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INTERIM SITE MANAGEMENT PLAN for the K - FRONT ST. STATION

SITE #224063

Prepared for:
National Grid
One Metrotech Center
Brooklyn, New York 11201

Prepared by:
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Project Number: 60412543

Submittal Date:
January 2021

K - FRONT ST. STATION

KINGS COUNTY

BROOKLYN, NEW YORK

INTERIM SITE MANAGEMENT PLAN

NYSDEC Site Number: 224063

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One MetroTech Center
Brooklyn, New York 11201

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

January 2021

CERTIFICATION STATEMENT

I _KEVIN CONNARE, PG., certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Interim Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

_____[QEP]

_____1/25/21_____Date

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

K - FRONT ST. STATION

KINGS COUNTY

BROOKLYN, NEW YORK

INTERIM SITE MANAGEMENT PLAN

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List of Acronyms

bgs	Below Ground Surface
BTEX	Benzene, Ethylbenzene, Toluene, and Xylenes
BUG	Brooklyn Union Gas
CAMP	Community Air Monitoring Plan
CCP	Citizen Participation Plan
CFR	Code of Federal Regulation
CP	Commissioner Policy
cu ft	Cubic Feet
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
EE	Environmental Easement
ELAP	Environmental Laboratory Approval Program
EWP	Excavation Work Plan
FT	Feet
HASP	Health and Safety Plan
IC	Institutional Control
in	Inch(es)
ISMP	Interim Site Management Plan
mcg/m^3	micrograms per cubic meter
MGP	Manufacture Gas Plant
No.	Number
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRAP	Proposed Remedial Action Plan
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RP	Remedial Party and Respondent
RSO	Remedial System Optimization
SC	Site Characterization
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SMP	Site Management Plan

List of Acronyms (cont'd)

SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-volatile Organic Compound
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Interim Site Management Plan (ISMP):

Site Identification: **NYSDEC Site Number: 224063**
K - Front St. Station
Kings County, Brooklyn, New York

Item	Description
Institutional Controls:	1. The Site may be used for restricted residential; commercial, or industrial use
	2. An Environmental Easement shall be placed on the Site to prevent future exposure to impacts remaining on-site.
	3. Implement, maintain and monitor Engineering Control (EC) systems at the Site. All ECs must be inspected at a frequency and in a manner defined in the ISMP

Item	Description
Engineering Controls:	Cover System.

Inspections:	**Frequency**
Cover System	Annually, and after severe weather conditions that may affect the cover system
Monitoring:	
Soil Vapor Intrusion	As Needed for New Construction
Reporting	
Site-wide Inspection Report	Annually

Further descriptions of the above requirements are provided in detail in the Section 4 of this ISMP.

The property owner is required to comply with this ISMP including all notifications to National Grid and to the New York State Department of Environmental Conservation (NYSDEC), and the provisions in the Excavation Work Plan provided as Appendix B to this ISMP. If property ownership changes after the submission of the ISMP/Site Management Plan (SMP), the Institutional Controls (ICs) (Environmental Easement [EE]) must be addressed by the property owner's successors.

National Grid is responsible for Manufactured Gas Plant (MGP)-related impacts and costs associated therewith, only. If a remedy is determined to be necessary to address sources of non- MGP-related impacts present at the Site, this will be evaluated separately, by NYSDEC, for further action. **While National Grid has voluntarily assumed responsibility for preparation of this ISMP, National Grid reserves all of its rights under federal and state environmental laws to pursue other parties who may have responsibilities at this Site and for violations of the ISMP.**

1.0 INTRODUCTION

1.1 General

This Interim Site Management Plan (ISMP) is a required element of the remedial program for the K - Front St. Station site located in Brooklyn, New York (hereinafter referred to as "the Site"). The Site location is shown in **Figure 1**. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remediation Program Site No. 224063, which is administered by New York State Department of Environmental Conservation (NYSDEC).

The Brooklyn Union Gas Company (BUG), now doing business as National Grid NY (hereinafter "National Grid"), entered into an Order on Consent and Administrative Settlement, Index # A2-0552-0606, on February 7, 2007 (last amended September 2009) with the NYSDEC to investigate and remediate, if required, Manufactured Gas Plant (MGP)-related impacts at the Site (the Order).

The Site is situated on one property. The boundaries of the Site are shown in **Figure 2**. The boundaries of the Site are more fully described in the metes and bounds site description that is part of the Environmental Easement (EE), which is currently pending) and will be provided in **Appendix A** (the Site survey is provided in the appendix).

The results of a Site Characterization (SC), performed in phases from 2007 through 2013, indicate that some target compounds and target analytes were detected in samples collected from the subsurface at this Site. Samples in which the compounds and analytes were detected were collected at depth, and the compounds and analytes were detected at relatively low concentrations. Under existing site conditions, the potential for human exposure through inhalation, direct contact or ingestion is minimal. Under future conditions, there is a potential for exposure.

Institutional Controls and Engineering Controls (ICs and ECs, respectively) have been incorporated into the Site remedy and this ISMP to control exposure to target compounds and target analytes detected at concentrations exceeding applicable Standards

Criteria and Guidance (SCGs) in environmental samples collected at the Site (*i.e.*, impacts) to ensure protection of public health and the environment. An EE, to be granted to the NYSDEC, by the property owner (hereinafter "the Property Owner" and/or "the Grantor") and recorded with the Kings County Clerk by National Grid, requires compliance with this ISMP and all ECs and ICs placed on the Site. **Table 1** presents Site property divisions and owner information.

Since the final remedy has not yet been completed for the Site, this ISMP will be implemented to address intrusive activities prior to the final remedy or any portion of the final remedy at the Site. If a remedy is determined to be necessary to address sources of non-MGP-related impacts present at the Site, this will be evaluated separately for further action. Any necessary remediation will be completed prior to, or in association with, redevelopment. A Site Management Plan (SMP) will be prepared once the final remedy for the Site has been implemented and approved by NYSDEC. This ISMP has been approved by the NYSDEC, and compliance with this plan is required by the Grantor of the EE and the Grantor's successors and assigns. This ISMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This ISMP details the site-specific implementation procedures that are required by the EE. Failure to properly implement the ISMP is a violation of the EE.

- Failure to comply with this ISMP is also a violation of Environmental Conservation Law (ECL), 6 New York Codes, Rules and Regulations (NYCRR) Part 375 and the Order for the Site and thereby is subject to applicable penalties. If the failure to comply with this ISMP occurs, the NYSDEC may take action against the violating party.

- The property owner is required to comply with this ISMP including all notifications to National Grid and NYSDEC and with the provisions in the Excavation Work Plan ([EWP] - Appendix B). National Grid is only responsible for the costs associated with MGP-related impacts.

- NYSDEC can take action against an onsite and/or offsite owner if they interfere with the remedial program under the ECL. Triggers include improper disposal, release of chemicals of concern to environment, lack of odor control, etc.

- Annual inspections of the Site will be conducted to assess compliance with the provisions of the EE and this ISMP.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in **Appendix C** of this ISMP.

This ISMP was prepared by AECOM USA, Inc. (AECOM) on behalf of National Grid in accordance with the requirements of the NYSDEC's Division of Environmental Remediation (DER)-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This ISMP addresses the means for implementing the ICs and ECs that are required by the EE for the Site. **While National Grid has voluntarily assumed the costs of preparing this ISMP, National Grid reserves all of its rights under federal and state environmental laws to pursue other parties who may have responsibilities at this Site and for violations of the ISMP.**

As required by the March 2018 Record of Decision (ROD) for the Site, this ISMP includes the following two plans:

1. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the Site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

    - Institutional Controls: an Environmental Easement; and
    - Engineering Controls: a cover system;

The Institutional and Engineering Control Plan, which is presented in Section 3 of this ISMP, includes the following plans and provisions:

- An Excavation Work Plan which details the provisions for management of limited excavations in areas of remaining impacts;
- A Health and Safety Plan;
- Community Air Monitoring Plans;
- A Quality Assurance Project Plan;
- A Field Sampling Plan;
- Further investigation and possible remediation should large-scale redevelopment occur (see Section 3.8);
- Evaluation of the potential for Soil Vapor Intrusion (SVI) for any buildings developed on the Site, including provision for implementing actions recommended to address exposures related to SVI (see Section 3.9);
- Management and inspection of the identified engineering controls (see Section 4);
- Maintenance of Site access controls and Department notification.

2. A Monitoring Plan to assess the performance and effectiveness of the remedy (see Section 4). The plan includes:
    - A schedule of monitoring and frequency of submittals to the Department; and
    - Monitoring for vapor intrusion for any buildings developed on the Site, as may be required by the Institutional and Engineering Control Plan discussed above.

1.2 Revisions

Revisions to this ISMP will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, removal of impacted soil, or other significant change to the Site conditions. In accordance with the EE for the Site, the NYSDEC will provide a notice of any approved changes to the ISMP, and append these notices to the ISMP that is retained in its files.

1.3 Notifications

All intrusive activities must be approved by NYSDEC. Sufficient notification must be made to NYSDEC so it can make the decision on the type of reporting to be required. Typically, the type of notification and reporting requirements depend on the scope of work. Large-scale intrusive work will require additional investigation and, depending on findings of the investigation, may require a detailed work plan, such as a Remedial Action Work Plan, while smaller scale (i.e., "limited") intrusive activities will comply with the EWP (**Appendix B**) and may require a Notice of Intrusion letter or a simple letter work plan.

Notifications shall be submitted, in writing, by the property owner, to National Grid and the NYSDEC, as needed, in accordance with NYSDEC's DER-10 for the following reasons:

1. 60-day advance notice of any proposed changes in Site use that are required under the Order, 6NYCRR Part 375, and/or ECL.

2. 7-day advance notice of the start of any field activity not pursuant to the EWP (e.g., work associated with or related to maintenance to the building slab or construction).

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the EWP.

4. Notice within 48-hours of any damage or defect to the EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Verbal notice will be provided to National Grid and to NYSDEC by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site. The owner will provide written confirmation to NYSDEC within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

6. Follow-up status reports on actions taken to respond to any damage or defect to the EC requiring ongoing responsive action will be prepared by National Grid and submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site, use of the Site, or the responsibility for implementing this ISMP will include the following notifications:

7. At least 60 days prior to the change, National Grid and the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order, and all approved work plans and reports, including this ISMP.

8. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to National Grid and to the NYSDEC.

In addition to the above notifications pursuant to DER-10, notification shall be made to National Grid for the following reasons:

1. 30-day advance notice of the start of any field activity not pursuant to the EWP (*e.g.*, work associated with or related to maintenance to the building slab or construction).

2. As-soon-as-possible advance notice of any proposed ground-intrusive activity pursuant to the EWP.

3. 12-month advance notice of any property redevelopment and/or building demolition; or as soon as possible in advance of property redevelopment, if the Site is acquired within 18 months of redevelopment.

Appendix C includes contact information for the above notification. The information in this appendix will be updated as necessary to provide accurate contact information.

1.4 Prior Communications between National Grid, NYSDEC, and/or the Property Owner

On several occasions National Grid has communicated, either verbally or in writing, the results of the above-described investigations performed at the Site. On numerous occasions National Grid has provided reports and letters that discuss investigation findings to, or met directly with, the property owners.

At a minimum, information about the findings of the SC and future remedial steps was provided to Great Front Realty (GFR), or their counsel on the following dates, including preparation of a Proposed Remedial Action Plan (PRAP) and ROD:

Date	Communication
May 19, 2015	PRAP/ROD process meeting between National Grid, Tannenbaum Helpern Syracuse & Hirschtritt LLP (counsel for GFR), Apex (consultant to GFR), GFR, and NYSDEC.
May 5, 2015	Email from National Grid to GFR about a future PRAP public meeting and the fact sheet that would announce the meeting.
October 17, 2014	National Grid met with Tannenbaum Helpern Syracuse & Hirschtritt LLP (counsel for GFR) and Apex (consultant to GFR).
March 3, 2014	Email from National Grid to GFR transmitting the following documents • Final Front Street Holder Station SC Report dated July 2013; • Letter from NYSDEC to National Grid dated July 17, 2013, approving the Front Street Holder Station revised draft SC Report dated March 29, 2013; • Letter from NYSDEC to National Grid, dated July 17, 2013, requesting an EE for the Front Street MGP Site. • Letter from National Grid to GFR dated July 31, 2013
February 5, 2014	Email from National Grid to Tannenbaum Helpern Syracuse & Hirschtritt LLP (counsel for GFR) transmitting the following documents • Final Front Street Holder Station SC Report dated July 2013; • Letter from NYSDEC to National Grid dated July 17, 2013, approving the Front Street Holder Station revised draft SC Report dated March 29, 2013;

	• Letter from NYSDEC to National Grid, dated July 17, 2013, requesting an EE for the Front Street MGP Site. • Letter from National Grid to GFR dated July 31, 2013
July 31, 2013	Letter from National Grid to GFR transmitting the following documents • Letter from NYSDEC to National Grid dated March 23, 2012, transmitting comments on the December 2011 Front Street Holder Station draft SC Report; • Letter from NYSDEC to National Grid dated July 17, 2013, approving the Front Street Holder Station revised draft SC Report dated March 29, 2013; • Final Front Street Holder Station SC Report dated July 2013; • Letter from NYSDEC to National Grid, dated July 17, 2013, requesting an EE for the Front Street MGP Site.
May 10, 2013	Letter from National Grid to GFR transmitting two copies of the Revised Draft Site Characterization Report dated March 29, 2013.
October 14, 2011	Letter from National Grid to GFR stating that NYSDEC and NYSDOH have reviewed the draft SC data for the Front Street Holder Station site and they have requested that a draft SC Report be submitted. No soil vapor intrusion (SVI) sampling is required at this time.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in the Vinegar Hill section of Brooklyn, Kings County, New York (see **Figures 1** and **2**). The Site address is 218 Front Street and is composed of one parcel, identified as Block 55, Lot 20. The Site is approximately 1.13 acres in size and is located in the middle of a city block bounded on the north by Front Street, on the east by Gold Street, on the south by York Street, and on the west by Bridge Street. These streets are occupied by mixed commercial and residential properties.

The boundaries of the Site are more fully described in the EE (**Appendix A**). The owner of the Site at the time of this issuance is GFR.

A one-story warehouse affronts 218 Front Street and the remainder of the 218 Front Street property consists of an active lumber yard that affronts 171 York Street. These structures occupy approximately 90 percent of the Site.

The Site is four blocks south of the east river, two blocks east of the Manhattan Bridge, and two blocks north of Interstate 278 (*i.e.*, Brooklyn-Queens Expressway).

The topography at the Site is relatively flat, but slopes within a few blocks to the north and East toward the East River. Also, the ground surface at the lumber yard is approximately 5 feet (ft) higher than adjacent York Street.

2.2 Physical Setting

2.2.1 Land Use

Land use in the Site area includes residences and commercial properties to the east and west (see **Figures 1** and **2**). Use of the 218 Front Street property is currently commercial, being used as a warehouse and lumber yard. The properties on the south side of Front Street, from 218 Front Street east to Gold Street, are commercial businesses. The

properties along the north side of York Street are mostly commercial businesses with apartments above. The properties on the north side of Front Street, across from 206 and 218 Front Street, and the south side of York Street across from 171 York Street, are mostly residential.

According to New York City tax maps, land use in the area is identified as manufacturing/industrial and the Lot 55, Block 20 parcel is zoned as C2-4/R6A which allows for residential, commercial, and light industrial uses. The actual use is commercial with an active warehouse and lumber yard. The nearest residential area is directly adjacent to the site at the northwest and southeast site boundaries.

2.2.2 Geology

The Site is located within the Atlantic Coastal Plain physiographic province of New York State. The Atlantic Coastal Plain is characterized by low relief with elevations ranging from sea level to almost 400 ft above mean sea level.

The lithology of Brooklyn and Queens consists of Cretaceous and Pleistocene age unconsolidated deposits underlain by Precambrian crystalline bedrock. The unconsolidated deposits pinch out in northwestern Queens where bedrock outcrops, but reach a thickness of more than 1,000 ft in southeastern Queens. The unconsolidated deposits form six distinct hydrogeologic units consisting of four aquifers and two confining layers that generally dip to the south-southeast. The units in descending order are the:

- Upper glacial aquifer (0-300 ft thick)
- Gardiners clay (0-150 ft thick),
- Jameco aquifer (0-200 ft thick),
- Magothy aquifer (0-500 ft thick),
- Raritan confining unit (0-200 ft thick), and
- Lloyd aquifer (0-300 ft thick),

The units pinch out to the north-northeast and may not all be found at any one location.

The Site area is underlain from the surface down by the upper glacial aquifer, the Raritan Formation, and crystalline bedrock. The upper glacial aquifer is of Wisconsin age and consists of a terminal moraine, a ground moraine, and glacial outwash deposits whose area is characterized as an unsorted and unstratified mixture of clay, sand, gravel and boulders. The Raritan Formation is recognized as a confining unit which has been described as light to dark gray, brown-red, pink, red and gray-white clay, silty clay and clayey to silty fine sand. Disseminated lignite and pyrite are common and calcareous concretions may be found.

During the SC, drilling within the two holders identified the presence of fill consisting of sands and gravel and varying amounts of concrete, brick, glass, wood, and metal.

Observations from the well borings on the sidewalks outside the former gas holders indicate that the Site area is underlain by varying amounts of fill which is underlain by natural deposits of fine to coarse sand with varying amounts of gravel and cobbles.

Above-grade portions of the former gas holders are no longer present. The soil borings in the warehouse basement of 218 Front Street and the lumber yard at 171 York Street were advanced to determine if the foundations of the former gas holders are present and if there are remaining MGP-related impacts within.

Using the data obtained from the subsurface investigation, along with BUG gas holder drawings, **Figure 3** presents a cross section from Front Street on the north to York Street on the south. The line of cross section is shown in **Figure 4**. Site-specific boring logs and monitoring well construction logs are provided in **Appendix D**.

2.2.3 Hydrogeology

The primary hydrogeologic units beneath the Site are the upper glacial aquifer which is underlain by the Raritan Formation unit at an approximate depth of approximately 125 ft below ground surface (bgs). Regional groundwater within the upper glacial aquifer occurs at a depth of approximately 40 ft bgs with overall flow towards the East River.

