trying to capture or kill it. Note the shape & color of the snake's head.
- 5.5.9 If you are alone and on foot, start walking slowly toward help, exerting the injured area as little as possible.
 - Note that there are several species of snakes that superficially resemble rattlesnakes. Several species, including Bull, Milk, Fox, and Rat Snakes will even rattle their tails when startled.
 - Massasauga Rattlesnake is recognized as a Threatened Species in Ontario and it is an offence to harass, , or destroy the habitat of this species.
 - One scorpion species, the Northern Scorpion (*Paruroctonus boreus*) occurs in semi-arid areas of southern British Columbia, Alberta, and Saskatchewan. It carries a stinger on the end of its tail. The sting is painful but not life threatening unless there is an allergic reaction.

6.0 Species

6.1 Venomous Snakes in Canada


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Prairie Rattlesnake (*Crotalus viridis*) found in south eastern Alberta, and south western Saskatchewan.

6.2 **Venomous snakes in the U.S.**





Coral Snake (*Micrurus sp.*) found in the southern range of many temperate US states including North Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Arizona, and New Mexico.



7.0 References

- 7.1 The Eastern Massasauga Rattlesnake Stewardship Guide. A resource and field guide for living with rattlesnakes in Ontario. Sponsored by the Government of Canada, and distributed on behalf of the Toronto Zoo and the Eastern Massasauga Rattlesnake Recover Team.
- 7.2 http://www.rattlesnakes.us/
- 7.3 http://drdavidson.ucsd.edu/Portals/0/snake/Crotalus.htm

S3NA-313-WI15 Alligators

1.0 Hazard

- 1.1 Your chance of encountering an alligator is greatest during the animal's courtship and mating season, which takes place from March through September. This is when male alligators become most dominant and aggressive as they try to intimidate rival males and attract females by their show of power. Some males end up having to travel to find a mate. July through September is when mother alligators are guarding nests.
- 1.2 Mating season takes up much of the warmer months a very popular time in the southeastern USA for outdoor activities and alligators are solar-powered, so-to-speak. The warmth from the sun fires up their metabolism, giving them renewed energy; and renewed energy means great potential for conflict.

2.0 Encounter

- 2.1 The alligator is naturally wary of humans, and will flee quickly if you get too close to it, or it may utter a very audible and compelling warning hiss. In some cases; however, alligators may charge or attack. Here are some examples of such cases:
- 2.1.1 An alligator that is accustomed to being fed by humans may not be so shy.



- 2.1.2 An alligator that is surprised and alarmed by your approach may attack, thinking that it is being attacked itself.
- 2.1.3 A mother alligator caring for her nest or for live babies. If you see alligator babies, or if you encounter a nest (usually a mound of vegetation mixed with mud), remove yourself to a safe distance, the mother alligator is sure to be close by. If you get close, the mother may sound a very audible and intimidating warning hiss. Such a nest may be difficult to identify for a non-expert, but it is likely the mother will issue you a warning.
- 2.1.4 Alligator mothers are well-known to be practically fearless when defending their offspring, whether the little ones have hatched or not. A mother alligator was observed leaping, jaws agape, to attack a helicopter as it approached the nest area to land! (The helicopter carried biologists studying alligator nests.)
- 2.2 Also be careful near heavy vegetation in or near the water's edge. This is where an alligator likes to enjoy privacy and peace during the daylight hours. If you trudge through there and surprise it, the outcome may not be positive.
- 2.3 Generally, a good minimum distance to keep between you and an alligator or nest is 15 feet/ 4.6 meters.
- 2.4 When trying to get past an alligator, make sure not to walk between the alligator and the water, because if it's spooked, it's going to run to the water.
- 2.5 If an alligator does approach in a threatening manner, make as much noise and movement as possible. This should show the alligator that he has taken on more than he can handle and he'll back away.

3.0 Alligator Charge

3.1 The alligator is not a natural runner. Those short legs obviously don't serve it like a horse's legs do, and the alligator can actually tire out in a relatively short time. When it charges after a human or animal, it is either trying to scare it away or seize it. It has a fast and furious burst of energy which serves it well for stealth hunting -- grabbing prey when it doesn't expect it. Furthermore, the reptile is



opportunistic, which means, quite simply, it doesn't like to work very hard to get its food if it doesn't have to.

- 3.2 In the very rare event you are charged or chased by an alligator, move in as straight a line as possible away from it as fast as you reasonably can. In many cases, the vegetation features of the wild will serve to protect you by slowing the alligator down, like trees, bumps, bushes, etc. -- your comparatively long legs usually make it easier for you to maneuver through the trees and brush than an alligator's short legs do.
- 3.3 Most adult humans can outrun even a fast crocodilian, which has been clocked at a maximum of about 10 mph/17 kilometers per hour (kph), compared to a human speed of 15-17 mph/24-27 kph. But this doesn't matter much; an alligator will often give up the chase because it sees that the runner is moving away too quickly, and realizes that too much effort will be required to continue pursuit.
- 3.4 You may have heard somewhere that the zigzag run (running in a "z" pattern, side-to-side) is a good idea, but this is not only an unnecessary maneuver but probably a very unwise one. Here's why:
- 3.4.1 Unless you're an Olympic athlete, running zigzag over natural topography increases your risk of tripping and falling over rocks, plants, roots, and the like. And it goes without saying that falling while being pursued by an alligator is not good.
- 3.4.2 Furthermore, an alligator doesn't have the degree of stereoscopic vision we have. It actually has a small 'blind spot' directly in front of it. Hence, the alligator's vision is most effective in the 'sides' of its field of view. So, running zigzag not only slows your rate of distance from your pursuer, it may clearly indicate to the animal exactly where you are; even this point hardly matters since in many cases the alligator may keep its eyes shut while pursuing so as not to get them hit by twigs, grass stalks and branches in its path.
- 3.4.3 Finally, an alligator bites very effectively in a side-swiping motion, so if you are trying to run zigzag and are slowed down by plants, rocks, or other obstacles, the backwards flying leg of a running human is an optimal target for side-swiping, chomping jaws (the operative word here is "side").
- 3.5 Simply put, when faced with an attack, move directly away from the alligator as quickly as possible, navigating the terrain as carefully as possible. The zigzag idea will likely not serve you well.

4.0 Alligator Attack

- 4.1 If it seizes prey, and the prey fights back hard, the alligator may release it, depending on factors such as its own size relative to that of the victim, its own level of aggression, and its measure of hunger. Merely struggling to break free may not be enough counter-aggression to stop an alligator, and may actually prompt a devastating "death roll" response, in which the reptile furiously spins on its central axis to tear muscle and bone free of the victim's body.
- 4.2 These armored saurian are among the toughest beasts in the animal kingdom, so an attack victim should channel his or her nervous energy and will to survive and take the offensive by fighting hard. Not struggling...fighting very, very, very hard. Others on hand during such an event may be able to help by fighting the reptile, too. This should include punching the snout, poking the eyes, and even jabbing the ears, which are seen as small slits behind the eyes.

5.0 Additional Resources

- 5.1 Additional resources can be found at:
- 5.1.1 http://www.tpwd.state.tx.us/huntwild/wild/species/alligator/index.phtml
- 5.1.2 http://corkscrew.audubon.org/Wildlife/Alligators.html



S3NA(US)-404-PR Commercial Motor Vehicle

1.0 Purpose and Scope

- 1.1 AECOM's Commercial Motor Vehicle (CMV) Program provides guidance to facilitate compliance with the U.S Department of Transportation (DOT) Federal Motor Carrier Safety Regulations (FMCSR) 49 Code of Federal Regulations (CFR), Transportation; Federal Motor Carrier Safety Administration.
- 1.2 This procedure is only applicable to AECOM personnel operating CMVs within the United States. It establishes minimum compliance criteria and guidelines for AECOM employees licensed within the United States that operate CMVs as part of their job description.
- 1.3 Major objectives of the CMV Program:
- 1.3.1 Identify accountability, responsibility, and authority pertaining to compliance with FMCSR.
- 1.3.2 Establish minimum criteria for drivers required to operate CMVs in accordance with USDOT and FMCSA regulatory requirements.
- 1.3.3 Define documentation and corresponding retention requirements.
- 1.3.4 Provide guidelines and reporting mechanism to ensure driving records and histories are current.

2.0 Terms and Definitions

- 2.1 **Commercial Motor Vehicle (CMV):** For AECOM operations, a CMV is defined as any vehicle used for AECOM business that:
- 2.1.1 ≥10,001 lbs gross vehicle weight rating (GVWR); and/or
- 2.1.2 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).
- 2.1.3 FMCSR also defines any vehicle that carries hazardous material in quantities ≥ 1001 lbs. combined total weight at any time (49 CFR 173.6) as a CMV. No AECOM vehicle will be used to, nor will any AECOM employee, transport hazardous material in quantities ≥ 1001 lbs.
- 2.2 **CMVs:** CMVs are also those property-carrying vehicles that meet any of the following criteria:
- 2.2.1 Group A (Combination Vehicle): Any combination of vehicles with a GVWR of 26,001 lbs or more, provided the GVWR of the vehicle(s) being towed is in excess of 10,001 lbs.
- 2.2.2 Group B (Heavy Straight Vehicle): Any single vehicle with a GVWR of 26,001 lbs. or more, or any such vehicle towing a vehicle not in excess of 10,000 lbs. GVWR.
- 2.2.3 Group C (Small Vehicle): Any single vehicle, or combination of vehicles, that meets neither the definition of Group A or Group B, but that is either designed to transport 16 or more passengers including the driver; or weighs more than 10,000 lbs., <u>or</u> has a GVWR greater than 10,000 lbs.; <u>or</u> is used to transport *hazardous materials* as defined under 49 CFR 171.8 and 173.6. Vehicles transporting hazardous materials ≥ 1001 lbs (total combined weight) qualify as CMVs regardless of vehicle weight.

Notes:

- Weight rating is the maximum load-limit that a vehicle or combination vehicle (e.g., truck plus trailer) has been given by the manufacturer. Compliance with applicable regulations is based on the weight rating: what the **manufacturer** has rated the vehicle or combination vehicle to carry. The regulatory guidelines apply whether the cargo is loaded or not. Vehicles may not be modified to carry more weight than designed by the manufacturer or as currently registered.
- Some states may designate vehicles that are < 10,001 lbs as CMVs based on use. For example, Florida designates vehicles >8,000 lbs GVWR as a CMV. The Regional SH&E Manger will provide support in states that have requirements that differ from the FMSCA.



- 2.3 A comprehensive list of definitions has been provided in S3NA(US)-404-WI1 Definitions.
- 2.4 Please reference this attachment as it will assist in implementation of this program.

3.0 Attachments

- 3.1 S3NA(US)-404-FM1 Motor Vehicle Driver's Certification of Violations
- 3.2 S3NA(US)-404-FM2 CMV Employee Release of Information
- 3.3 S3NA(US)-404-FM3 Employer Contact Documentation
- 3.4 S3NA(US)-404-FM4 Human Resource Confirmation of Background Check/Inquiry
- 3.5 S3NA(US)-404-FM5 Annual Review of Driving Record
- 3.6 S3NA(US)-404-FM6 Record of Road Test
- 3.7 S3NA(US)-404-FM7 Pre-Trip Inspection Checklist
- 3.8 S3NA(US)-404-FM8 Inspection of Cargo, Cargo Securement Devices and Systems
- 3.9 S3NA(US)-404-FM9 Post-Trip Inspection Checklist
- 3.10 S3NA(US)-404-WI1 Definitions
- 3.11 S3NA(US)-404-WI2 Initial Hire Documentation Requirements
- 3.12 S3NA(US)-404-WI3 Required Emergency Equipment
- 3.13 S3NA(US)-404-W4 Commercial Motor Vehicle Area of Responsibility
- 3.14 S3NA(US) 404-WI5 Commercial Motor Vehicle New Hire Work Flow

4.0 Procedure

Please see S3NA-404-WI4-Commerical Motor Vehicle Areas of Responsibility for areas of responsibility concerning the AECOM Commercial Motor Vehicle Program.

4.1 Roles and Responsibilities

4.1.1 Operational Managers

- **Operational management** is responsible for management and implementation of the Commercial Motor Vehicle Program in accordance with the requirements of this procedure.
- Compliance with regional state, local, business unit, and section specific requirements are to be addressed in additional guidance documents that are to be generated by the business unit to facilitate compliance with regional, state, and/or local requirements.

4.1.2 Region Manager

 Each Region Manager is responsible for systems that are in place to implement and enforce the requirements of this program. This includes allocation of resources (budget, training staff, etc.) that will support their operation's effective implementation, tracking and maintenance of the CMV Program.

4.1.3 District/Office Managers

- **District/Office Managers** are responsible for ensuring that all applicable employees and vehicles within their office/section are compliant with the CMV Program requirements. This will include:
 - Implementation and enforcement of the CMV program to ensure appropriate driving licenses and endorsements are current and consistent with the class/category CMV the employees will operate.
 - Designating an office/section support person (CMV Contact) who will serve as an office/section point of contact as discussed in this program.
 - Ensure an initial and annual review of driving records and history is performed. This process will be performed with support from the **Human Resources (HR) Department**.
 - Ensure employee driving status is communicated to office/section HR contact and CMV Contact prior to the initiation of the hiring process or when an employee is re-assigned to a CMV position.



- Ensure all documentation specified in this program is submitted to the appropriate regional HR and CMV contact.
- Perform an annual review of employees' job requirements/description to ensure appropriate driving designation.
- Ensure employees are evaluated for CMV operations and, for those without CDLs, and are given a Certified Road Test. See S3NA-404-FM6 Record of Road Test.
- Confirm CMV compliance with regulatory requirements in whatever states employees operate a CMV.
- Track employee driving status to ensure FMCSA and/or state regulation violations that would affect employee's ability to operate a CMV are identified.
- o Ensure all CMVs meet FMCSA design, maintenance, and operational criteria.
- Maintain Office/Section archives for all paper work and documentation in accordance with the CMV program and FMCSA requirements.

4.1.4 Human Resources (HR) Department

- Once the District/Office Managers or their designees identify to Human Resources (HR) the employees that are subject to these DOT and FMCSR, HR will be responsible for the following regarding compliance with the CMV program:
 - Collecting the information and documentation that is required for an individual to maintain their driving status. Specific documentation requirements are provided in Attachments.
 - Performing employee background checks regarding employment history, driving history, driving records, CMV/CDL violations, etc. See S3NA-404-WI5 Commercial Motor Vehicle Areas New Hire Work Flow.
 - Oversight and maintenance of the DOT drug and alcohol program (DAP). The DAP support includes coordinating testing and contacting supervisors/employees regarding scheduling results.
 - Submittal of required driver management documentation to the appropriate Federal and state agencies. Examples of reporting to a federal and state agency would be AECOM reporting failures of previous employers to respond to a background check, contacting state agencies regarding driving status, etc. Additional information/direction is provided in the subsequent sections and attachments.

4.1.5 Safety, Health and Environmental (SH&E) Department

- The SH&E Department is responsible for:
 - Monitor training and medical surveillance anniversary dates. This would include oversight of documentation management for covered employees.
 - Establishing requirements regarding compliance with FMCSA and state safety regulations and communicating these requirements to each business unit.
 - Providing a resource to maintain employee certification and training dates (e.g., Driver Management On-line through J.J. Keller).
 - Auditing to determine compliance with program requirements.
 - Providing technical assistance/support as requested by the business unit. This is key in states that have additional regulatory requirements above the FMCSA safety requirements.
 - Filing the MCS-150 form/update on the schedule discussed in Motor Carrier Identification Report on a yearly basis.
 - CMV and hazardous material transportation related vehicle incident reporting, investigation and management.
 - Roadside inspection report (MCS-63) responses shall follow S3NA-211-PR Regulatory Inspections.

4.1.6 Employee Requirements

 Employees required to maintain a Commercial Drivers License (CDL) are responsible for maintaining their license(s) and ensuring compliance with FMCSA and state regulatory requirements in accordance with FMCSA – 49 CFR, Part 383: Commercial Driver's License Standards; Requirements and Penalties. This includes those employees who operate Group A and Group B vehicles. Those AECOM employees who drive Group C vehicles are not required under FMCSA to have a CDL.



- All employees who drive CMVs are responsible for:
 - o Providing a 10-year employment history when completing the employment application.
 - Current employees are to provide this information subtracting their current AECOM employment period from the 10-year history (e.g., if the individual has been employed by AECOM for 3 years [or a legacy AECOM operating company], they would provide their work history for 7 years prior to working for AECOM).
 - Minimum work history information requirements are provided in S3NA(US)-404-Wl2 Initial Hire Documentation Requirements.
 - Tracking driver's license expiration date and updating license prior to expiration.
 - Tracking medical surveillance test dates to ensure they are compliant with FMCSA and state requirements.
 - Immediately reporting to their supervisor, regardless if the event occurred on-duty or off-duty, any of the violations/offenses listed below:
 - Has had more than one license within a 2-year period.
 - Has had their license suspended, revoked, or cancelled.
 - Has received any citation, warning, or notification of violation of any states' motor vehicle code/regulation. The employee's supervisor is to be provided a copy of the citation, notification or warning.
 - Has had any convictions in any type of motor vehicle for major disqualifying offenses.
 - Has had more than one conviction for any type of motor vehicle for serious traffic violations.
 - Has had any violation of State or local law relating to motor vehicle traffic control arising in connection with any traffic accident.
 - Has an accident.
- If any of the events listed above have occurred, the employee is to complete the forms provided in: S3NA(US)-404-FM1 Motor Vehicle Driver's Certification of Violations (form is required within 24 hours of the event). Once the forms are completed, the employee is to submit the forms to the appropriate agency as indicated on the forms. The forms are also to be submitted to the employee's supervisor. The supervisor is to submit the original to their HR contact and a copy to the Region SH&E Manager.
- Completing and submitting all paperwork and documentation as required in this program (49 CFR 395).
- When operating a CMV, the employee is required to keep on their person a current CDL.
- When operating a CMV, the employee is to maintain on their person a current copy of the physician certification/statement that they are qualified to operate a CMV in accordance with FMCSA guidelines.
- Must comply with the AECOM DOT DAP.

4.2 Minimum Employee Qualifications

4.2.1 General

Provided in this section are the minimum requirements for employees that operate a CMV. If an employee does not meet these requirements, they are unqualified to operate the designated vehicle class. Any further action will be in accordance with the AECOM employment policy and at the sole discretion of the **Supervisor** and **HR Department**.

4.2.2 Employee Driver Requirements

Employees operating any CMV must meet the following minimum requirements:

- Is at least 21 years old if they are to drive in an interstate situation.
- Reads and speaks the English language sufficiently to converse with the general public, to
 understand highway traffic signs and signals in the English language, to respond to official
 inquiries, and to make entries on reports and records.
- Office/section manager (or their designee) and the employee's immediate supervisor have authorized operation of the CMV. This process shall be documented to provide evidence in case of unauthorized personnel operating a CMV.
- Has been issued a written medical certification/clearance in accordance with this program.



- Has completed entry level driver training (49 CFR 380.503).
- Has a current and valid license appropriate for the CMV to be driven that is issued only by one state or jurisdiction.
- Has provided their immediate supervisor with the list of all motor vehicle violations for the last three years, see S3NA(US)-404-FM1 Motor Vehicle Driver's Certification of Violations.
- Has not been disqualified from driving CMVs.
- Has successfully passed a Certified Road Test or has a CDL.
- Has completed a comprehensive FMCSA Safety and Security, and a USDOT Hazardous Material Regulations (HMR) Training Program (Materials of Trade at minimum) in the past three years. This training can be coordinated with the local SH&E representative.

4.2.3 Employee Background Check/Inquiry

All employees authorized to operate any CMV will have their driving records and driving history checked by the **HR Department**. If this is a new employee, this is done prior to hire. If an existing employee has not had this check, it must be done prior to operating any CMV. In order to perform the background check a signed release, see S3NA(US)-404-FM2 CMV Employee Release of *Information,* is to be obtained from the employee by the **HR Department** prior to any background check. The background check may consist of any of the following:

- Personal interviews,
- Telephone interviews,
- Letters,
- Any other method that the HR Department deems appropriate.
 - The HR Department will document the results (see S3NA(US)-404-FM3 Employer Contact Documentation) and/or good faith effort (see S3NA(US)-404-FM4 Human Resource Confirmation of Background Check/Inquiry) to make contact with previous employers and place the results into the employee's driver qualification file. The minimum information that is to be collected during the background check is reviewed (S3NA(US)-404-Wl2 Initial Hire Documentation Requirements).

The employee must not have any violations that would preclude them from operating a CMV. The information that is to be collected as part of the background check will include the following:

- Employee driving record during the preceding three years of employment from the appropriate agency of every state in which the driver held a motor vehicle operator's license or permit during those three years.
- Any driving record information collected as part of the state background check is to be placed into the employee driver qualification file within 30 days of employment or for existing employees within 30 days of the background check initiation date. (Note: If an employee has no violations this is to be included in the driving record file).
- Drug and alcohol test results for the past three years.
- A background check of the employee's driver safety performance during the preceding three years.
- Any driver safety performance history collected as part of the employment check is to be placed into the individuals driver qualification file within 30 days of employment or for existing employees within 30 days of the check initiation date.
- If the employee's previous employers cannot be contacted, a memo will be generated and placed into the employee's driver qualification file stating that a good faith effort was made to collect the required information.

AECOM will report failures of previous employers to respond to a background check to the FMCSA following procedures specified in 49 CFR 386.12.

4.2.4 Annual Inquiry and Review of Driving Record

 AECOM's HR Department, in conjunction with a representative from SH&E, will investigate and evaluate the driving record of all employees authorized to operate any CMV on an annual basis (no less than every 12 months) to ensure the CMV employee has not been disqualified as a CMV operator in any of the States in which the employee holds an operator's license or permit or has violated AECOM policies regarding the operation of a CMV.

- AECOM
- Any employee that has been disqualified will not be permitted to operate a CMV and may be subject to other AECOM employment policies.
- The annual evaluation will be documented on the form provided in S3NA(US)-404-FM5 Annual Review of Driving Record. This form will be completed, supporting documentation attached, and used to determine driving qualifications. Failure to pass all criteria as listed in 49 CFR 383.5, Disqualification of Drivers (for employees who operate Group A and B vehicles) and 49 CFR 391.15, Disqualification of Drivers (for employees who operate Group C vehicles) will disqualify the employee from driving a CMV for AECOM for no less than one year. A copy of the evaluation will be maintained in the employee's driver qualification file.

4.2.5 Road Test Certification

- In place of, and as equivalent to, a road test, a person who drives a CMV may present a valid CDL or a copy of a valid certificate of a driver's road test issued to him/her within the preceding three years. A copy of the CDL must be placed in the driver's file.
- For persons without CDLs or road tests issued within the preceding three years, AECOM will
 require a person to complete a road test. The S3NA(US)-404-FM6 Record of Road Test is to be
 issued by an AECOM supervisor who has been identified as competent, by the Office/Section
 Manager, to evaluate the employee's skills adhering to the following criteria:
 - The competent person will evaluate the skill of the employee when operating the assigned CMV. The minimum skills sets while operating the CMV are as follows:
 - Successfully execute S3NA(US)-404-FM7 Pre-Trip Inspection Checklist.
 - Demonstrate coupling and uncoupling of combination units (only required if employee will operate equipment that includes combination units).
 - Initiate operation/start-up.
 - Demonstrate successful use of controls and emergency equipment.
 - Operate in traffic typical of normal operating conditions.
 - Pass other motor vehicles.
 - Execute left and right turns.
 - Braking.
 - Reducing speed by means other than braking.
 - Backing up at least two full lengths of the CMV.
 - Parking.
- A checklist, see S3NA(US)-404-FM6 Record of Road Test, must be completed by the competent person evaluating the employee. The employee must successfully demonstrate all skills to receive the Certification of Road Test.
- A copy of the Certification of Road Test is to be given to the employee.
- The original copy of the Certification of Road Test is to be maintained in the driver qualification file.
- The employee's immediate supervisor is to ensure the Certification of Road Test is entered into the appropriate AECOM online tracking database.

4.2.6 Physical Qualifications of Drivers

- Prior to operating a CMV, all employees are required to pass a medical examination or review of medical records in accordance with 49 CFR Subpart E, Physical Qualifications and Examinations. The examining physician is to be knowledgeable of FMCSA requirements and operation requirements of the CMVs the employee will operate. The examining physician is to issue a written certification that shall include the following information:
 - Physician's name and license number.
 - Physician's address and telephone number.
 - Date of examination.
 - Employees name.
 - Date of exam expiration.
- The examining physician is to provide a signed certificate in accordance with 49 CFR 391.43(h). The following statement is to appear on the certification referencing the employee: "physically fit or not fit to operate a CMV in accordance with 49 CFR 391.41-391.49." The certificate is to



identify, in accordance with 49 CFR 391.43(h), any limitations that would affect the employee's ability to operate a CMV.

4.2.7 Medical Certification Maintenance

- Access and maintenance of the physician's medical certification is as follows:
 - The employee is to ensure AECOM is provided a copy of the physician's written certification that they are fit to operate a CMV. A copy of the certification will be provided to:
 - SH&E contact
 - HR contact
 - Employee
 - When operating a CMV, all employees are required to keep on their person a current copy of the physician certification/statement that they are physically qualified to operate a CMV in accordance with FMCSA guidelines. This requirement is to be considered part of the individual's job performance expectations.

4.2.8 Frequency of Medical Examination/Evaluation

- The immediate supervisor of the **employee** operating a CMV is responsible for notifying the CMV Contact and the local **HR contact** of the following:
 - That a potential new hire has been designated a CMV employee.
 - When an employee has been reassigned into a position that requires a CMV.
 - Submitting this notification in writing or electronically (see AECOM SH&E SOP 401: Medical Surveillance Program).
- The CMV Contact responsibilities include confirming the employee's medical surveillance anniversary dates are posted in Driver Management Online. This includes forwarding the information to AECOM's medical provider and **HR contact**.
- AECOM's medical surveillance provider will be responsible for examining and evaluating the employee upon initial hire or when reassigned.
- The medical surveillance provider will issue a medical clearance/certification indicating whether or not an employee is medically qualified to operate a CMV.
- After the initial examination/evaluation the employee is to participate in a biennial examination, unless they are regulated under 49 CFR 391.64, in which case an annual examination will be required. AECOM's medical provider will classify employee's biennial or annual evaluation based on the results of the medical examination and/or evaluation.

4.3 Drug and Alcohol Program (DAP)

- 4.3.1 All Employees who operate Group A and/or Group B CMVs are subject to the AECOM DOT Drug and Alcohol Program (DAP). These employees must meet requirements of the DOT DAP in order to operate a CMV. Minimum DOT DAP requirements are provided below. For additional detail reference the DOT DAP.
 - All employees who operate Group A and/or Group B CMVs are required to have a preemployment DOT substance abuse test performed prior to driving a CMV. The employee is subject to all guidelines and disciplinary actions as defined in the DOT DAP.
 - All employees who operate Group A and/or Group B CMVs are subject to post-accident testing in accordance with DOT DAP.
 - All employees who operate Group A and/or Group B CMVs are subject to reasonable suspicion testing in accordance with the DOT DAP.
 - Employees who operate a CMV with a gross combination vehicle rating or gross vehicle rating ≥ 26,001 lbs. (Group A and/or Group B CMVs) are subject to random testing. Reference the DOT DAP for additional detail.
 - Employees who operate a CMV with a gross combination vehicle rating or gross vehicle rating ≥ 10,001 but <26,000 lbs. (Group C vehicles) are subject to the AECOM Drug–Free Workplace policy.

4.4 Marking of Commercial Motor Vehicles

• AECOM's Logo:

- 4.4.1 The exterior of all CMVs used for AECOM business are to be marked on both sides of the CMV as follows:
 - AECOM



Note: AECOM has multiple legal names please check with your business line to confirm the current legal name your business line is operating under.

• The USDOT motor carrier identification number issued by the FMCSA must immediately follow the AECOM Label:



- Size, shape, location, and color of marking are to be as follows:
 - Signage is to appear on both sides of the CMV.
 - o Letters are to sharply contrast in color with the background on which the letters are placed.
 - The letters are to be readily legible, during daylight hours, from a distance of 50 feet (15.24 meters) while the CMV is stationary.
 - The letters are to be maintained in a manner that retains the legibility as required in 5.3, 3, c.
 - The signage may be painted on or may consist of a removable device.
- CMVs rented or leased for less than 30 days shall meet the following criteria:
 - o Signage appears on the CMV as discussed above; or
 - The legal name or a single trade name of the leaser/rental company is displayed in accordance with as listed above.
 - The leaser's or rental company's identification number preceded by the letters "USDOT" is displayed in accordance as listed above.
 - The lease/rental agreement contains the following information:
 - The name and complete physical address of the AECOM office renting the CMV.
 - The identification number issued to AECOM by the FMCSA, preceded by the letters "USDOT." In lieu of the identification number required in this paragraph, the following may be shown in the rental agreement.
 - Information which indicates whether the AECOM will be engaged in "interstate" or "intrastate" commerce.
 - Information which indicates whether AECOM is transporting hazardous materials in the rented CMV.
 - The sentence: "This (the rental/leasing company's name) cooperates with all Federal, State, and local law enforcement officials nationwide to provide the identity of customers who operate this rental CMV".
 - The rental/lease agreement entered into by the Rental/Leasing Company and AECOM is carried in the rental CMV during the full term of the rental agreement.

4.5 Motor Carrier Identification Report

- 4.5.1 AECOM must file a Motor Carrier Identification Report, Form MCS-150, with the FMCSA. The form with complete filing instructions are on the FMCSA website: www.usdotnumberregistration.com. The filing is to occur at the following frequency:
 - Prior to interstate travel occurring.
 - After the initial filing an update, resubmit the MCS-150 form, is required every 24 months based on the following schedule:
 - The last USDOT number dictates the filing month.



USDOT Number Ends With:	Must file report by the last day of:
1	January
2	February
3	March
4	April
5	Мау
6	June
7	July
8	August
9	September
0	October

- The last digit [1] of AECOM's USDOT Number (XXXXXXX) stipulates that MCS-150 is to be filed by January 31 of the filing year.
- The next-to-last USDOT Number dictates the filing year. The MCS-150 Report is to be filed in odd years if the number is odd and even years if the number is even.
- The Regional SH&E manager for a business unit in which CMVs are operated will ensure the Motor Carrier Identification Report is maintained for that business unit.

4.6 **Commercial Motor Vehicle Operation**

- 4.6.1 Pre-trip Inspection Requirements
 - Employees are required to perform a documented pre-trip inspection prior to the operation of a CMV. The employee will perform the following inspection to ensure equipment is functional prior to each work shift and/or operating the CMV:
 - Service brakes, including trailer brake connections
 - o Parking (hand) brake
 - Steering mechanism
 - o Lighting devices and reflectors
 - o Tires
 - o Horn
 - Windshield wiper or wipers
 - o Rear-vision mirror or mirrors
 - Coupling devices
 - Fire extinguisher that is approved for the CMV operated
 - o Stopped vehicle-warning devices (e.g., reflective triangles)
 - Load is secure and evenly distributed
 - Load meets all requirements of USDOT Materials of Trade, including paperwork
 - An example of a checklist that may be used to complete the inspection is provided in S3NA(US)-404-FM7 Pre-Trip Inspection Checklist.
- 4.6.2 Inspection of Cargo, Cargo Securement Devices and Systems
 - Employees are required to inspect loads and ensure the CMV's cargo is properly distributed and adequately secured. A Cargo securement checklist has been provided in S3NA(US)-404-FM8 Inspection of Cargo, Cargo Securement Devices and Systems. The employee must document that the cargo has been inspected and meets minimum requirements as discussed on the checklist prior to operating the CMV.

4.6.3 Required Emergency Equipment

- The minimum emergency equipment that is to be maintained in a CMV at all times has been listed in S3NA(US)-404-WI3 Required Emergency Equipment. This equipment is to be maintained in functional condition at all times. The employee will ensure the emergency equipment is in place and functional prior to each work shift and/or operation of the CMV.
- 4.6.4 Post-Inspection Report
 - Every employee that operates a CMV is required to complete a post-trip inspection report at the end of each day's work on each CMV operated. An example of a post-trip inspection report is provided in S3NA(US)-404-FM9 Post-Trip Inspection Checklist.



4.7 Training Program Management

4.7.1 Each **office/section manager** is to ensure training vendors, internet training, or any other outside training programs comply with applicable regulatory guidelines and AECOM Safety Program requirements. The **SH&E Department** will provide technical support in assessing qualifications. The business unit Regional SH&E manager's approval is required prior to using an outside training vendor or service or for individuals providing in-house training.

4.8 Maintenance of Records and Documents

- 4.8.1 General Information
 - Maintenance (e.g., updating, tracking, storage) of all CMV documentation and records are the responsibility of each business unit. The section manager's/location manager's HR contact and SH&E professional will provide guidance and support regarding record maintenance. Documentation regarding vehicle maintenance will be maintained at a location designated by the office/business line manager. All records are to be accessible and copies provided to authorized recipients within 48 working hours of their request. Copies of training records are to be maintained at the office/section where the employee reports for their CMV operation activity.
- 4.8.2 Employee Responsibility
 - It is the responsibility of the employee, with oversight from their immediate supervisor, to:
 - Maintain personal copies of training certifications, license, and medical surveillance certifications.
 - Ensure all required personal documentation and records that are generated in compliance with this program are copied to the office/section CMV contact and originals sent to HR contact.
 - Any information that is considered confidential in nature will be maintained solely by the office/section HR contact.

4.8.3 Human Resources

- The **HR Department** will be responsible for archiving, storage, and maintenance of documentation that is related to the individual (e.g., driving history, employment history, violations, DAP history, etc.). Guidelines for maintenance and storage are provided as follows.
- 4.8.4 Employee Driver Qualification Files
 - The HR Department will maintain an employee driver qualification file that will contain the following:
 - The employee's job application.
 - The certificate of driver's road test as discussed in Road Test Certification
 - o (Documentation for items 3 through 8 may be purged 3 years from execution date).
 - A copy of the response from each State agency concerning an employee's driving record as discussed in Section 4.2.3, Employee Background Check/Inquiry.
 - o Documentation of the annual review of the driver's driving record.
 - o A list or certificate relating to violations of motor vehicle laws and ordinances.
 - \circ ~ The medical surveillance certificate and DOT DAP documentation.
 - Copy of current CDL for those employees required to have one.
 - Copy of current driver's license (drivers of Group C vehicles).
- 4.8.5 CMV Contact Documentation Support
 - The CMV Contact is required to provide the following support service regarding maintenance and storage of non-confidential documentation/records:
 - Create an electronic file (hard copy when electronic file is not available) for each covered employee within their office/section.
 - Employees' files are to contain the following:
 - Current CMV medical certification.
 - DOT DAP documentation of compliance from AECOM's medical surveillance provider. AECOM's medical provider will maintain all substance abuse results information. The HR Department will be primary contact for accessing substance abuse testing information.



- Current copy of Driver's CDL or Road Test Certification, if road test was completed.
- The CMV Contact is to forward original copies of all documentation/records referenced in (a) through (c) to the HR contact that supports the employee.