Groundwater levels recorded from the four sidewalk monitoring wells on June 10, 2011 are presented in **Figure 5**. The depth to groundwater recorded in the four sidewalk wells ranged from approximately 37 to 42 ft bgs. Groundwater flow is to the north-northwest under a fairly low hydraulic gradient of approximately 0.0007 ft/ft. The groundwater surface configuration is consistent with the ground topography, which slopes to the west-northwest toward the East River. Groundwater monitoring well construction logs are provided in **Appendix D**. The Site monitoring wells were decommissioned with NYSDEC approval in 2013.

Groundwater was encountered at a depth of approximately 6 ft bgs in well MW-5 located within the Holder No. 5 tank. This depth to groundwater is approximately 39 feet above the levels recorded in the nearby sidewalk wells. This elevated groundwater level in MW-5 suggests that the groundwater within Holder No. 5 is perched above the local groundwater aquifer. It also suggests that the holder tank is hydraulically tight.

Groundwater was not observed in Holder No. 4 tank, the footprint of which is completely within the footprint of the overlying warehouse. The Holder No. 4 tank may not have been exposed to infiltrating precipitation since at least 1969 when the warehouse first appeared on Sanborn maps.

2.3 Site and Investigation and Remedial History

As the following figure illustrates, and as summarized below, the former Front Street Holder Station operated in a highly industrialized area that included dozens of historical industrial and manufacturing uses, all of which constitute potential sources of soil and groundwater contamination surrounding the Site. Historical property uses in the vicinity of the Site included dry cleaning, automobile repair and painting, parking, machine shops, and other manufacturing facilities. Surrounding historical land uses that could contribute environmental contamination were reviewed within a 500-ft radius of the Site (**Table 2**, **Figure 6**). **Appendix E** includes source information for each of the listed historical surrounding property uses.

Figure 6 – Historical Land Uses in Front Street Site Vicinity

Operations to the north of the Site included:

Operations	Ownership and Approximate Date Range
Lumber Yard	Schultz and Strileer in 1855
Auto Repair	Unknown ownership from 1981 to 1987
Paint Works	Benjamin Moore Co from 1898 to 1929
Paint Works, Tin Shop and Can Storage	Seely Bro's from 1880 to 1887
Canned Paint Warehouse	Unknown ownership in 1950
Paint Works	Unknown ownership in 1880
Bagging Factory	Unknown ownership in 1880
Iron Works	Unknown ownership in 1880
Weaving, Spinning, Storage	The Eagle Mill from 1880 to 1887
Glycerine Plant	Kirkman and Son from 1904 to 1950

Operations	Ownership and Approximate Date Range
Paint Works	Unknown ownership from 1855 to 1904
Waste Paper Bailing	Unknown ownership from 1988 to 2007
Brady Manufacturing	Unknown ownership in 1880
Cortage Factory/Coal Yard	Excelsior Patent in 1855
Dyeing and Laboratory	S Rawitser and Company from 1887 to 1904
Fur Cleaning	Wood Mosaic Co from 1887 to 1904
Laundry Supplies	Unknown ownership in 1904
Paint Factory	Unknown ownership in 1887
Spice Grinding	Durkee and Co in 1887
Spices	Calcutta Mills Co from 1887 to 1904
Tin Plate Decorating	Unknown ownership in 1915
Unknown	Reliable Steam Power from 1903 to 1920
Machine Shop	Kent Machine Co 1887 to 1969
Unknown	Meyers Lipman Co in 1929
Wallpaper Factory	Unknown ownership in 1887
Water Color Works	Unknown ownership in 1887
Cocoa Mat and Matting Factory	Unknown ownership in 1887
Cooperage	Unknown ownership in 1938
Dyeing, Drying Weaving	Greenland Coco Matting Co from 1887 to 1904
Furniture Manufacturing	Unknown ownership in 1950
Waste Paper Bailing	Unknown ownership from 1969 to 2007
White Lead Works	Benjamin Moore and Co in 1915
Cocoa Matting	Unknown ownership in 1920
Paper Products Manufacturing	Unknown ownership in 1950
Machine Shop	N Hubbards Sons from 1887 to 1904
Paint Manufacturing	Unknown ownership in 1938
Storage of Liquid Cement	Unknown ownership in 1950

Operations	Ownership and Approximate Date Range
Unknown	International Carbon Paper in 1915
Paint and Oil	Taylor from 1898 to 1899
Paint Works	Unknown ownership in 1880
Printing Ink, Manufacturing and Color Mill	Philip Ruxton Co from 1887 to 1929
Printing Inks	International Inks Inc. from 1938 to 1950
Sausage Skin Disinfecting	Unknown ownership from 1950 to 1969
Axle Grease Factory	Unknown ownership in 1887
Charcoal Storage	Unknown ownership in 1887
Factory	Unknown ownership from 1969 to 2007

Operations to the northeast included:

Operations	Approximate Date Range
Waste Paper Storage	Unknown ownership in 1950
Machine Warehouse	Unknown ownership from 1950 to 1969
Coal Yard	Peoples in 1855
Printing Blank Books	Boerum and Pease Co from 1915 to 1989
Unknown	Globe Storage and Moving Co Inc. from 1991 to 2007
Metal Stamping	Unknown ownership in 1950
Sub-Station	Con Edison of NY from 1969 to 2015
Wire Basket Manufacturer	Unknown ownership in 1950

Operations to the east included:

Operations	Approximate Date Range
Auto Repair	Unknown ownership from 1977 to 1987
Dry Cleaning	Unknown ownership in 1969
Paper Novelty Manufacturer	Royal Lace Paper Co from 1938 to 1950
Unknown	Gardner Lucas Co Inc. in 1929
Burlap Bag Manufacturing	Sterling Bar Co from 1938 to 1950
Unknown	Euclid Candy Co in 1929

Operations to the south included:

Operations	Approximate Date Range
Unknown	Kirkman and Son from 1907 to 1908
Heating Plant	Unknown ownership from 1950 to 1993
Cooperage	John J Monck from 1904 to 1915
Syrup and Coloring Works	Unknown ownership in 1887

Operations to the southwest included:

Operations	Approximate Date Range
Plastic Products Warehouse	Unknown ownership from 1969 to 1993

Operations to the west included:

Operations	Approximate Date Range
Chinese Laundry	Unknown ownership in 1904
Coal and Wood Yard	Hendrickson and Ralph from 1855 to 1887
Lumber Yard	Arthur C Jacobson and Sons from 1904 to 1915
Blank Books	Boerum and Pease Co from 1898 to 1993
Malt House	Unknown ownership in 1855

Operations	Approximate Date Range
Tin Plate Decorating	The Tin Plate Decorating Co from 1887 to 1915
Unknown	Leary and Britton from 1907 to 1908
White Lead Works	Holl Bradley and Co in 1880
White Lead Works	Union in 1880
White Lead/Bradley Works	National Lead Co/Bradley from 1887 to 1989

Operations to the northwest included:

Operations	Approximate Date Range
Borax Soap Factory	Kirkman and Son from 1898 to 1950
Coal	Unknown ownership in 1880
Coal Yard	Hendrickson and Ralph in 1855
Furniture Warehouse	Unknown ownership from 1969 to 2007
Storage	Unknown ownership from 1969 to 2007
Storage of Coal and Glycerine Drums	Kirkman and Son in 1938
Iron Wheelbarrow Factory	Unknown ownership in 1887
Manufacturing	Len Art Co from 1972 to 1977
Manufacturing	Brillo Manufacturing Co Inc. from 1950 to 1969
Coop Stock and Storage	Arbuckle Bros in 1904
Shoe Factory	Hanan and Son from 1898 to 1929
White Lead Works	Union from 1855 to 1887
Glycerine Plant	Kirkman and Son from 1904 to 1950
Axle Grease Factory	Unknown ownership in 1887
Charcoal Storage	Unknown ownership in 1887
Factory	Unknown ownership from 1969 to 2007
Glycerine Plant	Unknown ownership in 1904
Machine Shop	Unknown ownership in 1887
Machine Shop	Foster Pump Works from 1904 to 1915

Unknown	Armstrong Cork Co in 1904
Cooperage	Unknown ownership in 1887
Operations	**Approximate Date Range**
Flint and Glass Works	Dobelmanns in 1880
Foundry	E W Bliss Co from 1903 to 1908
Glycerine Plant	Unknown ownership from 1904 to 1915
Machine Depot	Philips Whiting Factory in 1887
Whiting and Putty Manufacturing	Unknown ownership in 1880

2.3.1 Site History

The Site has had varied uses over time including use as a gas holder station, automobile repair/filling station, parking lot, warehouse, and lumber yard. The following narrative provides a summary of the available project records to document key milestones for the Site and nearby properties. Full titles for each of the reports referenced below are provided in Section 7.0 - References.

2.3.1.1 Holder Station History

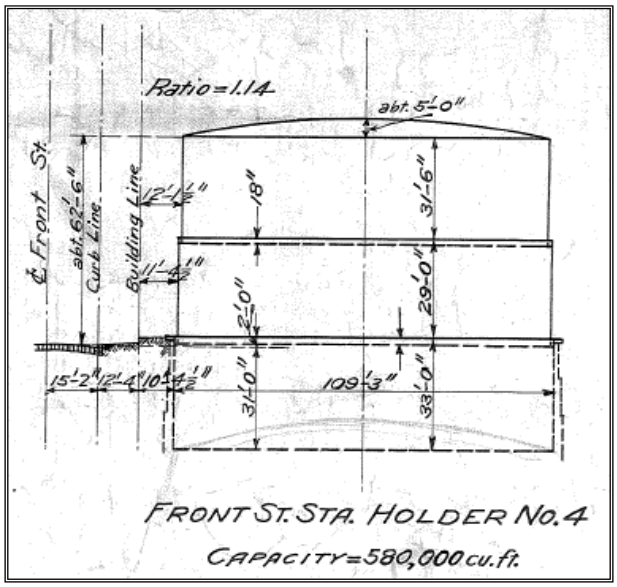
The Site was the location of two gas holders used for the sole purpose of gas distribution. No gas production occurred at the Site. The former locations of the two holders are shown in **Figure 2**.

Two water-sealed gas holders, identified as Holder No. 4 and Holder No. 5 (Holder Nos. 1, 2, and 3 being located at the nearby Plymouth Street Holder Station) were located at the Site. The holders were initially associated with the Brooklyn Gas Light Works located on the East River, between Hudson Avenue and the Brooklyn Navy Yard.

Water-sealed gas holders were commonly used for the low pressure storage of gas produced at MGP sites. The holders were constructed throughout urban areas, such as New York City, to provide gas for industrial, commercial, and residential use. A water-sealed gas holder is a cylindrical structure with a water tank beneath. The cylindrical shell is made up of one or more telescopic lifts coupled together with rims containing water to seal the

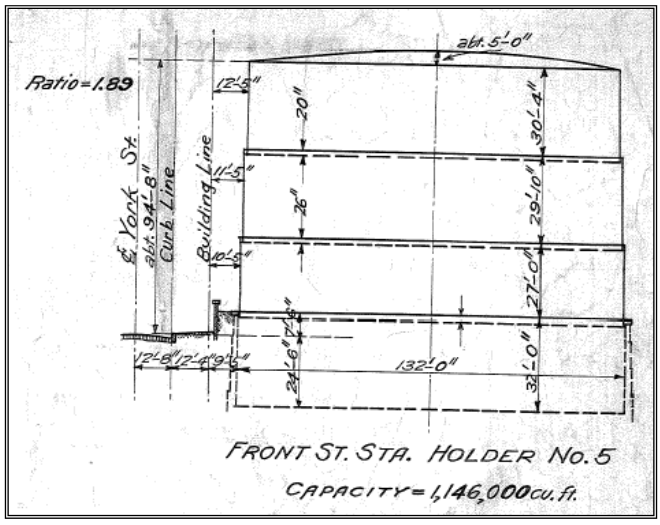
gas. The lifts rise and fall depending on the volume of gas stored. The gas holder tank houses the lifts when down and contained water in which the holder rose and fell depending on gas flow. The water functioned as a gas-tight seal. The tanks could be constructed below the surrounding ground surface, partially below ground, or aboveground.

A BUG drawing (No. 6-B-50), dated December 22, 1913, shows diagrams of holders constructed in Brooklyn. The drawing identifies the two holders located at the Front Street Holder Station. Holder No. 4, located along Front Street, was the smaller of the two holders, with a capacity of 580,000 cubic feet (cu ft).



Drawing 1 – Holder No. 4

BUG drawing 6-B-50 shows that Holder No. 4 was 109 ft, 3 inches (in) in diameter and stood approximately 62 ft, 6 in above street level. The bottom of the fixed lower section, or tank, was approximately 31 ft below street level. Tabulated information pertaining to BUG holders indicates that Holder No. 4 and was an open (i.e., not enclosed or covered), two-lift structure with a brick tank and a concrete foundation.



Drawing 2 – Holder No. 5

Holder No. 5, located along York Street, was the larger holder (i.e., 1,146,000 cu ft). It was approximately 132 ft in diameter and stood approximately 94 ft, 8 in above the street level. The bottom of the tank was approximately 24 ft, 6 in below street level, or approximately 32 ft below the contemporary Site grade. Tabulated information pertaining to BUG holders indicates that Holder No. 5 was an open, three-lift structure, with a brick tank and a concrete foundation.

The Front Street Holder Station was initially constructed, circa 1867, as a remote holder station for The Brooklyn Gas Light Company. Holder No. 4 was constructed at that time.[1]

During the 1870s, the city of Brooklyn was being served with gas by several companies. One of these companies, The Mutual Gas Light Company of Brooklyn, was incorporated on December 7, 1875.[2] James Jourdan was its president.[3] Construction of The Mutual Gas Light Company's works was begun during or after April 1877.[4] Circa 1879,

[1]New York City Department of Buildings, *Gas Holder Construction Information*, 1916, 1920, and 1921.
[2] Russell, Edwin F. The Brooklyn Union Gas Company Franchises and Municipal Consents. Cullen and Dykman, 1971, p. 69.
[3] "The Brooklyn Gas Monopolists." The New York Times. 27 July, 1879.
[4] "In Trouble." The Brooklyn Daily Eagle. 26 July 1879, p. 4.

"Jourdan secured the Long Island rights to the Tessie du Motay process of making water gas by combining steam with vaporized naphtha and other petroleum products…"[5]

Another gas company, The Fulton Municipal Gas Company of Brooklyn, was organized by James Jourdan and others and incorporated on March 5, 1879.[6,7] On April 9, 1879, The Fulton Municipal Gas Company of Brooklyn acquired The Mutual Gas Light Company of Brooklyn.[8] The sale price was allegedly $1, and the acquisition included The Mutual Gas Light Company's works, which were at that time under construction at the head of the Gowanus Canal.[9] With the transfer of assets to The Fulton Municipal Gas Company, construction on the works ceased. The plant was later completed, in 1880, as a carbureted water gas plant utilizing the Tessie du Motay process. Jourdan became vice-president of the Fulton Municipal Gas Company.[10,11]

Of the many Brooklyn gas companies, at this time The Fulton Municipal Gas Company alone manufactured carbureted water gas; the other companies manufactured gas by coal carbonization. The petroleum products to be used in The Fulton Municipal Gas Company's Tessie du Motay process "were controlled by the Standard Oil company [now ExxonMobil], and the Standard Oil men with their unlimited capital thus became interested in the Fulton Municipal Gas company."[12] Accordingly, Standard Oil supplied The Fulton Municipal Gas Company with naphtha.[13]

In the early 1880s, The Fulton Municipal Gas Company of Brooklyn, having an "exceedingly comprehensive charter" but no territory of its own began a series of gas rate

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[5] "Financial Raids." The Brooklyn Daily Eagle. 13 May 1893, p. 2.
[6] Ibid, p. 2.
[7] Russell, Edwin F. The Brooklyn Union Gas Company Franchises and Municipal Consents. Cullen and Dykman, 1971, pp. 32 and 39.
[8] Ibid, p. 14.
[9] "The Brooklyn Gas Monopolists." The New York Times. 27 July, 1879.
[10] Stiles, Henry Reed. History of Kings County, Including Brooklyn, N.Y., 1683-1884, Volume 1. W. W. Munsell & Co. 1884. p. 676.
[11] Murphy, Robert E. Brooklyn Union: A Centennial History. The Brooklyn Union Gas Company. 1995, p. 9.
[12] Ibid.
[13] Stiles, Henry Reed. History of Kings County, Including Brooklyn, N.Y., 1683-1884, Volume 1. W. W. Munsell & Co. 1884. p. 675.

wars against other Brooklyn gas companies.[14] Consistent with rate wars conducted by Standard Oil as it gained domination of oil markets during the 1870's, the goal of the gas rate wars prosecuted by The Fulton Municipal Gas Company was to create and control a market for Standard Oil products.

The first gas rate war by The Fulton Municipal Gas Company of Brooklyn was waged against The Brooklyn Gas Light Company. "It ended in a compromise by which the Fulton Municipal agreed to lay no more mains in the territory of the Brooklyn company, and the latter organization turned over to General Jourdan's party one-third of its capital stock at very moderate valuation and agreed to pay the Fulton Municipal its profits on all gas sold above a certain amount. After the gas rate war, The Brooklyn Gas Light Company entered into a pooling agreement, set to expire on May 1, 1893, with The Fulton Municipal Gas Company of Brooklyn.[15] Circa 1890, during the period of the pooling agreement, Holder No. 5 was constructed at the Front Street Holder Station.[16]

In 1882, the Standard Oil Trust had been formed and was headquartered at 26 Broadway in New York, New York. That same year, the Standard Oil Trust formed the Standard Oil Company of New York, and William A. Rockefeller, Jr. became its president. Henry Huttleston (H. H.) Rogers, also of Standard Oil,[17] "With some of his associates…was instrumental in forming the Consolidated Gas Company [of New York (Consolidated Gas)] in 1884."[18] In 1890, William Rockefeller became a trustee of the Consolidated Gas.[19]

In the spring of 1883 Henry Huttleston (H. H.) Rogers and William [A.] Rockefeller[, Jr.] were on the boards of The Fulton Municipal Gas Company, The

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[14] Progressive Age. Volume XI. 1893, p. 323.
[15] The American Gas Journal, 2 July, 1894, p. 12.
[16] New York City Department of Buildings, *Gas Holder Construction Information*, 1916, 1920, and 1921.
[17] "H. H. Rogers Dead, Leaving $50,000,000." *The New York Times.* 20 May, 1909, p. 1.

[18] "Dual Personality of Henry H. Rogers." *The New York Times.* 20 May 1909, p. 2.

[19] Collins, Frederick L. Consolidated Gas Company of New York, A History. Consolidated Gas Company of New York. 1934.

Metropolitan Gas Light Company, and the People's Gas Light Company.[20] Rogers and Rockefeller also served on the board of the Williamsburg Gas Light Company during the 1880s and 1890s,[21] and The Nassau Gas Light Company entered a pooling agreement with The Fulton Municipal Gas Company.[22] The Standard Oil Company of New York operated a Gas Stock Pool at least in 1886 – 1887. In the pool, John D. Rockefeller owned 100 shares of The Fulton Municipal Gas Company and 175 shares of The Williamsburg Gas Light Company.[23]

In the early1890's, the settlement agreements of the early 1880s made with The Fulton Municipal Gas Company began to end. A second episode of gas rate wars began to return control of the gas market to Standard Oil. As a result of this second gas rate war, Standard Oil was able to gain control of at least two-thirds of the stock of several Brooklyn gas companies, which amount was needed to affect consolidation.[24]

The Brooklyn Union Gas Company was incorporated in September 1895,[25] for the express purpose of acquiring seven Brooklyn gas companies.[26] A former "director of the Fulton Municipal company" identified Elverton R. Chapman, Henry H. Rogers, and William A. Rockefeller, among others, as the "promoters" of The Brooklyn Union Gas Company.[27] On November 4, 1895, BUG acquired by purchase seven Brooklyn gas companies, including The Brooklyn Gas Light Company and its Front Street Holder Station. There was an interim board of directors for the first year of BUG's incorporation [28,29] E. R. Chapman, "a recognized representative of The Standard Oil Company," was

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[20] Stiles, Henry Reed. History of Kings County, Including Brooklyn, N.Y., 1683-1884, Volume 1. W. W. Munsell & Co. 1884. p. 676.
[21] Progressive Age. Volume XI. 1893. p. 323.
[22] The American Gas Journal, 2 July, 1894, p. 12.
[23] Letter from William Rockefeller, President of the Standard Oil Company of New York, to John D. Rockefeller, October 25, 1887, Rockefeller Archive Center.
[24] "Will Form a Gas Trust." The New York Times. 18 May, 1895.
[25] Russell, Edwin F. The Brooklyn Union Gas Company Franchises and Municipal Consents. Cullen and Dykman, 1971, p. 2.
[26] Ibid, p. 4.
[27] "Sues to Recover Gas Stock." The Brooklyn Daily Eagle. 18 January, 1896, p. 14.
[28] Murphy, pp. 22-27, 47.
[29] Minutes of the Board of Directors of the Brooklyn Union Gas Company. 1895 - 1896.

elected Treasurer.[30] At the November 1896 annual meeting, the elected directors included H. H. Rogers and William Rockefeller. H. H. Rogers was elected vice-president, later in the month, at a meeting of the board of directors.[31,32] Meetings of the BUG board of directors were held in Manhattan, at or near the offices of Standard Oil, rather than at the offices of BUG, in Brooklyn.[33] Board meetings continued to be held in Manhattan at least into 1914.[34]

The Brooklyn Gas Light Company ceased operations after the creation of BUG and before 1904, the Sanborn Fire Insurance map for which year shows The Brooklyn Gas Light works site vacant. After unification of BUG and perhaps before, but certainly after shutdown of The Brooklyn Gas Light Company works, gas stored at the Front Street Holder Station would have been supplied by one or more other plants within the BUG network.

In 1907, the New York State Public Service Commission (PSC) was formed. According to a PSC annual report, "In 1907, Consolidated Gas controlled 84,418 of the 91,234 votes cast in Brooklyn Union's election."[35] And, "In the words of a contemporaneous Commission, 'harmonious cooperation instead of competition . . . [was] assured.'"[36]

In 1909, following settlement of a rate case with the New York Public Service Commission, Standard Oil gave BUG a rebate of $702,157.02.[37] The rebate was based on credits for Standard Oil delivering a lower grade of gas oil than required by contract in 1904 and for increasing the price of gas oil on two other occasions. At about this time, Standard Oil operatives maintained an ownership interest of approximately 10% in BUG.[38]

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[30] Progressive Age, Volume XIII. 1895, p. 364.
[31] Minutes of the Board of Directors of the Brooklyn Union Gas Company. 1896.
[32] Murphy, pp. 21-27.
[33] Minutes of the Board of Directors of the Brooklyn Union Gas Company. 1895 - 1896.
[34] Murphy, pp. 39-40.
[35] Bradley, Lisa Gayle. "On the Acquisition of Upstream Interests in New York Energy Operating Companies - An Uncharted Area?" Energy Law Journal. Volume 31.509. P. 521.
[36] Ibid
[37] "Standard Oil Gave B'klyn Union Gas $700,000 Rebate." The Evening World 29 December 1915, p. 2.
[38] Murphy, p. 39.

Through at least 1919, Standard Oil remained the sole supplier of petroleum to BUG.[39] William A. Rockefeller, Jr. served as the Executive Committee Chairman of BUG until his death in June 1922.[40,41] A Resolution, commemorative of his decease, adopted by the BUG board of directors states William Rockefeller was "one of the organizers of the Company and since its inception a member of the Board of Directors and Chairman of the Executive Committee. In his indefatigable service on the Board for a period of nearly twenty-seven years he was a potent influence on the up building of the Company."[42]

By the mid-1920s, The American Light and Traction Company (American), a holding company organized for the purchase and reorganization of utilities and street railroads, had acquired an approximately 30% ownership interest in BUG. The United Light and Power Company (United), another holding company, had an ownership interest in American. In 1924, Koppers also made an investment in American.[43] By this time, "the Koppers interests had adopted the policy of acquiring coke producing properties at strategic points along the Atlantic Seaboard for the purpose of establishing a monopoly of that business in that area" and had formulated a plan for expanding its coke business. [44,45] In 1925 BUG acquired property in Greenpoint for the construction of combined carbureted water gas and by-product coke-oven plant. Construction of the combined plant, for which plans had been "kept in the drawer for many years," began in the winter of 1925-1926.[46]

In 1924, Henry B. Rust, president of Koppers, was elected to the board of director of American.[47] In the fall of 1927, now chairman of the executive committee of American,

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[39] Ibid, p. 44.
[40] Ibid, p. 47.
[41] Resolution of the Board of Directors. Rockefeller Archive Center. William Rockefeller Collection, Record Group RG50, Series 1, Box 1, Folder 6.
[42] Ibid.
[43] Harry Helfman, et al. v. American Light and Traction Company, et al. 121 N.J. Eq. 1. (Court of Chancery, N.J. 1936).
[44] The United Light and Power Company v. Commissioner of Internal Revenue. 38 B.T.A 477 (1938).
[45] Harry Helfman, et al. v. American Light and Traction Company, et al. 121 N.J. Eq. 1. (Court of Chancery, N.J. 1936).
[46] Murphy. pp. 51-52.
[47] Harry Helfman, et al. v. American Light and Traction Company, et al. 121 N.J. Eq. 1. (Court of Chancery, N.J. 1936).

Henry B. Rust began discussions with BUG to purchase the by-product coke plant at Greenpoint.[48] The presidents of United and American, who were philosophically opposed to Koppers' business model, intervened and convinced, BUG not to sell the coke-oven plant to Koppers.[49] To resolve the impasse, it was agreed that, in 1928, Koppers would obtain from American all of its holdings in BUG, allowing Koppers to negotiate with BUG, without interference from American, for the sale of the coke-oven plant, which began operation in November 1928.[50,51,52]

Koppers, by December 31, 1927, itself maintained an approximate 4% ownership interest in BUG, which combined with stocks acquired from American, in 1928, brought its total ownership interest in BUG to approximately 34%.[53,54,55] BUG agreed to sell the coke-oven plant to Koppers, who greatly expanded the plant and operated it until 1930, when the New York Public Service Commission blocked the sale.[56] Subsequently, BUG took over the plant and the Koppers staff which operated it.[57] With the completion of the combined carbureted water gas and coke-oven plant, gas production at most of BUG's other gas plants was gradually decreased and the plants were taken out of service.

In the 1930's, the United States government conducted studies of the American economy and its structure. Two of the studies group The Brooklyn Union Gas Company within what is identified as the "Mellon Interest Group" and the "Mellon Family," with The Brooklyn Union Gas Company being indirectly and directly held by Koppers and

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[48] The United Light and Power Company v. Commissioner of Internal Revenue. 38 B.T.A 477 (1938).
[49] Ibid.
[50] Ibid.
[51] Murphy, p. 53.
[52] Koppers United Co. v. Securities Exchange Commission. Koppers Co. v. Same. Eastern Gas Fuel Associates v. Same. 138 F.2d 577 (D.C. Cir. 1943).
[53] "B'klyn Gas Deal Unverified." The Brooklyn Daily Eagle. 20 September 1928, p. 23.
[54] Koppers United Co. v. Securities Exchange Commission. Koppers Co. v. Same. Eastern Gas Fuel Associates v. Same. 138 F.2d 577 (D.C. Cir. 1943).
[55] In 1929, Koppers' approximate 34% ownership was reduced to 23.87% when debenture bonds that had been issued by The Brooklyn Union Gas Company in 1926 were converted to stocks. ("Brooklyn Union Gas Lists More Stock." The Brooklyn Daily Eagle 16 December 1928, p. 39.)
[56] Ibid.
[57] Ibid.

having an interlocking directorate.[58,59] The interlocking directorate was dated to 1939; however, prior to that date Koppers may have exercised control over Brooklyn Union through the Virginian Railway Company, which carried coal bound for Greenpoint, Brooklyn and in which both Koppers and heirs of Henry H. Rogers, who served on both the boards of Brooklyn Union and the Virginian Railway Company, were interested.[60] A report of the Temporary National Economic Committee (TNEC) states, "it appears that the holdings of the Koppers Co. represent working control in The Brooklyn Union Gas Co.,…"[61]

During the period of Koppers interest, BUG bought all its coal from Koppers and sold all its surplus coke to Koppers.[62] The directors of BUG "exerted only the most casual supervision over the prices involved in the inter-company sales."[63] They gave "no serious consideration to the possibility of finding coke markets other than Koppers, although other concerns made unsolicited and unsuccessful attempts to buy Brooklyn's [The Brooklyn Union Gas Company's] coke."[64] Based on a 1943 New York Supreme Court decision, going forward from at least 1934, Koppers received unlawful profits from BUG, in violation of the New York State Public Service Law.[65] Consequently, the New York State Supreme Court, ordered Koppers to pay $346,358.35, with interest, $479,000, to BUG, minus income tax and lawyers' and accountants' fees for both the BUG directors and the plaintiffs.[66,67]

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[58] Means, Gardiner C. The Structure of the American Economy, Part I. Basic Characteristics, U. S. National Resources Committee, June 1939.
[59] Goldsmith, Raymond W. et al. The Distribution of Ownership in the 200 Largest Nonfinancial Corporations, Temporary National Economic Committee – Monograph 29, October 1940.
[60] Koppers United Co. v. Securities Exchange Commission. Koppers Co. v. Same. Eastern Gas Fuel Associates v. Same. 138 F.2d 577 (D.C. Cir. 1943). Westlaw, p. 4.
[61] Goldsmith, p. 103.
[62] Koppers United Co. v. Securities Exchange Commission. 138 F.2d 577 (D.C. Cir. 1943) | Casetext.
[63] Ibid.
[64] Ibid.
[65] Weis v. Coe. 180 Misc. 321 (N.Y. Misc. 1943) | Casetext.
[66] Ibid.
[67] Murphy, p. 64.

Having petitioned the Securities and Exchange Commission to declare that BUG was not its subsidiary, the application having been denied, and all appeals having been lost, on March 29, 1944, Koppers sold its ownership interest in BUG.[68,69] The next day, a Koppers vice-president, who had served on the BUG board since 1939, resigned.[70] As of this time, BUG "had issued no securities for nearly 20 years,"[71] an interval coincident with the period of Koppers ownership interest. The period encompassing control of BUG and its predecessor-in-interest, The Brooklyn Gas Light Company, by other entities overlaps with the operation and ownership of the Front Street Holder Station from its construction circa 1867 through Koppers' sale of its ownership interest in BUG in 1944.

The Standard Oil Company, The American Light and Traction Company, The United Light and Power Company, and Koppers have been succeeded by other corporations, are doing business under other names, and/or are defunct. There are many successors to The Standard Oil Company; in the present instance the relevant successor is ExxonMobil Corporation. Successors to The American Light and Traction Company include American Natural Resources Company, a wholly-owned subsidiary of TransCanada Corporation, and DTE Energy. The successor to Koppers is Beazer. The United Light and Power Company was liquidated and dissolved in 1950, with its liabilities ultimately passing to the Iowa-Illinois Gas & Electric Company, now MidAmerican Energy Company.

2.3.1.2 Post-Holder-Station History

The two holders at the Front Street Station site appear to have been decommissioned and demolished in the 1930s. A 1909 plan prepared by BUG shows the presence of the two gas holders as well as other structures, including a coal bin, boiler house, valve house, and exhauster house. Holder No. 4 was out of service by August 1935. The 1909 plan contains a note, dated July 1938, stating that many structures have been

[68] Koppers United Co. v. Securities Exchange Commission. 138 F.2d 577 (D.C. Cir. 1943) | Casetext.
[69] Murphy, pp. 63-64.
[70] Ibid, pp. 63-64.
[71] Ibid, p. 63.

demolished and a note that the Holder No. 4 tank has been filled with earth. In the 1938 Sanborn Fire Insurance map, the holder station is shown to be vacant. A 1939 drawing prepared by BUG shows that the property is vacant and contains a note, stating that the property was sold on August 15, 1951.

The 1950 Sanborn map shows that the property was being used as a parking lot. The 1969 Sanborn map shows that the areas that a non-combustible concrete and brick "Wood Frame Mfg." building was constructed in 1960-67 at the location of the original gas holder. Tax records indicate that the building, which is the warehouse at 218 Front Street, was built in 1960. Also, the 1969 Sanborn map shows a filling station present in the northwestern portion of the site.

The 1986 Sanborn map shows no changes to the Site. However, the filling station in the northwestern portion of the site was identified as an auto repair shop. The most recent Sanborn map dated 1996, shows the current lumber yard area as a parking lot.

2.3.1.3 Adjacent Parcel History

This section describes historical uses of parcels which abut the Front Street Holder Site. Front Street is located immediately adjacent to the north side of the Site and York Street is immediately adjacent to the south side of the Site. Therefore, the following discussion pertains to parcels immediately to the east and west of the site. It is noted that it was, and still is, common practice on primary and secondary streets to have structures with commercial businesses on the ground floor and residences above. Identification of commercial businesses are provided where available.

The earliest available Sanborn map, dated 1887, shows Holder No. 4 present in the northeastern portion of the Site. Residences and a school and church were located on parcels to the east. Residences and a coal and wood yard (Hendrickson and Ralph) were located to the west.

The 1904 Sanborn map shows Holder No. 5 also present at the Site. Parcel use to the east looks similar as in the 1887 Sanborn map. To the east, the lumber yard is identified

as Arthur C. Jacobson & Sons. A blacksmith shop was located farther to the north toward Front Street. A hardware store was located at the corner of York and Bridge Streets, and a tin shop and Chinese laundry were located on York Street.

The 1915 Sanborn map appears similar to the 1904 map with the exception that the hardware store, Chinese laundry, and tin shop are not identified.

The 1938 Sanborn map shows that the holders had been removed (the holders were demolished prior to 1938). Adjacent parcel uses appear similar to the 1904 and 1915 Sanborn maps, with the exception that the Jacobson lumber yard is not identified.

Subsequent Sanborn maps show little significant change to properties adjacent to the Site – property use appears to have been residential with some properties having various commercial businesses. Of note, the 1950 Sanborn identifies the former blacksmith shop as a junk shop, the 1969 Sanborn map shows a dry cleaner located to the southeast (upgradient) of the Site and a filling station to the northwest, and the 1977 Sanborn map shows an auto repair shop located to the east of the Site and the filling station to the northwest.

2.3.2 Investigation and Remedial History

The SC, which was performed in phases from 2007 through 2013, was the only known investigation at the Site. The SC was performed to identify and characterize the nature and extent of contamination at the properties. The SC included two soil borings drilled within the area of each of the two former gas holders, four soil borings completed as monitoring wells on sidewalks near the former holders, and one boring completed as a monitoring well in Holder No. 5. Soil and groundwater samples collected during the SC were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. The results of the SC are described in detail in the *Site Characterization for the Former Front Street Holder Station*, prepared by URS (now AECOM) and dated July 2013, revised April 2015.

Investigation Results - Soil

The SC drilling program identified fill in the holders. The fill closer to the bottoms of the holders contained naphthalene-like odors and slightly elevated VOCs, as measured using a photoionization detector (PID). Petroleum odors were also noted at a depth of 20 ft in boring FS-SB-1 in former Holder No. 5 and at a depth of 2 ft in boring FS-SB-3 in former Holder No.4. There were no visual impacts in any of the soil borings, including the ones used to install the monitoring wells.

A total of seven soil samples from the holders were submitted for laboratory analyses. The presence of VOCs in the soil samples from the gas holder borings, especially MGP indicators such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs), along with the field observations of naphthalene-like odors, suggests the presence of remaining MGP-related impacts. However, as petroleum odors were also observed, the detected VOCs could also indicate the presence of some petroleum impacts. SC soil analytical results exceeding Part 375 Commercial use criteria are provided on **Figure 7.** SC soil analytical results exceeding Part 375 Restricted Residential use criteria are provided on **Figure 8**.

SVOCs or, more specifically, PAHs, were detected in all seven samples from the holder borings. Although PAHs are associated with MGP wastes, it is not uncommon to find these compounds in urban fill.

The metals copper, lead, and mercury exceeded the Commercial and/or Restricted Residential soil criteria in several samples from the holders. While metals can be derived from a variety of sources, the presence of cyanide, albeit at below criteria concentrations, suggests MGP/gas storage operations are a source of some remaining impacts in the fill within the former holders.

Investigation Results - Groundwater

To evaluate groundwater conditions in the Site area, two monitoring wells were installed in the sidewalk on Front Street and two monitoring wells were installed in the

sidewalk on York Street. No VOCs were detected at concentrations above the soil cleanup criteria in the monitoring well boring soil samples. SVOCs were detected at concentrations above soil cleanup criteria in four of the ten soil samples collected from the well borings. However, because no evidence of MGP impacts (e.g., naphthalene-like odors, staining, coatings, etc.) was observed during drilling, it is likely that the SVOCs are associated with the urban fill. The metals analytical results also suggest the absence of MGP impacts.