4.9 Commercial Motor Vehicle Documentation

- The office/section manager will designate an individual who will be responsible for maintaining the documentation regarding vehicle service and maintenance. This individual will maintain the following documentation on each motor vehicle for 1 year and, for 6 months after the motor vehicle is sold or leaves AECOM's control:
 - o All vehicle registration documentation includes current and historical information.
 - o Vehicle inspection information includes state inspections, federal inspections, etc.
 - o Hard copies of all maintenance history. Documentation is to maintained as follows:
 - An identification of the vehicle including: company number; make; serial number; year; and tire size, and the name of the person furnishing the vehicle if not owned by the carrier.
 - A means to indicate the nature and the due date of the various inspection and maintenance operations to be performed.
 - A record of inspection, repair and maintenance indicating their date and nature.
 - Post-trip inspections.

4.10 Hours of Operation

- 4.10.1 Daily Operation
 - When operating a CMV, the CMV operator:
 - Is not permitted to drive more than 11 consecutive hours.
 - Is required to have 10 hours off work (duty) prior to the 11-hour shift.
 - Is required to have 10 hours off work (duty) prior to 14 hours of non-consecutive driving time (i.e. the employee takes breaks, meals, rest periods, etc. during their driving shift).
- 4.10.2 Weekly Operation
 - Employees are not permitted to operate a CMV after operating (on-duty) a CMV for 60 hours within a 7 consecutive day period. Any period of seven consecutive days may end with the beginning of any off-duty period of 34 or more consecutive hours (49 CFR Part 395.3).
 - In the instance of employees operating CMVs used primarily in the transportation of groundwater well drilling operations, and construction materials and equipment, any period of seven consecutive days may end with the beginning of any off-duty period of 24 or more consecutive hours [49 CFR Part 395.1 (I) and (m)].

4.11 Driver's Record of Duty Status

- 4.11.1 Exemptions for 100-air mile/short haul drivers (CDL Drivers)
 - Employees are not required to maintain a standard log when they operate a CMV under short haul status. The following conditions must be met.
 - The employee:
 - Operates the CMV within a 100-air-mile radius of the normal work reporting location (employee's home office).
 - Returns to the work reporting location and is released from work within 12 consecutive hours on-duty.
 - o Is required to have 10 hours off work (duty) separating each 12-hour shift.
 - o Does not exceed 11 hours maximum driving time following 10 consecutive hours off-duty;
 - o Required documentation for exemptions status:
 - The duty time seven days prior to the first day of a work shift.
 - The time the driver reports for duty each day.
 - The total number of hours the driver is on duty each day.
 - The time the driver is released from duty each day.
 - Documentation is maintained for six months by the driver's supervisor.



- 4.11.2 Exemptions for 150-air-mile/employee (Not required to have a CDL)
 - Those employees that operate a CMV, but are not required to have a CDL, are not required to maintain a standard log under the following conditions:
 - Operates the CMV within a 150-air-mile radius of the normal work reporting location (AECOM home office).
 - Returns to the work reporting location and is released from work within 11 consecutive or 14 non-consecutive hours driving time.
 - Is required to have 10 hours off work (duty) separating each 11 consecutive hours or 14 nonconsecutive hours shift.
 - Driver does not operate a CMV more than five days per seven day period. Any seven consecutive day period ends with 34 consecutive hours off duty.
 - Drivers who use this exception are ineligible to use the 100-air-mile radius exception.
- 4.11.3 Non-Exempt CMV Documentation Requirements
 - When operating a CMV or on-duty for operation of a CMV all employees are required to record their duty status for each 24-hour period. The requirements for recording the duty status are as follows:
 - The duty status is to be recorded on a self-duplicating graph grid.
 - The graph grid is to be submitted to the employee's immediate supervisor who will review the logs and forward to the HR contact at the end of each week.
- 4.11.4 Minimum Information Required for Duty Status
 - The minimum information and guidelines that are to be recorded for the employee duty status is as follows:
 - "Off duty" or "OFF."
 - "Sleeper berth" or "SB" (only if a sleeper berth used).
 - "Driving" or "D."
 - "On-duty not driving" or "ON."
 - For each change of duty status (e.g., the place of reporting for work, starting to drive, on-duty not driving and where released from work).
 - City, town, or village
 - State abbreviation

Note: If a change of duty status occurs at a location other than a city, town, or village, show one of the following:

- The highway number and nearest milepost followed by the name of the nearest city, town, or village and State abbreviation.
- The highway number and the name of the service plaza followed by the name of the nearest city, town, or village and State abbreviation.
- The highway numbers of the nearest two intersecting roadways followed by the name of the nearest city, town, or village and State abbreviation.
- o Date (month, day and year for the beginning of each 24-hour period)
- o Total driving miles during each 24-hour period
- o Truck or tractor and trailer number
- Name of carrier
- o Driver's signature/certification
- o 24-hour period starting time (e.g., midnight, 9:00 a.m., noon, 3:00 p.m.)
- Main office address
- o Remarks
- Name of co-driver
- o Total hours
- Shipping document number(s), or name of shipper and commodity
- Drivers shall keep their records of duty status current to the time shown for the last change of duty status. Entries are to only be made by the driver.
- All entries relating to driver's duty status must be legible and in the driver's own handwriting.



- The 24-hour period starting time must be identified on the duty status record.
- One-hour increments must appear on the graph, be identified (labelled), and pre-printed.
- The words "Midnight" and "Noon" must appear above or beside the appropriate one-hour increment.
- Recording days off duty.
- Two or more consecutive 24-hour periods off duty may be recorded on one duty status record if they occur in the same month.
- The graph grid is to be completed as follows:
 - A continuous line shall be drawn between the appropriate time markers for each of the following events:
 - Off duty
 - Sleeper berth resting period
 - Driving
 - On duty not driving
- 4.11.5 Filing Driver's Record of Duty Status
 - The employee is to submit or forward by mail the original driver's record of duty status to their immediate supervisor within 7 days following the completion of the form. The supervisor is to review the information for compliance with program and submit approved originals to their local **HR** contact.
 - Employees operating CMVs for the first time or intermittently are required to submit a signed statement giving the total time on-duty during the preceding 7 days and the time at which the driver was last relieved from duty prior to beginning work.
- 4.11.6 Retention of Driver's Record of Duty Status
 - Original records of duty status, as discussed in Section 4.11.4, are to be submitted to the section HR department contact. The records of duty status and all supporting documents are to be maintained for a period of six months from the date of receipt.
 - The employee is required to retain a copy of each record of duty status for the previous seven consecutive days which is to be in their possession and available for inspection while on duty.

4.12 CMV Inspection, Repair, and Maintenance

- All CMVs owned and/or operated by AECOM must meet FMCSA requirements. Compliance with
 inspection, repair, and maintenance of AECOM CMVs is managed through a business group
 management program that tracks inspection, repair and maintenance. Documentation for
 inspection, repair and maintenance that ensure compliance with FMCSA requirements must be
 maintained at the office where the vehicle is operated.
- Inspection, repair and maintenance records are retained for a period of one year from the inspection, repair and/or maintenance date. Once a CMV is taken out of service the CMV inspection, repair and maintenance records are to be maintained for six months.

5.0 Records

5.1 None

6.0 References

- 6.1 Federal Motor Carrier Safety Administration
- 6.2 USDOT Hazardous Materials Regulations (HMR)

S3NA(US)-404-FM1 Motor Vehicle Driver's Certification of Violations

I (print name) certify that the following is a true:

Section A. Employee has had motor vehicle violations

I have provided a complete list of traffic violations (other than parking violations) for which I have been convicted or forfeited bond or collateral during the past 12 months (insert N/A into first line if there are no violations; do not leave blank):

Date of conviction:	Offense:	Location:	Type of motor vehicle operated:			

Section B. Employee has had no motor vehicle violations

If N/A appears in the table in Section A., I certify that I have not been convicted or forfeited bond or collateral on account of any violation required to be listed during the past 12 months.

Section C. Employee Certification Signature of Review/Acknowledgement

My signature below confirms that I have reviewed the information above, that I have disclosed all required information, and that is true and accurate:

Driver's Printed name:	Driver's Signature:	Date: dd/mm/yyyy

Supervisor's Printed Name	Supervisor's Signature:	Date: dd/mm/yyyy

Once this form has been completed, the supervisor is to submit the original of this form to Human Resources for incorporation into the driver qualification file.



S3NA(US)-404-FM2 CMV Employee Release of Information

This form is required for any individual operating a vehicle that has a GVWR of 10,001 or more.

I (employee's printed name) authorize AECOM's Human Resource Representative to investigate my driving history regarding the operation of commercial motor vehicles.

I understand that as part of the background check, AECOM will contact previous employers as listed in my work history to obtain the following information:

- 1. General driver identification
- 2. Employment verification
- 3. A list of accidents that includes the following:
 - a. Date of accident
 - b. City or town in which or most near where the accident occurred
 - c. State in which the accident occurred
 - d. Driver name
 - e. Number of injuries
 - f. Number of fatalities
 - g. Whether hazardous materials, other than fuel spilled from the fuel tanks of motor vehicles involved in the accident, were released.
 - h. Copies of all accident reports required by state or other governmental entities or insurers
- 4. Driving safety history/performance
- 5. Violations the alcohol and controlled substances prohibitions
- 6. Failure to undertake or complete a substance abuse rehabilitation program if required.
- 7. Successful completion of a substance abuse program
- 8. Alcohol and substance abuse violations:
 - a. Alcohol tests with a result of 0.04 or higher alcohol concentration
 - b. Verified positive drug tests
 - c. Refusals to be tested (including verified adulterated or substituted drug test results)

I grant AECOM permission to contact any states in which I have/had a driver's license. I understand that AECOM will continue to contact states in which I operate a commercial motor vehicle on an annual basis to confirm my driving record/history.

I understand that if I do not permit AECOM to collect this information that I will not be permitted to operate a commercial motor vehicle and subject to other actions under AECOM's employment policies.

My signature below acknowledges that I understand the background check process and grant AECOM permission to collect the information as stated above:

Employee Signature

Date

The CMV Employee (driver operating a vehicle with a GVWR of 10,001 lbs) has the right to

- 1. Review information provided by previous employers. A written request from the employee to AECOM is required to review information provided by a previous employer.
- 2. Have errors in the information corrected by the previous employer and for that previous employer to re-send the corrected information to AECOM.
- 3. Have a rebuttal statement attached to the alleged erroneous information, if the previous employer and the driver cannot agree on the accuracy of the information.



S3NA(US)-404-FM3 Employer Contact Documentation

Contact Date or Attempt	Employer Name	Address	Contact Name	Phone	Mode of Contact	Background Check Information (Background Check Criteria provided in Section II)



S3NA(US)-404-FM4 Human Resource Confirmation of Background Check/Inquiry

I, HR Department representative printed name), have made a good faith effort to contact all states, in accordance with their protocols and previous employers as provided on (employee's printed name) Employment Application. Any information provided by the state and/or employer has been inserted into the employee's personnel file.

The states and employers listed below have not provided any records on the employee or their driving history (N/A indicates that all states and/or employers provided the required information):

State/Company Name	Address	Contact Name	Telephone Number

Human Resources Department Representative Signature

Date

S3NA(US)-404-FM5 Annual Review of Driving Record

- 1. Employee Name:
- 2. License Number:
- 3. Evaluation Period (month/day/year): to
- 4. Name of Evaluator:
- 5. Date of Evaluation:

Ev	aluation questions:	Yes*	No							
1)	Has the employee violated any Federal Motor Carrier Safety Administration FMCSA regulations that would cause a disqualification under 49 CFR?									
2)	Has the employee received any violations that warrant corrective actions in accordance with SH&E 116-Driver and Vehicle Safety Program?									
3)	Has the employee operated a commercial motor vehicle (CMV) while under the influence of alcohol or any controlled substance?									
Re one em	Results: Any yes indication disqualifies the employee from driving a CMV for a period of no less than one (1) year or longer as mandated by other AECOM policies (e.g., SH&E 116). Additionally, the employee may be subject to other disciplinary policies as mandated by AECOM employment policy.									

* Any yes response requires all supporting documentation to be attached and included in the employee's CMV file.

Evaluator Signature

Date



S3NA(US)-404-FM6 Record of Road Test

Form A — Certification of Road Test										
Department Name				Project Name						
Driver's Full I	Name (printed)	S	Social S Number	ecurity		License Number (CDL Employee, CDL Numb	er)	State		
Power Unit/C	MV				Тур	e of Trailer				
This is to certify that the above-named driver was evaluated in accordance with Federal Motor Carrier Safety Administration criteria for "road test" under the direct supervision of 										
type of comm	ercial motor venicle listed ab	ove.	6:	anoturo of C	-	iner	Det	•		
Name	or Examiner		51	gnature of E	-xam	Iner	Dat	e		
Title										
Office/Project	t Address			Lo	catio	n Test Conducted				
	Evaluator is Each All criteria mus	to use criterion t be pas	the crit h is to b ssed to	eria below t e marked p issue certif	o ass ass o icatio	sess driver. or fail. on of road test.				
		Pass	Fail				Pass	Fail		
a. Successfu inspection	າlly execute a pre-trip າ.			f. Pass o	ther	motor vehicles.				
 b. Demonstration uncouplin required if operate in 	ate coupling and g of combination units (only f CMV that employee will cludes combination units).			g. Execut	te left	and right turns.				
c. Initiate op	eration/start-up.			h. Brake	CMV	properly.				
d. Demonstra controls a	ate successful use of nd emergency equipment.			i. Reduc braking	e spe g.	ed by means other than				
e. Operate in operating	traffic typical of normal conditions.			j. Proper length	'ly ba s.	ck up at least two full CMV				
				k. Succes	ssfull	y park.				



S3NA(US)-404-FM7 Pre-Trip Inspection Checklist

PRE-TRIP INSPECTION													
Commercial Motor Vehicle (CMV) Inspection													
(This pre-trip checklist is to be completed by the CMV employee prior to operation of the CMV.)													
Office/ Project Name:	Office/ Project/ Project Name: Location Number												
Date: Time of Inspection													
Driver's Full Nar	ne (printe	d)	License	e Number		State	dd/mm/yyy	v	xx:xx am/pm				
	<u></u> (pe	u)				otato		,					
Power Unit/CMV	′ L	icense Number	State	Expiration Date	Re	egistratio	n/Inspection	E	Expiration				
Type of Trailer	L	icense Number	State	Expiration Date	Re	egistratio	n/Inspection	E	Expiration				
Insurance Provid	dor P	olicy Number	State	Expiration Date	Dr	ovider Co	untact Inform	nation					
Insulance Flow			State		FI			ation					
		INSPECTION ITE	EMS	1		N/A	YES	NO	DATE CORRECTED				
Has this equipme	ent been pr	roperly inspected by a	a CMV cor	mpetent person and									
Are seat belts rea	adily availa	ble and operational?											
Is the horn in wor	king condi	ition?											
Is the steering me	echanism (operational?											
Are all required m	nirrors pres	sent, clean, and adjus	sted for the	e CMV operator?									
Do tires meet ma	nufacturer	's operational criteria	(pressure	e, tread, etc.)?									
Are back-up alarr	ms installe	d as required and ope	erational?										
Are service brake functional?	es, includin	ig trailer brake conne	ctions, and	d parking (hand) bra	ke								
Are turn signals v	isible and	operational?											
Are headlights (Ic	w/high be	am) operational?											
Are brake lights v	isible and	operable?											
Is all cab glass in operational?	tact and fr	ee of distortion? Are	wipers, in	cluding wiper fluid,									
Have all fluids be	en checke	d and comply with op	erations r	nanual criteria?									
Is there an acces	sible fire e	extinguisher?											
Are there at least	three stop	pped vehicle warning	devices?										
If load lines/straps a. Used in b. Rated a	s are in us accordanc	e have they been insp ce with manufacturers ed for this type of load	pected? operatior	nal guidelines?									
Have all coupling	devices b	een inspected and se	cured?										
Insurance card, C	MV registi	ration, CMV employe	e medical	certificate, CDL, etc									
Driver's Signat	ture/												
Inspection Da	te:												

Γ



S3NA(US)-404-FM8 Inspection of Cargo, Cargo Securement **Devices and Systems**

INSPEC	TION OF CAR	GO, 0	CARGO SEC	URE	MEN	T DEVICE	S ANI	D SI	YSTE	MS
		Comme	ercial Motor Vehic	le (C	MV) Ins	pection				
(The	cargo inspection chec	klist, item	s 14 are to be compl	eted b	y the CN	IV employee prio	r to CMV	/ opera	ation.)	
Office/ Project Name:		Pro Loc	ject/ ation Number:							
						Date: Time of I	nspectio	on		
Driver's Full Nan	ne (Printed)	Licens	e Number		State	dd/mm/yyyy		xx:xx	am/pm	1
Power Unit/CMV	License Number	State	Expiration Date	Re	gistratio	n/Inspection	Expira	tion		
Type of Trailer	License Number	State	Expiration Date	Re	gistratio	n/Inspection	Expira	tion		
		NSPEC					N/A		YES	NO
 Cargo is loade Loss of loa Leaking Spilling Blowing of Falling Cargo is immo that the vehicle The following a Tailgate Tailboard Doors Tarpaulins Spare tire Any other 	INSPECTION TIEMS INA TES NO 1. Cargo is loaded and secured to prevent a. Loss of load b. Leaking c. Spilling d. Blowing off e. Falling d. Blowing off e. Falling d. Blowing off e. Falling d. Blowing off d. Blowing off e. Falling d. Blowing off e. Falling d. Blowing off d. Blowing off <th></th>									
a. Obscure th b. Interfere w c. Prevent re d. Prevent th	the driver's view ahead with the free movement ady access to access e free and ready exit c	or to the of the dr pries requ f any per	right or left iver's arms or legs iired for emergencies son from the CMV	to se		cargo within the				
first 50 miles a	fter beginning a trip.	e caryo a		10 260		cargo within the				
 Re-examine ar a. When the b. The CMV c. The CMV d. These insp i. If the c open i ii. The ca 	nd resecure the cargo: driver makes a change has been driven for 3 l has been driven for 15 pection requirements of container/trailer is seale t to inspect the cargo argo has been loaded i	e of duty s nours 0 miles (f lo not app ed and th n a mann	status for b or c, it is whiche bly e driver has been pro er that makes inspec	ver co ovided	omes first written c f its cargo) lirection not to o impracticable.				

S3NA(US)-404-FM9 Post-Trip Inspection Checklist

POST-TRIP INSPECTION													
Commercial Motor Vehicle (CMV) Inspection													
(This post-trip inspection is to be completed by the CMV employee at the end of each shift and/or change in CMV drivers.)													
Office/ Project Name: Project/ Location Number:													
						<u>.</u>	Ī		Dat	te: Time	of In	spec	tion
Driver's Full Nam	e (prin	nted)		Licens	e Numbe	er		State	dd/	/mm/yyy	у	x	x:xx am/pm
Power Unit/CMV		License N	lumber	State	Expira	tion Date	Reg	gistratio	n/Ins	spection	۱	Exp	piration
Type of Trailer		License N	lumber	State	Expira	tion Date	Reg	gistratio	n/Ins	spection	ı	Exp	piration
								_		-			
							<u> </u>		T				DATE
INSPECTION ITE	MS							N/A		YES	N	0	CORRECTED
Has this equipmen	nt been	properly in	spected by	the CMV c	lriver ope	erating the CN	/IV?						
Are seat belts read	dily ava	ailable and o	operational	?									
Is the horn in work	ing cor	ndition?											
Is the steering med	chanisr	m operatior	nal?										
Are all required mi	rrors p	resent, clea	an, and adju	usted for the	e CMV o	perator?							
Do tires meet man	ufactu	rer's operat	ional criteri	a (pressure	e, tread, e	etc.)?							
Are back-up alarm	is insta	lled as requ	uired and o	perational?									
Are service brakes functional?	s, inclue	ding trailer	brake conn	ections, an	d parking	g (hand) brak	e						
Are turn signals vis	sible ar	nd operatio	nal?										
Are headlights (low	v/high	beam) oper	rational?										
Are brake lights vis	sible ar	nd operable	?										
Is all cab glass inta operational?	act and	I free of dis	tortion? Ar	e wipers, in	cluding v	viper fluid,							
Have all fluids bee	n chec	ked and co	mply with c	perations r	manual c	riteria?							
Is there an access	ible fire	e extinguish	ner?										
Are there at least 3	3 stopp	ed vehicle	warning de	vices?									
If load lines/straps a. Used in a b. Rated and	are in accorda d appro	use have th ance with m oved for this	ney been in anufacture s type of loa	spected? rs operatior ad?	nal guide	lines?							
Have all coupling d	levices	been inspe	ected and s	ecured?									
Insurance card, CM immediately access	/IV regi sible.	istration, CI	MV employ	ee medical	certificat	e, CDL, etc.							
Driver's Signatu Inspection Date	ure/ e:												





S3NA(US)-404-WI1 Definitions

1.0 Department of Transportation (DOT) Recordable Accident

- 1.1 An occurrence involving a commercial motor vehicle operating on a highway in interstate or intrastate commerce that results in:
- 1.1.1 A fatality;
- 1.1.2 Bodily injury to a person who, as a result of the injury, immediately receives medical treatment away from the scene of the accident; or
- 1.1.3 One or more motor vehicles incurring disabling damage as a result of the accident, requiring the motor vehicle(s) to be transported away from the scene by a tow truck or other motor vehicle.
- 1.2 The term accident does not include:
- 1.2.1 An occurrence involving only boarding and alighting from a stationary motor vehicle; or
- 1.2.2 An occurrence involving only the loading or unloading of cargo.

2.0 Administrator

2.1 The Federal Motor Carrier Safety Administrator (FMCSA), the chief executive of the FMCSA, an agency within the DOT.

3.0 Adverse driving conditions

3.1 Snow, sleet, fog, other adverse weather conditions, a highway covered with snow or ice, or unusual road and traffic conditions, none of which were apparent on the basis of information known to the person dispatching the run at the time it was begun.

4.0 Alcohol or alcoholic beverage:

4.1 See DOT SAP for definition.

5.0 Alcohol concentration (AC)

5.1 The concentration of alcohol in a person's blood or breath. When expressed as a percentage, AC means grams of alcohol per 100 milliliters of blood or grams of alcohol per 210 liters of breath.

6.0 Commercial driver's license (CDL)

6.1 A license that is issued to an individual by a state or other jurisdiction in accordance with the standards contained in 49 CFR 383 and that authorizes the individual to operate a class of a commercial motor vehicle (CMV)

7.0 Commercial Driver's License Information System (CDLIS)

7.1 The CDLIS established by FMCSA pursuant to section 12007 of the Commercial Motor Vehicle Safety Act of 1986.

8.0 Commercial motor vehicle

- 8.1 CMV that does not require an operator to have a CDL.
- 8.2 Any self-propelled or towed motor vehicle used on a highway in interstate commerce to transport passengers or property when the vehicle:



- 8.2.1 Has a gross vehicle weight rating or gross combination weight rating, or gross vehicle weight or gross combination weight, of \geq 4,536 kg (10,001 pounds) and <11,794 kilograms (26,001) or
 - Is designed or used to transport more than eight passengers, including the driver, for compensation; or
 - Is designed or used to transport more than 15 passengers, including the driver, and is not used to transport passengers for compensation; or
 - Is used in transporting material found by the Secretary of Transportation to be hazardous under 49 U.S.C. 5103 and is transported in a quantity requiring placarding under regulations prescribed by the Secretary under 49 CFR, subtitle B, chapter I, subchapter C.
- 8.3 CMV that requires a CDL operator is a motor vehicle or combination of motor vehicles used in commerce to transport passengers or property if the motor vehicle –
- 8.3.1 Has a gross combination weight rating of 11,794 kilograms or more (26,001 pounds or more) inclusive of a towed unit(s) with a gross vehicle weight rating of more than 4,536 kilograms (10,000 pounds); or
- 8.3.2 Has a gross vehicle weight rating of 11,794 or more kilograms (26,001 pounds or more); or
 - Is designed to transport 16 or more passengers, including the driver; or
 - Is of any size and is used in the transportation of *hazardous materials* as defined in this section.

9.0 Conviction

9.1 An unvacated adjudication of guilt, or a determination that a person has violated or failed to comply with the law in a court of original jurisdiction or by an authorized administrative tribunal; an unvacated forfeiture of bail or collateral deposited to secure the person's appearance in court; a plea of guilty or *nolo contendere* accepted by the court; the payment of a fine or court cost; or a violation of a condition of release without bail, regardless of whether or not the penalty is rebated, suspended, or probated.

10.0 Direct assistance

10.1 Transportation and other relief services provided by a motor carrier or its driver(s) incident to the immediate restoration of essential services (such as electricity, medical care, sewer, water, telecommunications, and telecommunication transmissions) or essential supplies (such as food and fuel). Direct assistance does not include transportation related to the long-term rehabilitation of damaged physical infrastructure or routine commercial deliveries after the initial threat to life and property has passed.

11.0 Direct compensation

11.1 Payment made to the motor carrier by the passengers or a person acting on behalf of the passengers for the transportation services provided and not included in a total package charge or other assessment for highway transportation services.

12.0 Disabling damage

- 12.1 Damage that precludes the departure of a motor vehicle from the scene of an accident in its usual manner in daylight after simple repairs.
 - Inclusions— Damage to motor vehicles that could have been driven but would have been further damaged if so driven.
 - Exclusions
 - Damage that can be remedied temporarily at the scene of the accident without special tools or parts.
 - \circ ~ Tire disablement without other damage even if no spare tire is available.
 - o Headlamp or taillight damage.
 - o Damage to turn signals, horn, or windshield wipers that makes them inoperative.



13.0 Disqualification

13.1 Any of the following three actions:

- The suspension, revocation, or cancellation of a CDL by the state or jurisdiction of issuance.
- Any withdrawal of a person's privileges to drive a CMV by a state or other jurisdiction as the result of a violation of state or local law relating to motor vehicle traffic control (other than parking, vehicle weight, or vehicle defect violations).
- A determination by the FMCSA that a person is not qualified to operate a CMV under Parts 391 and 383 of this chapter.

14.0 Driver applicant (under Part 383)

14.1 An individual who applies to a state to obtain, transfer, upgrade, or renew a CDL.

15.0 Driver's license

15.1 A license that is issued to an individual by a state or other jurisdiction and that authorizes the individual to operate a motor vehicle on the highways.

16.0 Driver

16.1 Any person who operates any CMV.

17.0 Driving time

17.1 All time spent at the driving controls of a CMV in operation.

18.0 Driving a commercial motor vehicle while under the influence of alcohol

- 18.1 Committing any one or more of the following acts in a CMV:
 - Driving a CMV while the person's alcohol concentration is 0.04 or higher;
 - Driving under the influence of alcohol, as defined by state law;
 - Refusal to undergo such testing as is required by any state or jurisdiction.

19.0 Emergency

- 19.1 Any hurricane, tornado, storm (e.g. thunderstorm, snowstorm, ice storm, blizzard, sandstorm, etc.), high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, mud slide, drought, forest fire, explosion, blackout or other occurrence, natural or man-made, that interrupts the delivery of essential services (such as electricity, medical care, sewer, water, telecommunications, and telecommunication transmissions) or essential supplies (such as food and fuel) or otherwise immediately threatens human life or public welfare, provided such hurricane, tornado, or other event results in:
 - A declaration of an emergency by the President of the United States, the governor of a state, or their authorized representatives having authority to declare emergencies; by the FMCSA Field Administrator for the geographical area in which the occurrence happens; or by other federal, state or local government officials having authority to declare emergencies; or
 - A request by a police officer for tow trucks to move wrecked or disabled motor vehicles.
- 19.2 Emergency relief
 - An operation in which a motor carrier or driver of a commercial motor vehicle is providing direct assistance to supplement dtate and local efforts and capabilities to save lives or property or to protect public health and safety as a result of an emergency as defined in this section.

20.0 Employee

20.1 Any individual, other than an employer, who is employed by an employer and who in the course of his or her employment directly affects commercial motor vehicle safety. Such term includes a driver of a



commercial motor vehicle (including an independent contractor while in the course of operating a commercial motor vehicle), a mechanic, and a freight handler. Such term does not include an employee of the United States, any state, any political subdivision of a state, or any agency established under a compact between States and approved by the Congress of the United States who is acting within the course of such employment.

21.0 Employer

21.1 Any person engaged in a business affecting interstate commerce who owns or leases a commercial motor vehicle in connection with that business, or assigns employees to operate it, but such term does not include the United States, any State, any political subdivision of a State, or an agency established under a compact between States approved by the Congress of the United States.

22.0 Endorsement

22.1 An authorization to an individual's CDL required to permit the individual to operate certain types of commercial motor vehicles.

23.0 Fatality

23.1 Any injury that results in the death of a person at the time of the motor vehicle accident or within 30 days of the accident.

24.0 Federal Motor Carrier Safety Administrator (FMCSA)

24.1 The chief executive of the Federal Motor Carrier Safety Administration, an agency within the Department of Transportation.

25.0 Gross combination weight rating (GCWR)

25.1 The value specified by the manufacturer as the loaded weight of a combination (articulated) motor vehicle. In the absence of a value specified by the manufacturer, GCWR will be determined by adding the gross vehicle weight rating (GVWR) of the power unit and the total weight of the towed unit and any load thereon.

26.0 Gross vehicle weight rating (GVWR)

26.1 The value specified by the manufacturer as the loaded weight of a single motor vehicle.

27.0 Groundwater well drilling rig

27.1 Any vehicle, machine, tractor, trailer, semi-trailer, or specialized mobile equipment propelled or drawn by mechanical power and used on highways to transport water well field operating equipment, including water well drilling and pump service rigs equipped to access groundwater.

28.0 Hazardous material

28.1 A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

29.0 Hazardous waste

29.1 Any material that is subject to the hazardous waste manifest requirements of the EPA specified in 40 CFR part 262 or would be subject to these requirements absent an interim authorization to a state under 40 CFR part 123, subpart F.

30.0 Highway

30.1 Any road, street, or way, whether on public or private property, open to public travel. "Open to public travel" means that the road section is available, except during scheduled periods, extreme weather or emergency conditions, passable by four-wheel standard passenger cars, and open to the general



public for use without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight, or class of registration. Toll plazas of public toll roads are not considered restrictive gates.

31.0 Imminent hazard

31.1 The existence of a condition that presents a substantial likelihood that death, serious illness, severe personal injury, or a substantial endangerment to health, property, or the environment may occur before the reasonably foreseeable completion date of a formal proceeding begun to lessen the risk of that death, illness, injury or endangerment.

32.0 Interstate commerce

- 32.1 Trade, traffic, or transportation in the United States --
 - Between a place in a State and a place outside of such State (including a place outside of the United States);
 - Between two places in a State through another State or a place outside of the United States; or
 - Between two places in a State as part of trade, traffic, or transportation originating or terminating outside the State or the United States.

33.0 Intrastate commerce

33.1 Any trade, traffic, or transportation in any State which is not described in the term "interstate commerce."

34.0 Materials and amounts.

- 34.1 A material of trade is limited to the following:
- 34.1.1 A Class 3, 8, 9, Division 4.1, 5.1, 5.2, 6.1, or ORM-D material contained in a packaging having a gross mass or capacity not over --
 - 0.5 kg (1 pound) or 0.5 L (1 pint) for a Packing Group I material;
 - 30 kg (66 pounds) or 30 L (8 gallons) for a Packing Group II, Packing Group III, or ORM-D material;
 - 1500 L (400 gallons) for a diluted mixture, not to exceed 2 percent concentration, of a Class 9 material.
- 34.1.2 A Division 2.1 or 2.2 material in a cylinder with a gross weight not over 100 kg (220 pounds), or a permanently mounted tank manufactured to ASME standards of not more than 70 gallon water capacity for a non-liquefied Division 2.2 material with no subsidiary hazard.
- 34.1.3 A Division 4.3 material in Packing Group II or III contained in a packaging having a gross capacity not exceeding 30 mL (1 ounce).
- 34.1.4 This section does not apply to a hazardous material that is self-reactive (see § 173.124), poisonous by inhalation (see § 173.133), or a hazardous waste.

35.0 Medical examiner

35.1 A person who is licensed, certified, and/or registered, in accordance with applicable State laws and regulations, to perform physical examinations. The term includes but is not limited to, doctors of medicine, doctors of osteopathy, physician assistants, advanced practice nurses, and doctors of chiropractic.

36.0 Motor carrier

36.1 A for-hire motor carrier or a private motor carrier. The term includes a motor carrier's agents, officers and representatives as well as employees responsible for hiring, supervising, training, assigning, or dispatching of drivers and employees concerned with the installation, inspection, and maintenance of motor vehicle equipment and/or accessories.

37.0 Motor vehicle

37.1 Any vehicle, machine, tractor, trailer, or semi-trailer propelled or drawn by mechanical power and used upon the highways in the transportation of passengers or property, or any combination thereof determined by the Federal Motor Carrier Safety Administration, but does not include any vehicle, locomotive, or car operated exclusively on a rail or rails, or a trolley bus operated by electric power derived from a fixed overhead wire, furnishing local passenger transportation similar to street-railway service.

38.0 Multiple-employer driver

38.1 A driver, who in any period of 7 consecutive days, is employed or used as a driver by more than one motor carrier.

39.0 Multiple stops

39.1 All stops made in any one village, town, or city may be computed as one.

40.0 On duty time

- 40.1 All time from the time a driver begins to work or is required to be in readiness to work until the time the driver is relieved from work and all responsibility for performing work. On duty time shall include:
 - All time at a plant, terminal, facility, or other property of a motor carrier or shipper, or on any public property, waiting to be dispatched, unless the driver has been relieved from duty by the motor carrier;
 - All time inspecting, servicing, or conditioning any commercial motor vehicle at any time;
 - All driving time as defined in the term driving time;
 - All time, other than driving time, in or upon any commercial motor vehicle except time spent resting in a sleeper berth;
 - All time loading or unloading a commercial motor vehicle, supervising, or assisting in the loading or unloading, attending a commercial motor vehicle being loaded or unloaded, remaining in readiness to operate the commercial motor vehicle, or in giving or receiving receipts for shipments loaded or unloaded;
 - All time repairing, obtaining assistance, or remaining in attendance upon a disabled commercial motor vehicle;
 - All time spent providing a breath sample or urine specimen, including travel time to and from the collection site, in order to comply with the random, reasonable suspicion, post-accident, or follow-up testing when directed by a motor carrier;
 - Performing any other work in the capacity, employ, or service of a motor carrier; and
 - Performing any compensated work for a person who is not a motor carrier.

41.0 Operator -- See driver.

42.0 Out-of-service order

42.1 A declaration by an authorized enforcement officer of a Federal, State, Canadian, Mexican, or local jurisdiction that a driver, a commercial motor vehicle, or a motor carrier operation, is out-of-service.

43.0 Previous employer

43.1 Any DOT regulated person who employed the driver in the preceding 3 years, including any possible current employer.

44.0 Private motor carrier

44.1 A person who provides transportation of property or passengers, by commercial motor vehicle, and is not a for-hire motor carrier.

45.0 Representative vehicle



45.1 A motor vehicle which represents the type of motor vehicle that a driver applicant operates or expects to operate.

46.0 Secretary - The Secretary of Transportation

47.0 Serious traffic violation (under Part 383)

47.1 Conviction of any of the following offenses when operating a CMV, except weight, defect and parking violations:

- Excessive speeding, involving any single offense for any speed of 15 miles per hour or more above the posted speed limit;
- Reckless driving, as defined by State or local law or regulation, including but not limited to
 offenses of driving a CMV in willful or wanton disregard for the safety of persons or property;
- Improper or erratic traffic lane changes;
- Following the vehicle ahead too closely;
- A violation, arising in connection with a fatal accident, of State or local law relating to motor vehicle traffic control;
- Driving a CMV without obtaining a CDL;
- Driving a CMV without a CDL in the driver's possession. Any individual who provides proof to the
 enforcement authority that issued the citation, by the date the individual must appear in court or
 pay any fine for such a violation, that the individual held a valid CDL on the date the citation was
 issued, shall not be guilty of this offense; or
- Driving a CMV without the proper class of CDL and/or endorsements for the specific vehicle group being operated or for the passengers or type of cargo being transported.

48.0 Tank vehicle

48.1 Any commercial motor vehicle that is designed to transport any liquid or gaseous materials within a tank that is either permanently or temporarily attached to the vehicle or the chassis. Such vehicles include, but are not limited to, cargo tanks and portable tanks, as defined in part 171 of this title. However, this definition does not include portable tanks having a rated capacity under 1,000 gallons.

49.0 Trailer

- 49.1 **Full trailer**: Any motor vehicle other than a pole trailer which is designed to be drawn by another motor vehicle and so constructed that no part of its weight, except for the towing device, rests upon the self-propelled towing motor vehicle. A semi-trailer equipped with an auxiliary front axle (converter dolly) shall be considered a full trailer.
- 49.2 **Pole trailer**: Any motor vehicle which is designed to be drawn by another motor vehicle and attached to the towing motor vehicle by means of a "reach" or "pole," or by being "boomed" or otherwise secured to the towing motor vehicle, for transporting long or irregularly shaped loads such as poles, pipes, or structural members, which generally are capable of sustaining themselves as beams between the supporting connections.
- 49.3 **Semi-trailer**: Any motor vehicle, other than a pole trailer, which is designed to be drawn by another motor vehicle and is constructed so that some part of its weight rests upon the self-propelled towing motor vehicle.

50.0 Transportation of construction materials and equipment

50.1 The transportation of construction and pavement materials, construction equipment, and construction maintenance vehicles, by a driver to or from an active construction site (a construction site between mobilization of equipment and materials to the site to the final completion of the construction project) within a 50 air mile radius of the normal work reporting location of the driver. This paragraph does not apply to the transportation of material found by the Secretary to be hazardous under 49 U.S.C. 5103 in a quantity requiring placarding under regulations issued to carry out such section.

51.0 Truck

51.1 Any self-propelled commercial motor vehicle except a truck tractor designed and/or used for the transportation of property.



52.0 Truck tractor

52.1 A self-propelled commercial motor vehicle designed and/or used primarily for drawing other vehicles.

53.0 Utility service vehicle

53.1 Any commercial motor vehicle:

- Used in the furtherance of repairing, maintaining, or operating any structures or any other physical facilities necessary for the delivery of public utility services, including the furnishing of electric, gas, water, sanitary sewer, telephone, and television cable or community antenna service;
- While engaged in any activity necessarily related to the ultimate delivery of such public utility services to consumers, including travel or movement to, from, upon, or between activity sites (including occasional travel or movement outside the service area necessitated by any utility emergency as determined by the utility provider); and
- Except for any occasional emergency use, operated primarily within the service area of a utility's subscribers or consumers, without regard to whether the vehicle is owned, leased, or rented by the utility.

54.0 Vehicle

54.1 A motor vehicle unless otherwise specified.

55.0 Vehicle group

55.1 A class or type of vehicle with certain operating characteristics



S3NA(US)-404-WI2 Initial Hire Documentation Requirements

MINIMUM CMV EMPLOYEE INFORMATION

Employees who are required to operate a Commercial Motor Vehicle (CMV—defined as a vehicle with a GVWR of 10,001 lbs. or more) as a condition of their employment or reassignment to a new job function must provide the information listed below. The Human Resource Department will collect this information as part of a standardized form, AECOM employment application, and will maintain this information as part of each CMV employee's personnel file:

- 1. CMV employee potential hire (applicant) must complete and sign an AECOM job application.
- 2. The applicant's name, address, date of birth, and Social Security number.
- 3. The addresses at which the applicant has resided during the three years preceding the date on which the application is submitted.
- 4. Application submittal date.
- 5. The issuing state, number, and expiration date of each unexpired driver's license or permit that has been issued to the applicant.
- 6. The issuing state, number, and expiration date of each unexpired CMV operator's license or permit that has been issued to the applicant.
- 7. The nature and extent of the applicant's experience in the operation of motor vehicles, including the type of equipment (such as buses, trucks, truck tractors, semi-trailers, full-trailers, and pole-trailers) that he/she has operated.
- 8. A list of all motor vehicle accidents in which the applicant was involved during the three years preceding the date on which the application is submitted, specifying the date and nature of each accident and any fatalities or personal injuries it caused.
- 9. A list of all violations of motor vehicle laws or ordinances (other than violations involving only parking) of which the applicant was convicted or forfeited bond or collateral during the five years preceding the date on which the application is submitted. Attachment 2 is to be completed by all initial hires to document no violations.
- 10. A statement setting forth in detail the facts and circumstances of any denial, revocation, or suspension of any license, permit, or privilege to operate a motor vehicle that has been issued to the applicant, or a statement that no such denial, revocation, or suspension has occurred.
- 11. A list of the names and addresses of the applicant's employers during the three years preceding the date on which the application is submitted.
- 12. Employment dates.
- 13. The reason for leaving the employment of each employer.
- 14. If the applicant was subject to the FMCSRs while employed by that previous employer:
- 15. If the applicant's prior position(s) was (were) designated safety sensitive functions in any DOT-regulated mode subject to alcohol and controlled substances testing requirements as required by 49 CFR 40.
- a. A signature line stating the following must appear at the end of the application:
- b. The signature certifies that the CMV employee completed this application and that all entries on it and information in it are true and complete to the best of my knowledge. (Date) (Applicant's signature)
- 16. HR creates a "Driver Qualification File."

CDL Employees Only

17. Applicants who operate a CMV of 26,001 lbs. or more will be required to provide a 10- year employment history.

S3NA(US)-404-WI3 Required Emergency Equipment

REQUIRED EMERGENCY EQUIPMENT

1. Fire extinguisher:

- a. Inspected prior to operating CMV to ensure that it is fully charged.
- b. Located so that it is readily accessible.
- c. Securely mounted on the vehicle.
- d. The extinguishing agent is to be freeze resistant.
- e. The extinguishing agent should not pose an inhalation hazard as specified under Underwriters' Laboratories criteria.
- f. CMVs used to transport hazardous materials require a fire extinguisher that has an Underwriters' Laboratories rating 2 of 10 B:C or more.
- g. CMVs that are not used to transport hazardous materials require a fire extinguisher:
 - i. A fire extinguisher having an Underwriters' Laboratories rating 2 of 5 B:C or more; or
 - ii. Two fire extinguishers, each of which has an Underwriters' Laboratories rating 2 of 4 B:C or more.
- h. Each fire extinguisher must be labeled or marked with its Underwriters' Laboratories rating.

2. Spare fuses

a. At least one spare fuse or other overload protective device, if the devices used are not of a reset type, for each kind and size used.

3. Warning devices for stopped vehicles:

- a. Three (3) bidirectional emergency reflective triangles that conform to the requirements of Federal Motor Vehicle Safety Standard No. 125.
 - i. The triangles shall be maintained in a protective container that is always readily accessible.

4. First Aid Kit (Check with Wheels to confirm content)
ΔΞϹΟ/

S3NA-404-WI4 Commercial Motor Vehicle Areas of Responsibility

This work instruction explains the areas of responsibility of the AECOM Commercial Motor Vehicle Program.

SH&E

- Audit the CMV Program
- Monitor training and medical surveillance
- Provide technical assistance

Human Resources

- Collect the information for Driver Qualification files
- Perform employee background checks
- Oversee the DOT Drug and Alcohol Program

Compliance of the CMV Program

Management of the CMV Program

Maintain employee and equipment records that the CMV Program requires

Commercial Motor Vehicle Program



S3NA(US)-404-WI5 Commercial Motor Vehicle New Hire Work Flow

This work instruction explains the work flow that occurs when a new CMV driver is hired in AECOM.





S3NA-405-PR Drilling, Boring, and Direct Push Probing

1.0 Purpose and Scope

- 1.1 Provides the minimum requirements to be followed when drilling and boring work are performed.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

2.1 None

3.0 Attachments

- 3.1 S3NA-405-FM1 Drill Rig Inspection
- 3.2 S3NA-405-FM2 Subsurface Investigation Checklist
- 3.3 S3NA-405-ST Drilling and Boring
- 3.4 S3NA-405-WI Core Drilling Machine Safety Card

4.0 Procedure

- 4.1 All client on-site safety procedures shall be understood and adhered to.
- 4.2 Be aware of the provincial/territorial regulations that govern drill rig operations and exposed moving parts.

4.3 Roles and Responsibilities

- 4.3.1 **Project Manager or Resident Engineer** is responsible for ensuring that sound principles of safety, training, inspection, maintenance, and operation consistent with all resource data available from the manufacturer, OSHA, and ANSI is provided to the operator and users by the Contractor or operating entity.
- 4.3.2 **Site Safety Coordinator (SSC)** shall assist the **Project Manager** in compliance with the requirements of this procedure.
- 4.3.3 The **SH&E Department** shall assist site management with guidance about this procedure.
- 4.3.4 **AECOM employees** engaged in project field activities shall be cognizant of contractor activities that may affect their safety and shall follow these procedures.

4.3.5 **AECOM Equipment Operator**

- In cases where AECOM owns and operates drilling, boring, or probing equipment, the lead equipment operator is responsible for the maintenance and safe operation of equipment under their control consistent with those responsibilities of a Contractor.
- Operations will be terminated during an electrical storm, and all crew members will move away from the rig. If lightning is observed, shut down all rig operations immediately.

4.3.6 Contractors

- **Contractors** have direct control over the application and operation of all drilling, boring, and probing equipment owned by their organization.
- It is the **Equipment Contractor** operator's responsibility to implement safe work practices provided by the **Contractor's** project management or supervisory staff supplemented by good judgment, safe control, and caution whenever operating drilling, boring, and probing equipment.
- 4.3.7 Safety Representative: Unless the Contractor has a designated Safety Representative, the Contractor's responsible person for safety for the drill crew will be the drill rig operator. The safety person's responsibilities are to
 - Consider the "responsibility" for safety and the "authority" to enforce safety to be a matter of first importance.



- Be the leader in using proper personal protective equipment (PPE) and set an example in following the rules that are being enforced on others. See section 4.5 for PPE required by this SOP.
- Enforce the use of proper safety equipment and take appropriate corrective action when proper PPE is not being used.
- Understand that the proper maintenance of tools and equipment and general housekeeping on the drill rig will provide an environment that promotes and enforces safety. See Sections 4.7 and 4.9 for housekeeping and maintenance requirements of this SOP.
- Ensure that the operator has had adequate training and is thoroughly familiar with the rig, its controls, and its capabilities prior to commencement of drilling activities.
- Inspect the I rig at least daily for structural damage, loose bolts and nuts, proper tension in chain drives, loose or missing guards or protective covers, fluid leaks, damaged hoses, and/or damaged pressure gauges and pressure relief valves. A Rig Inspection Form has been provided in S3NA-405-FM1 Drill Rig Inspection for use in performing inspections when the Contractor does not have their own.
- Check and test all safety devices such as emergency shutdown switches at least daily and preferably at the start of a work shift. Rig operation should not be permitted until all emergency shutdown and warning systems are working correctly. Wiring around, bypassing, or removing an emergency device is not permitted.
- Check that all gauges, warning lights, and control levers are functioning properly, and listen for unusual sounds on each starting of an engine.
- Ensure that all new rig workers are informed of safe operating practices on and around the rig. Provide each new rig worker with a copy of the organization's drilling operations safety procedures and, when appropriate, the rig manufacturer's operations and maintenance manual. The safety person should ensure that each new employee reads and understands the safety procedures.
- Ensure that a first aid kit and fire extinguishers are available and properly maintained on each rig and on each additional vehicle.
- Be well trained and capable of using a first aid kit, a fire extinguisher, and all other safety devices and equipment.
- Maintain a list of addresses and telephone numbers of emergency assistance units (ambulance services, police, hospitals, etc.), and inform other members of the drill crew of its location.
- See that new workers are instructed in rig safety, and observe the new worker's progress toward understanding safe operating practices.
- Observe the mental, emotional, and physical capability of workers to perform the assigned work in a proper and safe manner. Dismiss from the job site any worker whose mental and physical capabilities might cause injury to the worker or coworkers.
- Rig Crew and Other Field Personnel (Those employees involved in fieldwork): All personnel engaged in site activities are required to become thoroughly familiar with, and to conform to, the provisions of AECOM's safety plan, procedures, and such other safety directives as may be considered appropriate by **Project Managers**, **Safety Officers**, and **Supervisors**.
- Rig Workers: Personnel are encouraged to offer ideas, suggestions, or recommendations regarding any operational condition, procedure, or practice that may enhance the safety of site personnel or the public. Their primary responsibilities will be:
 - Perform all required work safely.
 - Familiarize themselves with and understand the plan, including proper use of personal protective equipment.
 - o Report any unsafe conditions to supervisory personnel.
 - o Be aware of signs and symptoms of thermal stress.

4.4 Training

- 4.4.1 All staff shall be provided with on-site orientation to the rig and its operator.
- 4.4.2 All operators and assistants shall have industry-standard safety training and be versed in the equipment to be utilized. This may include, but is not limited to, HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.



4.5 Personal Protective Equipment

- 4.6 For most geotechnical, mineral, and/or groundwater drilling projects, PPE should include
 - Hard hat: Hard hats shall be worn by everyone working at a drilling/boring site. Hats should meet the requirements of ANSI Z89 and be kept clean and in good repair with the headband and crown straps properly adjusted for the employee.
 - Safety shoes: Safety shoes or boots shall be worn by all drilling personnel and all visitors to the site who observe operations within close proximity of the rig. Safety shoes or boots should meet the requirements of ANSI Z4 1.1.
 - Safety glasses: All rig personnel shall wear safety glasses meeting the requirements of ANSI Z87.1.
 - High Visibility Class II Safety Vest shall be worn by all **AECOM employees**. All rig personnel should attempt to wear high-visibility clothing that should be close fitting and not have large cuffs or loose material that can catch on rotating or translating components of the rig.
 - Close fitting gloves and clothing: All rig personnel should wear gloves for hand protection against cuts and abrasions that could occur while handling wire rope or cable and from contact with sharp edges and burrs on drill rods and other drilling or sampling tools. Gloves should be close fitting and not have large cuffs or loose ties which can catch on rotating or translating components of the rig.
 - Other protective equipment: For some operations, the project may dictate use of other protective equipment. The management of the contractor and its safety person shall determine the requirements. Such equipment might include face or ear protection or reflective clothing. The design and composition of the protective equipment and clothing should be determined as a joint effort of management and the client.
 - Each worker should wear noise reducing ear protectors around operating equipment or during elevated noise levels.
 - When drilling, boring, or probing is performed in chemically or radiological contaminated ground, special protective equipment and clothing will probably be required.
 - The clothing of the individual rig worker is not generally considered protective equipment; however, clothing should be close fitting and comfortable without loose ends, straps, draw strings or belts or otherwise unfastened parts that might catch on some rotating or translating component of the rig. Rings and jewelry should not be worn during a work shift.

4.7 Housekeeping

- 4.7.1 A key requirement for safe field operations is that the Contractor safety person understands and fulfills the responsibility for maintenance and "housekeeping" on and around the drill rig, including the following:
 - Suitable storage locations should be provided for all tools, materials, and supplies so that tools, materials, and supplies can be conveniently and safely handled without hitting or falling on a member of the crew or a visitor.
 - Storage or transporting tools, materials, or supplies within or on the mast (derrick) of the rig should be avoided.
 - Pipe, drill rods, probe rods, casing augers, and similar tooling should be orderly stacked on racks or sills to prevent spreading, rolling, or sliding.
 - Penetration or other driving hammers should be placed at a safe location on the ground or be secured to prevent movement when not in use.
 - Work areas, platforms, walkways, scaffolding and other accesses should be kept free of materials, debris and obstructions and substances such as ice, grease, or oil that could cause a surface to become slick or otherwise hazardous.
 - All controls, control linkages, warning and operation lights, and lenses should be kept free of oil, grease, and/or ice.
 - Do not store gasoline in any portable container other than a non-sparking, red safety container with a flame arrester in the fill spout and having the word "gasoline" easily visible.



4.8 Traffic Control

- 4.8.1 When operating near public vehicular and pedestrian traffic, the on-site personnel shall take every precaution necessary to see that the work zone is properly established, identified, and isolated from both moving traffic and passerby pedestrians.
- 4.8.2 All traffic control devices shall be installed, placed, and maintained in accordance with the Traffic Control Plan, client specifications, and/or the Manual of Uniform Traffic Control Devices (MUTCD). Traffic control devices shall consist of and not be limited to:
 - Directional and informational signage;
 - High visibility barricades, cones, or barrels;
 - Lighting; and
 - Other equipment and devices as required.

4.9 Maintenance & Inspection

- 4.9.1 Good maintenance and thorough inspection will make operations safer. Maintenance tasks should be done safely by a qualified maintenance person. Inspection and maintenance tasks include but are not limited to the following requirements:
 - Inspections shall be completed at the beginning of each day by the equipment operator and in the presence of an AECOM employee when the equipment is not owned and operated by AECOM. A Rig Inspection Form is provided in S3NA-405-FM1 Drill Rig Inspection for use in performing inspections.
 - Safety glasses should be worn when performing maintenance on a rig or on drilling or probing tools.
 - The drill rig engine should be shut down to make repairs or adjustments to a drill rig or to lubricate fittings (except repairs or adjustments that can only be made with the engine running).
 - Precautions should be taken to prevent accidental starting of an engine during maintenance by removing or tagging the ignition key.
 - Wheels or the lowering of leveling jacks or both should be blocked ("zero energy state") and hand brakes set before working under a drill rig.
 - When possible and appropriate, all pressure on the hydraulic systems should be released as well as the drilling fluid system and the air pressure systems of the drill rig prior to performing maintenance. In other words, reduce the drill rig and operating systems to a "zero energy state" before performing maintenance. Use extreme caution when opening drain plugs and radiator caps and other pressurized plugs and caps.
 - Personnel shall not touch an engine or the exhaust system of an engine following its operation until the engine and exhaust system have adequate time to cool.
 - Welding and cutting shall not occur on or near a fuel tank.
 - Wire rope safety factors shall be in accordance with American National Standards Institute B 30.5-1968 or SAE J959-1966.
 - Gasoline or other volatile or flammable liquids shall not be used as a cleaning agent on or around an I rig.
 - The manufacturer's recommendations should be followed for applying the proper quantity and quality of lubricants, hydraulic oils, and/or coolants.
 - All caps, filler plugs, protective guards, panels, high-pressure hose clamps, chains, or cables that have been removed for maintenance should be replaced.

4.10 Hand Tools

- 4.10.1 A large number of hand tools can be used on or around a drill or probe rig and in repair shops and more than an equal number of instructions for proper use exist. "Use the tool for its intended purpose" is the most important rule. Additionally, equipment operators and assistants should not use their hand in place of the proper tool; work shall be stopped until the correct tool can be found. The following are a few specific and some general suggestions that apply to the safe use of several hand tools that are often used on and around rigs:
 - When a tool becomes damaged, either repair it before using it again or get rid of it.
 - When using a hammer, any kind of hammer for any purpose, wear safety glasses and require all others around you to wear safety glasses.



- When using a chisel, any kind of chisel, for any purpose, wear safety glasses and require all others around you to wear safety glasses.
- Keep all tools cleaned and orderly stored when not in use.
- Use wrenches on nuts; don't use pliers on nuts.
- Use screwdrivers with blades that fit the screw slot.
- When using a wrench on a tight nut, first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and apply force to the wrench with both hands when possible and with both feet firmly placed. Don't push or pull with one or both feet on the drill rig or the side of a mud pit or some other blocking-off device. Always assume that you may lose your footing check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches should be wire brushed frequently to prevent an accumulation of dirt and grease which would otherwise build up and cause wrenches to slip. Replace hook and heel jaws when they become visibly worn.
- Avoid the use pipe wrenches in place of a rod-holding device whenever possible.
- When breaking tool joints on the ground or on a drilling platform, position your hands so that your fingers will not be smashed between the wrench handle and the ground or the platform, should the wrench slip or the joint suddenly let go.

4.11 Clearing Work Areas

4.11.1 Prior to set up, adequate site clearing and leveling should be performed to accommodate the rig and supplies and provide a safe working area. Clearing the site includes clearing the intended drilling area of underground utilities in accordance with *S3NA-417-PR Utilities*, *Underground*. Drilling or probing should not be commenced when tree limbs, unstable ground or site obstructions cause unsafe tool handling conditions.

4.11.2 Start-Up

- All rig personnel and visitors should be instructed to "stand clear" of the rig immediately prior to and during starting of an engine.
- Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the neutral-actuating positions, and the cathead rope is not on the cathead before starting a drill rig engine.
- Start all engines according to the manufacturer's manual.

4.12 **Drilling and Probing Operations**

- 4.12.1 The following safety measures shall be taken during drilling and probing operations on-site:
 - The operator and helper shall be present during all active rig operations.
 - Site personnel shall remain within visual contact of the rig operator.
 - Hard hats, approved safety boots and hearing protection shall be worn in the presence of a rig.
 - Services shall be cleared prior to drilling or probing.
 - Hands shall be kept away from moving parts (augers).
 - The emergency shut-off switch on the rig should be identified to site personnel and tested on a regular basis by the operator.
 - Unauthorized personnel shall be kept clear of the rig.
- 4.12.2 Safety requires the attention and cooperation of every worker and site visitor.
 - Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
 - Before raising the mast (derrick) look up to check for overhead obstructions. Refer to S3NA-417-PR Utilities, Underground and S3NA-406-PR Electrical Lines, Overhead.
 - Before raising the mast (derrick), all rig personnel (with the exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the mast. All rig personnel and visitors should be informed that the mast is being raised prior to raising it.
 - Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig shall be first leveled and stabilized with leveling jacks and/or solid cribbing. The drill rig should be releveled if it settles after initial set up. Lower the mast (derrick) only when the leveling jacks are down, and do not raise the leveling jack pads until the mast (derrick) is lowered completely.



- Before starting drilling operations, secure and/or lock the mast (derrick) if required according to the drill manufacturer's recommendations.
- The operator of a rig should only operate a drill rig from the position of the controls. If the operator of the rig shall leave the area of the controls, the operator should shift the transmission controlling the rotary drive into neutral and place the feed control lever in neutral. The operator should shut down the drill engine before leaving the vicinity of the drill.
- Throwing or dropping tools will not be permitted. All tools should be carefully passed by hand between personnel or a hoist line should be used.
- Do not consume alcoholic beverages or other depressants or chemical stimulants prior to starting work on a rig or while on the job.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area. Exhaust fumes can be toxic and some cannot be detected by smell.
- Clean mud and grease from your boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All air and water lines and pumps should be drained when not in use if freezing weather is expected.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes should be covered, protected, or backfilled adequately and according to local or state regulations on completion of the drilling project.
- "Horsing around" within the vicinity of the drill rig and tool and supply storage areas should never be allowed, even when the rig is shut down.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending or descending. Always use adequate fall protection and a full body harness when climbing above six feet of the ground. Do not attempt to use one or both hands to carry a tool while on a ladder. Use a hoist line and a tool "bucket" or a safety hook to raise or lower hand tools.

4.13 Elevated Derrick Platforms

- 4.13.1 The following precautions should be used:
 - When a rig worker first arrives at a derrick platform, the platform should immediately be inspected for broken members, loose connections, and loose tools or other loose materials.
 - A derrick platform over 4 feet (1.2 m) above ground surface should have toe boards and safety railings that are in good condition.
 - When climbing to a derrick platform that is higher than 6 feet (am), a fall arresting device shall be used. The fall arresting device should consist of a full body harness and fall protection. The harness should fit snugly but comfortably. The lifeline when attached to the derrick should be less than 6 feet (2 m) long and attached to a fall arrester. The harness and lifeline should be strong enough to withstand the dynamic force of a 250-pound (115 kg) weight (contained within the belt) falling 6 feet (2 m).
 - When a rig worker is on a derrick platform, the lifeline should be fastened to the derrick just above the derrick platform and to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
 - Tools should be securely attached to the platform with safety lines. Do not attach a tool to a line attached to your wrist or any other part of your body.
 - When you are working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
 - Loose tools and similar items should not be left on the derrick platform or on structural members of the derrick.
 - Workers on the ground or the drilling floor should avoid being under rig workers on elevated platforms whenever possible.



4.14 Lifting Heavy Objects

- 4.14.1 Before lifting any object without using a hoist, make sure that the load is within your personal lifting capacity. If it is too heavy, ask for assistance.
- 4.14.2 Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform the lifting with the muscles in your legs, not with the muscles in your lower back.
- 4.14.3 If a heavy object shall be moved some distance without the aid of machinery, keep your back straight and unarched. Change directions by moving your feet, not by twisting your body.
- 4.14.4 Move heavy objects with the aid of handcarts or lifting devices whenever possible.

4.15 Use of Wire Line Hoists, Wire Rope, and Hoisting Hardware

- 4.15.1 The use of wire line hoists, wire rope, and hoisting hardware should be as stipulated by the American Iron Steel Institute, Wire Rope Users Manual.
 - All wire ropes and fittings should be visually inspected during use and thoroughly inspected at least once a week for abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper revving, jamming, crushing, bird caging, kinking, care protrusion, and damage to lifting hardware. Wire ropes should be replaced when inspection indicates excessive damage according to the Wire Rope Users Manual. All wire ropes that have not been used for a period of a month or more should be thoroughly inspected before being returned to service.
 - End fittings and connections consist of spliced eyes and various manufactured devices. All
 manufactured end fittings and connections should be installed according to the manufacturer's
 instructions and loaded according to the manufacturer's specifications.
 - If a ball-bearing type hoisting swivel is used to hoist drill rods, swivel bearings should be inspected and lubricated daily to ensure that the swivel freely rotates under load.
 - If a rod-slipping device is used to hoist drill or probe rods, do not drill through or rotate drill rods through the slipping device; do not hoist more than 1 foot (.3 m) of the rod column above the top of the mast (derrick); and do not hoist a rod column with loose tool joints while the rod column is being supported by a rod slipping device. If rods should slip back into the hole, do not attempt to break the fall of the rods with your hands or by applying tension to the slipping device.
 - Most sheaves on exploration drill rigs are stationary with a single part line. The number of parts of line should never be increased without first consulting with the manufacturer of the drill rig.
 - Wire ropes shall be properly matched with each sheave. If the rope is too large, the sheave will pinch the wire rope; if the rope is too small, it will groove the sheave. Once the sheave is grooved, it will severely pinch and damage larger-sized wire ropes and therefore shall be replaced.
- 4.15.2 The following procedures and precautions shall be understood and implemented for safe use of wire ropes and rigging hardware.
 - Use tool-handling hoists only for vertical lifting of tools (except when angle hole drilling). Do not use tool-handling hoists to pull on objects always from the rig; however, drills may be moved using the main hoist if the wire rope is spooled through proper sheaves according to the manufacturer's recommendations.
 - When struck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanism of the drill.
 - When attempting to pull out a mired down vehicle or drill rig carrier, only use a winch on the front or rear of the vehicle and stay as far as possible away from the wire rope. Do not attempt to use tool hoists to pull out a mired down vehicle or drill rig carrier.
 - Minimize shock loading of a wire rope. Apply loads smoothly and steadily. Avoid sudden loading in cold weather.
 - Never use frozen ropes.
 - Protect wire rope from sharp corners or edges.
 - Replace faulty guides and rollers.



- Replace damaged safety latches on safety hooks before using.
- Know the safe working load of the equipment and tackle being used. Never exceed this limit.
- Clutches and brakes of hoists should be periodically inspected and tested.
- Know and do not exceed the rated capacity of hooks, rings, links, swivels, shackles, and other lifting aids.
- Always wear gloves when handling wire ropes.
- Do not guide wire rope on hoist drums with your hands.
- Following the installation of a new wire rope, first lift a light load to allow the wire rope to adjust.
- Never carry out any hoisting operations when the weather conditions are such that hazards to
 personnel, the public, or property are created.
- Never leave a load suspended in the air when the hoist is unattended.
- Keep your hands away from hoists, wire rope, hoisting hooks, sheaves, and pinch points while slack is being taken up and when the load is being hoisted.
- Never hoist the load over the head, body, or feet of any personnel. Never use a hoist line to "ride" up the mast (derrick) of a drill rig.
- Replacement wire ropes should conform to the drill rig manufacturer's specifications.

4.16 Use of Cathead and Rope Hoists

4.16.1 The following safety procedures should be employed when using a cathead hoist:

- Keep the cathead clean and free of rust and oil and/or grease. The cathead should be cleaned with a wire brush if it becomes rusty.
- Check the cathead periodically, when the engine is not running, for rope wear grooves. If a rope groove forms to a depth greater than 1/8 inches (3 mm), the cathead should be replaced.
- Always use a clean, dry, sound rope. A wet or oily rope may "grab" the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast.
- Should the rope "grab" the cathead or otherwise become tangled in the drum, release the rope and sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear. If the rope "grabs" the cathead, and tools are hoisted to the sheaves at the top of the mast, the rope will often break, releasing the tools. If the rope does not break, stay clear of the drill rig until the operator cautiously returns to turn off the drill rig engine and appropriate action is taken to release the tools. The operator should keep careful watch on the suspended tools and should quickly back away after turning off the engine.
- The rope should always be protected from contact with all chemicals. Chemicals can cause deterioration of the rope that may not be visibly detectable.
- Never wrap the rope from the cathead (or any other rope, wire rope or cable on the drill rig) around a hand, wrist, arm, foot, ankle, leg or any other part of your body.
- Always maintain a minimum of 18 inches of clearance between the operating hand and the cathead drum when driving samplers, casing or other tools with the cathead and rope method. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground.
- Never operate a cathead (or perform any other task around a drill rig) with loose unbuttoned or otherwise unfastened clothing or when wearing gloves with large cuffs or loose straps or lacings.
- Do not use a rope that is any longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not use more rope wraps than are required to hoist a load.
- Do not leave a cathead unattended with the rope wrapped on the drum. Position all other hoist lines to prevent contact with the operating cathead rope.
- When using the cathead and rope for driving or back driving, make sure that all threaded connections are tight and stay as far away as possible from the hammer impact point.
- The cathead operator shall be able to operate the cathead standing on a level surface with good, firm footing conditions without distraction or disturbance.



4.17 Use of Augers

- 4.17.1 The following general procedures should be used when starting a boring with continuous flight of hollow-stem augers:
 - Prepare to start an auger boring with the drill rig level, the clutch or hydraulic rotation control disengaged, the transmission in low gear, and the engine running at low RPM.
 - Apply an adequate amount of down pressure prior to rotation to seat the auger head below the ground surface.
 - Look at the auger head while slowly engaging the clutch or rotation control and starting rotation. Stay clear of the auger.
 - Slowly rotate the auger and auger head while continuing to apply down pressure. Keep one hand on the clutch or the rotation control at all times until the auger has penetrated about one foot or more below ground surface.
 - If the auger head slides out of alignment, disengage the clutch or hydraulic rotation control and repeat the hole starting process.
 - An auger guide can facilitate the starting of a straight hole through hard ground or a pavement.
 - The operator and tool handler should establish a system of responsibility for the series of various activities required for auger drilling, such as connecting and disconnection auger sections, and inserting and removing the auger fork. The operator shall ensure that the tool handler is well away from the auger column and that the auger fork is removed before starting rotation.
 - Only use the manufacturer's recommended method of securing the auger to the power coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tools during rotation.
 - Whenever possible, use tool hoists to handle auger sections.
 - Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
 - Never allow feet to get under the auger section that is being hoisted.
 - When rotating augers, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
 - Use a long-handled shovel to move auger cuttings away from the auger. Never use your hands or feet to move cuttings away from the auger.
 - Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.

4.18 Rotary and Core Drilling

- 4.18.1 Rotary drilling tools should be safety checked prior to drilling:
 - Water swivels and hoisting plugs should be lubricated and checked for "frozen" bearings before use.
 - Drill rod chuck jaws should be checked periodically and replaced when necessary.
 - The capacities of hoists and sheaves should be checked against the anticipated weight to the drill rod string plus other expected hoisting loads.
- 4.18.2 Special precautions that should be taken for safe rotary or core drilling involve chucking, joint break, hoisting, and lowering of drill rods:
 - Only the operator of the drill rig should brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck.
 - Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
 - If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
 - In the event of a plugged bit or other circulation blockage, the high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
 - When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your hands to clean drilling fluids from drill rods.



- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

4.19 Site Movement of Equipment

- 4.19.1 The individual who transports a rig on and off a drilling site should:
 - Be properly licensed and should only operate the vehicle according to federal, state, and local regulations.
 - Know the traveling height (overhead clearance), width, length and weight of the rig with carrier and know highway and bridge load, width and overhead limits, making sure these limits are not exceeded with and adequate margin.
 - Never move an I rig unless the vehicle brakes are in sound working order.
 - Allow for mast overhand when cornering or approaching other vehicles or structures.
 - Be aware that the canopies of service stations and motels are often too low for a drill rig mast to clear with the mast in the travel position.
 - Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.
 - Never travel on a street, road, or highway with the mast (derrick) of the rig in the raised or partially raised position.
 - Remove all ignition keys if rig is left unattended.

4.19.2 Loading and Unloading

- Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.
- Load and unload on level ground.
- Use the assistance of someone on the ground as a guide.
- Check the brakes on the rig carrier before approaching loading ramps.
- Distribute the weight of the rig, carrier, and tools on the trailer so that the center of eight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the high of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.
- The rig and tools should be secured to the hauling vehicle with ties, chains, and/or load binders of adequate capacity.

4.19.3 Off-Road Movement

The following safety suggestions relate to off-road movement:

- Before moving a drill rig, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a drill rig carrier before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Discharge all passengers before moving a drill rig on rough or hilly terrain.
- Engage the front axle (for 4 x 4, 6 x 6, etc. vehicles or carriers) when traveling off highway on hilly terrain.
- Use caution when traveling side-hill. Conservatively evaluate side-hill capability of drill rigs, because the arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill. Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Attempt to cross obstacles such as small logs and small erosion channels or ditches squarely, not at an angle.
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.



• After the drill has been moved to a new drilling site, set all brakes and/or locks. Always block/chock the wheels.