SC groundwater analytical results exceeding criteria are provided on **Figure 9**. The groundwater sample collected from former Holder No. 5 showed the presence of VOCs, SVOCs, metals and cyanide, which are indicative of remaining MGP-related impacts. The absence of this suite of contaminants in the samples from the wells located on the sidewalk suggests that the potential MGP impacts present in Holder No. 5 tank are not significantly impacting site area groundwater quality. (Note that all five monitoring wells were decommissioned with NYSDEC approval in October 2013).

Summary of SC Findings

The SC concluded that impacts, including likely MGP-related impacts, are present in the groundwater within the Holder No. 5 tank. However, they do not appear to be impacting the groundwater quality in the underlying aquifer. Because groundwater is in the Site area is not used as a water supply, the potential for human exposure through direct contact, inhalation, or ingestion of the perched groundwater is minimal.

The potential for contaminant vapors to migrate upward though the subsurface and create an inhalation exposure pathway to workers in the lumber yard is minimal as contaminant concentrations would be further reduced by biodegradation and diffusion. Furthermore, because the lumber yard is located outdoors, any vapors that reach ground surface would quickly dissipate into the atmosphere. Therefore, the potential for human exposure is minimal with the existing engineering controls (*i.e.,* cover and integrity of former Holder No. 5).

However, there is a potential for future exposure to construction and/or utility workers who may encounter the contaminants during intrusive subsurface work, or to future residents and/or property users if there is future onsite construction.

2.4 Remedial Action Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the impacts identified at the Site through the proper application of scientific and engineering principles.

The remedial action objectives for the Site, as listed in the ROD dated March 2018, are:

Groundwater

Remedial Action Objectives (RAOs) for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or direct exposure from contamination volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, SVI into buildings at the Site.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since impacts have been detected in soil and groundwater samples collected at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the ISMP and is subject to revision by the NYSDEC.

This IC/ EC Plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the restrictions set forth in the EE;
- A description of the controls to be evaluated during each required inspection;
- A description of plans and procedures to be followed for implementation of IC/ECs (*i.e.*, the Community Air Monitoring Plan [CAMP], Health and Safety Plan [HASP], Field Sampling Plan [FSP], Quality Assurance Project Plan [QAPP], and/or EWP);
- A description of the roles and responsibilities of each party with respect to this ISMP; and
- Other provisions necessary to identify or establish methods for implementing the IC/ECs, per the March 2018 ROD, as determined by the NYSDEC:
    - An EWP (provided in **Appendix B**) that details the provisions for management of small-scale (*i.e.*, limited) excavations, in areas of impacts detected in soil and/or groundwater samples, including the proper handling of impacted material that may be disturbed during small-scale intrusive work and/or activities at the Site.
    - Further investigation and remediation should large-scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

- Evaluation of the potential for SVI for any buildings developed on the site, including implementing actions recommended to address exposures related to SVI.
- Should a building foundation or building slab be removed in the future, a cover system consistent with that described in Paragraph 1 above will be placed in any areas where the upper 2 ft of exposed surface soil exceed the applicable soil cleanup objectives (SCOs).
- The management and inspection of the identified engineering controls.
- Maintenance of site access controls and Department notification.

3.2 Roles and Responsibilities

A description of the roles and responsibilities of each party (*i.e.,* the Department, the property owner, and National Grid) with respect to this ISMP is included as the Matrix of Responsibility (**Table 3**). A decision tree chart describing notifications and actions to be taken in advance of onsite work by the property owner is included as **Figure 10**.

3.3 Institutional Control

An IC is required to: (1) implement, maintain and monitor EC systems; (2) prevent future exposure to potentially MGP-related impacts; and, (3) limit the use and development of the Site to restricted residential, commercial, and industrial uses, only. The IC for the Site is the EE, recorded with the Kings County Clerk, and contained in **Appendix A** of this ISMP. The EE, in the paragraph entitled Institutional and Engineering Controls, provides a list of several controls that apply to the use of the "Controlled Property," run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the "Controlled Property," any lessees and any person using the "Controlled Property." Controls presented in the EE, which by reference include the controls and requirements of this ISMP, may not be discontinued without an amendment to or extinguishment of the EE. The IC/EE boundaries are shown on **Figure 2**. Key components of the EE are:

(1) The Controlled Property may be used for Restricted Residential as described in 6 NYCRR Part 475-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 475-1.8(g)(2)(iii), and Industrial as described in 6 NYCRR Part 475-1.8(g)(2)(iv);

(2) All ECs must be operated and maintained as specified in this ISMP (see Section 5);

(3) All ECs must be inspected at a frequency and in a manner defined in the ISMP (see Section 4);

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in this ISMP (see Section 4);

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this ISMP (see Section 6);

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this ISMP (see Section 3);

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this ISMP (see Section 4);

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in this ISMP (see Section 4); and

(10) Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owners to assure compliance with the restrictions identified by the EEs.

Responsibility for implementing controls and requirements of this ISMP is presented in **Table 3** – Matrix of Responsibilities for Property Owner, National Grid, and NYSDEC.

3.4 Engineering Control

The EC is a cover system. Exposure to impacts at the Site is prevented by a cover system over the Site. A cover is required to allow for restricted residential use of the Site in areas where the upper 2 ft of exposed surface soil will exceed the applicable SCOs. Where a soil cover is to be used it will be a minimum of 2 ft of soil placed over a demarcation layer, with a minimum of 6 in of soil of sufficient quality to maintain a vegetative layer. Soil cover material, including any fill material brought to the Site, will meet the SCOs for cover material for the use of the Site as set forth in 6 NYCRR Part 375-6.7(d). Substitution of other materials and components may be allowed where such components already exist or are a component of the tangible property to be placed as part of site redevelopment. Such components may include, but are not limited to: pavement, concrete, paved surface parking areas, sidewalks, building foundations and building slabs.

3.4.1 Existing Cover System

There is an existing cover system at the Site. The existing cover system is comprised of the warehouse, which has a concrete floor slab, and exterior areas where the surface is covered with concrete, asphalt, and/or gravel. Depending on the location, this cover is comprised of a minimum of 1 to 7 in of concrete, or 1 in of asphalt, or 1 to 3 in of gravel.

3.4.2 Management and Inspection of the Cover System

The cover system requires periodic inspection and may require maintenance. Procedures for the inspection of the cover system are provided in the Monitoring and Sampling Plan included in Section 4.0 of this ISMP. The EWP provided in **Appendix B** outlines the procedures required to be implemented in the event the cover is breached, penetrated or temporarily removed, and any underlying impacts are disturbed. Responsibility for management of the cover system is per the Matrix of Responsibility (**Table 3**).

3.4.3 Replacement of Existing Cover System

Should a building foundation or building slab be removed in the future, a cover system consistent with that described above, at the beginning of Section 3.4, will be placed in any areas where the upper 2 ft of exposed surface soil exceed the applicable SCOs.

3.5 Plans and Procedures to be followed for Implementation of IC/ECs

As mentioned above in Section 3.1, this ISMP provides a description of plans and procedures (*i.e.,* CAMP, HASP, FSP, QAPP, and EWP) to be followed for implementation of IC/ECs. Any intrusive work at the Site will need to be performed in compliance with these plans.

3.5.1 Excavation Work Plan

This ISMP includes an EWP, provided in **Appendix B**, that is to be used for small-scale (*i.e*., limited) excavations. NYSDEC will make the determination of small-scale or otherwise, with respect to excavations. This EWP will be implemented to address any intrusive activities prior to the final remedy or any portion of the final remedy at the Site. The property owners, their tenants, consultants, and contractors are required to implement this EWP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in the FSP, HASP, QAPP, and CAMP.

3.5.2 Steps to Be Taken in Advance of On-Site Intrusive Work

A chart describing notifications and actions to be taken in advance of onsite work by the property owner is included as **Figure 10**.

3.5.3 Health and Safety Plan

The HASP, provided in **Appendix F**, is designed to identify, evaluate, and control safety and health hazards, and to outline emergency response actions. The HASP is to be kept on site during work activities and made available to all workers including contractors and other Site occupants for informational purposes. Contractors are expected to independently characterize, assess, and control Site hazards created by their specific scope of work. The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees are discussed in the HASP. The document is intended to identify known potential hazards and to facilitate communication and control measures to prevent injury or harm.

This HASP establishes policies and procedures to protect personnel from the potential hazards posed by the activities at the Site. Site workers are required to review and sign the HASP, acknowledging that they understand and will adhere to the HASP. Subcontractors will also prepare their own Site-specific HASP for the protection of their employees from the hazards associated with their work tasks and may use this document as a guide.

3.5.4 Field Sampling Plan

The ISMP requires annual site inspections to assess and document Site conditions. No other activities are currently planned. However, it is possible that limited excavations *(e.g.*, a water line repair) or additional subsurface investigation could require the collection of soil and/or groundwater samples.

Also, Site development could result in the construction of residential units without removal of subsurface impacts. Thus, the potential for soil vapor intrusion (SVI) would need to be assessed through a SVI sampling program.

The FSP, provided in **Appendix G**, describes specific procedures that are to be followed during the Site activities, including drilling and well installation, test pitting, soil sampling, groundwater sampling, and SVI sampling. The FSP includes requirements for sample collection quality control; field documentation; sample preservation, labeling, and shipping; sampling instrumentation; and decontamination procedures.

3.5.5 Quality Assurance Project Plan

The QAPP presents the project scope and goals, organization, objectives, sample handling procedures and specific quality assurance/quality control (QA/QC) procedures. Furthermore, the QAPP identifies project responsibilities, prescribes guidance and specifications to make certain that:

- Samples are identified and controlled through sample tracking systems and chain-of custody (COC) protocols;
- Field and laboratory analytical results are valid and usable by adherence to established protocols and procedures;
- Laboratory data are validated so they can be applied to developing a conceptual understanding of the nature and extent of contamination of soils and ground waters at the Site; and
- All aspects of the investigation, from field to laboratory are documented to provide data that are technically sound and legally defensible.

The requirements of this QAPP apply to all contractor activities as appropriate for their respective tasks. This QAPP was prepared based upon guidance provided by the United States Environmental Protection Agency (EPA) and NYSDEC, including DER-10, Technical Guidance for Site Investigation and Remediation, New York State Department of Environmental Conservation, May 2010. The QAPP is included as **Appendix H**.

3.5.6 Community Air Monitoring Plan

A CAMP has been prepared (**Appendix I**) for use in for small-scale (*i.e.*, limited) Site activities, such excavations for water line repair and SVI evaluation, and more substantial activities, such as site development.

During limited site work, the CAMP addresses real-time monitoring for VOCs and particulates in the immediate area of the work activity. The monitoring equipment could be hand-held or tripod-mounted and moved as needed following the work from area to area. During more substantial work, such as site development or remedial excavation, the CAMP will involve the use of fixed stations set at locations around the site perimeter to continuously monitor and record VOC and particulates.

3.6 Maintenance of Site Access Controls

Access to the Site is controlled by existing buildings, their walls and doors, and gates and fences. Control of access to the Site is to be maintained. Responsibility for maintenance of site access controls (*e.g.*, buildings, walls, doors, fences, gates, etc.) is per the Matrix of Responsibility (**Table 3**).

3.7 Notification of the Department

As stated in Section 1.3, NYSDEC and National Grid must be notified in advance of all intrusive work performed at the Site. Responsibility for notifications to the Department, including those notifications described in Section 1.3 of this ISMP, is per the Matrix of Responsibility (**Table 3**).

3.8 Further Investigation and Possible Remedial Work Plan

Further investigation of the Site will be required should large-scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible. The nature and extent of impacts, if any, in areas where access was previously limited or unavailable, will be investigated pursuant to a plan approved by the NYSDEC. Based on the investigation results and the NYSDEC's determination of the need

for a remedy, a remedial work plan will be developed for the final remedy for MGP-related impacts at the Site, including removal and/or treatment of any source areas to the extent feasible. If a remedy is determined to be necessary to address sources of non-MGP-related impacts present at the Site, this will be evaluated separately for further action. A Citizen Participation Plan (CPP) will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment.

Investigation activities would need to be performed in accordance with the EWP, HASP, QAPP, FSP, and CAMP.

3.9 Soil Vapor Intrusion

VOCs in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as SVI. The potential exists for people to inhale site contaminants in indoor air due to SVI within the on-site buildings. The potential for SVI must be considered if site development includes construction of buildings above known areas of VOC impacts.

3.9.1 Evaluation of Potential for Soil Vapor Intrusion

An evaluation of the potential for SVI will be conducted. SVI sampling activities, if required, would need to be performed in accordance with the HASP, QAPP, FSP, and CAMP.

3.9.2 Implementation of Actions Recommended to Address Exposures, if Any

If potential for exposure related to soil vapor is determined, based on the evaluation described in Section 3.9.1, above, recommended actions, if any, will be implemented. Responsibility for implementation of the recommended actions will be based on the nature and extent of the detected compounds to which potential exposure is attributed. National Grid is not responsible for implementation of actions recommended to address exposures,

potential or real, related to non-MGP-related compounds (*e.g.*, chlorinated volatile organic compounds).

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples that may be collected as part of site management for the Site are included in the FSP and QAPP in **Appendices G and H, respectively**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (*e.g.*, soil, groundwater, etc.);
- Assessing compliance with applicable NYSDEC SCGs, particularly NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring and Sampling Plan provides information on Annual inspections. Reporting requirements are provided in Section 6.0 of this ISMP.

4.2 Site–wide Inspection

Site-wide inspections will be performed by a Qualified Environmental Professional (QEP) at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix J** – Site Inspection Form. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;

- An evaluation of the condition and continued effectiveness of the cover system;
- General site conditions at the time of the inspection; and
- Confirm that site records are up to date.

A comprehensive site-wide inspection will be conducted and documented according to the ISMP schedule. The site-wide inspections will determine and document the following:

- Whether the cover system continues to perform as expected;
- If the cover system continues to be protective of human health and the environment;
- Compliance with requirements of this ISMP and the EE; and
- If Site records are complete and up to date.

Reporting requirements are outlined in Section 6.0 of this plan.

Inspections will also be performed by a QEP in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, the property owner shall notify National Grid and NYSDEC as soon as possible but at least by noon the following day. In addition, an inspection of the Site will be conducted by a QEP within 5 days of the event (to the extent possible) to verify the effectiveness of the IC/ECs implemented at the Site, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event (to the extent possible) that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Interim Media Monitoring and Sampling

Large-scale development of the Site would require evaluation of the potential for SVI for any buildings developed on the Site, including implementing actions recommended to address exposures related to SVI.

4.3.1 Soil Vapor Intrusion Evaluation

If requested by NYSDEC, SVI sampling details will be developed. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Deliverables for the SVI sampling program are specified in Section 6.0 – Reporting Requirements.

4.3.2 Sampling Protocol

All sampling activities performed by the QEP will be recorded in a field book and associated sampling log as provided in **Appendix G** (FSP). Other observations will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the FSP.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems, or soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this ISMP.

6.0 REPORTING REQUIREMENTS

6.1 Interim Site Management Monitoring/Inspection Reports

All interim site management inspection, maintenance and monitoring events will be recorded on the site inspection form provided in **Appendix J**. This form is subject to revision by NYSDEC for use on the Site.

All applicable inspection forms and other records, including media sampling data, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC by the QEP in accordance with the requirements of **Table 4** and summarized in the Site Wide Inspection report.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (*e.g.*, sub-slab vapor, indoor air, outdoor air, etc.);
- Copies of all field forms completed (*e.g.*, well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and

- A determination as to whether impact conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at http://www.dec.ny.gov/chemical/62440.html.

6.1.1 Investigation Reports

All sampling activities and findings should be presented in an investigation report in general accordance with NYSDEC DER-10 and/or as required by NYSDEC. This would include a technical overview and findings along with a description of the work completed. The technical overview and findings should include a summary of the overall nature and extent of contamination using the state standards, criteria, and guidance for comparison and any significant events, observations or seasonal variation which may have influenced sampling procedures or analytical results.

7.0 REFERENCES

The American Gas Journal, 2 July 1894.

The Brooklyn Daily Eagle. "B'klyn Gas Deal Unverified." 20 September 1928.

The Brooklyn Daily Eagle. "Brooklyn Union Gas Lists More Stock." 16 December 1928.

The Brooklyn Daily Eagle. "Financial Raids." 13 May 1893.

The Brooklyn Daily Eagle. "In Trouble." 26 July 1879. The Brooklyn Daily Eagle. "Sues to Recover Gas Stock." January 18, 1896, p. 14.

Bradley, Lisa Gayle. "On the Acquisition of Upstream Interests in New York Energy Operating Companies – An Uncharted Area?" Energy Law Journal. Volume 31.509. P. 521.

The Brooklyn Union Gas Company. Drawing 6-B-50. December 13, 1913, revised August 19, 1935.

The Brooklyn Union Gas Company. Minutes of the Board of Directors of the Brooklyn Union Gas Company. 1895 - 1896.

The Brooklyn Union Gas Company. Resolution of the Board of Directors. Rockefeller Archive Center. William Rockefeller Collection, Record Group RG50, Series 1, Box 1, Folder 6.

Collins, Frederick, L. Consolidated Gas Company of New York. A History. Consolidated Gas Company of New York. 1934.

Collins, Frederick L. Consolidated Gas Company of New York, A History. Consolidated Gas Company of New York. 1934.

The Evening World. "Standard Oil Gave B'klyn Union Gas $700,000 Rebate." December 29, 1915.

Goldsmith, Raymond W. et al. The Distribution of Ownership in the 200 Largest Nonfinancial Corporations, Temporary National Economic Committee – Monograph 29, October 1940.

Harry Helfman, et al. v. American Light and Traction Company, et al. 121 N.J. Eq. 1. (Court of Chancery, N.J. 1936).

Koppers United Co. v. Securities Exchange Commission. Koppers Co. v. Same. Eastern Gas Fuel Associates v. Same. 138 F.2d 577 (D.C. Cir. 1943).

Means, Gardiner C. The Structure of the American Economy, Part I. Basic Characteristics, U. S. National Resources Committee, June 1939.

Murphy, Robert E. Brooklyn Union: A Centennial History. The Brooklyn Union Gas Company. 1995.

New York City Department of Buildings, Gas Holder Construction Information, 1916, 1920, and 1921.

The New York Times. "The Brooklyn Gas Monopolists." 27 July, 1879.

The New York Times. "Will Form a Gas Trust." 18 May, 1895.

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006. NYSDEC DER-10 –"Technical Guidance for Site Investigation and Remediation".

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

Progressive Age. Volume XI. 1893.

Progressive Age. Volume XIII. 1895.

Rockefeller, William. Letter from the President of the Standard Oil Company of New York to John D. Rockefeller. October 25, 1887, Rockefeller Archive Center.

Russell, Edwin F. The Brooklyn Union Gas Company Franchises and Municipal Consents. Cullen and Dykman, 1971.

Stiles, Henry Reed. History of Kings County, Including Brooklyn, N.Y., 1683-1884, Volume 1. W. W. Munsell & Co. 1884.

The United Light and Power Company v. Commissioner of Internal Revenue. 38 B.T.A 477 (1938).

URS Corporation. Records Search Report for the Former Front Street Holder Station. November 2007.

URS Corporation. Site Characterization for the Former Front Street Holder Station. July 2013, revised April 2015.

Weis v. Coe. 180 Misc. 321 (N.Y. Misc. 1943) | Casetext.

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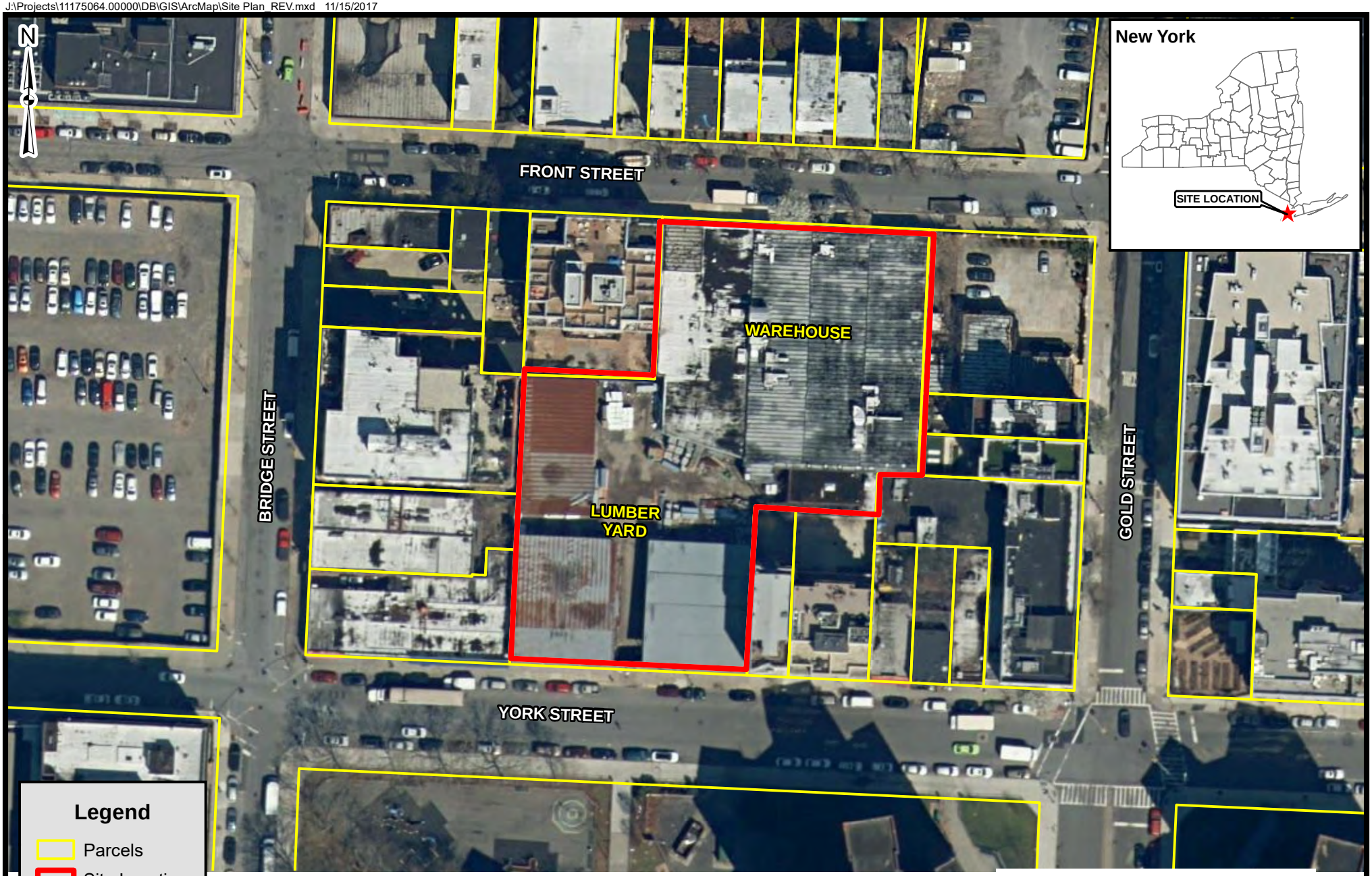

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FRONT STREET FORMER GAS HOLDER SITE
SITE LOCATION MAP

FIGURE 1

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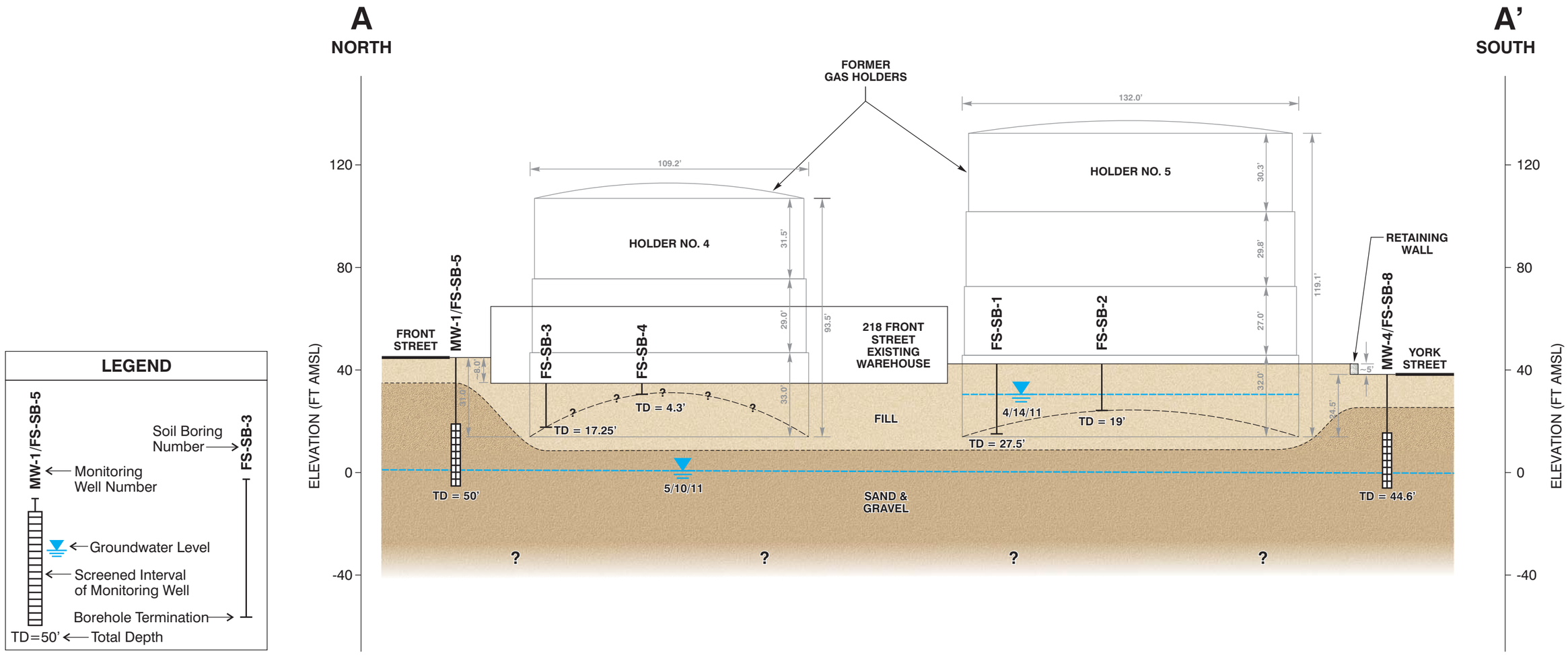
FORMER FRONT STREET HOLDER STATION SITE PLAN

FIGURE 2



LEGEND

NOTES: National Grid drawings show that some gas holder foundations had prominences that extended as much as 10 feet or more above the gas holder bottom. Drilling refusal depths suggest the presence of prominences in Holder No. 4 and No. 5.

Holder dimensions were taken from Brooklyn Union Gas Drawing No. 6-B-50. The holder dimensions do not reflect any distortion that may result from plotting the cross section along the length of the transect shown in Figure 3.

The site conditions depicted here were made from observations and information obtained from the investigation points and historic drawings. The interpretation of conditions between the investigation points is based on accepted professional hydrogeologic and engineering practices and principals. Actual conditions between the investigation points may vary from those shown.

APPROXIMATE SCALE IN FEET

0' 40' 80'

FORMER FRONT STREET HOLDER STATION CROSS SECTION A-A'

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FIGURE 3

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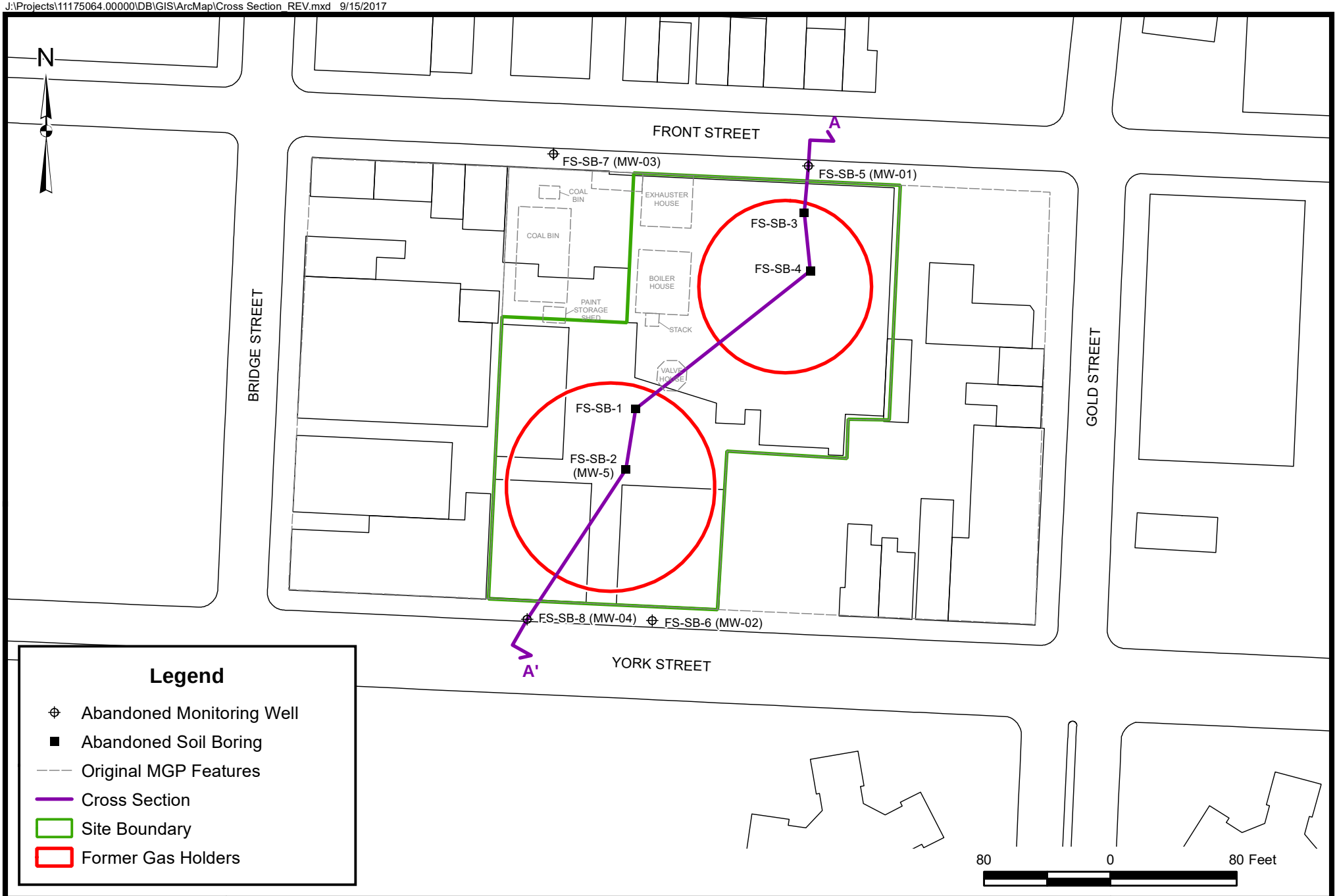

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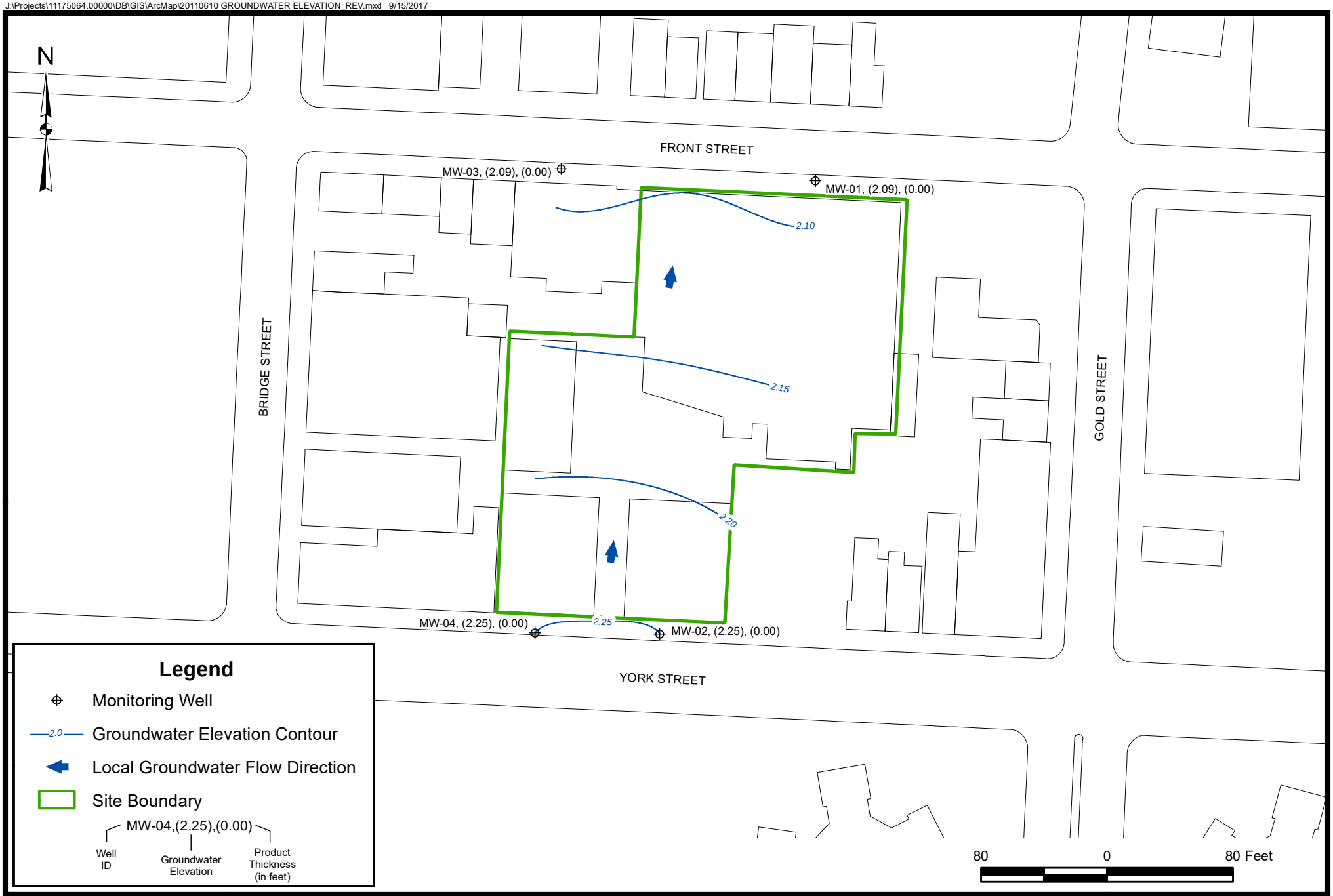
FORMER FRONT STREET HOLDER STATION
CROSS SECTION LOCATION MAP

FIGURE 4

J:\Projects\11175064.00000\DB\GIS\ArcMap\20110610 GROUNDWATER ELEVATION_REV.mxd 9/15/2017



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FRONT STREET FORMER GAS HOLDER SITE
JUNE 10, 2011 GROUNDWATER ELEVATION MAP