4.20 Tires, Batteries, and Fuel

- 4.20.1 Tires on the rig shall be checked daily for safety and during extended travel for loss of air and they shall be maintained and/or repaired in a safe manner. If tires are deflated to reduce ground pressure for movement on soft ground, the tires should be inflated to normal pressures before movement on firm or hilly ground or on streets, roads and highways. Under-inflated tires are not as stable on firm ground as properly inflated tires. Air pressures should be maintained for travel on streets, roads, and highways according to the manufacturer's recommendations. During air pressure checks, inspect for:
 - Missing or loose wheel lugs.
 - Objects wedged between dual or embedded in the tire casing. Damaged or poorly fitting rims or rim flanges.
 - Abnormal wear, cuts, breaks, or tears in the casing.
 - The repair of truck and off-highway tires should only be made with required special tools and following the recommendations of a tire manufacturer's repair manual.
- 4.20.2 Batteries contain strong acid. Use extreme caution when servicing batteries.
 - Batteries should only be serviced in a ventilated area while wearing safety glasses.
 - When a battery is removed from a vehicle or service unit, disconnect the battery ground clamp first.
 - When installing a battery, connect the battery ground clamp last.
 - When charging a battery with a battery charger, turn off the power source to the battery before either connecting or disconnecting charger leads to the battery posts. Cell caps should be loosened prior to charging to permit the escape of gas.
 - Spilled battery acid can burn your skin and damage your eyes. Spilled battery acid should be immediately flushed off of your skin with lots of water. Should battery acid get into someone's eyes, flush immediately with large amounts of water and see a physician at once.
 - To avoid battery explosions, keep the cells filled with electrolyte; use a flashlight (not an open flame) to check electrolyte levels and avoid creating sparks around the battery by shorting across a battery terminal. Keep lighted smoking materials and flames away from batteries.
- 4.20.3 Special precautions shall be taken for handling fuel and refueling the rig or carrier. Only use the type and quality of fuel recommended by the engine manufacturer.
 - Refuel in a well-ventilated area.
 - Do not fill fuel tanks while the engine is running. Turn off all electrical switches. Do not spill fuel on hot surfaces. Clean any spillage before starting an engine. Wipe up spilled fuel with cotton rags or cloths. Do not use wool or metallic cloth.
 - Keep open lights, lighted smoking materials, and flames or sparking equipment well away from the fueling area.
 - Turn off heaters in carrier cabs when refueling the carrier or the drill rig.
 - Do not fill portable fuel containers completely full to allow expansion of the fuel during temperature changes.
 - Keep the fuel nozzle in contact with the tank being filled to prevent static sparks from igniting the fuel.
 - Do not transport portable fuel containers in the vehicle or carrier cab with personnel.
 - Fuel containers and hoses should remain in contact with a metal surface during travel to prevent the buildup of static charge.

4.21 First Aid (see S3NA-207-PR Medical Services and First Aid)

- 4.21.1 At least one member of the crew (and if only one, preferably the drilling and safety supervisor) should be trained to perform first aid. First aid is taught on a person-to-person basis, not by providing or reading a manual. Manuals should only provide continuing reminders and be used for reference. It is suggested that courses provided or sponsored by the American Red Cross or a similar organization would best satisfy the requirements of first aid training for drill crews.
- 4.21.2 For drilling and probing operations it is particularly important that the individual responsible for first aid should be able to recognize the symptoms and be able to provide first aid for electrical shock, heart



attack, stroke, broken bones, eye injury, snake bite, and cuts or abrasions to the skin. Again, first aid for these situations is best taught to drill crewmembers by instructors qualified by an agency such as the American Red Cross.

4.21.3 A first aid kit should be available and well maintained on each drill site. The contents of the first aid kit shall be placed in a weatherproof container with individual sealed packages for each type of item.

4.22 Rig Utilization

- 4.22.1 Do not attempt to exceed manufacturers' ratings of speed, force, torque, pressure, flow, etc.
- 4.22.2 Only use the drill rig and tools for the purposes that they are intended and designed.

4.23 Rig Alterations

4.23.1 Alterations to a rig or drilling or probing tools should only be made by qualified personnel and only after consultation with the manufacturer.

5.0 Records

5.1 None

6.0 References

6.1 None



S3NA-405-FM1 Drill Rig Inspection

Project Name: Date: Site Manager: Project Number:

Subcontractor Inspected:

General Safety		
Safety Officer Designated for Job:	Yes	🗌 No
Name:		
Safety Meeting Performed (Daily)	Yes	🗌 No
Personal Protective Equipment (PPE)		
Hard Hats	🗌 Yes	🗌 No
Safety Glasses	🗌 Yes	🗌 No
Steel-toed Boots	🗌 Yes	🗌 No
Hearing Protection	🗌 Yes	🗌 No
Work Gloves	🗌 Yes	🗌 No
Orange Work Vests	Yes	🗌 No
Traffic Cones and Signs	Yes	🗌 No
Other	🗌 Yes	🗌 No
Disposal of PPE in Proper Waste Containers (if applicable)	🗌 Yes	🗌 No
Comments:		
Daily Inspections of Drill Rig		
Structural Damage, Loose Bolts	Yes	🗌 No
Proper Tension in Chain Drives	🗌 Yes	🗌 No
Loose or Missing Guards, Fluid Leaks	🗌 Yes	🗌 No
Damaged Hoses and/or Damaged Pressure	Yes	🗌 No
Gauges and Pressure Relief Valves	Yes	□ No
Comments:		



Check and test all safety devices such as:		
Emergency shutdown switches, at least daily	Yes	🗌 No
All gauges and warning lights, and ensure control levers are functioning properly	Yes	🗌 No
First aid and fire extinguishers on drill rig	☐ Yes	🗌 No
Back up alarm functioning properly	☐ Yes	🗌 No
Comments:		
Drill Crew Training Requirements		
40-hour OSHA Training	🗌 Yes	🗌 No
8-hour Annual Refresher Training	🗌 Yes	🗌 No
Drill Rig Training/Safe Operating Practices	🗌 Yes	🗌 No
First Aid/CPR	🗌 Yes	🗌 No
Emergency Procedures	🗌 Yes	🗌 No
Emergency Phone Numbers Posted	🗌 Yes	🗌 No
Site Orientation	🗌 Yes	🗌 No
Health and Safety Plan Review	🗌 Yes	🗌 No
Comments:		
Housekeeping		
Suitable storage for tools, materials, and supplies	Yes	🗌 No
Pipes, drill rods, casing, and augers stacked on racks to prevent rolling and sliding	☐ Yes	🗌 No
Platforms and other work areas free of debris materials and obstructions	Yes	🗌 No
Comments:		



Hand Tools		
Tools in good condition	🗌 Yes	🗌 No
Broken tools discarded and replaced	🗌 Yes	🗌 No
Right tool used for the right job	🗌 Yes	🗌 No
Comments:		
Drilling Operations		
Mast or derrick down when moving rig		
Overhead obstructions identified before mast is raised	Yes	🗌 No
Drill rig stabilized using leveling jacks or solid cribbing	🗌 Yes	🗌 No
Secure and lock derrick	🗌 Yes	🗌 No
Comments:		
Overhead and Buried Utilities		
Buried utilities identified and marked	🗌 Yes	🗌 No
Safe distance of drill rig from overhead power lines	🗌 Yes	🗌 No
Comments:		
Wire Line Hoists, Wire Rope, and Hardwa	re	
Inspection for broken wires where reduction in rope diameter, wire diameter,	🗌 Yes	🗌 No
fatigue, corrosion, damage from gear jamming, crushing, bird caging, kinking		
Inspect and lubricate parts daily	∐ Yes	L] No
Comments:		



Auger Operations—what to look for:

- A system of responsibility between the operator and the tool handler when connecting and disconnecting auger sections and inserting and removing auger fork.
- During connecting and disconnecting auger sections and inserting auger for the tool, handler should position himself away from the auger column while it is rotating.
- When securing the auger to the power coupling, pin should be inserted and tapped into place using a hammer or other similar device.
- Tool hoist should be used to lower second section of auger into place.
- Both operators should be clear of auger as it is being lifted into place.
- Long-handled shovel should be used to move dirt away from auger.

Overall Summary:



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S3NA-405-FM2 Subsurface Investigation Checklist

Name of Contractor:		
Location:		Project #:
Date:	Time:	Weather:
Person Conducting Inspection:		Title:

Note: As you conduct your inspection, you should be able to answer each question with a **YES**. If the answer to any question is **NO**, this deficiency should be corrected as soon as possible.

	Deticiency Corrected?		cy ed?	
	YES	NO	ок	N/A
Do on-site personnel have required-level PPE (steel-toe boots, safety vests, hard hats, safety glasses, and gloves)?				
Is there a copy of HASP and EAP available at each drill rig location?				
Are there a PID, multi-gas meter, and a colorimetric pump available at each drill rig location?				
Has the field screening equipment been calibrated in the morning?				
Are calibration gases available at the site?				
Are drilling fluids contained in the mud tub?				
6a. Does mud tub setup provide adequate splash guards to protect the public?				
6b. Does setup present five (5) feet of walk space for the public?				
6c. Will the mud tub be emptied at end of day?				
6d. Explain how the mud tub will be covered to prevent an accident.				
6e. Are adequate containment practices being implemented to prevent mud tub liquids from being released onto pedestrian walkways?				
Is the drill rig properly grounded?				
Is there a DOT permit available on site at each drill rig location?				
8a. Are operations in compliance with DOT permit?				
Is there an orange snow fence with appropriate warning signage erected as a site barrier around the drill rig to keep pedestrians out of the work area?				
Are hydrant water hoses out of the pedestrian sidewalk?				
Are smoking and eating prohibited in the immediate work area?				
Does each drill rig have a fire extinguisher, absorbent materials to cleanup a spill, and a first aid kit?				
Is the waste from the mud tub properly contained in 55-gallon drums?				
13a. Are drums properly labeled?				
Are proper housekeeping procedures followed to avoid slips, trips, and falls?				
Are decontamination/hand washing facilities available at the site?				

S3NA-405-FM2 Subsurface Investigation Checklist

Revision 0 09 June 2010March 2011

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COMMENTS:



S3NA-405-ST Drilling and Boring

Jurisdiction	Regulation
United States	
OSHA	29CFR 1910.212
Canada	
Alberta	OHS Code (2009) Sect 310, 362
British Columbia	OHS Regulation (1997) Sect 8.10, 16.27, 16.28
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 16.5, 22.5
New Brunswick	OHS Regulation (91-191) Sect 237, 241, 242
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 52, 61, 68, 71, 73
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 87, 88
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 39, 97, 141, 220
Ontario	O. Reg. 851 Sect 24
Prince Edward Island	OHS Regulations (EC180/87) Sect 30.2, 30.8
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 340
	Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 2.10.2, 3.10.13
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 135
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 1.12, 7.19



S3NA-405-WI Core Drilling Machine Safety Card

1.0 Objective / Overview

1.1 Core drilling machines are used on all types of jobs. They can be electrical or gas powered and come with a stand or can be hand held. Caution should be used when operating such a machine. It may look harmless and easy to run, but drilling machines have many hazards.

2.0 Safe Operating Guidelines

- 2.1 Clean the flanges before mounting the blade.
- 2.2 Make sure the blade is correct for the material being cut and that the arrow on the blade corresponds with the direction of rotation of the machine spindle.
- 2.3 Avoid tilting the blade when cutting.
- 2.4 Use only the machines that have an approved safety guard.
- 2.5 Remove the diamond blade from the machine during transit to prevent accidental damage.
- 2.6 Inspect the blades frequently to detect cracks or undercutting of the steel center.
- 2.7 Don't let excessive heat be generated at the cutting edge of the blade.
- 2.8 Use adequate water supply to both sides of the blade.
- 2.9 Follow the manufacturers recommended pulley sizes and operating speeds for specific blade diameters.
- 2.10 Make sure to tighten drive belts to ensure full available power.
- 2.11 Don't force the blade on the blade shaft or mount blade on an undersized spindle.

3.0 Potential Hazards

- 3.1 Electrical shock.
- 3.2 Flying debris.
- 3.3 Severe cuts.
- 3.4 Hearing loss.
- 3.5 Breathing fumes or dust.
- 3.6 Binding/biting torque control.



4.0 Training Requirements

- 4.1 Review of Applicable SOPs (e.g., S3NA-305-PR Hand and Power Tools; S3NA-302-PR Electrical, General).
- 4.2 Demonstrated knowledge on the use of a coring machine.
- 4.3 Review and follow manufacturers' operating guidelines.

5.0 Personal Protective Equipment (Level D PPE)

- 5.1 Leather gloves.
- 5.2 Face shield.
- 5.3 Steel-toed/composite-toed boots.
- 5.4 Hearing protection.



5.5 Respirator or dust mask.

6.0 Other Safety Tips

- 6.1 Keep fingers and hands away from the cutting edge.
- 6.2 Hold handle firmly when operating.
- 6.3 A subsurface utility clearance should be performed prior to initiating drilling operations.
- 6.4 Stand firmly and apply body weight at anchored side of guarded platform.



S3NA-406-PR Electrical Lines, Overhead

1.0 Purpose and Scope

- 1.1 Provides the safe work requirements to be observed where overhead power lines are present on a job site.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 Types of overhead lines:
- 2.1.1 Overhead power lines
- 2.1.2 Structural cable supports
- 2.1.3 Guy wires
- 2.1.4 Cable television / communication lines

3.0 Attachments

3.1 S3NA-406-FM Overhead Electrical Lines Acknowledgement Form

4.0 Procedure

- 4.1 An appropriate distance must be kept between equipment and overhead utility lines.
- 4.2 **Employees** must contact the power line operator before work is done or before equipment is operated within 15.25 metres (50 feet) of an energized overhead power line, in order to:
- 4.2.1 Determine the voltage of the power line, and
- 4.2.2 Establish the appropriate safe limit of approach distance as identified by provincial/territorial regulations.
- 4.3 The safe limit of approach distances do not apply to a load, equipment, or building that is transported under energized overhead power lines if the total height, including equipment transporting it, is less than 4.15 metres (13.5 feet).
- 4.4 **Employers** or **Project Managers** must formally notify (using the S3NA-406-FM Overhead Electrical Lines Acknowledgement form) all subcontractors or equipment operators of an energized overhead power line before work is done or equipment is operated in the vicinity of the power line at distances less than the safe limit of approach distances and obtain the operator's assistance in protecting workers involved.
- 4.5 **Employees** must not place earth or other material under or beside an overhead power line if doing so reduces the safe clearance to less than the safe limit of approach distances.
- 4.6 To maintain minimum safe clearances:
- 4.6.1 Install warning devices and signs (hang a sign from and mark all guy wires to warn traffic of low clearance; provide warning signage for all overhead services).
- 4.6.2 Install telescopic, nonconductive posts and flagging across right-of-way at the minimum allowable clearance as allowed by regulations for the line voltage.
- 4.6.3 Position signs or other devices to determine the "Danger Zone."
- 4.6.4 Inform all on-site staff with the on-site clearances required.
- 4.6.5 Beware of atmospheric conditions, such as temperature, humidity, and wind, that may dictate more stringent safety procedures.
- 4.7 Operation of heavy equipment and cranes in areas with overhead power lines represents a significant hazard to all personnel on the job site. Accidental contact with an energized line or arcing between a



high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. Although maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. If work will (or may) occur within 50 feet of any energized line, the procedures outlined below will be observed.

- 4.8 Overhead power lines will be identified on each job site before the work commences. For each identified line, the **Project Manager** must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders, cranes, etc.) will occur within 50 feet (15.25 metres) of the line. Unless verified, it will be assumed that all lines are energized.
- 4.9 Safe working distance is the minimum distance that must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins and is based on the line voltage of the power line. Figure 4-1 lists the line voltages in kilovolts and the Minimum Safe Work Distance in the United States and Figure 4-2 indicates the Nominal Phase to Phase voltage rating in kilovolts for Canada. The following safe working distance criteria will be applied for all AECOM operations:

Line Voltage (Kilovolts)	Minimum Safe Working Distance
0 – 50	10 feet
>50 - 200	15 feet
>200 - 350	20 feet
>350 - 500	25 feet
>500 – 750	35 feet
>750 – 1,000	45 feet

Figure 4-1: United States Overhead Line Criteria

Source: American National Standards Institute, Publication B30.5.

Figure 4-2: Canadian Overhead Line Criteria

Column 1	Column 2
Nominal phase-to-phase voltage rating	Minimum Distance
Over 425 to 12,000	3.0 metres
Over 12,000 to 22,000	3.0 metres
Over 22,000 to 50,000	3.0 metres
Over 50,000 to 90,000	4.5 metres
Over 90,000 to 120,000	4.5 metres
Over 120,000 to 150,000	6.0 metres
Over 150,000 to 250,000	6.0 metres
Over 250,000 to 300,000	7.5 metres
Over 300,000 to 350,000	7.5 metres
Over 350,000 to 400,000	9.0 metres

Source: Canada Occupational Health and Safety Regulations Electrical Safety- Subsection 8.5(6).



- 4.10 Under no circumstances will any object pass closer than 3 metres to any energised, uninsulated electrical line.
- 4.11 Formally notify all subcontractors of Overhead Power lines with the attached S3NA-406-FM Overhead Electrical Lines Acknowledgement form.

4.12 Acceptable Safety Procedures

- 4.12.1 Where any work task will not allow the minimum safe working distance to be maintained at all times, an alternate means of protection must be identified and approved by the **SH&E Department.** In order of preference, acceptable procedures are
 - De-energize the power line(s)/lockout by local utility authorities
 - Install insulated sleeves on power lines
 - Assign line spotters to assist the equipment operator

4.12.2 De-energize Power Lines

• Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site power lines are under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the owner of the line (generally the local electrical utility). Therefore, de-energizing of a line requires advance coordination with the line owner; generally, at least one week advance notice should be provided.

4.12.3 Install Insulating Sleeves

- Insulating sleeves can be placed over power lines to provide a contact and arcing barrier if work must occur closer to the power lines than the accepted safe work distance. Although not as desirable as line de-energizing, the use of these sleeves can provide an acceptable alternative where electrical lines are required to remain in service.
- As with de-energizing of distribution and transmission lines, placement of insulating sleeves can be performed only by the line owner. This requires advance coordination with the line owner; generally, at least one week advance notice should be provided. To install the sleeves, representatives of the line owner will require access to the job site.

4.12.4 Assign Line Spotters

- A line spotter is a person located at ground level who is assigned to observe equipment operations, with the specific duty of assisting the equipment operator to ensure that no part of the equipment gets too close to an energized, unprotected electrical line.
- Persons assigned to act as line spotters must meet the following requirements:
 - While acting as a line spotter, no other duties may be performed (e.g., the line spotter cannot also act as the load spotter during a lifting operations).
 - The spotter will have a radio or other direct means of communicating with the equipment operator at all times.
 - The spotter will be positioned at a right angle to the equipment operator's line of sight to maximize the sight angles between the personnel.

Under no circumstances will any portion of a piece of equipment pass closer than 10 feet to any energized, uninsulated electrical line.

4.13 Additional Safety Measures

- 4.13.1 The following additional safety measures can be implemented as needed when working around energized power lines:
 - Provide equipment with proximity warning devices. These provide an audible alarm if any part of the equipment gets too close to a line.
 - Install ground safety stops. These prevent vehicles from accidentally entering hazardous areas.
 - Equip cranes with a boom-cage guard. This prevents the boom from becoming energized if an electrical line is contacted.
 - Utilize insulated links and polypropylene tag lines. These prevent the transmission of electricity to loads or tag line handlers if an electrical line is contacted.



NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures in Section 4.1.

- 4.13.2 If an electrical power line is hit or an electrical arc occurs:
 - All ground personnel must evacuate IMMEDIATELY to a distance of at least 50 feet (15.25 metres). DO NOT attempt to rescue any injured person until the line can be de-energized.
 - The operator should remain in the cab until the line can be de-energized and should carefully try to extricate the equipment from the power line. This may not be possible where melting of insulator material or metal has occurred.
 - Contact the line owner to report the line contact and request that the line be de-energized immediately.
 - Once the line has been confirmed to be de-energized, the operator can safely evacuate the cab and rescue can commence for any injured personnel.
 - Contact the SH&E Department to report the incident and implement any instructions provided.
 - If the operator must evacuate while the line is still energized (because of fire or other lifethreatening condition) he/she should jump clear of the equipment (making sure to avoid touching the equipment and the ground simultaneously), and land upright and with feet together. Once on the ground, proceed in a direct line away from the equipment using a short, shuffling gait (feet touching, sliding each foot no more than 1 foot forward at a time) to minimize shock hazard from electrical energy being transmitted through the ground.

5.0 Records

5.1 None

6.0 References

6.1 None



S3NA-406-FM Overhead Electrical Lines Acknowledgement

Company information				
Name of Employer or Contracting Operation:				
Address:				
City:	Prov	ince:	Postal Code	ə :
Telephone:		Fax:		
Project name:				
AECOM contact name:				
Acknowledgement				
I acknowledge that I have received a copy of the S3NA-406-PR Electrical Lines, Overhead, I understand that this project site may have Overhead Electrical Hazards, and I have discussed this procedure with all of our company staff who will be on this site.				
Name and Title (Print)	:	Signature		Date



S3NA-417-PR Utilities, Underground

1.0 Purpose and Scope

- 1.1 Establishes requirements to ensure that underground installations are identified properly before excavation work commences.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Underground Utilities:** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling and communications, etc.
- 2.2 **Ground Disturbance (GD):** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

3.0 Attachments

- 3.1 S3NA-417-FM Identifying Underground Installations Checklist
- 3.2 S3NA-417-WI One Call System Definition and Directory
- 3.3 S3NA-417-ST Underground Utilities

4.0 Procedure

- 4.1 Ground disturbance may be a conducted for a variety of purposes, including, but not limited to, exposing existing buried lines, soil sampling, remedial excavations, or installing monitoring wells or test pits.
- 4.2 Improper ground disturbance may impact a buried pipeline or utility line and cause a major release of a hazardous substance, flood, or electrocution. Serious injuries and significant property damage have resulted from insufficient/inadequate identification of underground installations during the course of ground disturbance work.
- 4.3 To control hazards associated with coming in contact with such installations, the American Public Works Association's (APWA) guidelines for the uniform identification of underground installations has been adopted.
- 4.4 **Project Managers** are responsible for ensuring that all work, including the identification, location, and access to all underground utilities, is planned and performed in accordance with contract specifications and safety requirements.
- 4.4.1 The planning for associated work and avoidance of contacting underground utilities shall be part of the project safety planning in the HASP.
- 4.5 The **Lead Site Manager or Supervisor** is responsible for the execution of work in accordance with this and other associated AECOM SOPs, including:
 - The review of the HASP.
 - Verification that all steps have been taken to identify existing underground utilities in the area to be disturbed.
- 4.6 **Region SH&E Manager** provides guidance as needed.

4.7 **Personal Protective Equipment**

- Long sleeved shirt and pants (coveralls/Nomex LILA for upstream oil and gas)
- Safety toe boots
- Hard hat
- High-visibility clothing
- Gloves
- Respirator with organic vapor/particulate filter cartridge (for use when the exposure exceeds the occupational exposure limit stated on the MSDS), as required

S3NA-417-PR Utilities, Underground Revision 0 01 March 2011



Hydrogen Sulfide (H2S) Monitor (for areas with known or suspected H2S

4.8 Training

- 4.8.1 Staff shall successfully complete a Ground Disturbance training course.
- 4.8.2 Some clients may also have required client-based Ground Disturbance training.

4.9 Underground Utility Lines

- 4.9.1 To avoid injury from electrical and other utilities on site, utility lines shall be located and marked prior to conducting any drilling or digging on site. If available, refer to site drawings or client interviews for information pertaining to utilities on site.
- 4.9.2 Types of underground lines:
 - Gas line
 - Potable water line
 - Raw water line
 - Sewer line
 - Power line
 - Cable television/communication line
 - Cathodic protection lines
 - Grounding cable
 - Process piping/flow line
- 4.9.3 Prior to conducting the ground disturbance, you shall locate all pipelines and utilities that pass within (30 m) of the work area. This is your search and control area. To do so, you need to do the following:
 - Notify all pipeline and utility companies, and confirm that their notification requirements are fulfilled prior to conducting a ground disturbance.
 - Identify pipelines, power lines, utilities, and irrigation canals in a 30-foot (9.1 m) zone of the work area with the owner of the utility.
 - On private property, a properly trained and competent third party utility locator shall be used.
 - Get approval for work within a right-of-way (ROW) or within 15 feet (4.6 m) of a line if there is no ROW.
 - Prepare a site map identifying the search area, the ground disturbance area, and known underground utilities.
 - Confirm that all pipelines, power lines, and utilities are marked.
- 4.9.4 Look for pipeline indicators:
 - Look for warning signs where pipelines cross roads or water courses.
 - Look for cut lines, wells, tanks, or valves that may indicate the presence of pipelines.
 - Look for ground settling from previous work.
 - Talk to nearby landowners and residents.
 - Look for vegetation appearing "different" from the surrounding vegetation (e.g., greener, taller, shorter, or more brown than surrounding vegetation).
- 4.9.5 When you are working within a pipeline right-of-way, you shall get written approval from the pipeline owner prior to doing your work.
- 4.9.6 Call the pipeline owner at least two full working days before you dig so the pipeline can be located and marked.
- 4.9.7 Expose the pipeline by hand/hydrovac before digging within 15 feet (4.6 m) of the pipeline with machinery (no machinery comes may come within 2 feet [60 cm] of the pipeline) with the supervision of the owner or their representative, and call the owner at least one full day before you cover the exposed line.



4.9.8 During ground disturbance:

- All underground utilities shall be hand exposed or hydrovac'd within 3.3 feet (1 m) of a mark out
 or within the distance required by the owner of the utility before operating any mechanized
 equipment.
- Make arrangements for supervision ("a Signal Person") during hand exposure.
- If for any reason these hand excavations are temporarily filled in, mark them.
- Make arrangements for supervision ("a Signal Person") during any mechanical excavation within 5 m of the underground utility.
- Make arrangements for supervision ("a Signal Person") during backfilling of utilities.
- Cutting back and shoring of excavations shall be completed to ensure that there are no cave-ins (follow SOP S3NA-303-PR Excavation and Trenching).
- Do not damage utilities by shovels when hand exposing and picks should not be used.
- Remember that all workers have the right and responsibility to refuse to carry out any work or procedures that they feel are unsafe.
- If the ground disturbance is deeper than 3.3 feet (1 m), all crew members shall have appropriate training for excavations and trenches and shall be protected from cave-ins or sliding/rolling materials (follow SOP S3NA-303-PR Excavation and Trenching).
- Remember that incidents, injuries, and near misses shall be reported immediately.
- Review the site-specific emergency response plan.
- 4.9.9 If you hit an underground facility, stop the work immediately and notify the owner of the facility.
 - The owner shall be informed of the location of the contact and the type of damage that resulted.
 - If the facility is a pipeline, the company (client) shall immediately notify the required agencies and regulatory bodies of the location of the contact and the type of damage that resulted.
 - The government agencies will require a written record and the company (client) should conduct an incident investigation into the causes and make recommendations for the future prevention of this incident.

4.10 Identification of Installations

- 4.10.1 Various forms of underground utility lines or pipes may be encountered during AECOM deployments to field sites. Damaged utilities, in particular, can present other hazards including asbestos, explosion, electric shock, scalding, etc., and they shall be avoided. The presence of damaged utilities at any work location shall be immediately brought to the attention of the field Lead Manager or other member of the AECOM site management team.
- 4.10.2 Guidance will be provided on the appropriate action to be taken, which could include suspension of work until the responsible utility agency is contacted and the hazard is either isolated or eliminated.
- 4.10.3 Extreme caution shall always be exercised when attempting to locate underground utilities. The location of utilities can be in some cases not consistent as shown on drawings, as indicated by the placement of surface signage, or as described by personnel. Coordination and planning of the job shall be required with the client or owner.
 - Prior to digging and drilling operations, the client shall always be informed of the potential location(s) of underground utility systems.
 - If a utility permit is required from the client or owner, it shall be secured.
 - The client shall explain how the utility line may be identified—e.g., red concrete encasement.
 - All underground installations shall be considered "live" and "operational" until the owner, client, or utility authority isolates any hazardous energy or deactivates the system and can demonstrate that condition.
 - Where a line placement and depth is known or suspected and where there is potential for contact, hand digging, or hand auguring, instrumentation and other investigative techniques shall be used.
- 4.10.4 The One Call System Definition and Directory or its equivalent shall be used to prepare for excavation work in the event the identity of an underground installation(s) is unknown.
- 4.10.5 Line location documentation (or appropriate regional agency or company) provides a listing of companies that have registered buried facilities in the proposed work area. Some public utilities and private companies are not members of the One Call System. In order to give line operators sufficient



time to respond to a request to locate, a minimum waiting period of 72 business hours is required prior to beginning work.

4.10.6 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines contained in this SOP or as contract-specified.

4.11 Surface Markings

- 4.11.1 Color-coded surface marks (paints or similar coatings) shall be used to indicate the type, location, and route of buried installations. Additionally, to increase visibility, color-coded vertical markers (temporary stakes or flags) shall supplement surface marks.
- 4.11.2 All marks and markers shall indicate the name, initials, or logo of the company that owns or operates the installation and the width of the installation if it is greater than two inches.
- 4.11.3 If the surface over the buried installation is to be removed, supplemental offset marking shall be used. Offset markings shall be on a uniform alignment and shall clearly indicate that the actual installation is a specific distance away.

4.12 Uniform Color-Coding

- 4.12.1 The colors and corresponding installation type are as follows unless otherwise contract-specified.
- 4.12.2 Red: Electric Power Lines, Cables, Conduit, and Lighting Cables
- 4.12.3 Yellow : Gas, Oil, Stream, Petroleum, or Gaseous Materials
- 4.12.4 Orange :Communication, Alarm or Signal Lines, Cables, or Conduit
- 4.12.5 Green: Sewers and Drain Lines
- 4.12.6 White : Proposed Ground Disturbance area
- 4.12.7 Pink: Temporary Survey Markings
- 4.12.8 Purple: Nonpotable Water

5.0 Records

- 5.1 The following records on the identification of and response to underground utilities will be maintained in the project files:
- 5.1.1 All information regarding the identification of underground installations (this information can also be transferred to the appropriate drawings and/or prints and shall be available on site).
- 5.1.2 Drawings and/or prints shall be maintained for the life of this project.
- 5.1.3 Identifying Underground Installations Checklist.

6.0 References

6.1 American Public Works Association, Excavator's Damage Prevention Guide and One-Call System Directory International 1990-1991, Utility Location and Coordination Committee.



S3NA-417-FM Identifying Underground Installations Checklist

Name of Contractor:			
Location:	Project #:		
Type of Ground Disturbance Planned:			
Date:	Time:	Weather:	
Person Conducting Inspe	Title:		

Responsibilities of the Ground Disturbance Contractor

Supply as much pertinent information as possible when calling in location (house #, pole #, facility #, landmark to measure distance, nearest intersection, etc.)

	Completed	N/A
Notify the One-Call Center 3 business days in advance but no more than 10 days prior to activities.		
Hand expose or hydrovac within 2 feet (60cm) of a mark out or within the distance required by the owner of the utility before operating any mechanized equipment.		
Mark and identify perimeter of proposed site of excavation or boring locations in white.		
Protect and preserve markings, staking, or other designations until no longer necessary for safe excavation, demolition, or blasting.		
Obtain new ticket every 30 business days.		
Check surrounding area before initiating ground disturbance.		
Recordkeeping		
Confirmation number received.		
Copy of mark-out ticket readily available.		
Site Map documenting ground disturbance area and identified utilities completed.		
Records have been maintained to document any damage.		

Comments:



S3NA-417-WI One Call System Definition and Directory

1.0 What Is It?

1.1 It is a communication system established by two or more utilities, governmental agencies, or other operators of underground facilities to provide one telephone number for excavating contractors and the general public to call for notification of their intent to use equipment for excavating, tunneling, demolition, or any other similar work. This one-call system provides the participating members an opportunity to identify and locate their underground facilities.

2.0 Why Is It Needed?

2.1 Damage to underground facilities increased considerably following the building boom of the 1950s, 1960s, and early 1970s when the trend was to go underground with utilities. Thousands of miles of underground facilities were vulnerable to excavating machines such as backhoes, and the resulting damage interrupted utility service and threatened life, health, and property.

3.0 How to Get It

3.1 Write or call the number of the Utility Location and Coordination Council (ULCC) One-Call Systems International Committee representing the area within your American Public Works Association (APWA) region shown on the map. They will be pleased to assist you. For further information on ULCC programs, write APWA headquarters.

4.0 Disclaimer

4.1 The purpose of this directory is to illustrate the extent of one-call service available. The accuracy of information is not guaranteed by APWA or the one-call systems. Users must verify information including the extent and limit of service from local sources.