FIGURE 5

AECOM

FRONT STREET FORMER GAS HOLDER SITE
HISTORICAL LAND USES IN FRONT STREET SITE VICINITY

FIGURE 6

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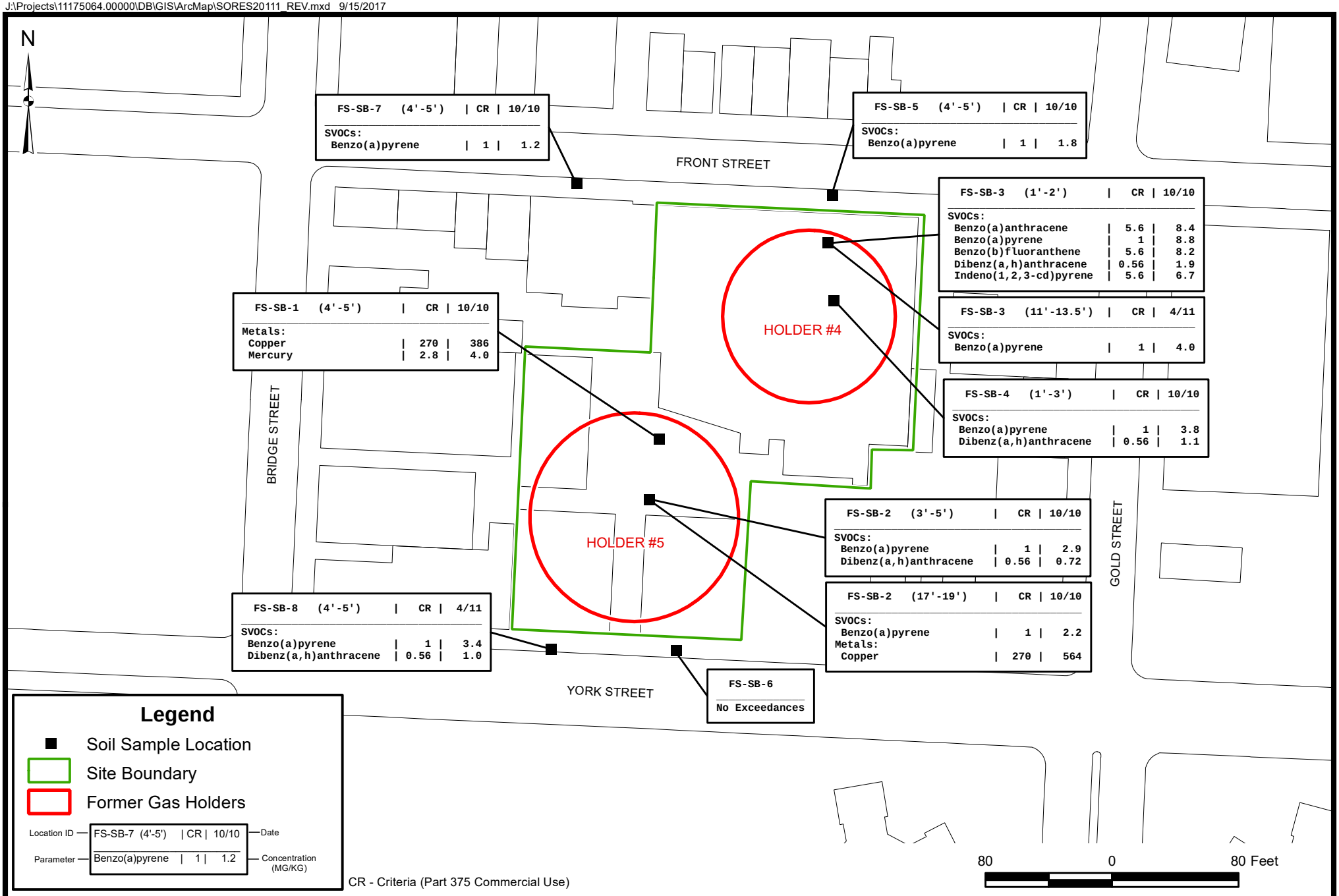


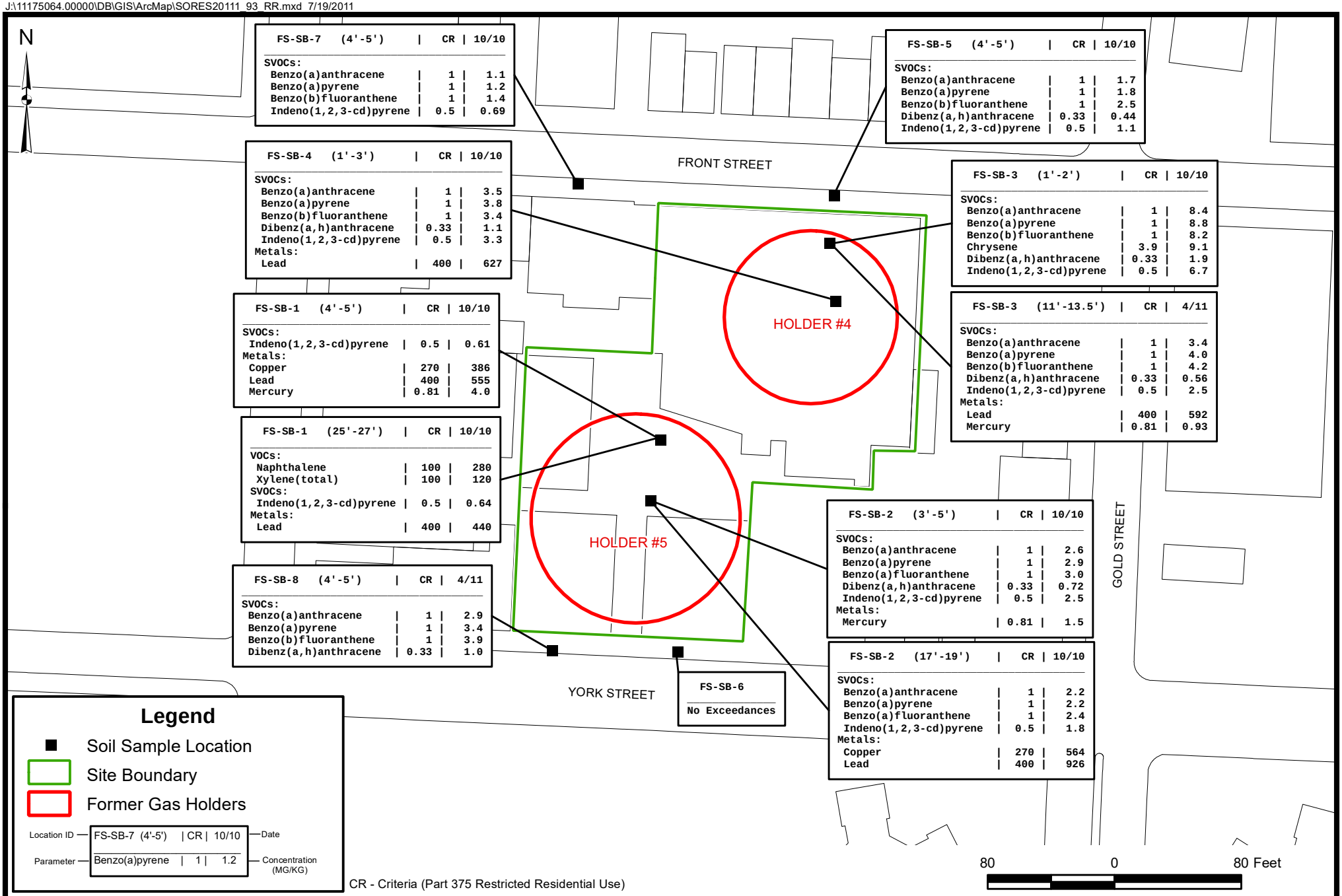
CR - Criteria (Part 375 Commercial Use)

AECOM

FORMER FRONT STREET HOLDER STATION
SOIL EXCEEDANCES - PART 375 COMMERCIAL USE

FIGURE 7

J:\11175064.00000\DB\GIS\ArcMap\SORES20111_93_RR.mxd 7/19/2011



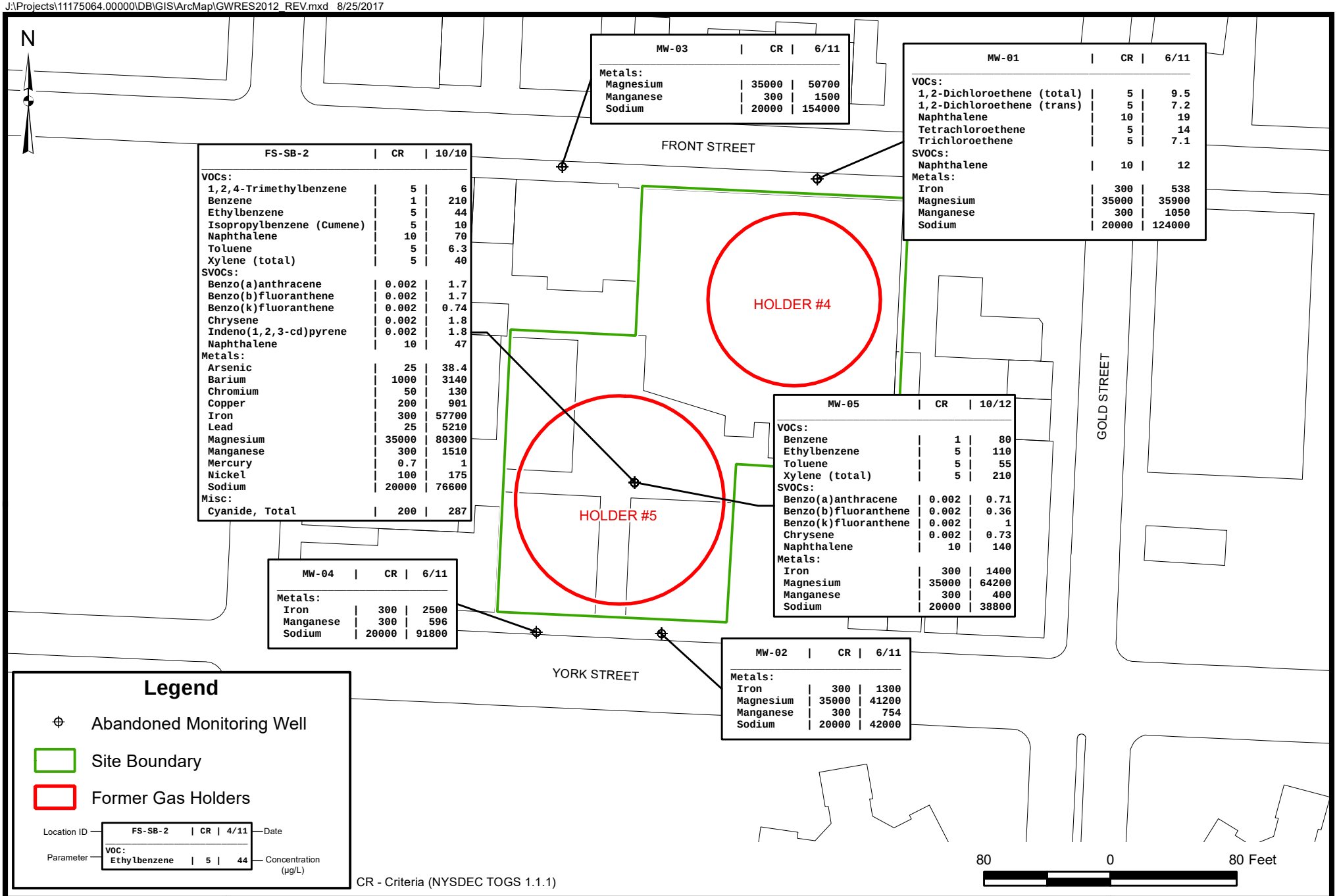
CR - Criteria (Part 375 Restricted Residential Use)

AECOM

FORMER FRONT STREET HOLDER STATION
SOIL EXCEEDANCES - PART 375 RESTRICTED RESIDENTIAL USE

FIGURE 8

J:\Projects\11175064.00000\DB\GIS\ArcMap\GWRES2012_REV.mxd 8/25/2017



MW-03	CR	6/11
Metals:		
Magnesium	35000	50700
Manganese	300	1500
Sodium	20000	154000

MW-01	CR	6/11
VOCs:		
1,2-Dichloroethene (total)	5	9.5
1,2-Dichloroethene (trans)	5	7.2
Naphthalene	10	19
Tetrachloroethene	5	14
Trichloroethene	5	7.1
SVOCs:		
Naphthalene	10	12
Metals:		
Iron	300	538
Magnesium	35000	35900
Manganese	300	1050
Sodium	20000	124000

FS-SB-2	CR	10/10
VOCs:		
1,2,4-Trimethylbenzene	5	6
Benzene	1	210
Ethylbenzene	5	44
Isopropylbenzene (Cumene)	5	10
Naphthalene	10	70
Toluene	5	6.3
Xylene (total)	5	40
SVOCs:		
Benzo(a)anthracene	0.002	1.7
Benzo(b)fluoranthene	0.002	1.7
Benzo(k)fluoranthene	0.002	0.74
Chrysene	0.002	1.8
Indeno(1,2,3-cd)pyrene	0.002	1.8
Naphthalene	10	47
Metals:		
Arsenic	25	38.4
Barium	1000	3140
Chromium	50	130
Copper	200	901
Iron	300	57700
Lead	25	5210
Magnesium	35000	80300
Manganese	300	1510
Mercury	0.7	1
Nickel	100	175
Sodium	20000	76600
Misc:		
Cyanide, Total	200	287

MW-05	CR	10/12
VOCs:		
Benzene	1	80
Ethylbenzene	5	110
Toluene	5	55
Xylene (total)	5	210
SVOCs:		
Benzo(a)anthracene	0.002	0.71
Benzo(b)fluoranthene	0.002	0.36
Benzo(k)fluoranthene	0.002	1
Chrysene	0.002	0.73
Naphthalene	10	140
Metals:		
Iron	300	1400
Magnesium	35000	64200
Manganese	300	400
Sodium	20000	38800

MW-04	CR	6/11
Metals:		
Iron	300	2500
Manganese	300	596
Sodium	20000	91800

MW-02	CR	6/11
Metals:		
Iron	300	1300
Magnesium	35000	41200
Manganese	300	754
Sodium	20000	42000

Legend

- Abandoned Monitoring Well
- Site Boundary
- Former Gas Holders

Location ID — FS-SB-2 | CR | 4/11 — Date

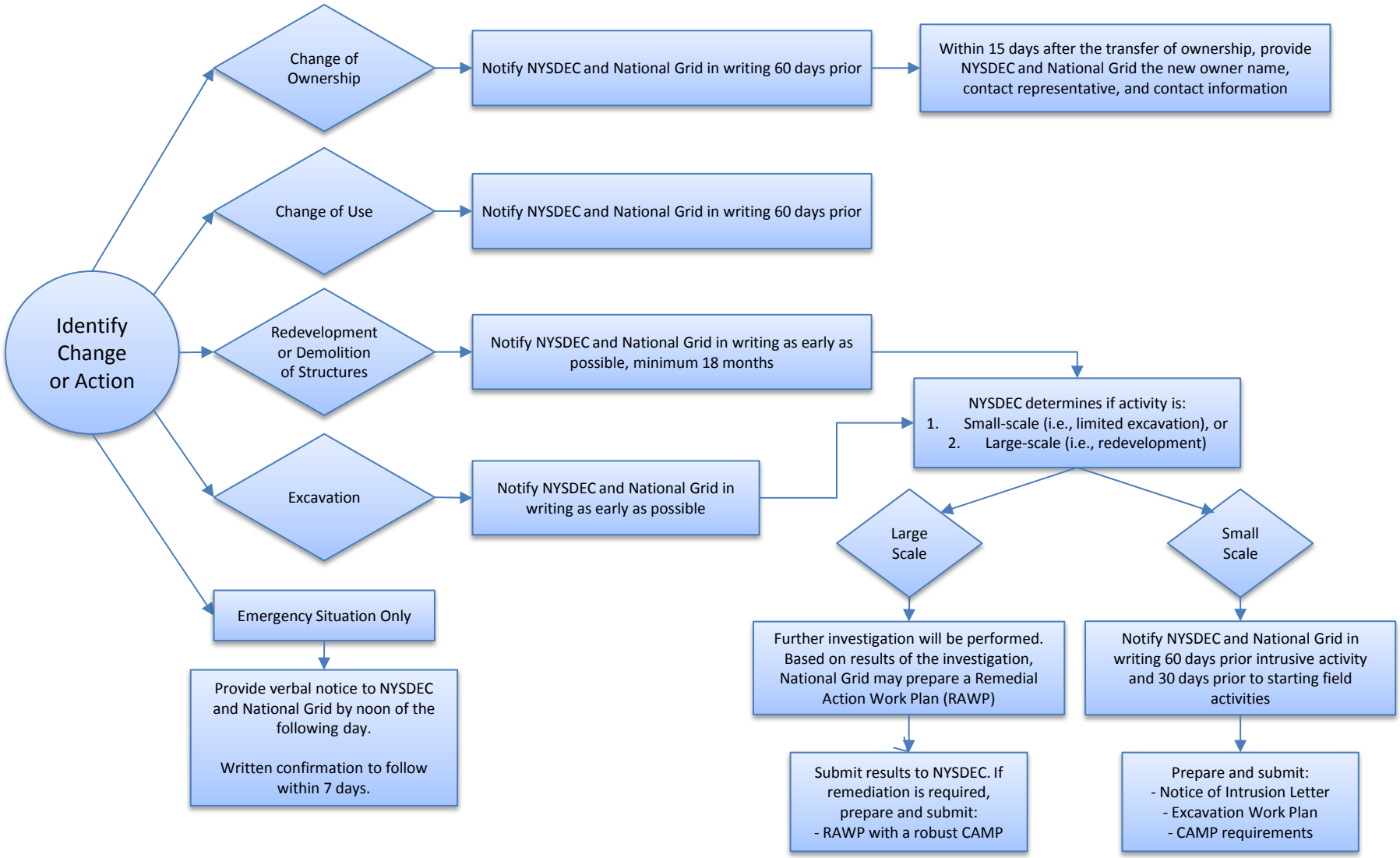
Parameter — VOC: Ethylbenzene | 5 | 44 — Concentration (µg/L)

CR - Criteria (NYSDEC TOGS 1.1.1)

AECOM

FORMER FRONT STREET HOLDER STATION
DISSOLVED PHASE GROUNDWATER EXCEEDANCES

FIGURE 9



Interim Site Management Plan Front Street Holder Station Brooklyn, New York	AECOM	PROPERTY OWNER DECISION TREE
nationalgrid	November 2017	Figure 10

Table 1

Site Property Divisions and Owner

Property Address	218 Front	171 York
Owner	Great Front Realty	Great Front Realty
Occupant(s)	NA*	NA*
Block and Lot Number	Block 55, Lot 20	Block 55, Lot 20
Current Zoning	R6A, C2-4 Commercial overlay	R6A, C2-4 Commercial overlay

Note: 218 Front Street is used as a warehouse and 171 York Street is used as a lumber yard. There are no permanent occupants at either location.

Table 2
Nearby Potential Contaminant Sources
Front Street Station Site
Brooklyn, New York

PRP Site Code	Block	Lot	Company Name	Facility Operations	Known Years of Operation	Reference Source ID	Rationale	Potential Contaminants of Concern
ON-1	55	20	Unknown	Wood Frame Manufacturer	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap, 9at	Moderate chemical-oil use, moderate potential for release, long duration onsite	Petroleum, solvents
ON-2	55	20	Unknown	Paint Storage	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
ON-3	55	7502	Schultz and Strileer	Lumber Yard	(1855)	9a		
ON-4	55	7502	Unknown	Auto Repair	(1981-1987)	9x, 9y, 9aa, 9ab	Moderate oil use, moderate potential for release	Petroleum
AB-1	55	1	Unknown	Chinese Laundry	(1904)	9n	Moderate chemical-oil use, moderate potential for release	Solvents
AB-2	55	25	Unknown	Auto Repair	(1977-1987)	9u, 9v, 9w, 9x, 9y, 9aa, 9ab	Moderate chemical-oil use, moderate potential for release	Petroleum
AB-3	55	40	Unknown	Dry Cleaning	(1969)	9t	Moderate chemical-oil use, moderate potential for release	Solvents
AB-4	55	7501	Hendrickson and Ralph	Coal and Wood Yard	(1855-1887)	9a, 9m		
AB-5	55	7501	Arthur C Jacobson and Sons	Lumber Yard	(1904-1915)	9j, 9n, 9o	Moderate chemical-oil use, moderate potential for release	Creosote
RAD-01	31	29	Unknown	Glycerine Plant	(1904)	9j		
RAD-02	31	7501	Unknown	Machine Shop	(1887)	9m		
RAD-03	31	7501	Foster Pump Works	Machine Shop	(1904-1915)	9j, 9n, 9o		
RAD-04	31	7501	Armstrong Cork Co	Unknown	(1904)	9j		
RAD-05	31	7502	Kirkman and Son	Borax Soap Factory	(1898-1950)	9h, 9i, 9j, 9k, 9l, 9n, 9o, 9r, 9s, 9ar		
RAD-05	32	1	Kirkman and Son	Glycerine Plant and Fat Storage, Iron Tallow Storage [Several Tanks on Site]	(1938-1950)	9r, 9s		
RAD-05	32	7501	Kirkman and Son	Glycerine Plant and Fat Storage, Iron Tallow Storage [Several Tanks on Site]	(1904-1950)	9n, 9r, 9s, 9as		
RAD-05	41	13	Kirkman and Son Inc.	Storage of Coal and Glycerine Drums	(1938)	9r		
RAD-05	41	42	Kirkman and Son Inc.	Storage of Coal and Glycerine Drums	(1938)	9r		
RAD-05	42	1	Kirkman and Son	Borax Soap Factory	(1915-1938)	9l, 9o, 9r, 9ar, 9as		
RAD-05	68	1	Kirkman and Son	Unknown	(1907-1908)	9k		
RAD-06	31	7502	Unknown	Cooperage	(1887)	9m		
RAD-07	31	7502	Dobelmanns	Flint and Glass Works	(1880)	9d, 9e		
RAD-08	31	7502	E W Bliss Co	Foundry	(1903-1908)	9i, 9k, 9l		
RAD-09	31	7502	Unknown	Glycerine Plant	(1904-1915)	9n, 9o		
RAD-10	31	7502	Phillips Whiting Factory	Machine Depot	(1887)	9g, 9m		
RAD-11	31	7502	Unknown	Whiting and Putty Manufacturing	(1880)	9d		
RAD-12	32	12	Unknown	Paint Manufactory/Works	(1855-1904)	9a, 9m, 9n		
RAD-13	32	12	Unknown	Waste Paper Baling	(1988-2007)	9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		

Table 2
Nearby Potential Contaminant Sources
Front Street Station Site
Brooklyn, New York

RAD-13	32	14	Unknown	Waste Paper Baling	(1988-2007)	9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
RAD-13	32	17	Unknown	Waste Paper Baling	(1988-2007)	9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
RAD-14	32	17	Unknown	Brady Manufacturing	(1880)	9d		
RAD-15	32	17	Excelsior Patent	Cortage Factory/Coal Yard	(1855)	9a		
RAD-16	32	17	S Rawitser and Company	Dyeing room, Laboratory, Wool Clip Sorting	(1887-1904)	9j, 9m, 9n		
RAD-17	32	17	Wood Mosaic Co	Fur Cleaning	(1887)	9m		
RAD-17	32	21	Wood Mosaic Co	Unknown	(1904)	9j		
RAD-18	32	17	Unknown	Laundry Supplies	(1904)	9n		
RAD-19	32	17	Unknown	Paint Factory	(1887)	9m		
RAD-20	32	17	Durkee and Co	Spice Grinding	(1887)	9m		
RAD-20	32	50	Durkee and Co	Spice Grinding	(1887)	9g, 9m		
RAD-20	32	140	Durkee and Co	Spice Grinding	(1887)	9g		
RAD-21	32	17	Calcutta Mills Co	Spices	(1904)	9j		
RAD-21	32	50	Calcutta Mills Co	Spices	(1887)	9m		
RAD-22	32	17	Unknown	Tin Plate Decorating	(1915)	9o		
RAD-23	32	17	Reliable Steam Power	Unknown	(1903-1920)	9i, 9l, 9ar		
RAD-24	32	17	Kent Machine Co	Unknown	(1887-1904)	9j, 9m		
RAD-24	32	21	Kent Machine Shop	Machine Shop	(1938-1969)	9r, 9s, 9t		
RAD-25	32	17	Meyers Lipman Co	Unknown	(1929)	9as		
RAD-25	32	50	Meyers Lipman Co	Unknown	(1929)	9as		
RAD-26	32	17	Unknown	Wallpaper Factory	(1887)	9m		
RAD-27	32	17	Unknown	Water Color Works	(1887)	9g, 9m		
RAD-28	32	26	Unknown	Cocoa Mat and Matting Factory	(1887)	9l, 9m		
RAD-29	32	26	Unknown	Cooperage	(1938)	9r		
RAD-29	32	29	Unknown	Cooperage	(1938)	9r		
RAD-30	32	26	Greenland Coco Matting Co	Dyeing, Drying, Weaving	(1887-1904)	9j, 9m		
RAD-30	32	29	Greenland Coco Matting Co	Dyeing, Drying, Weaving	(1887-1904)	9j, 9m		
RAD-31	32	26	Unknown	Furne Manufacturing	(1950)	9s		
RAD-32	32	26	Unknown	Waste Paper Baling	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap, 9at		
RAD-33	32	26	Benj. Moore and Co	White Lead Works	(1915)	9o		
RAD-33	32	29	Benj. Moore and Co	White Lead Works	(1915)	9o		
RAD-33	42	11	B Moore and Co/ Benj. Moore and Co/Benjamin Moore Co	Paint Works	(1903-1929)	9i, 9j, 9k, 9l, 9n, 9o, 9ar, 9as	Moderate to high chemical-oil use, moderate potential for release, across Front Street from site	Petroleum, solvents, dyes, metals
RAD-33	42	16	B Moore and Co/ Benj. Moore and Co/Benjamin Moore Co/ Moores	Paint Works	(1898-1929)	9i, 9j, 9k, 9l, 9n, 9o, 9ar, 9as	Moderate to high chemical-oil use, moderate potential for release, long duration, across Front Street from site	Petroleum, solvents, dyes, metals
RAD-34	32	29	Unknown	Cocoa Matting	(1920)	9ar		
RAD-35	32	29	Unknown	Paper Products Manufacturing	(1950)	9s		

Table 2
Nearby Potential Contaminant Sources
Front Street Station Site
Brooklyn, New York

RAD-36	32	50	N Hubbards Sons	Machine Shop	(1887-1904)	9j, 9m, 9n		
RAD-37	32	50	Unknown	Paint Manufacturer	(1938)	9r		
RAD-38	32	50	Unknown	Storage of Liquid Cement in Drums	(1950)	9s		
RAD-39	32	50	International Carbon Paper	Unknown	(1915)	9o		
RAD-40	32	55	Taylor	Paint and Oil	(1898-1899)	9h		
RAD-41	32	55	Unknown	Paint Works	(1880)	9d		
RAD-42	32	55	Seely Bro's	Paint Works	(1880-1887)	9g, 9m		
RAD-42	42	11	Seely Bro's	Tin Shop and Can Storage	(1880-1887)	9g, 9m		
RAD-43	32	55	Philip Ruxton Inc./ Phillip Ruxton Co.	Printing Ink/ Manufacturing and Color Mill	(1887-1929)	9i, 9j, 9k, 9l, 9m, 9n, 9ar, 9as		
RAD-44	32	55	International Inks Inc.	Printing Inks	(1938-1950)	9r, 9s		
RAD-45	32	140	Unknown	Sausage Skin Disinfecting	(1950-1969)	9s, 9t		
RAD-46	32	7501	Unknown	Axle Grease Factory	(1887)	9m		
RAD-47	32	7501	Unknown	Charcoal Storage	(1887)	9m		
RAD-48	32	7501	Unknown	Factory	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
RAD-49	33	1	Unknown	Metal Stamping	(1950)	9s		
RAD-50	33	1	Con Edison Co of NY INC	Phase Angle Regulator Station/Water St Sub-Station	(1969-2015)	9t, 9u, 9v, 9a, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap, 9at, 9av		
RAD-51	33	1	Unknown	Wire Basket Manufacturer	(1950)	9s		
RAD-52	41	13	Unknown	Iron Wheelbarrow Factory	(1887)	9g, 9m		
RAD-53	41	13	Len Art Co	Manufacturing	(1972-1977)	9u, 9at		
RAD-54	41	13	Brillo Manufacturing Co Inc.	Manufacturing	(1950-1969)	9s, 9t		
RAD-55	41	17	Arbuckle Bros	Cooper Stock and Storage	(1904)	9j, 9n		
RAD-56	41	17	Hanan and Son	Shoe Factory	(1898-1929)	9h, 9i, 9j, 9k, 9l, 9n, 9o, 9aq, 9as		
RAD-57	41	17	Union	White Lead Works	(1855-1887)	9a, 9e, 9f, 9g, 9m	Moderate to high chemical-oil use, moderate potential for release, long duration, cross gradient	Petroleum, solvents, dyes, metals
RAD-58	42	1	Unknown	Coal	(1880)	9d		
RAD-59	42	1	Hendrickson and Ralph	Coal Yard	(1855)	9a		
RAD-60	42	1	Unknown	Furne Warehouse	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap, 9at		
RAD-61	42	1	Unknown	Storage	(1969-2007)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
RAD-62	42	11	Unknown	Canned Paint Warehouse	(1950)	9s		
RAD-63	42	11	Unknown	Paint Works	(1880)	9e	Moderate to high chemical-oil use, moderate potential for release, across Front Street from site	Petroleum, solvents, dyes, metals

Table 2
Nearby Potential Contaminant Sources
Front Street Station Site
Brooklyn, New York

RAD-64	42	16	Unknown	Bagging Factory	(1880)	9e		
RAD-64	42	43	Unknown	Paint Works	(1880)	9e	Moderate to high chemical-oil use, moderate potential for release, across Front Street from site	Petroleum, solvents, dyes, metals
RAD-65	42	16	Unknown	Iron Works	(1880)	9e		
RAD-65	42	39	Unknown	Iron Works	(1880)	9e		
RAD-65	42	40	Unknown	Iron Works	(1880)	9e		
RAD-66	42	16	The Eagle Mill	Weaving, Spining, Storage	(1880-1887)	9d, 9g, 9m		
RAD-66	42	18	The Eagle Mill	Weaving, Spining, Storage	(1887)	9m		
RAD-67	43	13	Unknown	Waste Paper Storage	(1950)	9s		
RAD-68	43	20	Unknown	Machine Warehouse	(1950-1969)	9s, 9t		
RAD-69	43	29	Peoples	Coal Yard	(1855)	9a		
RAD-70	43	29	Boerum and Pease Co/ Boorum and Pease Co	Printing Blank Books	(1915-1989)	9l, 9o, 9r, 9s, 9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ar, 9as, 9at	Moderate to high chemical-oil use, moderate potential for release, long duration, across Front Street from site, cross gradient, documented possible impact	Petroleum, solvents, dyes
RAD-70	54	1	Boerum and Pease Co/ Boorum and Pease Co	Blank Books	(1898-1993)	9h, 9i, 9j, 9k, 9l, 9n, 9o, 9r, 9s, 9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ar, 9as, 9at	moderate chem-oil use, moderate potential for release, possible impact (long duration), cross gradient	Petroleum, solvents, dyes
RAD-71	43	29	Globe Storage and Moving Co Inc.	Unknown	(1991-2007)	9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap		
RAD-71	54	1	Unknown	Malt House	(1855)	9a		
RAD-72	54	1	The Tin Plate Decorating Co	Tin Plate Decorating	(1887-1915)	9i, 9j, 9m, 9n, 9o		
RAD-73	54	1	Leary and Britton	Unknown	(1907-1908)	9k		
RAD-74	54	1	Holl Bradley and Co	White Lead	(1880)	9d	Moderate to high chemical-oil use, moderate potential for release, long duration, across Bridge Street from site	Petroleum, solvents, dyes, metals
RAD-75	54	1	National Lead Co/ Bradley	White Lead/ Bradley Works	(1887-1989)	9h, 9i, 9j, 9k, 9l, 9m, 9n, 9o, 9r, 9s, 9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9at	Moderate chemical-oil use, moderate potential for release, long duration, documented possible impact, cross gradient	Petroleum, solvents, dyes, metals
RAD-76	56	3	Royal Lace Paper Co	Paper Novelty Manufacturer	(1938-1950)	9r, 9s		
RAD-77	56	3	Gardner Lucas Co Inc.	Unknown	(1929)	9as		
RAD-78	56	7	Pack Bag Company Burlap Bag Mfg./Sterling Bag Co.	Burlap Bag Manufacturing	(1938-1950)	9r, 9s		
RAD-79	56	7	Euclid Candy Co	Unknown	(1929)	9as		
RAD-80	66	18	Unknown	Plastic Products Warehouse	(1969-1993)	9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag	Moderate to high chemical-oil use, moderate potential for release, long duration, across York Street from site, documented possible impact	Petroleum, solvents, unknown chemical use
RAD-81	68	1	Unknown	Heating Plant	(1950-1993)	9s, 9t, 9u, 9v, 9w, 9x, 9y, 9aa, 9ac, 9ad, 9ae, 9af, 9ag	Moderate to high chemical-oil use, moderate potential for release, long duration, across York Street from site, documented possible impact	Petroleum, solvents, unknown chemical use
RAD-82	68	1	John J Monck	Pre-Cooperage	(1904-1915)	9j, 9n, 9o		
RAD-83	68	1	Unknown	Syrup and Coloring Works	(1887)	9g		

Table 1
Nearby Potential Contaminant Sources
Front Street Station Site

Source ID	Description/Title Brooklyn, New York	Source
9a	Maps of the City of Brooklyn Perris W 1855. [Plates 3, 4, & 12]	NYPL Digital Collection
9b	Map of the City of Brooklyn, Dripps M 1869.	NYPL Digital Collection
9c	Farm Line Map of the City of Brooklyn, Fulton H. 1874.	NYPL Digital Collection
9d	Atlas of the entire city of Brooklyn, Bromley, G.W. 1880 [Plate 2]	NYPL Digital Collection
9e	Detailed Estate and Old Farm Line Atlas. Hopkins 1880. [Plates A, & B vol 5]	NYPL Digital Collection
9f	Atlas of Brooklyn, E. Robinson 1886. [Plate 1]	NYPL Digital Collection
9g	Atlas 66. Vol. 2, Sanborn Map Company 1887. [Plates 34, 35, 36, & 37]	NYPL Digital Collection
9h	Atlas of the Brooklyn Borough of the City of New York, Ullitz H. 1898-99, Vol 1 [Plate 1]	NYPL Digital Collection
9i	Atlas of the Borough of Brooklyn, Hyde E.B 1903. [Plate 2]	NYPL Digital Collection
9j	Atlas 67. Vol. 2, Sanborn Map Company 1904. [Plates 7, 8, 9, 10, & 16]	NYPL Digital Collection
9k	Atlas of the Borough of Brooklyn, Bromley GW and Co. 1907-08. [Plate 1]	NYPL Digital Collection
9l	Atlas of the Borough of Brooklyn v. 1, Hyde E.B 1916. [Plate 1]	NYPL Digital Collection
9m, 9n, 9o, 9p, 9q, 9r, 9s, 9t, 9u, 9v, 9w, 9x, 9y, 9z, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap	Sanborn Maps 1887, 1904, 1915, 1922, 1928, 1938, 1950, 1969, 1977, 1979, 1980, 1981, 1982, 1984, 1986, 1987, 1988, 1989, 1991, 1992, 1993, 1995, 1996, 2001, 2002, 2003, 2004, 2005, 2006, 2007	EDR - Certified Sanborn Map Report
9aq	Atlas of the City of Brooklyn, Bromley 1893	NYPL Physical Collection
9ar	Desk Atlas Borough of Brooklyn Vol 1, Hyde 1920	NYPL Physical Collection
9as	Desk Atlas Borough of Brooklyn Vol 1, Hyde 1929	NYPL Physical Collection
9at	Insurance Maps of Brooklyn Vol 2, Sanborn Map 1915, revised 1972	NYPL Physical Collection
9au	Google Maps (2013-2015)	Google
9av	OASIS/ACRIS	www.oasisnyc.org/map.aspx

Table 3
Interim Site Management Plan
Matrix of Responsibilities
Front Street Holder Station Site
NYSDEC Site No. 224063
Brooklyn, New York

Responsible Party → / Trigger ↓	NYSDEC	National Grid	Property Owner	Action		
				NYSDEC	National Grid	Property Owner
National Grid perform work or reimburse property owner cost delta which represents the incremental cost borne by the Property Owner due to SMP requirements. The cost reimbursements will be on a case-by-case basis.						
Access Agreement (AA)		x	x		AA will be executed between the Property Owner and National Grid for activities required under the ISMP (e.g., inspections, soil vapor intrusion evaluation, and further investigation).	AA will be executed between the Property Owner and National Grid for annual inspection and indoor air monitoring (if needed in future)
Annual Certifications		x	x		Inspections and certifications. Certification will be included in Annual Report stating all ECs are in place and effective.	Provide access to all areas of the property. Fill out form stating either nothing or something has changed.
Annual Report		x			Report will be completed by National Grid and submitted to NYSDEC.	
Emergency Response	x	x	x	Property Owner has to provide details of emergency work to National Grid and NYSDEC verbally by noon of the next day with written confirmation within 7 days of emergency	National Grid will review emergency activities, conduct maintenance or repair (if necessary) and submit update to NYSDEC within 45 days and with Annual Inspection Report	Property Owner has to provide details of emergency work to National Grid and NYSDEC verbally by noon of the next day with written confirmation within 7 days of emergency
Environmental Easement (EE)	x		x	EE will be executed between the Property Owner and NYSDEC	National Grid will facilitate EE and provide for owner execution	EE will be executed between the Property Owner and NYSDEC
Future Property Re-development	x	x	x	Review and Comment	National Grid to review and decide if oversight is required. Following re-development, National Grid to update SMP, if required.Following development, National Grid to update ISMP and submit to NYSDEC with Annual Inspection Report	Property Owner has to provide an 18-month advance notice of property redeveoplment and/or building demolition to National Grid and NYSDEC. There are no restrictions on type of development activities.
Ground Intrusion Work (e.g., excavation)		x	x		National Grid will notify NYSDEC of any event and associated changes within 45 days. National Grid to review and decide if oversight is required. Following development, National Grid to update ISMP and submit to NYSDEC with Annual Inspection Report	Property Owner is to provide notice to National Grid as soon as possible in advance of any ground intrusive activity pursuant to the EWP and notice to NYSDEC at least 15 days prior the proposed start of activity. All ground intrusive activities have to follow the (I)SMP.
Management of Cover System			x			Owner is responsible
Damage or Defect to Cover System			x			Owner to provide notice to NYSDEC and National Grid within 48 hours. National Grid to follow-up within 45 days.
Replacement of Cover System		x	x		Responsible depending on nature of cause (e.g., ISMP issue).	Responsible depending on nature of cause (e.g., maintenance issue).
Demolition of Buildings			x			Owner is responsible to provide notification as soon as possible within 18 months.
Groundwater Use			x			Never; removed groundwater has to be managed according to ISMP requirements
HASP Development			x			Develop a Site-specific HASP for the existing or replaced cover work.