Province/State	One-Call Agency	Number
Canada		
British Columbia	http://www.bconecall.bc.ca/	1.800.474.6886
Alberta	http://www.alberta1call.com/	1.800.242.3447
Saskatchewan	http://www.sask1stcall.com/	1.866.828.4888
Manitoba	www.callb4udig.mb.ca/	1.800.827.5094
Ontario	http://www.on1call.com/	1.800.400.2255
Québec	http://www.info-ex.com/	1.800.663.9228
British Columbia	http://www.bconecall.bc.ca/	1.800.474.6886
United States	http://www.mail-house.com/utility.htm	811
Alabama	Alabama Line Location Center, Inc.	1.800.292.8525
Alaska	Locate Call Center of Alaska, Inc.	1.800.478.3121
Arizona	Arizona Blue Stake, Inc.	1.800.STAKE.IT
		(1.800.782.5348)
Arkansas	Arkansas One Call System, Inc.	1.800.482.8998
California	Underground Service Alert North	1.800.227.2600
Colorado	Utility Notification Center of Colorado	1.800.922.1987

S3NA-417-WI One Call System Definition and Directory

Revision 0 01 March 2011



Province/State	One-Call Agency	Number
Connecticut	Call Before You Dig	1.800.922.4455
Delaware	Miss Utility of Delmarva	1.800.282.8555
Florida	Call Sunshine	1.800.432.4770
Georgia	Utilities Protection Center, Inc.	1.800.282.7411
Idaho	Dig Line	1.800.342.1585
	Kootenai County Utility Coordinating Council	1.800.428.4950
	One Call Concepts – Idaho	1.800.626.4950
	Palouse Empire Underground Coordinating Council	1.800.822.1974
	Shoshone County One Call	1.800.398.3285
	Utilities Underground Location Center	1.800.424.5555
Illinois	Digger (Chicago Utility Alert Network)	312.744.7000
	Julie, Inc.	1.800.892.0123
Indiana	Indiana Underground Plant Protection Services, Inc.	1.800.382.5544
Iowa	Underground Plant Location Service, Inc.	1.800.292.8989
Kansas	Kansas One-Call Center	1.800.DIG.SAFE
Kentucky	Kentucky Underground Protection Inc.	1.800.752.6007
Louisiana	Louisiana One Call System, Inc.	1.800.272.3020
Maine	Dig Safe – Maine	1.800.225.4977
Maryland	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.282.8555
Massachusetts	Dig Safe – Massachusetts	1.800.322.4844
Michigan	Miss Dig System, Inc.	1.800.482.7171
Minnesota	Gopher State One Call	1.800.252.1166
Mississippi	Mississippi One-Call System, Inc.	1.800.227.6477
Missouri	Missouri One Call System, Inc.	1.800.344.7483
Montana	Utilities Underground Location Center	1.800.424.5555
Nebraska	Diggers Hotline	1.800.331.5666
Nevada	Underground Service Alert North	1.800.227.2600
New Hampshire	Dig Safe – New Hampshire	1.800.225.4977
New Jersey	Garden State Underground Plant Location Service	1.800.272.1000
New Mexico	New Mexico One Call System, Inc.	1.800.321.ALERT
New York	New York City – Long Island One Call Center	1.800.272.4480
	Underground Facilities Protective Organization "UFPO"	1.800.962.7962
North Carolina	The North Carolina One Call Center, Inc.	1.800.632.4949

S3NA-417-WI One Call System Definition and Directory Revision 0 01 March 2011



Province/State	One-Call Agency	Number
North Dakota	Utilities Underground Location Center	1.800.454.5555
Ohio	Ohio Utilities Protection Service	1.800.362.2764
Oklahoma	Call Okie	1.800.522.6543
Oregon	Douglas Utilities Coordinating Council	1.503.673.6676
	Josephine Utilities Coordinating Council	1.503.476.6676
	Rogue Basin Utility Coordinating Council	1.503.779.6676
	Utilities Notification Center	1.800.332.2344
	Utilities Underground Location Center	1.800.424.5555
Pennsylvania	Pennsylvania One Call System, Inc.	1.800.242.1776
Rhode Island	Dig Safe – Rhode Island	1.800.225.4977
South Carolina	Palmetto Utility Protection Service Inc. "PUPS"	1.800.922.0983
South Dakota	South Dakota One Call	1.800.781.7474
Tennessee	Tennessee One-Call System, Inc.	1.800.351.1111
	Rogue Basin Utility Coordinating Council	1.503.779.6676
	Utilities Notification Center	1.800.332.2344
Utah	Blue Stakes Location Center	1.800.662.4111
Vermont	Dig Safe – Vermont	1.800.225.4977
Virginia	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.441.8355
	Miss Utility of Virginia	1.800.552.7001
Washington	Chelan-Douglas Utilities Coordinating Council	1.509.663.6111
	Grays Harbor & Pacific County Utility Coordinating Council	1.206.532.3550
	Inland Empire Utility Coordinating Council	1.509.456.8000
Utah	Blue Stakes Location Center	1.800.662.4111
Vermont	Dig Safe – Vermont	1.800.225.4977
Virginia	Miss Utility	1.800.257.7777
	Miss Utility of Delmarva	1.800.441.8355
	Miss Utility of Virginia	1.800.552.7001
Washington	Chelan-Douglas Utilities Coordinating Council	1.509.663.6111
	Grays Harbor & Pacific County Utility Coordinating Council	1.206.532.3550
	Palouse Empire Utilities Coordinating Council	1.800.822.1974
	Upper Yakima County Underground Utilities Council	1.800.553.4344
	Utilities Council of Cowlitz County	1.360.425.2506
	Utilities Notification Center	1.800.332.2344
	Utilities Underground Location Center	1.800.424.5555
West Virginia	Miss Utility of West Virginia, Inc.	1.800.245.4848
Wisconsin	Diggers Hotline, Inc.	1.800.982.0299
Wyoming	Albany County Utility Coordinating Council	1.307.742.3615
	Call-in Dig-in Safety Council	1.307.382.9811
	Carbon County Underground Utility Coordinating Council	1.307.324.6666
	Central Wyoming Utilities Coordinating Council	1.800.759.8035

S3NA-417-WI One Call System Definition and Directory

Revision 0 01 March 2011


Province/State	One-Call Agency	Number			
	Converse County Utility Coordination Council	1.800.562.5561			
	Fremont County Utility Coordinating Council	1.800.489.8023			
	Southeast Wyoming Utilities Coordinating Council	1.307.638.6666			
	Southwest Wyoming One Call	1.307.362.8888			
	Utilities Underground Location Center	1.800.454.5555			
	Wyoming One-Call	1.800.348.1030			
	Palouse Empire Utilities Coordinating Council	1.800.822.1974			
	Upper Yakima County Underground Utilities Council	1.800.553.4344			
	Utilities Council of Cowlitz County	1.360.425.2506			
	Utilities Notification Center	1.800.332.2344			
	Utilities Underground Location Center	1.800.424.5555			
West Virginia	Miss Utility of West Virginia, Inc.	1.800.245.4848			



S3NA-417-ST Underground Utilities

1.0 Regulations

- 1.1 Every province and territory has strict regulations governing the procedures and practices that MUST be followed. As these regulations vary slightly, before work can commence, the Project Manager MUST review these documents and identify how all of the hazards will be addressed and how the regulations will be adhered to:
- 1.1.1 Occupational Health and Safety Code
- 1.1.2 Regional or industry-specific regulations (e.g., Alberta EUB (Pipeline Act).

2.0 Occupational Health and Safety Regulations

2.1 The following Occupational Health and Safety regulations apply directly to ground disturbance:

Jurisdiction	Regulation
United States	
OSHA	CFR 1926.651
Canada	
Alberta	OHS Code (2009) Sect 441 – 464, Schedule 9
British Columbia	OHS Regulation (1997) Sect 20.78 – 20.101
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 26.0 – 26.47
New Brunswick	OHS Regulation (91-191) Sect 93 – 94.1, 180 – 188
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 139 – 148
Nova Scotia	OHS Regulation (N.S. Reg. 44/99) Sect 153, 166 – 173
NWT/NU Territories	General Safety Regulations (R.R.N.W.T. 1990, c. S-1), Safety Act (SI-013-92) Sect 396 – 432
Ontario	O. Reg. 213/91 Sect 6, 7, 222 – 242
Prince Edward Island	OHS Regulations (EC180/87) Sect 12.1 – 12.15
Quebec	Safety Code for the Construction Industry (R.R.Q. 1981, c. S-2.1, r. 6) Sect 3.15.1 – 3.15.10
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 257 – 265, Schedule Table 17
Yukon Territory	OHS Regulations (O.I.C. 2006/178) Sect 10.62 – 10.72



S3NA-505-PR Cold Stress Prevention

1.0 Purpose and Scope

- 1.1 To protect workers from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all workers can be repeatedly exposed without adverse health effects.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Cold Stress:** The production of physiological effects due to cold temperatures and\or wind chill.
- 2.2 Equivalent Chill Temperature (ECT): Also known as Wind Chill (see below)
- 2.3 Frostnip: Superficial cooling of tissues without cellular destruction.
- 2.4 **Frostbite:** Freezing of tissue, resulting in tissue destruction.
- 2.5 **Hypothermia:** Condition of reduced core body temperature to 95°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 Attachments

- 3.1 S3NA-505-WI1 Temperature Thresholds
- 3.2 S3NA-505-WI2 Symptoms and Treatment
- 3.3 S3NA-505-ST Cold Exposure

4.0 Procedure

4.1 Restrictions

- 4.1.1 Staff working in extreme cold (wind chill or ECT below 10°F or -12°C) shall not work alone.
- 4.1.2 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frost bite.
 - If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist.
 - Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure.
 - Schedule work for the warmest part of the day or when the wind is most calm.
 - Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
 - Because prolonged exposure to cold air or to immersion in cold water at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection shall be used.

4.2 Roles and Responsibilities

4.2.1 **Project Managers/field task managers**

- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign personnel physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating worker capability.
- Confirm personnel are properly trained to recognize the symptoms of cold stress.



4.2.2 **Region SH&E Managers**

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.
- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.2.3 Supervisors

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that personnel are physically capable of performing the assigned tasks and are not in a
 physically compromised condition.

4.2.4 Employees

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly vested condition.
- Report all suspected cold stress-related illnesses.

4.3 Training

- 4.3.1 Before they begin work in a cold environment, project staff who might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. Workers that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress.
- 4.3.2 Personnel potentially exposed to cold stress will receive training including, but not limited to:
 - Sources of cold stress, the influence of protective clothing, and the importance of acclimatization
 - How the body loses heat.
 - Recognition of cold-related illness symptoms
 - Cold stress preventative/corrective measures
 - Tthe harmful effects of excessive alcohol consumption in a cold stress environment
 - The hazards associated with unstable snow or ice build ups
 - First aid procedures for symptoms related to cold stress

4.4 **Personal Protective Equipment**

- 4.4.1 Wear multiple layers of loose fitting clothing to maintain immobile layers of warm air next to the body.
- 4.4.2 Avoid cotton, especially blue jeans.
- 4.4.3 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.
- 4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.
- 4.4.5 Confirm extra blankets or sleeping bags are on-site.
- 4.4.6 Sunglasses and sunscreen should be used when there is a persistent combination of snow and direct sun.
- 4.4.7 If shelter is not readily available, consider supplying temporary shelters
- 4.4.8 Confirm that staff carry fire starter materials if working in remote areas..
- 4.4.9 Pack warm, sweet drinks, and high calorie food for snacks.



4.5 General Cold Stress Prevention Measures

- 4.5.1 In order to prevent hypothermia:
 - Wear multiple layers of clothing to maintain immobile layers of warm air next to the body. Avoid cotton, especially blue jeans.
 - When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
 - Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
 - Next remove head gear and neck wrappings.
 - o Then coats/parkas should be opened at the waist and sleeves.
 - Finally, layers of clothing should be taken off.
 - When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.
 - Garments worn to keep out rain and spray should also allow water vapor to escape.
 - Take advantage of heat from the sun and stay out of the wind as much as possible.
 - Have available emergency shelter providing protection from wind and rain and insulation from the ground.
 - Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
 - Get adequate rest; conserve energy.
 - Get adequate nutrition to replenish energy stores; rest after meals.
 - Drink adequate fluids to avoid dehydration.
 - If any project staff member shows signs of hypothermia, stop and treat him/her.
- 4.5.2 In order to prevent frost bite:
 - Dress to prevent hypothermia and protect the feet and hands.
 - Avoid obstruction of circulation by, for example, tight boots or tightly fitting clothing.
 - Avoid nicotine, particularly cigarettes, and alcohol.
 - Keep ears and nose covered and out of the wind.
 - Frostbite of the corneas of the eyes can be prevented by protective goggles.
 - Adopt a "buddy system" of constantly watching the faces of others in the party for white skin tissue, which is evidence of frostbite (frostnip).
 - Practice constant personal vigilance for signs of trouble in one's own fingers and toes; when in doubt, investigate thoroughly before it is too late.
- 4.5.3 Adequate, insulating dry clothing that will help maintain core temperatures above 96.8°F (37°C) shall be provided to workers if work is performed in air temperatures below 40°F (5°C). Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.
- 4.5.4 An Equivalent Chill Temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in *S3NA-505-Wl1 Temperature Thresholds*. Unless unusual or extenuating circumstances exist, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32°F (0° C) regardless of wind speed. However, older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions that should be considered.
- 4.5.5 Continuous exposure of skin should not be permitted when the air speed and temperature results in an ECT of -25°F (-32°C) or below.
- 4.5.6 At air temperatures of 40°F (5°C) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.



- 4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.
- 4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.
- 4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.
- 4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.
- 4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.
- 4.5.12 Supplies such as PPE, fuels, enclosures, de-icing, traction aids, warm drinks, and batteries will be specified by the SH&E Manager and/or the Project Manager. These supplies will be inspected at least weekly during cold weather projects and replaced when necessary.

4.6 Cold Stress Prevention Measures for the Hands

- 4.6.1 Special protection of the hands is required to maintain manual dexterity for the prevention of accidents including, but not limited to the following:
 - If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60°F (15° C), special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30°F (-1° C).
 - If the air temperature falls below 60°F (15° C) for sedentary work, 40°F (5° C) for light work, or 20°F (-6° C) for moderate work, and fine manual dexterity is not required, workers should use gloves.
- 4.6.2 To prevent contact frostbite, workers should wear anti-contact gloves:
 - When cold surfaces below 20°F (-6° C) are within reach, each worker should be warned to prevent inadvertent contact by bare skin.
 - If the air temperature is 0°F (-18° C) or less, workers should protect their hands with mittens.
 Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.
- 4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40°F (5° C). The workers should wear cold protective clothing appropriate for the level of cold and physical activity.
- 4.6.4 Additional Cold Stress Prevention Measures For work practices at or below 10°F (-12° C) ECT, the following will apply:
 - The worker should be under constant protective observation (buddy system or supervision).
 - The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
 - New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing.
 - The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
 - The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.
 - Workers should be instructed in safety and health procedures, which should address:
 - Proper rewarming procedures and appropriate first aid treatment.
 - Proper clothing practices.
 - Proper eating and drinking habits.
 - Recognition of impending frostbite.



- Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
- Safe work practices.
- 4.6.5 Eye protection for workers employed outdoors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against blowing ice crystals and ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.
- 4.6.6 Workers handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of "cryogenic fluids" or those liquids with a boiling point that is just above ambient temperature.
- 4.6.7 Trauma sustained in freezing or subzero conditions requires special attention, because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Work-Warming Regimen

- 4.7.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below -15°F (-26°C), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure.
- 4.7.2 The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.
- 4.7.3 When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing should be loosened to permit sweat evaporation or a change of dry work clothing provided.
- 4.7.4 A change of dry work clothing should be provided as necessary to prevent workers from returning to the cold environment with wet clothing.

5.0 Records

- 5.1 Training records will be maintained by the SH&E Department
- 5.2 Exposure assessments will be documented in the project files.

6.0 References

6.1 See attachment S3NA-505-WI1 Temperature Thresholds.



S3NA-505-WI1 Temperature Thresholds

1.0 Purpose and Scope

Table 1. Wind Chill Chart (C)

	Wind Speed in km/hour											
Actual Temp	8	16	24	32	40	48	56	64	72	80		
(0)	Ambient Temperature (°C)											
0	-2	-8	-11	-14	-16	-17	-18	-19	-19	-20		
-5	-7	-14	-18	-21	-23	-25	-26	-27	-28	-28		
-10	-12	-20	-25	-28	-31	-33	-34	-35	-36	-36		
-15	-18	-26	-32	-35	-38	-40	-42	-43	-43	-44		
-20	-23	-32	-38	-43	-46	-48	-50	-51	-52	-52		
-25	-28	-38	-45	-50	-53	-56	-57	-59	-59	-60		
-30	-33	-45	-52	-57	-61	-63	-65	-67	-67	-68		
-35	-39	-51	-59	-64	-68	-71	-73	-75	-75	-76		
-40	-44	-57	-65	-71	-75	-79	-81	-83	-83	-84		
-45	-49	-63	-72	-78	-83	-86	-89	-90	-91	-92		
-50	-54	-69	-79	-85	-90	-94	-96	-98	-99	-100		

Note: A. Little Danger: if less than one hour of exposure to dry skin.

B. Danger: Exposed flesh freezes within one minute.

C. Great Danger: Flesh may freeze with in 30 seconds.

Source: *Threshold Limit Values (TLVTM) and Biological Exposure Indices (BEITM) booklet; published by ACGIH, Cincinnati, Ohio.

Estimated				Actual	Tempera	ture Rea	ding (°F))					
Wind Speed	50	40	30	20	10	0	-10	-20	-30	-40			
(mph)	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	LITTLE DANGER INCREASING GREAT DANGER									GER			
>40 mph	DANGER												
have little additional	Trenchfoot and immersion foot may occur at any point on this chart.												
effect													

Table 2. Equivalent Chill Temperature Chart (F)

^{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 3. Work-Warming Schedule Guidelines

Air Temp.	No Not W	ticeable ind	5 mph Wind		10 mph Wind 15 m		15 mp	h Wind	20 mph Wind		25 mph Wind		Air Temp.		
(Sunny Sky) °F	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	(Sunny Sky) ℃		
above 5°									Normal Work		Normal Work Schedule		above -15 [°]		
5° to -1°					Normal Work		Normal Work		Norma Scho	al Work edule	Sch	edule	100 min	2	-15 [°] to -17 [°]
0° to -4°	Norma	al Work	Normal Work Schedule		Schedule				100 min	2	75 min	2	-18 [°] to -20 [°]		
-5° to –9°	Sche	edule					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 2 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			-29 [°] to -31 [°]		
-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	30 5 min 5					-32° to -34°		
-30° to -34°	55 min	3	40 min	4	30 min	5					Cooce Work		-35° to -37°		
-35° to -39°	40 min	4	30 min	5					Cease Work		Cease work		-38° to -39°		
-40° to -44°	30 min	5	Cease Work		Cease Work		Cease work						-40° to -42°		
-44 [°] & below	Cease	e Work			Cease Work										-43 [°] & below

Modified from ACGIH 2002 Threshold Limit Values for Chemical Substances and Physical Agents.

Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.

- Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions one step lower. For unacclimated workers apply the schedule for conditions two steps lower. These modifications are additive.
- Note 3: For work under 25%–50% overcast/clouds, apply the schedule for conditions one step lower. For work at night or under greater then 50% overcast/clouds, apply the schedule for conditions two steps lower. These modifications are additive with any applicable modifications from Note 2.
- Note 4: For wind speeds in excess of 25 mph, cease all nonemergency work when temperatures fall below 5°F.



S3NA-505-WI2 Symptoms and Treatment

1.0 Cold Stress-related Illnesses

1.1 Frostbite

- 1.1.1 Frostbite is a localized cold injury characterized by freezing of the tissues with ice crystal formation.
- 1.1.2 This injury is almost always limited to the upper and lower extremities or to such appendages as the ears or nose.
- 1.1.3 Conditions conducive to frostbite include sub-zero temperatures, hypothermia (most important predisposing factor), dehydration, obstruction of the blood supply to the extremities (by constricting clothing, especially on the feet or at the wrists or ankles), contact with cold metal, contact with organic liquids (such as gasoline or solvents that have been left outdoors in sub-zero temperatures), use of substances that cause vasoconstriction (such as smoking tobacco), or other injury or shock.
- 1.1.4 Symptoms of frostbite include:
 - Pain in the involved tissue is the earliest symptom.
 - Sudden and complete cessation of cold or discomfort in affected fingers or toes, often followed by a pleasant feeling of warmth.
 - Subsequently the only symptom may be the absence of any sensation in the frozen part.
 - Paleness in the affected tissues.
 - Firm or hard tissues.
 - Purple tissue, if a large area, such as an entire hand or food, is frostbitten.
- 1.1.5 If exposure occurs in temperatures that are below freezing (32°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Symptoms due to frostbite may include, but is not limited to:
 - Superficial redness of the skin
 - Slight numbness
 - Blisters
 - Obstruction of blood flow (ischemia)
 - Blood clots (thrombosis)
 - Skin discoloration due to insufficient oxygen in the blood (cyanosis)
- 1.1.6 Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration.
- 1.1.7 Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

1.2 Hypothermia

- 1.2.1 Hypothermia is a lower than normal body temperature that occurs when outer cold cools the body faster than the body can produce heat to stay warm.
- 1.2.2 Hypothermia can be caused by exposure to wind, cold, and/or moisture. The combination of wind, cold, and moisture can be deadly.
- 1.2.3 Early warning signs of hypothermia:
 - Feeling of being cold and tired.
 - Heavier breathing and increased pulse rate.
 - Tendency to keep moving (e.g., stamping feet, rubbing hands, continued walking/pacing).
 - Goose bumps, holding arms tightly wrapped around the body, hunching of shoulders.



- Shivering.
- 1.2.4 Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years after the initial hypothermia episode. Symptoms of hypothermia may include, but are not limited to:
 - Pain in the extremities.
 - Severe shivering and numbness.
 - Low core body temperature.
 - Drowsiness and muscular weakness.
 - Apathy.
 - Mental confusion.
 - Loss of consciousness.
 - Shock.
 - Decreasing pulse and breathing rate.

2.0 Recommended Treatment for Cold Stress-related Illnesses

2.1 Frostbite

- 2.1.1 Wrap the victim in woolen blanket and keep dry until he or she can be brought inside.
- 2.1.2 Remove the victim from the cold environment.
- 2.1.3 Do not rub, chafe, or manipulate frozen parts.
- 2.1.4 Place the victim in warm water (102°F to 105°F) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold; refreezing can cause significant tissue damage.
- 2.1.5 Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
- 2.1.6 Do not allow the victim to walk if his or her feet are affected.
- 2.1.7 Have the victim gently exercise the affected parts once they are thawed.
- 2.1.8 Seek immediate medical attention for thawing of serious frostbite.

2.2 Hypothermia

- 2.2.1 Bring the victim into a warm room or shelter as quickly as possible.
- 2.2.2 Give artificial respiration and stop any bleeding, if necessary.
- 2.2.3 If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets, or some other insulation between the victim and the ground.
- 2.2.4 Remove all wet clothing.
- 2.2.5 Provide an external heat source, because the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water, or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.
- 2.2.6 Do not allow the victim to sleep.
- 2.2.7 Give warm, sweet drinks. Do not give alcohol or pain relievers.
- 2.2.8 Keep the victim still. Do not try to walk.
- 2.2.9 Do not rub numb skin.
- 2.2.10 Get medical attention as soon as possible.

S3NA-505-ST Cold Exposure

The following Occupational Health and Safety regulations apply directly to cold and snow hazards:

Jurisdiction	Regulation						
United States							
OSHA	Title 29, Code of Federal Regulations, Sections 1910.1027 and 1926.1127						
Canada							
Alberta	n/a						
British Columbia	OHS Regulation (1997) Sect 7.33 – 7.38						
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.14						
New Brunswick	OHS Regulation (91-191) Sect 44						
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10						
Nova Scotia	n/a						
NWT/NU Territories	n/a						
Ontario	O. Reg. 851 Sect 39, 129						
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1						
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Schedule 4						
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70						
	Cold Conditions Guidelines for Outside Workers						
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9						

S3NA-507-PR Hazardous Materials Communication / WHMIS

1.0 Purpose and Scope

- 1.1 Provides a Hazard Communication Program so that AECOM employees are informed of the hazards of the chemicals to which they may be exposed in the course of their work by way of container labeling and other forms of warning, material safety data sheets (MSDS), and employee training.
- 1.2 This procedure applies to all AECOM North America based employees and operations.
- 1.3 The program applies to the use of any hazardous substances which are known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

2.0 Terms and Definitions

Additional definitions can be found in the Hazardous Material Regulations (HMR), the Transportation of Dangerous Goods (TDG) Regulations, and the International Air Transport Association (IATA) Dangerous Goods Regulation (DGR).

- 2.1 **Acute Effect:** An adverse effect on the human body with immediate onset of symptoms.
- 2.2 Article: A manufactured item: (1) which is formed to a specific shape or design during manufacture; (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and, (3) which does not release or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.
- 2.3 **Carcinogen:** Those chemicals appearing in any of the following reference sources are established as carcinogens for hazard communication purposes:
 - National Toxicology Program (NTP) Annual Report on Carcinogens.
 - International Agency for Research on Cancer (IARC) Monographs, Volumes 1-34. Note: The Registry
 of Toxic Effects of Chemical Substances published by NIOSH indicates whether a substance has
 been found by NTP or IARC to be a potential carcinogen.
- 2.4 **Chemical Name:** The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.
- 2.5 **Chronic Effect:** An adverse effect on the human body with symptoms which develop slowly over a long period of time or which frequently recur.
- 2.6 **Combustible Liquid:** Any liquid having a flash point at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flash points of 200°F (93.3°C), or higher, the total volume of which makes up 99% or more of the total volume of the mixture.
- 2.7 **Common Name:** Any designation or identification such as code name, code number, trade name or brand name used to identify a substance other than by its chemical name.
- 2.8 **Container:** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains a hazardous chemical. For purposes of this Safety Operating Procedure (SOP) and Occupational Safety and Health Administration (OSHA) standard, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.
- 2.9 Establishment: Any separate and distinct AECOM office, laboratory or other company facility.
- 2.10 **Exposure:** Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes or otherwise come into contact with a hazardous substance.



- 2.11 **Flammable:** A substance that falls into one of the following categories:
 - Flammable Aerosol: An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or flashback (a flame extending back to the valve) at any degree of valve opening;
 - Flammable Gas: A gas that at ambient temperature and pressure:
 - Forms a flammable mixture with air at a concentration of 13% of volume or less; or
 - Forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.
 - Flammable Liquid: Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flash points of 100°F (37.8°C) or higher, the total of which make up 99% or more of the total volume of the mixture.
 - Flammable Solid: A solid, other than a blasting agent or explosive as defined in 8 CCR 5237(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.
 - A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than onetenth of an inch per second along its major axis.
- 2.12 **Flash Point:** Minimum temperature of a liquid at which it gives off sufficient vapors to form an ignitable mixture with the air near the surface of the liquid or within the container used.
- 2.13 **Hazardous Chemical:** Those chemicals appearing in any of the following reference sources are established as hazardous chemicals for hazard communication purposes.
 - 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, OSHA.
 - Hazardous Products Act, R.C.S. 1985, c. H-3, section 2, Canada
 - For operations within the state of California, the list of hazardous substances prepared by the California Director of Industrial Relations pursuant to Labor Code Section 6382. The concentrations and footnotes, which are applicable to the list, shall be understood to modify the same substance on all other source lists or hazard determinations set forth in § 8 CCR 5194(d)(3)(B) and (d)(5)(D).
- 2.14 **Hazardous Substance:** A hazardous chemical or carcinogen, or a product or mixture containing a hazardous chemical or carcinogen provided that:
 - The hazardous chemical is 1% or more of the mixture or product or 2% if the hazardous chemical exists as an impurity in the mixture; or
 - The carcinogen is 0.1% or more of the mixture or product.
 - Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.
- 2.15 The following materials are not covered by the Hazard Communication Standard:
 - Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC 6901 et seq.) when subject to regulations issued under that act by the Environmental Protection Agency.
 - Tobacco or tobacco products
 - Wood or wood products. Note: Wood dust is not exempt since the hazards of wood dust are not "self-evident" as are the hazards of wood or wood products
 - Consumer products (including pens, pencils, adhesive tape) used in the work place under typical consumer usage
 - Articles (i.e. plastic chairs)
 - Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place



- · Foods, drugs, cosmetics in retail store packaged for retail sale
- Any drug in solid form used for direct administration to the patient (i.e., tablets or pills)
- 2.16 **Hazardous Substance Inventory (HSI) / WHMIS Log:** A listing of all chemicals stored or used at an office or project site. Note that the list may be imbedded in a project Health and Safety Plan.
- 2.17 **Immediate Use:** Means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- 2.18 **MSDS:** A Material Safety Data Sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Controlled Products regulations, schedule 1).
- 2.19 **MSDS Administrator:** The individual or group designated by the Office Manager to maintain the establishment-specific inventory list or log and the MSDS binder required if that establishment uses or stores hazardous substances.
- 2.20 **NFPA:** A system of categories, colors and numbers was created to provide basic hazard information. It enables firefighters and other emergency personnel to easily decide whether or not to evacuate an area or proceed with emergency control operations. The three principal categories of identification are Health, Flammability and Instability. A numerical range of "0 to 4" indicates the severity of the hazard. A "4" indicates the most severe and a "0" indicates a minimal hazard.
- 2.21 **Mixture:** Any solution or intimate admixture of two or more substances which do not react chemically with each other.
- 2.22 **Reactivity:** A measure of the tendency of a substance to undergo chemical reaction with the release of energy.
- 2.23 **Solubility:** The ability of substance to blend and mix uniformly with another.
- 2.24 **Specific Gravity (density):** Ratio of the weight of a substance to the weight of the same volume of another substance. As used in this directive, specific gravity or density refers to the weight of substance as compared to the weight of an equal volume of water.
- 2.25 **Vapor Density:** The weight of a vapor-air mixture resulting from the vaporization of a volatile liquid at equilibrium temperature and pressure conditions, as compared with the weight of an equal volume of air under the same conditions.
- 2.26 WHMIS: The Workplace Hazardous Materials Information System (WHMIS) is Canada's national hazard communication standard. The key elements of the system are cautionary labeling of containers of WHMIS "controlled products", the provision of material safety data sheets (MSDSs) and worker education and training programs.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 Region SH&E Managers will:
 - Audit their regional offices to assure that they maintain an establishment-specific Hazardous Substance Inventory (HSI).
 - Audit their regional offices to assure that if an establishment-specific HSI is required, that MSDSs are available for each substance listed on the HSI.
 - Provide interpretation of MSDSs and hazard information for WHMIS labels/NFPA labels and other information to assist in training employees.
 - Provide hazard communication training to AECOM employees and file documents of this training in the Corporate SH&E office.

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• Review MSDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.1.2 Office Managers will:

- Have an operations-specific, written hazard communication program which at least describes how the requirements of this Procedure and the US OSHA and Canadian Hazard Communication requirements for labels and other forms of warning, material safety data sheets, and employee information and training will be met.
- Appoint an MSDS administrator for their establishment if they store or use hazardous substances.
- Confirm, if required, that the MSDS Administrator maintains an HSI for their establishment.
- Confirm that MSDS are available for all substances listed on their establishment's HSI.
- Confirm that a copy of this Procedure and the site-specific MSDS are available to all employees. Employees shall be instructed in the location of this Procedure and the MSDS.
- Confirm that all employees in their office affected by the HAZCOM standard are provided with the appropriate training, including new employees.

4.1.3 **Project Managers (field task managers, supervisors)** will:

- Confirm that all employees under their supervision have received the initial and periodic training required by this SOP prior to assigning employees to tasks involve the use of, or potential exposure to, hazardous substances.
- Notify employees of hazardous substances covered by this SOP that are used in their work area.
- Determine the potential fire, toxic, or reactivity hazards which are likely to be encountered in the handling or utilization of a hazardous substance and will communicate this information to their affected employees, before any are permitted to work with it.
- Confirm that an MSDS is available for each hazardous substance used, or potentially encountered, in the work areas or on the projects that are under their supervision.
- Notify subcontractors (working for AECOM) of any hazardous substances that are used or stored by AECOM to which the subcontractor's employees may be exposed.
- Notify clients or property owner/operators of chemicals brought onto their property by AECOM or AECOM's subcontractors.
- Request MSDSs from all subcontractor organization for the relevant chemicals they bring onto an AECOM controlled site.

4.1.4 Employees will:

- Confirm that they have received appropriate hazard communication training prior to working with materials that fall under the standard.
- Only work with materials for which they have been instructed on how to find an MSDS and how to work with that material safely.
- Provide a copy of all MSDSs received to the MSDS Administrator at their facility.
- Verify that an MSDS is available in their work area for each hazardous substance that they use.
- Confirm that containers of hazardous substances that they use are properly labelled.
- 4.2 All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.
- 4.3 Should AECOM assign employees that do not read and speak English to tasks with chemical exposures, communications will be provided in the language understood by that employee.



4.4 Hazardous Waste Exemption

- 4.4.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. However, AECOM employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 – Hazardous Waste Operations And Emergency Response. This standard requires that:
 - Employees receive 40-hour initial and 8-hour annual SH&E training; and that
 - Information on the hazards of hazardous wastes be documented in a site-specific Health and Safety Plan (HASP) and communicated to all employees in site-specific briefing on-site training required by the standard.
- 4.4.2 Therefore, AECOM HAZWOPER projects are not required to comply with the requirements of this SOP as they relate to the hazardous wastes that are present at those project sites.
- 4.4.3 AECOM's Health And Safety Plan (HASP) requirements are specified in S3NA-509-PR Hazardous Waste Operations and Emergency Response.

4.5 Hazardous Substance Inventory

- 4.5.1 Establishment-Specific Hazardous Substance Inventory or WHMIS Log
 - If an AECOM establishment uses or stores additional hazardous substances, an establishmentspecific HSI must be maintained at that establishment.
 - If it is determined that an office-specific HSI is needed, the AECOM Office Manager shall assure that one is developed and maintained by someone appointed as the establishment's MSDS Administrator.
 - The content of the office-specific written inventory shall be updated as new hazardous substances are procured for, or removed from, the establishment and shall be verified by the Region SH&E Manager through regular inspections of the establishment.
 - In order to meet the 30-years-after-employment-termination record retention requirement, the officespecific HSIs shall be treated as a permanent record.

4.6 Material Safety Data Sheets

- 4.6.1 Establishment-Specific MSDS Inventory
 - If it is determined that an AECOM establishment is required to maintain an establishment-specific inventory ,MSDSs for the specific hazardous substances must be maintained on file at that establishment.
 - The Region SH&E Manager shall audit the local office program for MSDS request and maintenance and report deficiencies to the appropriate management level, as necessary, to assure compliance with this SOP.
- 4.6.2 Field Project Sites and Client Facilities
 - The Project Manager and/or the Site Safety Officer shall access or obtain, and maintain copies of MSDS from:
 - All AECOM subcontractors bringing chemicals onto the project site; and
 - The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.
- 4.6.3 Employee Access to MSDSs
 - MSDSs should be maintained at the local establishment that uses that hazardous substance. Copies
 of the MSDS should be made available to the employee upon request to the office's MSDS
 Administrator.



4.6.4 Field Access to MSDSs

 When hazardous substances are brought into the field, the user must assure that a copy of the MSDS for that substance accompanies it and is available at the field location where it is to be used.

4.6.5 MSDSs for AECOM Products

- It is unlikely that AECOM activities would create a chemical for which a new MSDS were needed. If such a chemical were created, the Corporate SH&E Department shall work with the appropriate operations groups to draft, review, and publish the new MSDS.
- 4.6.6 Content of the Material Safety Data Sheet
 - As a minimum, the MSDS must contain the following information:
 - The name, address, and telephone number of the source of the product or material, preferably those of the manufacturer
 - o The trade name and synonyms of the product or material
 - o Chemical names of hazardous ingredients, including, but not limited to, those in mixtures
 - An indication of the percentage, by weight or volume, which each ingredient of a mixture bears to the whole mixture
 - Physical data pertaining to the product or material, including boiling point (in °F); vapor pressure (in mm of mercury); vapour density of gas or vapour (air = 1); solubility in water (in percent by weight); specific gravity of material (water = 1); percentage volatile by volume (at 70 °F); evaporation rate for liquids (either butyl acetate or ether may be taken as 1); and appearance and odour
 - Fire and explosion hazard data pertaining to the product or material, including flash point (in °F);
 flammable limits (in percent by volume in air); suitable extinguishing media or agents; special fire
 fighting procedures; and unusual fire and explosion hazard information
 - Health hazard data pertaining to the product or material, including exposure limits, effects of overexposure and medical conditions aggravated by exposure, and emergency and first-aid procedures
 - Reactivity data, including stability, incompatibility, hazardous decomposition products, and hazardous polymerization
 - Procedures to be followed and precautions to be taken in cleaning up and disposing of materials leaked or spilled
 - Special protection information, including use of personal protective equipment, such as respirators, eye protection, and protective clothing, and ventilation or other control measures
 - o Special precautionary information about handling and strong
 - Any other general precautionary information
 - MSDSs that do not contain this information shall be returned to the distributor or manufacturer to be updated.
- 4.6.7 Trade Secrets
 - Some hazardous substance suppliers may claim the information requested on MSDSs is proprietary and not provide the information to AECOM.
 - When MSDSs supplied to the AECOM Regional SH&E Manager indicate that proprietary information
 has been withheld, the Regional SH&E Manager will either obtain the necessary information to make
 a hazard assessment or reject the material for use within AECOM.

4.7 Labeling

- 4.7.1 Containers of hazardous substances used or stored in each AECOM establishment must be labeled, tagged or marked with the following information:
 - Identification of the hazardous substance(s)



- Appropriate hazard warnings
- Name and address of the manufacturer, importer or other responsible parties
- Safe Handling Instructions
- Statement that an MSDS is available for the product
- 4.7.2 Labels on containers shall not be removed or defaced. Labels or other forms of warning shall be legible, in English and French (Canada), and prominently displayed on the container.
- 4.7.3 Any failure to have the appropriate labeling information on a container at any time will be cause to suspend use of the product until the container is properly labeled.
- 4.7.4 Carcinogen Labeling
 - Chemicals which have been indicated as positive or suspect carcinogens by either OSHA, ACGIH, the International Agency for Research on Cancer (IARC) (World Health Organization), or the National Toxicology Program (NTP) will be considered to be carcinogenic for purpose of the HCS. Those chemicals identified as being "known to be carcinogenic" by NTP must have carcinogen warnings on the label and information on the MSDSs.
- 4.7.5 Stationary Process Containers
 - If there is stationary process equipment within a work area, signs, placards, process sheets, batch tickets, operating procedures, or other such written materials may be used in lieu of fixed labels on the containers, as long as the alternative method conveys the appropriate hazard information. The written materials shall be readily accessible to the employees in the work area.
- 4.7.6 Portable Containers
 - Portable containers of hazardous substances need not be labelled when the substance is transferred from labelled containers and is intended for immediate use of the employee who performs the transfer.
 - Containers of hazardous substances transferred from labelled containers and not intended for the immediate use of the employee performing the transfer shall be labelled with the chemical name and a hazard warning label in accordance with the National Fire Protection Association's (NFPA) 704M Hazard Identification System shall be attached.

4.8 Chemical Storage

- 4.8.1 Hazardous chemicals are to be stored in their original, labeled containers with the lids securely closed and taped if possible. Flammable and combustible materials must be stored in fire impervious cabinets in designated stockroom areas. Chemicals must be stored in compliance with instructions provided on their labels, MSDS, or the manufacturer's specifications.
- 4.8.2 All hazardous chemicals must be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.
- 4.8.3 Hazardous chemicals shall not be stored with foods or beverages. Food and beverages shall not be consumed in areas where hazardous chemicals are used or stored.

4.9 Chemical Use in Offices

- 4.9.1 In general, hazardous substances should not be taken into office areas, conference rooms, or break areas. If this general requirement is infeasible, contact the SH&E Department for guidance.
- 4.9.2 General exceptions to this rule are the following:
 - Liquid paper
 - Toner
 - Cleaners
 - Isobutylene calibration gas
 - pH calibration solutions for instruments



4.10 **Employee Information and Training**

- 4.10.1 Each AECOM **employee** who handles or is exposed to hazardous substances must be provided information and training on hazardous substances in their work area.
 - At the time of their initial assignment
 - Whenever a new hazard is introduced into their work area
- 4.10.2 As a minimum, the training requirements apply to AECOM personnel in the following job categories:
 - All personnel who perform field work that involves the use of, or potential exposure to, hazardous substances
 - Laboratory Employees

4.11 Initial Training Content

- 4.11.1 The Initial Training will provide instruction in the following:
 - Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area (such as personal monitoring, visual appearance or odor of hazardous substances being released, etc.);
 - The physical and health hazards of substances in the work area and measures and procedures AECOM has implemented to protect employees; and
 - The details of this hazard communication program (SOP), including an explanation of the labeling system and the MSDS, and how he/she can obtain and use appropriate hazard information.
- 4.11.2 The Initial Training will also inform the employee of the following:
 - Any operations in their work area in which hazardous substances are present
 - Location and availability of this written hazard communications program (SOP)
 - Their right to personally receive information regarding hazardous substances to which they may be exposed
 - Their right to have their physician receive information regarding hazardous substances to which they may be exposed
 - Their right against discharge or other discrimination (in California) due to the employee's exercise of rights afforded pursuant to provisions of the California Hazardous Substances Information and Training Act

4.12 Periodic Training and Training for Non-Routine Tasks

- 4.12.1 Additional training will be provided to employees who have received initial training whenever:
 - A new hazardous substance is introduced into their work area
 - A new or revised MSDS is received, which indicates significantly increased risks to employee health as compared to those stated on the previous MSDS
 - Non-routine tasks are performed, which will potentially result in exposure to hazardous substances, or exposure under circumstances, which were not addressed during initial training
- 4.12.2 Supervisors, in coordination with their **Region SH&E Manager**, shall provide such training through an explanation of the information on the contents of the MSDS for that substance.
- 4.12.3 When training their employees, supervisors shall explain:
 - Any health hazards associated with use of the substance or mixture
 - Proper precautions for handling
 - Necessary personal protective equipment or other safety precautions to prevent or minimize exposure



- Emergency procedures for spills, fire, disposal, and first aid
- 4.12.4 For most projects involving field work, this periodic training requirement will be facilitated through the implementation of the site specific HASP that has been developed for the project.

4.13 Documentation of Initial and Periodic Training

4.13.1 All training required by this SOP shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.14 Chemical Usage

4.14.1 Prior to using any chemical, a Task Hazard Analysis (THA) shall be completed by the employees assigned to use the chemical. The analysis will identify the hazards associated with the tasks to be performed and prescribe the Personal Protective Equipment (PPE) to be used.

4.15 Office Specific Written Program

- 4.15.1 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program. If the local office decides to implement the requirements of the standard in any way that differs from this procedure, they shall verify the changes with the SH&E department, document the changes, and communicate the differences to all affected employees.
- 4.15.2 For Canadian operations, all relevant MSDS must be current (no more than 3 years old) and readily available (in French and English) for all hazardous materials.

4.16 Canada-specific

- 4.16.1 Consumer products are exempt from supplier labels and MSDS requirements. Some cleaning solvents may be packaged as consumer products and these must be labeled in accordance with the Consumer Product Act requirements.
- 4.16.2 In addition to the labelling of storage containers in the workplace, the contents of process piping (including valves), process vessels and reaction vessels are required to be identified through the use of colour coding, labels, placards or other modes of identifications that must be communicated to workers through training programs. It is very important for employees to be aware of and understand Client labelling requirements for these types of process systems.

5.0 Records

5.1 None

6.0 References

6.1 None

S3NA-508-PR Hazardous Materials Handling, Shipping, and Manifesting

1.0 Purpose and Scope

- 1.1 Prescribes the minimum requirements for shipping samples, hazardous materials (HZM) and dangerous goods. It is designed to provide a framework for compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR)published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air.
- 1.2 Applies to all AECOM North America based staff and operations.

2.0 Terms and Definitions

A complete list of definitions can be found in their entirety in the HMR, the TDG Regulations, and the IATA DGR. The below represents those terms most likely to affect AECOM's operations.

- 2.1 **Agency Letter:** A letter approved by both AECOM's Legal Department and the client and that authorizes AECOM to act as its agent for the purpose of arranging for the transport and/or disposal of waste, and indeminifies AECOM's liability when acting"As an Agent of [client's name]".
- 2.2 **Carrier:** A person engaged in the transportation of passengers or property by land, water, or air either as a common, contract, private carrier, or civil aircraft.
- 2.3 **Dangerous goods:** Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the TDG Regulations and/or IATA regulations or which are classified according to the TDG Regulations and/or IATA regulations. Generally synonymous with hazardous materials.
- 2.4 <u>Delegations of Authority</u> (DOA): The framework of authority within which AECOM (North America) carries out its day-to-day operations.
- 2.5 **Generator:** The party that created the hazardous waste; hazardous waste generators are divided into categories based on the amount of waste they produce each month.
- 2.6 **Hazardous materials (HzM):** A substance or material which has been determined by the U.S. Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials.
- 2.6.1 Hazardous materials may include, but are not limited to: batteries, adhesives, paints, compressed gases, nuclear density meters, laboratory reagents, field samples, soil and sand siftings, hazardous wastes, and materials used for bench scale and pilot plant operations. While most environmental samples (both water and soil) do not meet the definition of hazardous material, extreme care must be taken to properly classify materials. HzM Classifications are as follows:
 - Class 1 Explosives
 - Class 2 Gases
 - Class 3 Flammable Liquid
 - Class 4 Flammable Solid, Spontaneously Combustible, and Dangerous When Wet
 - Class 5 Oxidizer, Organic Peroxide
 - Class 6 Poison (Toxic), Poison Inhalation Hazard, Infectious Substance
 - Class 7 Radioactive

S3NA-508-PR Hazardous Materials Handling, Shipping, and Manifesting Revision 1 01 June 2012

- Class 8 Corrosive
- Class 9 Miscellaneous Hazardous Material
- 2.7

Hazardous Waste (HzW): A "solid waste" which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (1) Pose a substantial present or potential hazard to human health or the environment when improportly treated, stored or disposed of, or otherwise mismanaged; or (2) cause or contribute to an increase in mortality, or an increase in irreversible or incapacitating illness. Four types of hazardous waste exists:

- <u>Listed Waste:</u> Wastes that USEPA has determined are hazardous. The lists include the F-list (waste from common manufacturing and industrial processes), K-list (wastes from specific industries), and P- and U-lists (wastes from commercial chemical products).
- <u>Characterized Wastes:</u> Wastes that do not meet any of the listings above but that exhibit ignitability, corrosivity, reactivity, or toxicity.
- Universal Wastes: Batteries, pesticides, mercury-containing equipment and lamps.
- Mixed Wastes: Waste that contains both radioactive and hazardous waste components.
- 2.8 **Hazardous Waste Manifest System:** A set of forms, reports, and procedures designed to seamlessly track hazardous waste from the time it leaves the generator facility where it was produced, until it reaches the off-site waste management facility that will store, treat, or dispose of the hazardous waste.
- 2.9 **HzM employee:** A person who is employed by AECOM who in the course of employment directly affects dangerous goods/hazardous materials transportation safety. This term includes employees who prepare hazardous materials for transportation, or are responsible for safety of transporting hazardous materials.
- 2.10 **HzM employer:** A person who uses one or more of its employees in connection with transporting dangerous goods/hazardous materials in commerce, causing hazardous materials to be transported or shipping in commerce.
- 2.11 HMR: Hazardous Material Regulation
- 2.12 IATA: International Air Transport Association.
- 2.13 ICAO: International Civil Aviation Organization
- 2.14 **Manifest:** A paper document that contains information on the type and quantity of the waste being transported, instructions for handling the waste, and signature lines for all parties involved in the disposal process, which must be signed by each party that handles the waste.
- 2.15 **Materials of Trade (MOT) :** A hazardous material, other than a hazardous waste, that is carried on a motor vehicle:
 - For the purpose of protecting the health and safety of the motor vehicle operator or passengers;
 - For the purpose of supporting the operation or maintenance of a motor vehicle (including its auxiliary equipment); or
 - By a private motor carrier in direct support of a principal business that is other than transportation by motor vehicle.
- 2.16 **NAPL:** Non-aqueous phase liquid
- 2.17 **Offeror:** Any person who performs functions including selecting packaging, physical transfer of hazardous materials, classifying hazardous materials, preparing shipping papers, signing hazardous material certifications on shipping papers (as agent for), marking or placarding vehicles or packagings, or providing placards to carriers.
- 2.18 **Reportable Quantity (RQ):** The spill- or incident-related quantity of a material listed in the applicable Federal, State, or Provinicial regulations requiring a formal report.
- 2.19 **Serious Hazardous Materials Incident:** Anytime a material is found outside of its containment and has the potential to harm people or the environment.
- 2.20 **Shipper:** see Carrier

S3NA-508-PR Hazardous Materials Handling, Shipping, and Manifesting Revision 1 01 June 2012 PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET



2.21 **Transporter:** An entity that moves hazardous waste from one site to another by highway, rail, water, or air.

3.0 Attachments

3.1 S3NA-508-WI1 Hazardous Materials Shipping Guidelines

4.0 Procedure

4.1 General Requirements

- 4.1.1 Employees designated as HzM DOT Level 1 or 2 Shippers are the only individuals authorized to physically transport or prepare documents to ship HzM via a carrier.
- 4.1.2 Specific technical names must be used on shipping documents (i.e., Shipper's Declaration for Dangerous Goods); never use an acronym (i.e., LNAPL) as the technical name.
- 4.1.3 Shipments of HzM must be placed in appropriate containers to prevent any leaks or releases of the HzM.
- 4.1.4 All HzM shipments via a carrier must be reported to INFOTRAC prior to shipment.
- 4.1.5 AECOM staff are not authorized to physically transport HzM quanitities, in a motor vehicle, in excess of the MOT limits.
- 4.1.6 AECOM staff are only authorized to sign a client's Hazardous Waste Manifest if:
 - The necessary approvals have been obtained per the DOA (North America);
 - The client could not logistically sign the manifest given they were not on the site;
 - An Agency Letter was signed by the client and approved by the Legal Department; and
 - AECOM staff completed the required training.
- 4.1.7 AECOM will never be identified as the GENERATOR on a client's Hazardous Waste Manifest.
- 4.1.8 Never sign a client's Hazardous Waste Manifest as AECOM, sign "As an Agent of [client name]".

4.2 Roles and Responsibilities

- 4.2.1 **Project Managers** will be responsible for the following:
 - Verifying the potential to ship HzM via a carrier during the planned scope of services and if confirmed, identify the appropriately trained individuals are available to support the HzM shipment.
 - Prior to authorizing an AECOM employee to sign a client's Hazardous Waste Manifest, the Project Manager will:
 - Verify with the Office of Risk Management that the necessary DOA approvals are in-place;
 - o Obtain an Agency Letter approved by both the client and AECOM's Legal Department.
 - Prior to assignment, confirm that employees are properly trained to perform their job-specific assignments.
 - Filing copies of all HzM shipping documents in the project files.
 - Providing for the appropriate storage of the HzM in the office or other necessary location.
- 4.2.2 **Supervisors** will be responsible for the following:
 - Verifying that the HzM to-be shipped is prepared/packaged by the designated DOT Level 1 or 2 Shipper.
 - Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to AECOM's Incident Reporting Line.
- 4.2.3 **Employees** will be responsible for the following:
 - Shipping or transporting HzM as authorized.
 - Signing a client's Hazardous Waste Manifest as authorized.
 - Immediately reporting any incident, spill, release, mishandling, mislabelling, etc. related to a HzM shipment to the Supervisor.

S3NA-508-PR Hazardous Materials Handling, Shipping, and Manifesting Revision 1 01 June 2012



4.2.4 **DOT Level 1 Shippers** will be responsible for the following:

- Identifying, with the support of a DOT Level 2 Shipper, the appropriate HzM shipping requirements (i.e., packaging, labelling, regulated status, and shipping documents).
- Preparing the necessary HzM shipping documents.
- Contacting a DOT Level 2 Shipper if uncertain of the shipping requirements.
- Maintaining the appropriate training as required by the HMR, TDG, and IATA.
- 4.2.5 **DOT Level 2 Shippers** will be responsible for the following:
 - Serving as the HzM shipping Subject Matter Expert for the Geography, Region, or other business unit, as appropriate.
 - Supporting information requests from DOT Level I Shippers.

4.2.6 Americas SH&E Director will be responsible for the following:

- Contracting a 24-hour emergency response service with a telephone number that will be answered by a person either with information on the hazards of the shipment or with immediate access to such a person.
- Maintaining the annual renewal of AECOM's U.S. DOT Hazardous Materials Registration.
- Posting AECOM's Hazardous Materials Registration on myAECOM.
- 4.2.7 **Americas SH&E Training Director** will be responsible for the following:
 - Defining the training to be required of employees involved in HZM shipping and facilitate the delivery of that training.

4.2.8 **Region SH&E Managers** are responsible for the following:

- Provide resources to employees involved in shipping hazardous materials.
- Approving the designation of a DOT Level 2 Shipper.
- Supporting the delivery of HzM shipping and Hazardous Waste Manifest training.
- 4.2.9 **Region Counsel** will be responsible for the following:
 - Reviewing and approving the Agency Letter authorizing AECOM to sign a client's Hazardous Waste Manifest "As an Agent of [client's name]".
 - Updating the template Agency Letter to address additional liabilities, as necessary.
 - Providing the template Agency Letter to Project Managers, as requested.
- 4.2.10 Office of Risk Management will be responsible for the following:
 - Supporting Project Managers in understanding the applicable DOA requirements as it pertains to signing a client's Hazardous Waste Manifest "As an Agent of [client's name]".

4.3 Training

- 4.3.1 **Employees** involved in shipping hazardous materials/dangerous goods (e.g., packaging, preparing paperwork, loading and/or unloading, and transporting hazardous materials) are required to have documented training prior to shipping activities. Training requirements are based on the type of materials shipped (e.g., calibration/compressed gases, laboratory reagents, field samples, hazardous wastes, etc.) and employee responsibility.
- 4.3.2 **DOT Level 1 Shipper** *Performance Training*: The specific content of this 4-hour training will vary depending on the country in which you are performing work (Canada vs. US) and is focused on proper procedures for packaging, labeling and shipping HzM/HzW over land and sea. This training has a three year renewal requirement.
- 4.3.3 **DOT Level 2 Shipper** *Performance Training*: A comprehensive 2-day HzM shipping training course typically completed in an in-person seminar.



- 4.3.4 **IATA** *Performance Training*: This training supplements Level 1 training and provides additional information for the proper shipment of HzM/HzW via air transportation. This training has a two year renewal requirement.
- 4.3.5 **Resource Conservation and Recovery Act (RCRA) Part B Awareness Training (US Project Sites):** Applicable to employees shipping HzW, including listed wastes, from US project sites. General RCRA Awareness training can be completed through online vendors. Additional project-specific training regarding HzW generation, project site roles and responsibilities, HzW management and shipment will need to be coordinated between the Project Manager and Client. Training may also include procedures for signing waste documents, i.e. profiles and characterization forms, where permitted by client contracts. Training will be provided in accordance with Permits, Consent Orders or other Regulatory Agency-issued agreements regarding project site HzW generation. This training has an annual renewal requirement.

5.0 Records

- 5.1 Bill of Lading
- 5.2 Shipper's Declaration for Dangerous Goods
- 5.3 Agency Letter
- 5.4 Hazardous Waste Manifest

6.0 References

6.1 None



S3NA-508-WI1 Hazardous Materials Shipping Guidelines

1.0 Purpose and Scope

1.1 The following information outlines the generally accepted guidelines for preparing a HzM or Dangerous Goods package for shipment in compliance with the requirements of the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR)published under 49 CFR or Transport Canada Transportation of Dangerous Goods Regulations (TDG Regulations) published under Amendment 6 (SOR/2008-34) for shipment of hazardous materials/dangerous goods by land, and the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR) for shipping dangerous goods by air. However, this information is not implied or to be construed as a replacement for the regulatory requirements, rather this information is intended to help an individual better understand the necessary steps and formulate questions surrounding the shipment of HzM and/or Dangerous Goods.

1.2 Shipping

- 1.2.1 Select the best way to ship the hazardous material based on the quantity, hazard(s), and mode of transportation (e.g., air, land, water). Since more restrictive requirements apply to air shipments, ground shipment (e.g., use of a lab courier service) is encouraged for shipping HzM.
- 1.2.2 Most (if not all) package shipments (Common Carriers such as Federal Express, UPS, etc.) are transported by air. Air transportation of hazardous materials is regulated by IATA. AECOM will occasionally ship HzM internationally (e.g., Puerto Rico is considered an international destination by Federal Express). AECOM **employees** must follow the IATA DGR for any air transportation of hazardous materials.

1.3 Ground transportation of HzM may use either HMR or TDG Regulations protocols

- 1.3.1 Specific packaging and shipping instructions apply to all dangerous goods shipments. These instructions vary by chemical/product and are different for passenger aircraft and cargo aircraft.
- 1.3.2 Carrier-specific requirements can be obtained from the Internet or by calling the carrier's customer service line.
- 1.3.3 The process for offering HzM for shipment includes:
 - Determine the proper shipping name, hazard class, labeling requirements, and packing group.
 - Determine and comply with the proper packaging instructions.
 - Choose the proper package based on the packaging instruction and the type and quantity of material being shipped.
 - Ensure package contents are compatible.
 - Package, mark and label according to applicable regulations and instructions.
 - Prepare shipping papers and complete the bill of lading or shipper's declaration for dangerous goods, according to applicable regulations and according to the carrier's specific requirements.
 - Include on the shipping documents the shipper's certification, emergency response information and telephone number.
 - Include with the shipment a copy of the applicable emergency response information with shipping
 papers for responders to use in emergency situations. This information includes, but is not limited to,
 appropriate pages from the DOT Emergency Response Guidebook (ERG) and/or Material Safety
 Data Sheets (MSDS).

- 1.3.4 AECOM personnel participating in shipping HzM are required to provide a 24-hour emergency response telephone number that must be answered by a person either with information on the hazards of the shipment or with immediate access to such a person. AECOM has selected INFOTRAC® (http://www.infotrac.net/) to provide 24-hour emergency response support service. <u>All HzM shipping papers which list INFOTRAC® for 24-hour emergency response must list AECOM's account number **74984**.</u>
- 1.3.5 Determine the placard or placards required for the materials being offered for transportation, provide placards and affix as required.
- 1.3.6 Notify the carrier of the proper shipping name, hazard class and total quantity of each hazardous material being offered for transportation, and make a final check for compliance with regulations and instructions before tendering the shipment to the carrier. All HzM shipping papers and dangerous goods airbills must be typed.



1 of 14

S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities

1.0 Purpose and Scope

- 1.1 Provides requirements for AECOM operations pertaining to hazardous waste and emergency response (HAZWOPER) services.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.
- 1.3 In Canada there is no direct federal or provincial counterpart to HAZWOPER; however, as due diligence and in compliance with applicable provincial duty of care/general duty clauses, staff working in Canada will comply with this procedure.

2.0 Terms and Definitions

- 2.1 **Emergency Response**: A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrollable release of a hazardous substance. Responses to incidental release of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by maintenance personnel are not considered to be emergency responses within the scope of the HAZWOPER standard. Responses to releases of hazardous substances where there is no potential safety or health hazard are not considered to be emergency responses.
- 2.2 **Health and Safety Plan**: A document prepared for each project that contains site-specific information including the Emergency Response Plan for the project.
- 2.3 Incident Command System (ICS): ICS is a standardized on-scene incident management concept designed specifically to allow responders to adopt an integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries. In the ICS the first person responding to an incident becomes the Incident Commander and turns that title and duties over to more qualified responders as they arrive on scene.
- 2.4 **First Responder**: First responders are individuals who are likely to witness or discover a hazardous substance release, injury, fire, or other incident and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond first aid, initial control of the incident, and notifying the authorities and others of the incident.
- 2.5 **Hazardous Materials Specialist**: Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities in regards to site activities.
- 2.6 **Hazardous Materials Technician**: Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.
- 2.7 **Incident Commander**: The Incident Commander (IC) is responsible for all aspects of the response, including developing incident objectives and managing all incident operations. The title and responsibilities are typically assumed by a qualified IC from the client or public sector.
- 2.8 **Hazardous Waste**: Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be



discarded commercial products, like cleaning fluids or pesticides, or the byproducts of manufacturing processes. Hazardous waste are divided into

- 2.8.1 Listed wastes (http://www.epa.gov/osw/hazard/wastetypes/listed.htm),
- 2.8.2 Characteristic wastes (http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm),
- 2.8.3 Universal wastes (http://www.epa.gov/osw/hazard/wastetypes/universal/index.htmwastes), and
- 2.8.4 Mixed wastes
- 2.8.5 Specific procedures determine how waste is identified (http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm), classified, listed, and delisted.
- 2.9 **Hazardous Materials:** A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Additionally a hazardous material may be defined as any substance or chemical which is a "health hazard" or "physical hazard," including chemicals that are carcinogens, toxic agents, irritants, corrosives, sensitizers; agents that act on the hematopoietic system; agents that damage the lungs, skin, eyes, or mucous membranes; chemicals that are combustible, explosive, flammable, oxidizers, pyrophorics, unstable-reactive, or water-reactive; and chemicals that in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapors, mists, or smoke that may have any of the previously mentioned characteristics. This may be caused when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing into the environment, by being transported or moved, and items or chemicals that are "special nuclear source" or byproduct materials or radioactive substances.

3.0 Attachments

- 3.1 S3NA-509-FM1 Direct Reading Instrument Monitoring Log
- 3.2 S3NA-509-FM2 Instrument Calibration Log
- 3.3 S3NA-509-FM3 Personal Sampling Data Sheet
- 3.4 S3NA-509-FM4 Emergency Information and Hazard Assessment

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 Region Operations Managers and District Managers shall be responsible for the following:
 - Provide support to the implementation of Health and Safety Plans and Emergency Action Plans.
- 4.1.2 **Project managers** shall be responsible for the following:
 - Prepare or request a HASP for every AECOM project.
 - Verify that all personnel working on the project are qualified.
 - Request client's emergency response procedures.
 - Appoint a Site Safety Officer (SSO) for each project.
 - Communicate the site-specific emergency response details to all employees assigned to a field project.
 - Confirm that the necessary communications equipment for the project is available.
 - Confirm that an accident/incident investigation is performed and a report is filed.
- 4.1.3 **Region SH&E Managers** shall be responsible for the following:
 - Provide technical guidance for the development and implementation of Health and Safety Plans and Emergency Action Plans.
 - Prepare emergency action plans as part of project HASPs and emergency reference sheets.
 - Interface with the local emergency responders when necessary.
 - Interface with clients regarding facility emergency response procedures.



4.1.4 **Site Safety Officer** is responsible for the following:

- Verify that a HASP is available for the project.
- Communicate the site-specific emergency response details to all employees assigned to a field project.
- Stop work and initiate emergency response procedures as required.
- Account for all AECOM and subcontractor employees after site evacuation.
- Conduct pre-entry briefing and daily tailgate meetings and review facility and site-specific emergency procedures.
- Brief on-site and off-site responders in the event of an emergency.

4.1.5 Employees

- Maintain HAZWOPER training.
- Follow the HASP and emergency procedures prepared for the project.
- Initiate emergency response via verbal communications or the alarm system if first to encounter the emergency.
- 4.1.6 All personnel (e.g., AECOM **employees**, general laborers, equipment operators, chemists, supervisors, etc.) performing activities at hazardous waste sites that expose or potentially expose them to hazardous wastes and health hazards are considered HAZWOPER site workers and must meet the training and medical surveillance requirements specified in 29 CFR 1910.120(e) and (f), respectively. Additional training may be required based on site activities including related exposures and risks (e.g., confined space entry, excavations, fall protection, other materials [lead], etc.). These additional training requirements are to be outlined in the project- or site-specific health and safety plan (HASP).

4.2 Personnel Qualifications—Medical Surveillance and Training

- 4.2.1 HAZWOPER-qualified employees will participate in the following medical surveillance and training requirements.
- 4.2.2 Medical Surveillance
 - Specific HAZWOPER medical examination protocols have been developed by AECOM's Corporate Medical Provider (CMP) to meet the requirements of 29 CFR 1910.120(f). To be medically qualified to perform HAZWOPER work, employees receive the following medical examinations:
 - Initial (Baseline) Examination—The initial examination is part of pre-employment requirements and must be completed (with results received) prior to the employee's start of work date.
 - Annual Examination—HAZWOPER-qualified employees will complete a medical examination once each year. Medical qualification expires on the anniversary date of the last examination completed. There will be no "grace period" exemptions beyond this date without the express approval of the Region SH&E Manager. At the recommendation of the SH&E Department, the CMP may approve an alternate examination frequency at periods of up to two years (biennial) in cases in which the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel).
 - Termination Examination—When reassigned to non-HAZWOPER duties, or at the conclusion of employment at AECOM, HAZWOPER-qualified personnel will be provided with the opportunity to receive a termination medical examination.
 - Special Examinations—The SH&E Department and the CMP will jointly determine the need for special examinations because of
 - Unusual exposure conditions.
 - In response to possible overexposures.
 - The CMP will determine the medical protocol elements for each of these examinations based on exposure information provided by the SH&E Department. The CMP will evaluate the results of each employee's examination and will provide a written statement of medical clearance

clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120(f)) and approval of the employee to perform unrestricted HAZWOPER activities. for initial and annual examinations, the **CMP** will also evaluate the **employee** for the use of air purifying and supplied air respiratory protection. The written evaluation from these examinations will indicate the **CMP's** approval/limitations on the employee's use of respiratory protection.

4.2.3 AECOM Training

- All personnel assigned to work at a hazardous waste site must participate in training meeting the requirements of 29 CFR 1910.120(e).
- Initial 40-Hour Training—Before being assigned to a HAZWOPER site, AECOM employees must complete 40 hours of off-site training meeting the requirements of 29 CFR 1910.120(e)(3)(i). At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification must be provided to the employee's SH&E Coordinator. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the site supervisor when working on any HAZWOPER site.
- In addition to the initial 40-hour training, the **employee** must receive three days of actual supervision by a trained experienced supervisor.
 - Available Training Sources:
 - On-site training provided by the SH&E Department.
 - Outsourced training providers approved by the SH&E Department.
- Refresher 8-Hour Training—To remain qualified to perform on-site HAZWOPER work activities, each AECOM **employee** will complete 8 hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120(e)(8) at yearly intervals following completion of Initial 40-hour training. At the conclusion of training, personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification must be provided to the employee's SH&E Coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the site supervisor when working on any HAZWOPER site.
 - Available Training Sources:
 - Internet-based training approved by SH&E Department
 - On-site training provided by the SH&E Department
 - Outsourced training providers approved by the SH&E Department
- Supervisor 8-Hour Training—Any AECOM employee acting in a management capacity for HAZWOPER activities (e.g., project management personnel, field managers/foremen, site safety officers, etc.) must complete an additional 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120(e)(4). Although this training is required only once, supervisors must maintain their overall HAZWOPER qualification through annual completion of refresher training. At the conclusion of Supervisor 8-Hour Training personnel will receive a written certification of course completion, signed by the instructor, that indicates the course of instruction and the training date. A copy of this certification must be provided to the employee's SH&E coordinator. **Employees** are responsible for maintaining their own copy of this certificate and for presenting it to the senior site supervisor when working on any HAZWOPER site.
 - Available Training Sources:

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- On-site training provided by the SH&E Department
- Outsourced training providers approved by the SH&E Department
- 24-Hour HAZWOPER Training—Site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120(e)(3)(ii). Personnel potentially qualifying for this alternative training include:
 - Site support personnel who will not work in any Exclusion Zone areas.
- Subcontractors and site visitors whose duties will not entail significant exposure to site contaminants defined as not working in any areas where airborne contaminant concentrations



exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels. The **Region SH&E Manager** or **SH&E department** designee must approve the substitution of 24-hour training for initial 40-hour training. Persons qualifying for 24-hour training must provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training must complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work and must provide proof of this training (as necessary to demonstrate retraining) prior to beginning work on site.

4.2.4 Subcontractor Personnel

Any subcontractor organization whose employees will support AECOM operations at a HAZWOPER site will:

- Provide the **AECOM Project Manager** with a copy of their written HAZWOPER medical surveillance and training program requirements. The elements of the program(s) must be similar to those for AECOM's own program, as detailed above.
- Provide the **Project Manager** with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
 - o A copy of the physician's signed medical clearance for each employee (preferred), or
 - A letter identifying the medical status and clearance expiration date of every **employee**, signed by the company's safety director or an officer of the company.
 - A copy of the each employee's training certifications, which will include:
 - The initial 40-hour training certificate (24-hour training may be substituted with SH&E department approval).
 - The most current Refresher training certificate (must be current within the previous one-year period).
 - A copy of the Supervisor training certificate for each person serving in a site supervisory capacity (e.g., field managers/foremen, site safety officers, etc.).

4.3 **Project SH&E Documentation—Health and Safety Plans**

- 4.3.1 The project SH&E documentation prepared for HAZWOPER activities is referred to as a site-specific Health and Safety Plan (HASP), and must meet the requirements presented in 29 CFR 1910.120(b)(4).
- 4.3.2 The required plan elements include:
 - A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions).
 - A summary of the work activities to be performed under AECOM's scope of activities.
 - A safety and health risk or hazard analysis for each on-site task that will be performed. Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task.
 - Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses.
 - Personal protective equipment (PPE) requirements for each work task.
 - Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used.
 - Site control measures.
 - Decontamination procedures.
 - An emergency response plan, S3NA-509-FM4 Emergency Information and Hazard Assessment, addressing actions to be taken in the event of each type of credible incident that might result during the performance of planned work activities, including minor and major injuries, and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.



4.3.3 Responsibility for development of each AECOM HASP will be coordinated between the **Project Manager** and the **Region SH&E Manager** or **SH&E Department** designee as part of project initiation. Regardless of where the HASP is developed, it will be reviewed and approved by the **SH&E Department** prior to submission to any agency outside of AECOM.

4.4 Contractors and Subcontractors

- 4.4.1 The health and safety of any contractor's or subcontractor's employees is solely the responsibility of that contractor or subcontractor, who shall evaluate the hazards and potential hazards to their own employees and shall adhere to their own Health and Safety Plan.
- 4.4.2 In addition, all AECOM subcontractors' Health and Safety Plans will, at a minimum conform to the requirements of the AECOM Health and Safety Plan. The AECOM Health and Safety Plan does not, nor is it intended to, address procedures of contractors or subcontractors during their site activities.

4.5 Field Emergency Response Plans

- 4.5.1 AECOM employees are not expected to take action or to participate in rescues or responses to chemical releases beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911.) If AECOM employees are to participate in the response to a chemical release beyond the initial reaction, there must be a contractual provision for this response and the employees must be specifically trained for this response. This document is designed to provide guidelines on how to prepare a written plan that will ensure prompt and proper response to an emergency situation that arises during field investigations and to outline the duties of AECOM employees during a field emergency and the associated training requirements.
- 4.5.2 Site specific health and safety plans that are prepared to comply with the HAZWOPER standard (29 CFR 1910.120) must address emergency response. This standard specifically outlines the elements that must be contained in an emergency response plan. However, the definition of emergency response, as written in 29 CFR 1910.120, focuses on emergencies involving the uncontrolled release of hazardous substances. Under 29 CFR 1910.120, an employer can opt to evacuate employees from the danger area when such an emergency occurs. AECOM does not expect its employees to actively assist in the handling of uncontrollable chemical releases that may occur during the implementation of field programs. As such, and as provided by the HAZWOPER standard, AECOM is exempt from the emergency response plan requirements of the standard as long as it provides an emergency action plan within the HASP that complies with 29 CFR 1910.38 (a). Therefore, all emergency response plans required under 29 CFR 1910.120 will be written to comply with 29 CFR 1910.38 (a).
- 4.5.3 The HAZWOPER standard does not prohibit AECOM employees from performing limited response activities. AECOM employees can provide response assistance by placing absorbent pillows or vermiculite around a small, contained spill that occurs during sampling efforts. AECOM's SH&E SOP 203—*Spill Containment Program*, describes the specific procedures that AECOM will follow when responding to an incidental chemical spill.
- 4.5.4 Field Project Preparation
 - Every HASP that is prepared by AECOM will contain an emergency response section in which the required elements of an emergency action plan will be contained. For all projects that do not require a HASP, an emergency reference sheet will be prepared; minimally, the sheet will list the telephone numbers of the local emergency responders and the local hospital and provides directions to the local hospital. When AECOM is working at an operating facility, the emergency response procedures of the facility will be appended to the HASP or the emergency reference sheet.
 - There are two types of emergency situations that AECOM personnel must be prepared for and that must be addressed in the emergency action plan. These include:
 - Emergencies related to the operations of our clients at the facility where AECOM is working.
 - Emergencies related to our own on-site activities/investigations.
 - AECOM employees are typically not expected to take action or participate in responses to chemical releases beyond the initial discovery of the release and immediate mitigation actions such as closing a valve, placing absorbents, and notifying the client and or public emergency response system (911.)



- AECOM employees are not to accept the role of Incident Commander without specific authority from the Region SH&E Manager and the General Operations Manager responsible for the project. Assuming the role of the Incident Commander requires training beyond the scope of this Procedure.
- 4.5.5 Client Facility Emergency Response Procedures
 - AECOM implements field programs on active properties, including manufacturing facilities. These facilities have typically developed an emergency response plan that is specific to facilityrelated emergencies. If AECOM is working at an operating facility, emergency procedures established by the facility must be followed in the event of a facility catastrophe. AECOM personnel must be aware of and familiar with the alarm signals used at the facility to alert personnel to an emergency. AECOM personnel must also know where to assemble in the event of a facility evacuation as the facility must be able to account for all personnel, including subcontractors such as AECOM in the event of an evacuation.
 - The first priority in AECOM's preparation of a project emergency action plan is to ensure that the responsibilities under the client's emergency response plan are fully understood. Because of the nature of their business, many of our clients have in-house fire brigades, medical staff, and hazardous materials teams that can assist AECOM in the event of an emergency related to our field activities. In many instances, our clients prefer or require that subcontractors seek emergency assistance through their facility first before calling outside responders to the site.
 - A copy of the facility's procedures must be made available to AECOM so that the information can be incorporated into the HASP or attached to the emergency reference sheet. If this information is not available to AECOM prior to arriving on site, the SSO must meet with client representatives upon arrival to the facility to review procedures in the event of an emergency related to plant operations.

4.5.6 Emergency Action Plan

- As a minimum, each emergency action plan must contain the following topics as required by 29 CFR 1910.38 (a):
 - Procedures and contact information for reporting emergencies to public service responders and on-site (client or host employer) emergency control centers.
 - Emergency escape procedures and emergency escape route assignments.
 - Procedures to be followed by employees who remain to operate critical site operations before they evacuate.
 - Procedures to account for all employees after emergency evacuation is complete.
 - o Rescue and medical duties for those employees who are to perform them.
 - Preferred means of reporting fires and other emergencies.
 - PPE to protect employees from expected exposures and potential exposures during an emergency.
 - Names of persons or departments who can be contacted for further information (i.e. emergency reference sheet).
 - Availability of medical surveillance for workers who might have been exposed to chemicals, bloodborne pathogens, or other biological agents as a result of project work or emergency response.
- In addition, each plan must establish the specific alarm system that will be used on site to warn employees of an AECOM emergency. The chosen alarm signals should not conflict with alarm signals already in place at the facility.
- 4.5.7 Escape Routes and Procedures
 - Prior to the commencement of on-site activities, the SSO must determine how AECOM employees will evacuate each AECOM work area of the site. Two or more routes that are separate or remote from each other for each work area must be identified. Multiple routes are necessary in case one is blocked by fire or chemical spill. These routes must not overlap because, if a common point were obstructed, all intersecting routes would be blocked.



- Prominent wind direction should also be considered when designating escape routes and assembly areas. Escape routes and assembly areas should be upwind of the site whenever possible.
- Upon arrival to the site, the SSO must verify that the selected routes are appropriate for evacuation. During an emergency, the quickest and most direct route should be selected. However, when working at an operating facility, the established escape routes of the facility should be used whenever possible. In the event of a facility-related emergency, all AECOM employees must meet at the facility's assembly area so that the client can verify that AECOM has evacuated the property.

4.5.8 Accounting Method for All Employees after Evacuation

- The SSO is responsible for determining that all AECOM employees have been successfully evacuated from the work area(s). It is the responsibility of each AECOM subcontractor to verify that all of its employees evacuated the site and to report this information to the AECOM SSO. All employees must meet at the designated assembly area. A headcount is an acceptable way to determine complete evacuation when the field team is of a small size. The site log-in book should be referenced when attempting to account for more than 10 people. In the event of a facility-related emergency, the SSO must notify facility representatives that all AECOM employees and AECOM subcontract employees have successfully evacuated the work area(s). The SSO must notify emergency responders if any employee is unaccounted for and where on the site they were last seen.
- In the event of a project-related emergency, the SSO will provide off-site emergency responders or on-site HAZMAT teams or fire brigades (Incident Commander) with all available knowledge about the emergency situation upon their arrival to the scene.
- 4.5.9 Employees Who Remain to Operate Critical Site Operations Before They Evacuate
 - All equipment and operations are required to cease in accordance with the established alarm signal procedures. The only exception will be related to health and safety. The **SSO** must determine at the time of the emergency if health and safety will be jeopardized by immediate stoppage of any particular piece of equipment. If such a determination is made, personnel involved in critical operations must be minimized. Once it is determined that the operation is no longer needed or the threat to the operators is imminent, operations will cease and the operators will immediately evacuate.

4.5.10 Rescue and Medical Duties

 Only currently trained individuals will administer first aid or CPR. If the injury is life threatening, the Emergency Medical System (EMS) should be called (911). Depending on the procedures established for the project, the SSO would contact an emergency responder directly or notify the facility representatives for medical assistance. If the employee needs medical attention that can not be provided on-site, the SSO shall escort the individual to the local hospital identified on the emergency reference sheet and shall remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the Project Manager and Regional SH&E Manager.

4.5.11 Preferred Means of Reporting

 Unless facility representatives specifically indicate that they prefer AECOM personnel to notify them first of an emergency, the SSO will directly contact the appropriate emergency responders listed on the emergency reference sheet.

4.5.12 Alarm Signals

- An emergency communication system must be in effect at all sites. The most simple and
 effective emergency communication system in many situations will be direct verbal
 communications. However, verbal communications must be supplemented any time voices
 cannot be clearly perceived above ambient noise levels and any time a clear line of sight can
 not be easily maintained among all AECOM personnel because of distance, terrain, or other
 obstructions.
- Portable two-way radio communications may be used when employees must work out of the line of sight of other workers.
- When verbal communications must be supplemented, the following emergency signals shall be implemented using handheld portable air horns, whistles, or similar devices. Signals must be


capable of being perceived above ambient noise by all employees in the affected portions of the workplace.

- One Blast: General Warning—A relatively minor and localized, yet important, on-site event. An example of this type of an event would be a minor chemical spill where there is no immediate danger to life or health yet personnel working on the site should be aware of the situation so that unnecessary problems can be avoided. If one horn blast is sounded, personnel must stop all activity and equipment on-site and await further instructions from the SSO.
- Three Blasts: Medical Emergency—A medical emergency for which immediate first aid or emergency medical care is required. If three horn blasts are sounded, all first aid and/or CPR trained personnel should respond as appropriate. All other activity and equipment should stop and personnel should await further instructions from the SSO.
- Three Blasts Followed by One Continuous Blast: Immediate Threat to Life and Health—A situation that could present an immediate danger to life and health of personnel onsite. Examples include fires, explosions, large hazardous chemical release, severe weather-related emergencies, or security threats. If three horn blasts followed by a continuous blast are sounded, all activity and equipment must stop. All personnel must evacuate the site and meet in the designated assembly area where the SSO will account for all employees. The SSO will arrange for other emergency response actions if necessary. Information concerning the need to follow decontamination procedures during an emergency evacuation will be addressed in the emergency action plan.
- The **SSO** or his designate will acknowledge the distress signal with two short blasts on the air-horn or whistle.
- One Continuous Blast Following Any of the Above: All Clear/Return to Work—Personnel who sound the initial alarm are required to send an all clear signal when the emergency is over.
- 4.5.13 Emergency Reference Sheet
 - An emergency reference sheet (see S3NA-509-FM4 Emergency Information and Hazard Assessment) must be prepared for projects not requiring a HASP. Each emergency reference sheet must list the following:
 - o Emergency phone numbers for local police, fire, and ambulance service.
 - o In-house facility extensions for reporting an emergency (applies to operating facilities only).
 - o Phone number and address of closest hospital with an emergency room to the site.
 - Directions to the hospital from the site.
 - Map highlighting the site-to-hospital route.
 - Phone number for the Poison Control Center.
 - Names and phone numbers of AECOM representatives and facility representatives.
- 4.5.14 On-site and Off-site Communications
 - Regardless of the size or location of AECOM's field projects, it is extremely important that both on-site and off-site communications be maintained so that in the event of an emergency employees can contact each other or place a phone call immediately with the appropriate responder(s).
 - Walkie-talkies are required when members of the field team are working in separate areas of the site and verbal communications are no longer effective because of distance. A walkie-talkie must be available for each team that is working in a separate area of the site.
 - When AECOM is working at an occupied facility, access to a telephone may not be a problem. When AECOM is working on abandoned properties or when there is no access to a phone, a cellular telephone must be brought to the work location.

4.5.15 Evacuation

Although emergency evacuation procedures are included in AECOM's initial 40-hour
 HAZWOPER training, emergency procedures at each site will be different. Therefore,
 employees must be instructed about the specifics of the emergency procedures developed for



the site during the site-specific pre-entry briefing that must be held daily prior to the commencement of field activities. Update training is required anytime escape routes or procedures change. An evacuation drill will be conducted for projects that are scheduled for one month or longer. Visitors and untrained employees shall not be allowed into the project area until they receive a safety briefing including evacuation alarms and procedures.

4.5.16 First Responder

- First responders shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:
 - An understanding of what hazardous substances are, and the risks associated with them in an incident.
 - An understanding of the potential outcomes associated with an emergency.
 - The ability to recognize the presence of hazardous substances and physical hazards in an emergency.
 - o An understanding of the role of the first responder.
 - The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.5.17 First Responder HAZWOPER Operations Level

First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper personal protective equipment provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.

4.5.18 Hazardous Materials Technician

Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.

S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities Revision 0 01 December 2010



4.5.19 Hazardous Materials Specialist

Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

- Know how to implement the local emergency response plan.
- Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.
- Know the state emergency response plan.
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.
- o Understand in-depth hazard and risk techniques.
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.
- o Be able to determine and implement decontamination procedures.
- Have the ability to develop a site safety and control plan.
- o Understand chemical, radiological, and toxicological terminology and behavior.

4.6 Personal Protective Equipment (PPE) Ensembles

- 4.6.1 Defined HAZWOPER PPE ensembles are specified for general use on all AECOM HAZWOPER operations. The project HASP may specify modifications to these requirements to meet site-specific conditions.
- 4.6.2 Level D Ensemble
 - The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work uniform which will be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering hazardous substances or health hazards while working in controlled work areas.
 - Level D Equipment List
 - o Hard hat
 - o Eye protection
 - o Safety-toe work boots
 - Shirts with sleeves and long pants (shorts are unacceptable for use)
 - Hearing protection (as required)

4.6.3 Modified Level D Ensemble

- The Modified Level D ensemble provides moderate skin protection against contact with hazardous substances, but no respiratory protection. Its use is appropriate where there is a moderate-to-low potential for skin contact with known hazardous substances and health hazards, but no significant inhalation hazard is anticipated. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:
- Modified Level D Equipment List
 - Chemical-resistant disposable outer coveralls
 - o Chemical-resistant outer gloves taped to outer coveralls1
 - o Chemical-resistant inner gloves1
 - o Chemical-resistant safety-toe boots (taped to outer coveralls)
- 4.6.4 Level C Ensemble

S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities

Revision 0 01 December 2010

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¹ Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work-



- The Level C ensemble provides moderate skin protection against contact with hazardous substances and moderate respiratory protection. Its use is appropriate where there is the potential for skin contact with known hazardous substances and health hazards, together with a limited and well-defined potential for exposure via inhalation.
- Level C Equipment List
 - Full-face air-purifying respirator (APR) equipped with cartridge types as designated in the project HASP2
 - Chemical-resistant disposable outer coveralls
 - Chemical-resistant outer gloves taped to outer coveralls3
 - o Chemical-resistant inner gloves3
 - Hard hat
 - Safety-toe boots taped to coveralls; the use of boot covers (e.g., booties) or chemicalresistant boots may be specified
 - Hearing protection (as required)

4.6.5 Level B Ensemble

- The Level B ensemble provides both the highest level of inhalation exposure protection and considerable skin contact protection. Its use is appropriate where there are significant known or suspected hazardous substances and health hazards, involving both skin and inhalation exposure (up to and including Immediately Dangerous to Life or Health [IDLH] conditions) or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g., oxygen deficient atmospheres or chemicals with poor warning properties). The use of Level B PPE requires prior approval by the Regional SH&E Manager.
- Level B Equipment List
 - o Supplied air respirator (SCBA or air line system with Grade D or better breathing air)
 - o Chemical-resistant disposable outer coveralls
 - o Chemical-resistant outer glove taped to outer coveralls3
 - Chemical-resistant inner gloves3
 - Hard hat
 - o Chemical resistant safety-toe boots taped to coveralls
 - Hearing protection (as required)

4.6.6 Level A Ensemble

- The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires prior approval by the Americas SH&E Director.
- Specific Level A ensemble components will be determined on a case-by-case basis by the SH&E Department.

4.7 **Employee Exposure Monitoring**

- 4.7.1 Exposure monitoring at HAZWOPER sites will be conducted to determine explosive and oxygen levels, monitor and control employee exposures to airborne contaminants, and to determine and regulate controlled work area boundaries (e.g., support zone, contamination reduction zone, and exclusion zone) for the protection of non-HAZWOPER workers and the general public.
- 4.7.2 Direct Reading Exposure Monitoring Requirements
 - Explosive levels, oxygen levels, and airborne contaminants present potential hazards to HAZWOPER personnel working within controlled work areas and to non-HAZWOPER workers and the general public present outside the controlled work areas. On-site exposure monitoring

S3NA-509-PR Hazardous Waste Operations and Emergency Response Activities Revision 0 01 December 2010

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² Selection of specific cartridges will be made by the SH&E Department (or Competent Person – Respiratory Protection as designated by the DSM) based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on the manufacturer's cartridge performance data.

³ Selection of specific glove types/materials will be provided in the project HASP based on consideration of the contaminants and the physical conditions of the work.



will be utilized to assess the magnitude of these hazards and to provide indications of any necessary control procedures to mitigate unacceptable hazards. *S3NA-509-FM1 Direct Reading Instrument Monitoring Log* will be used to record all monitoring efforts using direct reading instruments and will remain part of the project file.

• Specific exposure monitoring requirements will be established in individual HASPs and will be implemented by the project team(s) subject to the following requirements:

Direct Reading Instrument	Example Trade Names	Use
Flame Ionization Detector (FID)	OVA	Detection of select organic vapors
Photo ionization detector (PID)	miniRAE, Micro-TIP	Detection of select organic vapors
Portable gas chromatograph	OVA	Detection of select organic vapors
Explosive meter	MSA ALTAIR, QRAE II, BW GasAlert	Determine explosiveness (as a percent of the Lower Explosive Limit [LEL])
Oxygen monitor	MSA ALTAIR, QRAE II, BW GasAlert	Determine oxygen concentration (in percent)
Single gas meters (mono-tox) • Hydrogen sulfide • Carbon monoxide • Oxides of nitrogen • Cyanide		Determine airborne concentrations of selected contaminants (in parts per million)
Colorimetric Detector Tubes	Drager	Determine airborne concentrations of selected contaminants (in parts per million)
Aerosol monitor	Mini-RAM	Determine airborne particulate concentration (in milligrams per cubic meter)

• Direct reading instrumentation will be used in accordance with the following table:

 Selected instruments will be capable of discriminating contaminant concentrations to concentrations of at least one-half of the HASP-specified exposure limit. All direct-reading instrumentation will be calibrated daily as directed by the manufacturer. S3NA-509-FM2 Instrument Calibration Log will be used to record instrument calibrations.

4.7.3 Work Area Exposure Monitoring

- Work area exposure monitoring will include breathing zone readings for the maximum exposed worker(s).
- Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the HASP.
- 4.7.4 Perimeter Exposure Monitoring
 - Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site.
 - Perimeter exposure monitoring will be conducted at locations downwind from the project activities at a minimum (also upwind if the potential exists for offsite contamination to migrate onto the site).
 - Sample results will be recorded in a log book or on the sample log form provided in S3NA-509-FM3 Personal Sampling Data Sheet



- Records will indicate individual name, SSN (last 4 digits is acceptable), and job/operation at the time of sample collection.
- Samples sent out for independent laboratory analysis will follow chain of custody requirements.
- Exposure results will be posted on site and explained in a safety briefing.
- **Employees** will receive a written statement of results within 15 days of receipt from the laboratory.
- Results of all personal exposure monitoring will be provided to the **SH&E department** for inclusion in the employee medical records.

5.0 Records

5.1 All forms and documents generated during a HAZWOPER project will be maintained in the project file.

6.0 References

- 6.1 Federal Emergency Management Agency—FEMA: Incident Command System www.fema.gov
- 6.2 29 CFCR 1910.120, Hazardous Waste Operations and Emergency Response
- 6.3 29 CFR 1910.38, Emergency Action Plans

S3NA-509-FM1 Direct Reading Instrument Monitoring Log

Project:

Date:

Instrument:

Operator: Calibration: (Amt, Component, Date)

Job No.:

Sampling Technique:

Sample Interval:

Background Reading:

Action Level/Response:

Time	Location	Reading (units)	Detection Limits (Scale)





S3NA-509-FM2 Instrument Calibration Log

Instrument Information		
Instrument Name:	Manufacturer:	
Serial Number:	Last Service Date:	
Parameter(s):	Calibration Gas:	
Calibration Procedure:		
Daily Calibra	ation Results	
Date:	Calibration Result:	
Name:	Signature:	
Notes:		
Date:	Calibration Result:	
Name:	Signature:	
Notes:		
Date:	Calibration Result:	
Name:	Signature:	
Notes:		
Date:	Calibration Result:	
Name:	Signature:	
Notes:		

Project: Job No.: Date: Operator: Instrument: Calibration:

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Air Flow Calibration

(L/min)

S3NA-509-FM3 Personal Sampling Data Sheet

Client:

Sample

ID.

Site Location:

Pump

No.

Job No.:

Total

Time

Volume

(Liters)

Sampler's

Initials

Date

Stop

Time

Start

Time

(Location of sampling, Employee name, SSN) Pre Post Average Minutes Amount Conc. (mg) ppm, mg/m³

1 of 1

ΑΞΟΟΜ

Results

Method:

Remarks

Sampling Media:

S3NA-509-FM4 Emergency Information and Hazard Assessment

EMERGENCY INFORMATION AND HAZARD ASSESSMENT

EMERGENCY REFERENCES

Ambulance:	911
Fire:	911
Police:	911
Medical Services	s/Regional Hospital (including a map is advisable):

Poison Control Center: http://www.aapcc.org/poison4.htm

Emergency Muster Point:

In case of a site/facility emergency, please meet at:

The escape route from the site and an emergency muster point will be determined and provided to all workers during the project mobilization.

Client Contacts:

Office: Cell:

AECOM Project Representatives:

Office: Mobile:

AECOM Medical Records and Medical Consultant WorkCare Anaheim, CA 94502 Telephone: 800-455-6155

AECOM



S3NA-510-PR Hearing Conservation Program

1.0 Purpose and Scope

- 1.1 Establishes procedures to ensure 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.

3.0 Attachments

- 3.1 S3NA-510-FM Site-Specific Hearing Conservation Program
- 3.2 S3NA-510-WI Hearing Protection Guidelines

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 Region SH&E Managers or their designate
 - Provide access to initial and refresher hearing conservation training.
 - Inform employees of noise monitoring results when full-shift noise exposure is at or above the action level.
 - Designate areas and tasks where employees' exposure is at or above the action level.
 - Conduct noise monitoring, as applicable, and support hazardous noise assessment/evaluation efforts.

4.1.2 **Project or Office Managers**

- Implement the hearing conservation program.
- Confirm that a hazardous noise assessment/evaluation has been conducted.
- Confirm that a hazardous noise assessment/evaluation is conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
- Implement engineering controls to reduce noise levels when such measures are considered feasible and when required by regulation.
- Purchase, monitor, and replenish for employees' use a supply of hearing protection devices with a minimum Noise Reduction Rating (NRR) of 26 dBA.
- Confirm that individuals included in the program receive training and that the training meets the criteria outlined in this program.
- Investigate and implement corrective action to all reports of non-conformance with this
 procedure, including reports of standard threshold shifts or employees' failure to wear hearing
 protectors in designated areas.



4.1.3 Supervisors

- Maintain an awareness of the noise levels in work areas for which he/she is responsible.
- Place warning signs in areas where sound levels would require the use of hearing protectors.
- Request that a hazardous noise assessment/evaluation be conducted when a change in equipment, procedures, or personnel may increase employee exposure to noise.
- Confirm that all employees are aware of the requirements for hearing protection for any designated area or task.
- Enforce the use of hearing protection by employees in designated areas and for designated tasks.

4.1.4 Employees

- Comply with the requirements of the Hearing Conservation program.
- Wear hearing protection devices in designated areas or for designated tasks.
- Inspect and maintain hearing protection devices.
- Report any suspected change in noise levels of work area to supervisor.
- Report any signs or symptoms experienced that could be the result of overexposure to noise to supervisor.
- Participate in audiometric testing and hearing protection training when required.

4.2 **Requirements**

4.2.1 The requirements of this procedure apply to all locations/facilities/projects where employee noise exposure may equal or exceed 50 percent of the allowable noise dose or Permissible Exposure Limit (PEL). Table 1 provides information relative to the current PEL for noise exposure expressed as a time-weighted average.

SOUND LEVEL (dBA)	TIME (hours)
85	8
90	4
95	2
100	1
105	0.5
110	0.25
115	0.125

Table 1. Permissible Exposure Limit

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 C	Conservation Progra	am
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SOUND LEVEL (dBA)	TIME (hours)
85	4
90	2
95	1
100	0.5
105	0.25
110	0.125
115	0.0625



4.3 Training Program

- 4.3.1 All employees with potential exposure above the action levels established in Table 2 of this procedure or who otherwise utilize any type of hearing protector will participate in a hearing conservation training program.
- 4.3.2 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 biannually for all affected employees or more frequently for employees who do not properly use hearing protectors or otherwise fail to comply with this policy.

4.4 Audiometric Testing

- 4.4.1 All AECOM personnel with exposure greater than the action level may be enrolled in the medical surveillance program and undergo a baseline audiogram 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.
- 4.4.3 When a Standard Threshold Shift (STS), as identified by the AECOM Medical Consultant, is noted between the last valid baseline and the annual audiogram, the following steps will be taken:
 - A retest will be conducted within 30 days to confirm the STS. The employee will not be exposed to workplace/hobby noise for 14 hours or will be provided with adequate hearing protection prior to testing.
 - If the STS persists, ear protection will be upgraded to one with a greater NRR. The minimum NRR will be 26 dBA.
 - The employee will be counselled and AECOM will obtain information regarding the employee's possible noise exposure away from the workplace or existing ear pathology.
 - Qualified medical personnel will review the audiograms. This group will determine the need for a medical referral.
 - The employee will be notified in writing by either the SH&E Department or the AECOM Medical Provider of the STS, within 21 days of determination, as required by regulation.
 - The employee's supervisor will be notified of the shift in hearing threshold.
- 4.4.4 If the employee who has experienced 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 As deemed necessary by an SH&E Professional, or a Project Safety Plan AECOM will periodically monitor personal and area noise levels using noise dosimetry and/or sound level meters.

4.6 Hearing Protectors

- 4.6.1 Selection of appropriate hearing protectors must be based on actual or anticipated exposure levels. At a minimum, hearing protectors must provide a level of protection that brings actual or anticipated exposure below the PEL established for the time period shown in the table above. Additional information relative to hearing protector use is as follows:
 - Hearing protection will be mandatory for all employees exposed to 85 dBA for eight hours.



- Hearing protection will be mandatory for all employees working in any area that has not been evaluated for noise exposure and the ambient noise level in the area is such that you must raise your voice to have a normal conversation with someone less than four feet from you and/or when within 25 feet of an operating piece of heavy equipment.
- Hearing protection will be mandatory for all employees who work on or near heavy equipment unless personal dosimetry or other techniques have been used to document actual exposure.
- Hearing protectors will be made available to all employees 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

- 5.1.1 Noise exposure measurement records will be retained for three years at the project/facility.
- 5.1.2 Audiogram records will be retained in the employee's medical records as per AECOM's Medical Surveillance Procedure for a period as directed by regulation or AECOM's Medical Provider.
- 5.1.3 Employee training session documentation will be retained for the duration of employment.

6.0 References

- 6.1 29 CFR 1910.95 Occupational Noise Exposure
- 6.2 Canadian Standards Association (CSA) Standard Z94.2-M1984
- 6.3 American National Standards Institute (ANSI) S3.19-1974.
- 6.4 S3NA_003_PR SH&E Training
- 6.5 S3NA_208_PR Personal Protective Equipment
- 6.6 S3NA_605_PR Medical Surveillance

S3NA-510-WI Hearing Protection Guidelines

1.0 Comparison

Comparison of Hearing Protection			
Ear Plugs		Ear Muffs	
Ad	vantages:	Advantages:	
•	small and easily carried	less attenuation variability among users	
•	convenient to use with other personal protection equipment (can be worn with ear	 designed so that one size fits most head sizes 	
•	muns) more comfortable for long-term wear in hot, humid work aroas	 easily seen at a distance to assist in the monitoring of their use 	
		 not easily misplaced or lost 	
 convenient for use in confined work areas 		may be worn with minor ear infections	
Dis	advantages:	Disadvantages:	
•	requires more time to fit	less portable and heavier	
٠	more difficult to insert and remove	 more inconvenient for use with other personal protective equipment 	
•	require good hygiene practices		
•	may irritate the ear canal	 more uncomfortable in not, numid work area 	
•	easily misplaced	 more inconvenient for use in confined work areas 	
•	more difficult to see and monitor usage	• 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. Soundattenuating material inside the ear cushions must not get wet.
- 2.7 Use a soft brush to remove skin oil and dirt that can harden ear cushions.
- 2.8 Squeeze excess moisture from the plugs or cushions and then place them on a clean surface to air dry.



S3NA-510-FM Site-Specific Hearing Conservation Program Site (Project)

1.0 Monitoring

As per regulation, noise monitoring will be conducted by the following procedure:

Such monitoring will consist of (check those that apply):

□ Noise Dosimetry □ Sound Level Meter Survey

Specific instrumentation to be used is (make/model):

Make	Model

and will be calibrated at a frequency of

and documented in the

Monitoring strategy is as follows (*list all equipment and activities on site that may involve sound pressure levels above 80 dBA and an explanation of the strategy to document actual exposures*):

Area/Equipment	Monitoring Strategy

Where areas or equipment are not clearly identified, all monitoring will be documented utilizing an illustrated layout (*attach form developed for the specific site*). Monitoring frequency will be in accordance with the strategy outlined above and when the following changes in site conditions/activities occur:

1.			
2.			
3.			
4.			
5.			



2.0 Employee Notification

All site employees exposed above the regulated action level (85 dBA – 8 hour TWA) will be notified of the monitoring results by (*insert name/title*) at an interval not to exceed after completion of monitoring.

Notification shall be written, with a copy to the SH&E Department. Documentation of employee notifications and corresponding signatures of notified employees will be kept in the site health and safety logbook/files.

3.0 Observation of Monitoring

All employees affected by the monitoring, or a designated employee representative, shall be given the opportunity to observe noise monitoring procedures. This will be achieved by:

4.0 Audiometric Testing Program and Requirements

AECOM personnel who perform field activities where noise exposure above action levels is expected are required to participate in an audiometric testing program. Additionally, any subcontractors performing work on AECOM projects where noise levels exceeding action level will be required to provide documentation that they participate in an audiometric testing program that meets the applicable regulations. Documentation of participation in the testing program will be maintained by and will be located at .

5.0 Hearing Protectors and Estimating Attenuation

A selection of suitable hearing protectors will be made available to all employees who are expected to have 8-hour TWA noise exposures above 85 dBA. The types anticipated to be available include:

Protection Type	Attenuation	

Hearing protector attenuation will be evaluated by for specific noise environments according to the following method prior to determining their suitability for use:

1.	
2.	
3.	

The following site personnel will be required to wear hearing protectors during specific activities and the results of site-specific monitoring conducted in accordance with this procedure. (*This section can be completed after monitoring, if necessary*).



Employee Name	Activity Type	Type of Protection

Hearing protectors will be properly fitted by upon initial distribution to site workers.

Training in the use and care of hearing protectors shall be conducted by during the initial site-specific health and safety training. Training contents shall meet the requirements set forth in this procedure and the applicable regulations.

Hearing protectors will be distributed by from the storage location at the

6.0 Access to Information and Training Materials

All information required by regulation to be made available to the employees will be posted by (*insert name/title*) at the .

Local Occupational Health and Safety Regulations will also be kept on site.

7.0 Recordkeeping

Records required by AECOM's Hearing Conservation Program and Regulations shall be completed by and shall be maintained at the and placed on permanent file at the for the minimum duration required by the standard. Employees can access their individual records by contacting .

All records required by this section will be transferred to any employee's successive employer if AECOM ceases to do business.

8.0 Approvals

Project Manager: Date:

SH&E Representative: Date:



S3NA-511-PR Heat Stress

1.0 Purpose and Scope

- 1.1 Establishes a heat stress prevention program to help ensure that employees know and recognize the symptoms of heat stress-related illnesses and are prepared to take appropriate corrective action.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Acclimated**: Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat and much of its benefit may be lost if exposure to hot environments is discontinued for a week.
- 2.2 **Chemical Protective Clothing (CPC):** Apparel that is constructed of relatively impermeable materials intended to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek® coveralls (all types) and polyvinyl chloride (PVC) coveralls and rain suits.
- 2.3 **Unacclimated**: Workers who have not been exposed to hot work conditions for one week or more or who have become heat-intolerant due to illness or other reasons.
- 2.4 **Heat Cramps**: A form of heat stress brought on by profuse sweating and the resultant loss of salt from the body.
- 2.5 **Heat Exhaustion**: A form of heat stress brought about by the pooling of blood in the vessels of the skin and in the extremities.
- 2.6 **Heat Rash**: A heat-induced condition characterized by a red, bumpy rash with severe itching.
- 2.7 **Heat Stress.** The combination of environmental and physical work factors that constitute the total heat load imposed on the body.
- 2.8 **Heat Stroke**: The most serious form of heat stress, which involves a profound disturbance of the body's heat-regulating mechanism.
- 2.9 **Sunburn**: Is caused by unprotected exposure to ultraviolet light that is damaging to the skin. The injury is characterized by red painful skin, blisters, and/or peeling.

3.0 Attachments

- 3.1 S3NA-511-FM Heat Stress Monitoring Log
- 3.2 S3NA-511-WI1 Temperature Thresholds
- 3.3 S3NA-511-WI2 Symptoms and Treatment
- 3.4 S3NA-511-ST Heat Exposure

4.0 **Procedures**

4.1 **Restrictions**

- 4.1.1 Staff working in extreme heat or sun for extended periods of time away from a shelter or vehicle must not work alone.
- 4.1.2 Staff shall not be exposed to levels that exceed those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.
- 4.1.3 Clothing corrections shall be applied in accordance with the heat stress and strain section of the ACGIH Standard.



4.2 Roles and Responsibilities

4.2.1 **Project Managers'/field task managers'** responsibilities:

- Evaluate the need for heat stress prevention measures and incorporate as appropriate into the Health and Safety Plan.
- Implement heat stress prevention measures, as applicable, at each work site.
- Develop/coordinate a work-rest schedule, as applicable.
- Ensure heat stress hazard assessments/evaluations were completed for the planned activities.
- Assign personnel physically capable of performing the assigned tasks.
- Ensure that personnel are properly trained in the recognition of heat stress-related symptoms.

4.2.2 Region SH&E Managers' responsibilities:

- Provide heat stress awareness training.
- Assist project teams develop appropriate work-rest schedules.
- Conduct/support incident investigations related to potential heat stress-related illnesses.

4.2.3 Site Supervisors' responsibilities:

- Identify those tasks that may be most impacted by heat stress and communicate the hazard to the assigned employees.
- Ensure that employees have been trained on the recognition of heat stress-related illness.
- Ensure that adequate supplies of appropriate fluids are readily available to employees.
- Ensure that a proper rest area is available.
- Conduct heat stress monitoring, as applicable.
- Implement the work-rest schedule.
- Ensure that first aid measures are implemented once heat stress symptoms are identified.
- Ensure personnel are physically capable of performing the assigned tasks and are not in a physically compromised condition.
- Report all suspected heat stress-related illnesses.

4.2.4 **Employees'** responsibilities:

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

4.3 Controls

- 4.3.1 If staff are or may be exposed, the supervisor shall:
 - Conduct a heat stress assessment to determine the potential for hazardous exposure of workers, and
 - Develop and implement a heat stress exposure control plan.
- 4.3.2 If staff are or may be exposed, the supervisor shall implement engineering controls (e.g., shelters, cooling devises, etc.) to reduce the exposure of staff to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard.
- 4.3.3 If engineering controls are not practicable, the supervisor shall reduce the exposure of workers to levels below those listed in the screening criteria for heat stress exposure in the heat stress and strain section of the ACGIH Standard by providing administrative controls, including a work-rest cycle or personal protective equipment, if the equipment provides protection equally effective as administrative controls.
- 4.3.4 If staff are or may be exposed, the supervisor shall provide and maintain an adequate supply of cool, potable water close to the work area for the use of a heat exposed worker.
- 4.3.5 If a staff person shows signs or reports symptoms of heat stress or strain, they shall be removed from the hot environment and treated by an appropriate first aid attendant, if available, or by a physician.



- 4.3.6 Heat stress can be a significant field site hazard, especially for workers wearing CPC. The workforce will gradually work up to a full workload under potentially stressful conditions to allow for proper acclimation.
- 4.3.7 Site personnel shall be instructed in the recognition of heat stress symptoms, the first aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.
- 4.3.8 Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

4.4 Symptoms and Treatment

- 4.4.1 Workers who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin), shall be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water.
- 4.4.2 Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).
- 4.4.3 Severe heat stress (heat stroke) is a life-threatening condition that must be treated by a competent medical authority.

4.5 **Prevention**

- 4.5.1 All staff working in extreme heat or sun should understand the following guidelines for preventing and detecting heat exhaustion and heat stroke.
 - If you experience heat exhaustion or heat stroke you must immediately seek shelter and water.
 - Take frequent short breaks in areas sheltered from direct sunlight; eat and drink small amounts frequently.
 - Try to schedule work for the coolest part of the day, early morning and evening.
- 4.5.2 Prevention of heat-related illnesses:
 - Avoid strenuous physical activity outdoors during the hottest part of the day.
 - Wear a hat and light-colored, loose-fitting clothing to reflect the sun.
 - Avoid sudden changes of temperature. Air out a hot vehicle before getting into it.
 - If you take diuretics, ask your doctor about taking a lower dose during hot weather.
 - Drink 8 to 10 glasses of water per day. Drink even more if you are working or exercising in hot weather.
 - Avoid caffeine and alcohol as they increase dehydration.
 - If you exercise strenuously in hot weather, drink more liquid than your thirst seems to require.

4.6 Personal Protective Equipment

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

4.7 Work-Rest Schedule Practices

- Intake of fluid will be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.
- Two 8-ounce glasses of water should be taken prior to beginning work, then up to 32 oz. per hour during the work shift; fluid replacement at frequent intervals is most effective.



- The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration and may increase loss of water.
- If commercial electrolyte drinks (e.g., Gatorade) are used, the drink should be diluted with water, or 8 ounces of water should be taken with each 8 ounces of electrolyte beverage.
- Additional salt is usually not needed and salt tablets should not be taken.
- Replacement fluids should be cool, but not cold.
- Breaks will be taken in a cool, shaded location, and any impermeable clothing should be opened or removed.
- Dry clothing or towels will be available to minimize chills when taking breaks.
- Manual labor will not be performed during breaks, other than paperwork or similar light tasks.
- Other controls that may be used include:
 - Scheduling work at night or during the cooler parts of the day (6 am–10 am, 3 pm–7 pm).
 - Erecting a cover or partition to shade the work area.
 - Wearing cooling devices such as vortex tubes or cooling vests beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

4.8 Evaluating the Work-Rest Schedule's Effectiveness

- 4.8.1 Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's vitals (e.g., pulse, blood pressure, and temperature) can provide additional information in determining if the schedule is adequate, and is accomplished as follows:
- 4.8.2 At the start of the workday each worker's baseline pulse rate (in beats per minute bpm) is determined by taking a pulse count for 15 seconds and multiplying the result by four or an automated pulse count device may be utilized. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:
 - Each worker's maximum heart rate at the start of any break should be less than [180 minus worker's age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
 - At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be remeasured and the end-of-break criteria again applied.
- 4.8.3 Use a clinical thermometer or similar device to measure the oral/ear temperature at the beginning (before drinking liquids) and end of each break period and apply the following criteria:
 - If the oral temperature exceeds 99.6°F, 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.
- 4.8.4 Use of an automated or similar blood pressure device will be used to assess each employee's blood pressure at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:
 - If the blood pressure of an employee is outside of 90/60 to 150/90, then the employee will not be allowed to begin or resume work; extend the break period by at least five minutes, at the end of which blood pressure rates will be remeasured and the end-of-break criteria again applied.
- 4.8.5 All physiological monitoring of heat stress will be documented using S3NA-511-FM Heat/Cold Stress Monitoring Log.

4.9 Training

- 4.9.1 Project staff and their supervisors that may be exposed to the hazard will be oriented to the hazard and the controls prior to work commencing.
- 4.9.2 Those personnel potentially exposed to heat stress will receive training including, but not limited to
 - Sources of heat stress, influence of protective clothing, and importance of acclimatization.



- How the body handles heat.
- Recognition of heat-related illness symptoms.
- Preventative/corrective measures.
 - Employees will be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.
 - All employees will be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
- First aid procedures for heat stress-related illnesses.

5.0 Records

5.1 None

6.0 References

- 6.1 S3NA-003-PR SH&E Training
- 6.2 S3NA-208-PR Personal Protective Equipment
- 6.3 S3NA-314-PR Working Alone and Remote Travel

S3NA-511-FM Heat Stress Monitoring Log

The purpose of this form is to track entry into hot zones wearing chemically protective clothing and monitor employees for heat stress-related illness. It is the responsibility of the foreman or supervisor-in-charge to ensure that each person entering the hot zone completes the required information. Vital signs must be taken by a competent person.

Project Name:			Forema	an/Superv	visor:				١	Work/Res	t Schedu	le1:	IN (min) Ol	JT (min)	
Date:	Water Provide	d²	Acclim	ated ³	Initial Vitals ³	Vital Si	gns and	Time In/C	Dut⁴							
Employee Name	Yes	No	Yes	No	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out	Vitals	In	Out
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		
					Р			Р			Р			Р		
					BP			BP			BP			BP		
					Temp			Temp			Temp			Temp		

1. Please refer to S3NA-511-PR, Heat Stress. Section 6.3 provides specific details on how to develop a work-rest schedule.

2. Each employee should be provided a sufficient amount of water or sports drink before entering the hot zone. Drinks such as coffee and cola should be discouraged.

3. A worker is "acclimated" if he/she has worked in a hot environment for at least 7 to 10 consecutive days. If a worker is acclimated, check "Yes." If a worker is not acclimated, check "No" and reduce the "Min In" by 50 percent for that employee until the 7- to 10-day period is reached.

4. "Vitals" refers to employee vital signs (e.g., pulse [P], blood pressure [BP], body temperature [Temp], etc.). Initial vitals must be taken and recorded before the start of work operations in the hot zone. Each time the employee exits the hot zone, vitals must be taken and evaluated for heat stress criteria. Section 6.4 of S3NA-511-PR *Heat Stress* provides specific instructions for taking and evaluating employee vital signs.

5. Body temperature vital signs will be recorded in °F.



S3NA-511-WI1 Temperature Thresholds

1.0 Work-Rest Schedule

The prevention of heat stress is best performed through supervisor observation of employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the work supervisor based upon the ambient temperature, amount of sunshine, humidity, the amount of physical labor being performed, the physical condition of the workers (e.g., acclimated/not), and protective clothing being used.

- 1.1 Establishing a Work-Rest Schedule
- 1.1.1 AECOM permits the use of either of two techniques to initially determine an appropriate daily workrest schedule. These methods are:
 - Wet Bulb Globe Thermometer (WBGT) Method: This method is preferred, if a WBGT meter is available.
 - Adjusted Temperature Method: This method should be used only if WBGT data is not available.
- 1.1.2 Either procedure will provide the work supervisor with a recommended routine; however, adjustments to this routine may be required to accommodate the specific daily conditions at the work site.
- 1.2 WBGT Work-Rest Schedule Guidelines
- 1.2.1 Table 1, the Non-CPC Activities WBGT Chart, is intended for use where personnel are not utilizing CPC. Where workers are required to utilize CPC, Table 2, the CPC Activities WBGT Chart, will be used.
- 1.2.2 WBGT readings are compared directly with the values the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

	WBGT					
Work-Rest Regimen	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)		

Table 1. Non-CPC Activities WBGT Chart

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

Table 2. CPC Activities WBGT chart

		WE	3GT	
Work-Rest Regimen	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74°F (23.3°C)	70°F (21.1°C)	67°F (19.4°C)	
75% Work – 25% Rest	75°F (23.9°C)	72°F (22.2°C)	70°F (21.1°C)	



50% Work – 50% Rest	77°F (25°C)	74°F (23.3°C)	72°F (22.2°C)	70°F (21.1°C)
25% Work – 75% Rest	79°F (26.1°C)	76°F (24.4°C)	75°F (23.9°C)	74°F (23.3°C)

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

1.3 Adjusted Temperature Work-Rest Schedule Guidelines

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments will be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the Adjusted Temperature, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching; very heavy work corresponds to significant, continuous physical labor) to determine the work-rest schedule.

Table 3.	Temperature	Adjustment	Factors
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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 we	earing 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	ng 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 Clothi	ng (CPC)				
Modified Level D (coveralls, no respirator)	+5°F (+2.78°C)				
Level C (coveralls w/o hood, full-face respirator)	+8°F (+4.45°C)				
Level C (coveralls with hood, full-face respirator)	+10°F (+5°C)				
Level B with airline system	+9°F (+5.56°C)				
Level B with SCBA	+9°F (+5.56°C) and right one column ²				
Level A	+14°F (+7.78°C) and right one column ²				
Other	Specified in the HASP				
Miscellaneous					

¹ This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

² Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.



Unacclimated work force	+5°F (+2.78°C)
Partially acclimated work force	+2°F (+1.11°C)
Working in shade	-3°F (-1.67°C)
Breaks taken in air conditioned space	-3°F (-1.67°C)

Table 4. Work-Rest Schedule Based on Adjusted Temperature

		Adjusted Ter	mperature	
Regimen	Light Work	Moderate Work	Heavy Work	Very Heavy Work
No specified requirements	< 80°F (22.67°C)	< 75 (23.88°C)	< 70 (21.11°C)	< 65 (18.33°C)
15 minute break every 90 minutes of work	80°F – 90°F (22.67°C) - (32.22°C)	75 – 85 (23.88°C) - (29.44°C)	70 – 80 (21.11°C) - (22.67°C)	65 – 75 (37.77°C) - (23.88°C)
15 minute break every 60 minutes of work	>90 – 100 (32.22°C) - (37.77°C)	> 85 – 95 (23.88°C) - (35°C)	>80 – 85 (22.67°C) - (23.88°C)	>75 – 80 (23.88°C) - (22.67°C)
15 minute break every 45 minutes of work	>100 – 110 (37.77°C) - (43.33°C)	>95 – 100 (35°C) - (37.77°C)	>85 – 90 (23.88°C) - (32.22°C)	>80 – 85 (22.67°C) - (23.88°C)
15 minute break every 30 minutes of work	>110 – 115 (43.33°C) - (46.11°C)	>100 – 105 (37.77°C) – (40.55°C)	>90 – 95 (32.22°C) - (35°C)	>85 – 90 (23.88°C) - (32.22°C)
15 minute break every 15 minutes of work	>115 – 120 (46.11°C) - (48.88°C)	>105 – 110 (40.55°C) - (43.33°C)	>95 -100 (35°C) - (37.77°C)	>90 – 95 (32.22°C) - (35°C)
Stop Work	> 120 (48.88°C)	>110 (43.33°C)	>100 (37.77°C)	>95 (35°C)

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.



S3NA-511-WI2 Symptoms and Treatment

1.0 Heat Stress-related Illness Symptoms

- 1.1 There are three stages of heat-related illness:
- 1.1.1 Heat Cramps
 - Heat cramps are painful muscle cramps caused by over-exertion in extreme heat.
 - o Muscle spasms, and
 - o Pain in the hands, feet, and abdomen

1.1.2 Heat Exhaustion

- Heat exhaustion is the next stage. Symptoms include:
 - o Cool, moist, pale, flushed or red skin
 - o Heavy sweating
 - o Headache
 - o Nausea or vomiting
 - o Dizziness, and
 - o Exhaustion.
- Mood changes (irritable, or confused/can't think straight)
- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting

1.1.3 Heat Stroke

- Heat stroke. Heat exhaustion can sometimes lead to heat stroke, which can be fatal and requires emergency treatment. Heat stroke happens when you stop sweating and your body temperature continues to rise, often to 105° F (40.5° C) or higher. Symptoms of heat stroke:
 - Vomiting
 - Decreased alertness level or complete loss of consciousness
 - High body temperature (sometimes as high as 105° F (40.5° C))
 - o Skin may still be moist or the victim may stop sweating and the skin may be red, hot, and dry
 - o Rapid, weak pulse, and
 - Rapid, shallow breathing.
- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong rapid pulse
- Coma

2.0 Recommended Treatment for Heat Stress-related Illnesses

- 2.1 Heat Cramps
- 2.1.1 Treatment:
 - Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary.
 - Take more frequent breaks and drink more water.
 - Move victim to a cool place.
 - Administer drinks of cool water.

S3NA-511-WI2 Symptoms and Treatment Revision 0 01 March 2011



- 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:
 - o Get out of the sun to a cool location and drink lots of water, a little at a time.
 - Remove or loosen tight clothing.
 - If you are nauseated or dizzy, lie down.
- Move the victim to a cool place.
- Remove as much clothing as possible and elevate the feet.
- Administer drinks of cool water and fan to cool.
- Seek medical attention immediately.

2.1.3 Heat Stroke

- Treatment of heat stroke, or if a person's temperature exceeds 102° F (38.9 ° C) :
- Call for immediate medical help and then try to lower the temperature as quickly as possible:
 - \circ Apply cool (not cold) water the person's whole body, then fan the person.
 - Stop cooling once the person's temperature appears to be down; be careful not to overcool.
 - o Do not give aspirin or acetaminophen to reduce the temperature.
- Treat as a true medical emergency. Seek medical help immediately
- Reduce body temperature quickly
- Douse with cool water (not cold water)
- Wrap in wet sheet
- If available, use cold packs under arms, neck, and ankles
- Protect from injury during convulsion
- Ensure that the person's airway is open.
- Transfer to a medical facility immediately.

S3NA-511-ST Heat Exposure

The following Occupational Health and Safety regulations apply directly to heat stress hazards:

Jurisdiction	Regulation				
United States					
OSHA	1910.132				
Canada					
Alberta	n/a				
British Columbia	OHS Regulation (1997) Sect 7.28 – 7.32, 8.21, 12.72, 12.73				
Manitoba	Workplace Health and Safety Regulation (217/2006) Sect 4.12, 4.13				
New Brunswick	OHS Regulation (91-191) Sect 44				
Newfoundland/Labrador	OHS Regulation (C.N.L.R. 1165/96) Sect 10				
Nova Scotia	n/a				
NWT/NU Territories	n/a				
Ontario	O. Reg. 213/91 Sect 112				
	O. Reg. 851 Sect 129				
	Heat Stress (Health and Safety Guidelines) (April 2003)				
Prince Edward Island	OHS Regulations (EC180/87) Sect 42.1				
Quebec	OHS Regulation (R.R.Q., c. S-2.1, r.19.01 O.C. 885-2001) Sect 121 – 124, Schedule 4, Schedule 5				
Saskatchewan	OHS Regulation (R.R.S., c. O-1, r. 1) Sect 70				
Yukon Territory	Occupational Health Regulations (O.I.C. 1986/164) Sect 9, 12				



S3NA-520-PR Spill Response, Incidental

1.0 Purpose and Scope

- 1.1 This procedure defines the role of AECOM employees in the event of a chemical spill in AECOM offices, laboratories, or storage areas and during field investigations, including the appropriate containment procedures that AECOM employees will follow.
- 1.2 This procedure applies to all AECOM North America-based employees and operations.

2.0 Terms and Definitions

- 2.1 **Emergency Response**: A response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence that results, or is likely to result, in an uncontrolled release of a hazardous substance or whenever a release requires that a federal or state agency be notified, such as:
- 2.1.1 A release at or above a reportable quantity (RQ) of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance (40 CFR 302.8) is required to be reported to the National Response Center (NRC).
- 2.1.2 A hazardous chemical release at or above an RQ under the Emergency Planning and Community Right-to-Know Act (EPCRA) (Title III under the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 350-372) is required to be reported to state and local officials.
- A release in violation of a facilities Spill Prevention, Control, and Countermeasure (SPCC) Plan (40 CFR 112).
- 2.2 **Incidental Releases:** A response to a spill or release of a hazardous substance (in quantities below its RQ) where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area using equipment and materials available to them at the time or the spill or release. Any spill or release that cannot be managed with the personnel, materials, and equipment at the site shall be considered an Emergency Response.
- 2.2.1 Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses. Handling of incidental releases shall be in accordance with applicable standard operating procedures.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

- 4.1.1 **Supervisor/Project Manager** shall become the individual in charge at the incident until relieved by more qualified personnel. All AECOM emergency responders and their communications shall be coordinated and controlled through this individual. The individual in charge shall implement the Incident Command System (ICS) and shall be responsible for the following tasks:
 - Designate a safety officer who is knowledgeable about the operations being implemented at the emergency response site and who will have specific responsibility to identify and evaluate hazards and to provide direction on the safety of operations for the emergency at hand. If the safety officer judges activities to be an Immediately Dangerous to Life or Health (IDLH) and/or to involve an imminent danger condition, the safety officer shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.



- Identify all hazardous substances or conditions present and address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance, and handling procedures.
- Implement appropriate emergency operations.
- Limit the number of emergency response personnel at the emergency site.
- Implement the buddy system in groups of two or more.
- Provide standby, backup personnel with equipment ready to provide assistance or rescue. Qualified basic life support personnel, as a minimum, shall also be standing by with medical equipment and transportation as necessary.
- Verify that personal protective equipment (PPE) meets, at a minimum; the criteria contained in 29 CFR 1910.156(e) when worn while performing firefighting operations beyond the incipient stage for any incident.
- Determine if employees, who are engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard, wear positive pressure self-contained breathing apparatus, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection is appropriate.
- When deemed necessary for meeting the tasks at hand, an approved, self-contained, compressed air breathing apparatus may be used with approved cylinders from other approved, self-contained, compressed air breathing apparatuses provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatuses shall meet U.S. Department of Transportation and National Institute for Occupational Safety and Health criteria.
- Ensure that the PPE worn is appropriate for the hazards to be encountered.
- Implement appropriate decontamination procedures after emergency operations have terminated.
- Responsibility for the emergency response shall be transferred upon arrival of a more qualified AECOM Incident Commander or a Public Service Incident Commander.

4.1.2 Region Safety, Health and Environmental Manager is responsible for the following:

- Provide technical assistance to the Incident Commander regarding the correct way to respond to the spill.
- Decide whether AECOM or an outside emergency response company will clean up the spill.
- Prepare project-specific Spill Response Plans when required.
- Report spills, as necessary, to state/provincial environmental agencies.
- Review the incident report and facilitate the post-response discussion.
- Review and revise this SOP as necessary based on recommendations from post-response discussions.

4.1.3 **AECOM Employees** are responsible for the following:

- Follow precautions and safe handling practices to avoid spills.
- Alert Supervisor/Project Manager to any deteriorating hazardous materials containers within the office or project area.
- Report all spills and leaks to the Supervisor/Project Manager immediately.
- Secure the spill area as quickly as possible and prevent the migration of exterior spilled materials or substances to drains or other openings.
- 4.1.4 **First Responder Awareness Level** are those employees who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response by notifying the proper authorities of the release. They take no further action beyond notifying the authorities of the release.



- 4.1.5 First responders at the awareness level shall have sufficient training or experience to demonstrate competency in the following areas:
 - An understanding of what hazardous substances are and the risks associated with them in an incident.
 - An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
 - The ability to recognize the presence of hazardous substances in an emergency.
 - The ability to identify the hazardous substances, if possible.
 - An understanding of the role of the first responder awareness individual in the employer's emergency response plan, including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.
 - The ability to realize the need for additional resources and to make appropriate notifications to the communication center.
- 4.1.6 **First Responder Operations Level** are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures.

First responders at the operational level shall receive at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level:

- Knowledge of the basic hazard and risk assessment techniques.
- Know how to select and use proper PPE provided to the first responder operational level.
- An understanding of basic hazardous materials terms.
- Know how to perform basic control, containment, and/or confinement operations within the capabilities of the resources and PPE available with their unit.
- Know how to implement basic decontamination procedures.
- An understanding of the relevant standard operating procedures and termination procedures.
- 4.1.7 **Hazardous Materials Technicians** are employees who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance.

Hazardous materials technicians shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas:

- Know how to implement the employer's emergency response plan.
- Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
- Be able to function within an assigned role in the Incident Command System.
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.
- Understand hazard and risk assessment techniques.
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and PPE available with the unit.
- Understand and implement decontamination procedures.
- Understand termination procedures.
- Understand basic chemical and toxicological terminology and behavior.
- 4.1.8 **Hazardous Materials Specialists** are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician; however, those



duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with federal, state, local, and other government authorities.

- 4.1.9 Hazardous materials specialists shall receive at least 24 hours of training equal to the technician level and in addition have competency in the following areas:
 - Know how to implement the local emergency response plan.
 - Understand classification, identification, and verification of known and unknown materials by using advanced survey instruments and equipment.
 - Know the state emergency response plan.
 - Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.
 - Understand in-depth hazard and risk techniques.
 - Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and PPE available.
 - Be able to determine and implement decontamination procedures.
 - Have the ability to develop a site safety and control plan.
 - Understand chemical, radiological, and toxicological terminology and behavior.
- 4.1.10 **On Scene Incident Commander,** who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas:
 - Know and be able to implement the employer's incident command system.
 - Know how to implement the employer's emergency response plan.
 - Know and understand the hazards and risks associated with employees working in chemical protective clothing.
 - Know how to implement the local emergency response plan.
 - Know the state emergency response plan and of the Federal Regional Response Team.
 - Know and understand the importance of decontamination procedures.
- 4.1.11 **Skilled Support Personnel** who are skilled in the operation of certain equipment (such as mechanized earth moving or digging equipment or crane and hoisting equipment), who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by AECOM's employees, and who will be or may be exposed to the hazards at an emergency response scene are not required to meet the training required. However, these Skilled Support Personnel shall be provided an initial briefing at the site prior to their participation in the emergency response. At a minimum, the initial briefing shall include instruction in the wearing of appropriate PPE, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to AECOM's own employees shall also be provided to any Skilled Support Personnel.
- 4.1.12 **Specialist Employees** are AECOM employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge shall receive training or demonstrate competency in the area of their specialization annually.

4.2 Emergency Response Plan

- 4.2.1 An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to performing emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, and OSHA personnel. The plan shall be reviewed and approved by the Regional SH&E Manager prior to issue.
- 4.2.2 If contract does not require AECOM to provide emergency response services, then AECOM'S SH&E Procedures S3NA-101-PR Emergency Response Planning, Offices and S3NA-203-PR Emergency



Response Planning, Field shall apply and employees shall evacuate from the danger area whenever an emergency occurs.

- 4.2.3 Upon completion of the emergency response, all followup remediation work shall be done in accordance with AECOM SH&E Procedure S3NA-509-PR Hazardous Waste Operations and Emergency Response.
- 4.2.4 At a minimum, the emergency response plan shall address the following:
 - Pre-emergency planning and coordination with outside parties
 - Personnel roles, lines of authority, training, and communication
 - Emergency recognition and prevention
 - Safe distances and places of refuge
 - Site security and control
 - Evacuation routes and procedures
 - Decontamination
 - Emergency medical treatment and first aid
 - Emergency alerting and response procedures
 - Critique of response and follow-up
 - PPE and emergency equipment
- 4.2.5 (Note: Local and state emergency response plans may need to be review and incorporated into the plan.)

4.3 Training

- 4.3.1 Training for responders shall be provided by AECOM's Regional SH&E Manager or by individuals who have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach. Employees who receive responder training shall also receive annual refresher training if their responding responsibilities continue.
- 4.3.2 Employees receiving initial and refresher responder training shall be issued a certificate indicating training competency. Copies of all training records shall be maintained by the Site Safety Officer.

4.4 Medical Surveillance

4.4.1 All employees participating in an emergency response shall participate in AECOM'S S3NA-605-PR Medical Surveillance Program.

4.5 Chemical Protective Clothing

4.5.1 Chemical protective clothing shall be worn in accordance with AECOM'S S3NA-208-PR Personal Protective Equipment Program.

4.6 Spill Response Equipment

- 4.6.1 All AECOM offices that store chemicals at their facility shall have the appropriate spill response equipment. Such equipment may include the following:
 - Overpack containers of varying capacities
 - Absorbent material such as vermiculite or commercially prepared, absorbent containing pillows, rolls, sheets, or booms
 - Acid and base neutralizing agents
 - Chemically resistant gloves for solvents, alcohols, and acids
 - Polycoated Tyvek coveralls
 - Safety goggles
 - Respiratory protection
- 4.6.2 Spill response equipment shall be placed adjacent to areas where chemicals are routinely handled, stored, and/or where shipments are received. Similar types of spill response equipment shall also be



available in any AECOM vehicle or rented vehicle in which chemicals are being transported. Access to the spill response equipment shall be designed to avoid likely spill locations.

4.7 Spill Response Equipment for Field Programs

4.7.1 The amount of chemicals being used during a field program will dictate the types and quantity of spill response equipment that is brought to the site. If several squirt bottles of decontamination solutions are all that is being brought to a site, a few spill pillows and a one-gallon bucket may be sufficient to respond to a spill of these materials. If gallons of chemicals are being delivered to the site in drums or bulk tanks, a greater variety of spill response equipment will be needed. As indicated previously, during these types of field programs, a separate spill plan will be incorporated into the project health and safety plan (HASP) and will provide a greater level of detail regarding the specific spill response effort for that field program.

4.8 Immediate Response

- 4.8.1 Evacuate all personnel that will not be involved in the clean up from the immediate area of the spill or release.
- 4.8.2 Take all reasonable measures to confine, repair, and remedy the effects of the spill; cleanup must be done by knowledgeable personnel and is in accordance with the product label and MSDS.
- 4.8.3 Use the appropriate equipment and PPE so that you do not expose yourself to any chemicals or hazardous substances.
- 4.8.4 Clean up teams shall be organized outside the spill area and re-enter for cleanup activities.
- 4.8.5 If it is not practicable to maintain the airborne concentration of a flammable gas or vapour below the applicable exposure limit, for example, in a temporary situation or an emergency,
 - Only the minimum number of workers necessary for the work may be exposed,
 - Every worker exposed must be adequately trained and equipped to safely perform the required duties,
 - The concentration of the flammable gas or vapor must not exceed 20% of the lower explosive limit (LEL), and
 - In a life-threatening emergency only, exposure of emergency response workers is permitted above 20% of the LEL, provided that only those qualified and properly trained and equipped workers necessary to correct the unsafe condition are exposed to the hazard and every possible effort is made to control the hazard while this is being done.

4.9 First Aid

- 4.9.1 In the event of an incident, refer to the MSDS labels to ensure proper first aid is administered for the hazardous material and call the nearest Poison Centre or 911.
- 4.9.2 The American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-1998) recommends that the affected body part must be flushed immediately and thoroughly for at least 15 minutes using a large supply of clean fluid under low pressure. However, other references recommend a minimum 20-minute flushing period if the nature of the contaminant is not known. The flushing or rinsing time can be modified if the identity and properties of the chemical are known. For example, at least
 - 5 minutes flushing time for mild irritants.
 - 20 minutes for moderate to severe irritants.
 - 20 minutes for nonpenetrating corrosives.
 - 60 minutes for penetrating corrosives.
 - If irritation persists, repeat the flushing procedure.
- 4.9.3 It is important to note that ingestion of any chemical is not likely to occur in the workplace. If ingestion does occur, evidence indicates that inducing vomiting is not necessary in most situations where there has been an occupational chemical ingestion. Induction of vomiting should only be recommended if the chemical has very high, short-term (acute) toxicity, and medical follow-up is not readily available. In these cases, first aiders should receive special training on how to safely and effectively induce vomiting in the appropriate circumstances.
- 4.9.4 In the unlikely event that there is an on-site release of a hazardous substance (e.g., H2S):


- Get out of the area (in an upwind direction).
- Sound an alarm.
- Assess situation.
- Put on a breathing apparatus.
- Rescue victim(s).
- Revive victim(s).
- Get medical aid.

4.10 Reporting

- 4.10.1 Should there be a spill or leak involving a hazardous product, employees shall immediately notify the Supervisor and SH&E Incident Reporting Line.
- 4.10.2 "Dangerous occurrences" must be reported immediately to the police, employer, vehicle owner/leaser and the dangerous goods owner. Such events would include spills, bulk container damage, fire, explosion, and transportation accidents involving dangerous goods.
- 4.10.3 Confirm and seek direction on external reporting requirements.
 - A major release of a hazardous substance must be reported to the appropriate provincial or territorial governing body for Occupational Health and Safety.
 - All spills and releases must be reported to the governing regulatory body. Each jurisdiction has
 regulations governing the minimum quantities for reporting based on the type of product spilled or
 released.
- 4.10.4 If you have knowledge of spill, release, or unlawful discharge, notify authorities immediately. Reporting does not imply guilt or assign blame. You will need to report the following details.
 - Location and time of spill.
 - Description of circumstances leading to spill.
 - Type and quantity of material or substance spilled.
 - Details of any action taken at the site of the spill.
 - Description of location of spill and immediately surrounding the area.
 - Any additional information in respect of the spill that the Minister, environmental protection officer or person designated by regulations requires.

5.0 Records

5.1 None

6.0 References

- 6.1 40 CFR 302.8
- 6.2 40 CFR 350-372
- 6.3 40 CFR 112
- 6.4 S3NA-101-PR Emergency Response Planning, Office
- 6.5 S3NA-203-PR Emergency Response Planning, Field
- 6.6 S3NA-208-PR Personal Protective Equipment Program
- 6.7 S3NA-509-PR Hazardous Waste Operations and Emergency Response
- 6.8 S3NA-605-PR Medical Surveillance Program

Jurisdiction	Name	Phone
Alberta	Environmental Service Response Centre	1-800-222-6514
British Columbia	Provincial Emergency Program	1-800-663-3456
Manitoba	Conservation Emergency Response Program	1-204-944-4888



New Brunswick	Canadian Coast Guard	1-800-565-1633
Newfoundland & Labrador	Canadian Coast Guard	1-800-563-9089
NWT & Nunavut	Spill Report Line	1-867-920-8130
Nova Scotia	Canadian Coast Guard	1-800-565-1633
Ontario	Spill Action Centre	1-800-268-6060
Prince Edward Island	Canadian Coast Guard	1-800-565-1633
Quebec	Environmental Emergency Response	1-866-694-5454
Saskatchewan	Spill Report Centre	1-800-667-7525
Yukon Territory	Spill Report Centre	1-867-667-7244



S3NA-521-PR Decontamination

1.0 Purpose and Scope

- 1.1 To define appropriate procedures to decontaminate both equipment and personnel when exposure to hazardous chemicals or physical agents has occurred.
- 1.2 This procedure applies to all AECOM North America based operations and employees.

2.0 Terms and Definitions

- 2.1 **Contamination Reduction Zone (CRZ):** the transition area between the contaminated area and the clean area where decontamination activities occur.
- 2.2 **Decontamination:** the process of removing or neutralizing contaminants that have accumulated on personnel or equipment.
- 2.3 **Exclusion Zone (EZ):** the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc.
- 2.4 **Support Zone (SZ):** an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located.

3.0 Attachments

3.1 None

4.0 Procedure

4.1 Roles & Responsibilities

- 4.1.1 **Project Managers** will be responsible for the following:
 - Authorizing the procurement of the necessary decontamination supplies
 - Verifying that the applicable decontamination steps are clearly defined in the approved work plan
 - Verifying staff are appropriately trained to execute the defined decontamination procedures
 - Verifying that adequate staffing is available to safely conduct the applicable decontamination steps
- 4.1.2 **Supervisor** will be responsible for the following:
 - Establishing the designated site work zones (i.e., EZ, CRZ, SP, etc.)
 - Conduct site-specific training on the applicable decontamination steps/procedures, as required
 - Procuring the necessary decontamination supplies and establishing the decon line
 - Enforcing the applicable decontamination steps as defined in the approved work plan
- 4.1.3 **Employees** will be responsible for the following:
 - Following the defined decontamination steps as stated in the approved work plan

4.1.4 Region SH&E Manager

- Advise project managers and site supervisors as to the necessary decontamination procedures based on the known or reasonably anticipated chemical hazards and physical agents associated with the planned scope of work
- Support the project team to verify that adequate supplied-air respiratory protection measures are inplace, as applicable

4.2 General Requirements



- 4.2.1 When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).
- 4.2.2 All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.
- 4.2.3 All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.
- 4.2.4 Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The MSDS must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.
- 4.2.5 All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements identified in the approved work plan.
- 4.2.6 For all Level B and A ensembles, adequate supplied air must be available to allow the employee to safely complete all necessary decontamination steps.
- 4.2.7 Where decontamination procedures involving radioactive materials are required, the removable limits for both personnel and equipment will be specified by a Certified Health Physicist in the project's approved Radiation Protection Plan or approved safety planning document.

4.3 Materials Needed to Decontaminate Personnel and/or Equipment

- 4.3.1 The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:
 - Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
 - Hoses, buckets of water or garden sprayers for rinsing;
 - Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
 - Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
 - Metal or plastic cans or drums for the temporary storage of contaminated liquids;
 - Paper or cloth towels for drying protective clothing and equipment; and
 - Poly or plastic sheeting to lay down and form the base for the CRZ, as well as to contain contaminants and decontamination fluids.

4.4 Personal Decontamination Steps: Level D Ensemble

- 4.4.1 Remove residual or caked on soil from boots using a dry method (i.e., soft-bristle scrub brush to knock off the soil)
- 4.4.2 Wash exposed skin with soap and water, as applicable.

4.5 **Personal Decontamination Steps: Modified Level D Ensemble**

- 4.5.1 In the Exclusion Zone
 - Equipment drop on plastic sheet
 - Remove the majority of gross contamination
 - Wash boot covers and outer gloves
 - Rinse boot covers and outer gloves
 - Remove tape
 - Remove boot covers and outer gloves



- 4.5.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)
 - Wash protective suits and safety boots
 - Rinse protective suits and safety boots
 - Safety boot removal
 - Remove protective suit
 - Wash inner gloves
 - Rinse inner gloves
 - Remove inner gloves.
 - Remove inner clothing (if necessary)

4.5.3 In the Support Zone

- Finish with personal decon/hygiene wash procedures
- Redress (if necessary).

4.6 Personal Decontamination Steps: Level C Ensemble

- 4.6.1 In the Exclusion Zone
 - Equipment drop on plastic sheet
 - Remove the majority of gross contamination
 - Wash boot covers and outer gloves
 - Rinse boot covers and outer gloves
 - Remove tape
 - Remove boot covers and outer gloves
- 4.6.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)
 - Wash protective suits and safety boots
 - Rinse protective suits and safety boots
 - Change out (if required): Filter/mask change and redress (boot covers and outer gloves)
 - Safety boot removal
 - Remove protective suit
 - Wash inner gloves
 - Rinse inner gloves
 - Remove respirator/mask
 - Remove inner gloves
 - Remove inner clothing (if necessary)
- 4.6.3 In the Support Zone
 - Finish with personal decon/hygiene wash procedures
 - Redress (if necessary)

4.7 Personal Decontamination Steps: Level B Ensemble

- 4.7.1 In the Exclusion Zone
 - Equipment drop on plastic sheet
 - Remove the majority of gross contamination
 - Wash boot covers and outer gloves
 - Rinse boot covers and outer gloves
 - Remove tape
 - Remove boot covers and outer gloves
- 4.7.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)
 - Wash SCBA/airline equipment, protective suits and safety boots



- Rinse SCBA/airline equipment, protective suits and safety boots
- Change out (if required): Tank change and redress (boot covers and outer gloves)
- Safety boot removal
- SCBA backpack or airline equipment removal
- Remove protective suit and/or splash suit
- Wash inner gloves
- Rinse inner gloves
- Remove face piece/mask
- Remove inner gloves
- Remove inner clothing (if necessary)
- 4.7.3 In the Support Zone
 - Finish with personal decon/hygiene wash procedures
 - Redress (if necessary)

4.8 Personal Decontamination Steps: Level A Ensemble

- 4.8.1 In the Exclusion Zone
 - Equipment drop on plastic sheet
 - Remove the majority of gross contamination
 - Wash boot covers and outer gloves (if applicable to ensemble)
 - Rinse boot covers and outer gloves (if applicable to ensemble)
 - Remove tape (if applicable to ensemble)
 - Remove boot covers and outer gloves (if applicable to ensemble)
- 4.8.2 In the Contaminant Reduction Zone (keep the most contaminated equipment near the EZ)
 - · Wash protective suite and safety boots
 - Rinse protective suits and safety boots
 - Change out (if required): Tank change and redress (boot covers and outer gloves)
 - Safety boot removal
 - Remove fully encapsulating suit and hard hat
 - Remove SCBA backpack
 - Wash inner gloves
 - Rinse inner gloves
 - Remove face piece/mask
 - Remove inner gloves
 - Remove inner clothing (if necessary)
- 4.8.3 In the Support Zone
 - Finish with personal decon/hygiene wash procedures
 - Redress (if necessary)

4.9 **Decontamination Steps during a Medical Emergency**

- 4.9.1 If decontamination can be done:
 - Wash, rinse and/or cut off protective clothing and equipment
- 4.9.2 If decontamination cannot be done:
 - Wrap the victim in blankets, plastic sheeting, or rubber to reduce contamination of other personnel
 - Alert emergency and offsite medical personnel to potential contamination
 - Instruct them about specific decontamination procedures if necessary

4.10 Equipment Decontamination Steps



- 4.10.1 All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools.
- 4.10.2 All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of protection required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.
- 4.10.3 For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.
- 4.10.4 For smaller equipment, use the following steps for decontamination:
 - 1. Remove majority of visible gross contamination in EZ.
 - 2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
 - 3. Rinse equipment.
 - 4. Visually inspect for remaining contamination.
 - 5. Follow appropriate personal decontamination steps outlined above.
- 4.10.5 All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ. Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

5.0 Records

5.1 None

6.0 References

6.1 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, National Institute of Occupational Safety and Health (NIOSH) 85-115, 1985.