Table 3
Interim Site Management Plan
Matrix of Responsibilities
Front Street Holder Station Site
NYSDEC Site No. 224063
Brooklyn, New York

Responsible Party → / Trigger ↓	NYSDEC	National Grid	Property Owner	Action		
				NYSDEC	National Grid	Property Owner
Inspections		x	x		Annual Site-wide and cover system inspection of ECs and ICs	Inspections (annual and following any emergency) of the ECs and ICs for the property
Interviews		x	x		National Grid to perform annually with Property Owner.	Discuss annually during inspections with National Grid any completed activity and upcoming activities on the property
Metes and Bounds Survey		x			National Grid will perform a Metes and Bounds (or similar) Survey to include in the ISMP and EE	Property Owner shall provide National Grid with access.
Monitoring		x	x		Soil vapor intrusion evaluatoin will be completed for any new buildings if MGP materials remain onsite.	Property Owner shall provide National Grid with access.
Owner Notification Timeline	x	x		Notification receipt confirmation to Property Owner in 15 days (business)	Notification receipt confirmation to Property Owner in 15 days (business)	
Property Ownership Change		x	x	Property Owner has to provide at a minimum 60 days prior notice to National Grid and NYSDEC	National Grid will submit update to NYSDEC with Annual Inspection Report	Property Owner shall provide at a minimum 60 days prior notice to National Grid and NYSDEC
Property Use Change (currently Restricted Commercial)	x	x	x	Review and Comment	National Grid to review and confer with NYSDEC if SMP revision and/or additional ECs/ICs are required. Following use change, National Grid to update ISMP and submit to NYSDEC with Annual Inspection Report	Property Owner has to provide at a minimum 60 days prior notice of any proposed changes in Site use to National Grid and NYSDEC
Implementation of Actions Recommended to Address Potenial Exposures Related to Soil Vapor Intrusion		x			National Grid will be responsible for assessment of need for further action.	
Site Management Plan (SMP) Implementation			x		National Grid has same responsibility as owner.	Implement the ISMP for any ground intrusive work that will disturb the cover system
Further Investigation		x			National Grid will be responsible for further investigations.	
Remediation		x			National Grid will be responsible for development of Remedial Action Work Plan for MGP contaminaton only.	

Table 4 - Schedule of Interim Monitoring/Inspection Reports

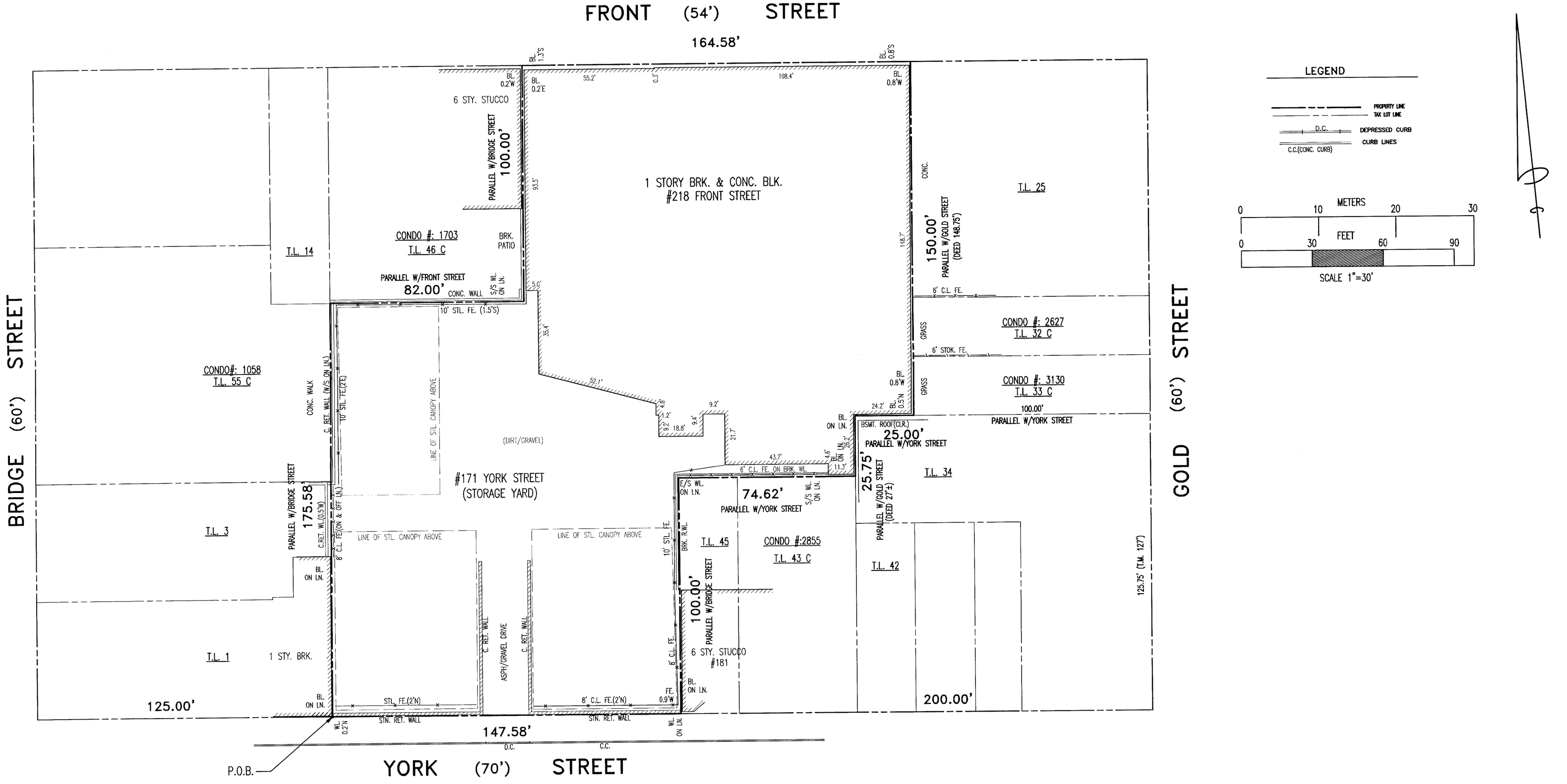
Task/Report	**Reporting Frequency***
Inspection Report	Monthly
Periodic Review Report	Annually, or as otherwise determined by the Department

APPENDIX A

FRONT STREET HOLDER STATION

ENVIRONMENTAL EASEMENT

Environmental Easement Pending; Site Survey Provided



LEGEND

PROPERTY LINE
TAX LOT LINE
D.C. DEPRESSED CURB
CURB LINES
C.C.(CONC. CURB)

METERS 0 10 20 30
FEET 0 30 60 90
SCALE 1"=30'

LEGAL DESCRIPTION
PROPOSED EASEMENTS (ENTIRE PARCEL)
2108 FRONT STREET & 171 YORK STREET, BROOKLYN
KCTM BLOCK 55 LOT 20

All that certain plot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York bounded and described as follows:

BEGINNING at a point on the northerly side of York Street distant 125 feet easterly from the corner formed by the intersection of said northerly side of York Street with the easterly side of Bridge Street. Running thence from said POINT OF BEGINNING the following courses;
Easterly along said northerly side of York Street 147.58 feet to a point distant 200 feet west of the westerly side of Gold Street. Thence,
Northerly parallel with Bridge Street, 100 feet. Thence,
Easterly parallel with York Street, 74.62 feet. Thence,
Northerly parallel with Gold Street, 25.75 feet (Deed 27' more or less). Thence,
Easterly parallel with York Street, 25.00 feet. Thence,
Northerly parallel with Gold Street, 150.00 feet (Deed 148.75 feet) to the southerly side of Front Street. Thence,
Westerly along said southerly side of Front Street, 164.58 feet. Thence,
Southerly parallel with Bridge Street, 100.00 feet. Thence,
Westerly parallel with Front Street, 82.00 feet. Thence,
Southerly parallel with Bridge Street, 175.58 feet to the point or place of BEGINNING.
Said parcel having an area of 49,253 square feet more or less.

EASEMENTS AND/OR SUBSURFACE STRUCTURES RECORDED OR UNRECORDED ARE NOT GUARANTEED UNLESS PHYSICALLY EVIDENT ON THE PREMISES AT THE TIME OF THE SURVEY.
GUARANTEES INDICATED HEREON SHALL RUN ONLY TO THE PERSON(S) FOR WHOM THE SURVEY IS PREPARED, AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTIONS LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS. THE OFFSETS (OR DIMENSIONS) SHOWN HEREON FROM THE STRUCTURES TO THE PROPERTY LINES ARE FOR A SPECIFIC PURPOSE AND USE AND THEREFORE ARE NOT INTENDED TO GUIDE THE ERECTION OF FENCES, RETAINING WALLS, POOLS, PATIOS, PLANTING AREAS, ADDITIONS TO BUILDINGS AND ANY OTHER CONSTRUCTION.

"This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in more detail in the (interim) Site Management Plan ((I)SMP). A copy of the (I)SMP must be obtained by any party with an interest in the property. The (I)SMP can be obtained from NYS Department of Environmental Conservsation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov".

R:/12200/12200-FRONT-STREET.DWG

CERTIFIED TO:

UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW. © 2016

JOB NO. 12200
REVISIONS: 4/5/16-NOTES, LEGEND
REV. 5/7/16
REV. NOTE 8/24/16

K.C.T.M. BLK. 55 LOT 20

SURVEY OF
PROPERTY
SITUATE AT
BOROUGH OF BROOKLYN
KINGS COUNTY, NEW YORK

SCALE 1"=30' FEBRUARY 17, 2016

AMERICAN ENGINEERING & LAND SURVEYING, P.C.
surveyors . engineers . architects . planners
1171 old country road - ste. 6
plainview, ny 11803
tel: 516.454.7500
fax: 516.822.2743
www.aelandsurveying.com

STEPHEN E. RAVN, P.E., L.S. (L.S. NO. 49664)

APPENDIX B

FRONT STREET HOLDER STATION

EXCAVATION WORK PLAN (EWP)

The March 2018 ROD requires an Excavation work Plan (EWP) that details the provisions for management of limited excavations in areas of impacts. This EWP will be implemented to address intrusive activities conducted prior to the final remedy, or portion of the final remedy, at the Site. The property owner and its tenants, consultants, and contractors are required to comply with this EWP. National Grid is only responsible for costs associated with MGP-related impacts.

B-1 NOTIFICATION

All intrusive activities must be approved by NYSDEC. Notification must be made to NYSDEC in accordance with Section 1.3 of the ISMP. At least 15 days prior to the start of small-scale (*i.e.,* limited)[*] activity, as previously determined by NYSDEC, that is anticipated to encounter impacts on the Site, based on the data available, the Site owner or their representative will notify the NYSDEC and National Grid in writing. **Table B-1** includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Attachment A**.

[*] Note that NYSDEC makes the determination of which excavations are limited and which are large-scale. To know with certainty that the proposed excavation is considered to be limited will require a prior notification to NYSDEC describing the work to be performed.

Table B-1

Name	Contact Information
R. Scott Deyette NYSDEC Project Manager	(518) 402-9662 scott.deyette@dec.ny.gov
Jane O'Connell NYSDEC Remediation Section Chief, Region 2	(718) 482-4599 jane.oconnell@ dec.ny.gov
Kelly Lewandowski Chief, NYSDEC Site Control	(518) 402-9569 kelly.lewandowski@dec.ny.gov
Donald Campbell National Grid Project Manager	(718) 963-5453 donald.campbell@nationalgrid.com

* Note: Notifications are subject to change and will be updated as necessary.

The property owner, will generate the notification to NYSDEC via a Notice of Intrusion letter. This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of impacted soil to be excavated and any work that may impact the engineering control;
- Whether proposed activities will require dewatering, proposed containment of dewatering liquids and planned disposal options for dewatering liquids;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly impacted media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement from the party performing the work, that the work will be performed in compliance with this EWP and 29 Code of Federal Regulations (CFR) 1910.120;

- A copy of the contractor's HASP, in electronic format, if it differs from the HASP provided in Appendix F of the ISMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

B-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (*e.g.*, photoionization detector) soil screening will be performed by a QEP or person under their supervision during all excavations into known or potentially-impacted material. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work.

Based on previous environmental data and screening results, soils will be segregated into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as soil beneath a cover. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections B-5, 6, and 7 of this appendix.

B-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points. Stockpiles will be located and sized to minimize potential for material or run-off to enter discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected, and damaged tarp covers will be promptly replaced. Stockpiles will be segregated on-site based on the soil/material type. These soil/material types will include impacted soils, reuse soil, and imported fill.

Stockpiles will be inspected, at a minimum, once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by the NYSDEC.

B-4 MATERIALS EXCAVATION AND LOAD-OUT

A QEP or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

To the extent that they perform work under this EWP, the property owner and its contractors are responsible for safe execution of all invasive and other work; including the structural integrity of excavations and structures; such as subsurface utilities and buildings that may be affected by excavations.

The presence of utilities and easements on the Site will be investigated. Based in the investigation, it will be determined whether a risk or impediment to the work planned under this EWP is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and New York State Department of Transportation (NYSDOT) requirements (and all other applicable transportation requirements).

A truck wash will be operated onsite, as appropriate. The QEP will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete. Truck wash waters will be collected and disposed off-site in an appropriate manner.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of offsite soil tracking.

The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the

Site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

B-5 MATERIALS TRANSPORT OFFSITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, state, and federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the Site will be secured with tight-fitting impermeable covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

The truck transport routes are included in **Figures B-1** and **B-2**. All trucks loaded with site materials will exit the vicinity of the Site using only the approved truck routes. These are the most appropriate routes and takes into account:

a. limiting transport through residential areas and past sensitive sites;
b. use of city mapped truck routes;
c. prohibiting off-site queuing of trucks entering the facility;
d. limiting total distance to major highways;
e. promoting safety in access to highways; and
f. overall safety in transport.

Truck transport routes will be developed based on the location of the approved disposal facility. Based on current site access and locations of major highways, the following truck routes are anticipated:

Route 278 (BQE) Westbound:

1. Exit Site west on York Street
2. Travel west to the end where it meets Front Street
3. Turn left on Front Street
4. Travel to Fulton Street.

5. Turn left on Fulton Street
6. Travel to the BQE entrance ramp (Vine Street)

Route 278 (BQE) Eastbound:

1. Exit Site east on York Street
2. Travel east to Gold Street
3. Turn right on Gold Street
4. Travel to Sands Street.
5. Turn right on Sands Street
6. Travel to Jay Street
7. Turn left on Jay Street
8. Travel to the BQE entrance ramp

Trucks will be prohibited from stopping and idling in the neighborhood outside the Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed onsite in order to minimize offsite disturbance. Offsite queuing will be prohibited.

B-6 MATERIALS DISPOSAL OFFSITE

All material excavated and removed from the Site will be treated as impacted and regulated material and will be transported and disposed in accordance with all local, State and Federal regulations. If disposal of material from the Site is proposed for unregulated offsite disposal (*i.e.* clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from the Site will not occur without formal NYSDEC approval.

Regulated soils will be stockpiled and transported to a National Grid approved facility. Offsite disposal locations for excavated soils will be identified in the pre-

excavation notification Prepared by the owner and provided to National Grid for review and submittal to NYSDEC. This will include estimated quantities and a breakdown by class of the disposal facility, if appropriate. Actual disposal quantities and associated documentation will be reported to the NYSDEC. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and impacted soils taken offsite will be handled, consistent with 6 NYCRR Parts 360, 361, 362, 363, 364, and 365. Material that does not meet Unrestricted Use SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-5 registered or permitted facility).

B-7 MATERIALS REUSE ONSITE

A Request to Import/Reuse Fill or Soil form, which can be found in **Attachment B** to this appendix and at http://www.dec.ny.gov/regulations/67386.html, will be prepared by the owner and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material that meets the [Restricted Residential SCOs listed in Table 375-6.8(b)] of 6 NYCRR Part 375 meet the chemical criteria for onsite reuse. Prior to reuse, samples will be collected and analyzed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory for:

- Total VOCs via U.S. Environmental Protection Agency (EPA) Method 8260
- Total SVOCs via EPA Method 8270C
- Polychlorinated biphenyls (PCBs) via EPA Method 8082/8082A/8080
- Total cyanide via EPA Method 9010/9014
- Total Metals (RCRA+Cu, Ni, Zn, Va, Cn, HexChrome) via EPA Method 6010B and 6010
- Total Mercury via EPA Method 7471
- per- and polyfluoroalkyl substances (PFAS)

- 1,4-dioxane

The QEP will ensure that procedures defined for materials reuse in this EWP are followed and that unacceptable material does not remain on-site. Impacted soil that is acceptable for reuse onsite will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will not be reused on-site.

B-8 FLUIDS MANAGEMENT

All impacted liquids to be removed from the Site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, state, and federal regulations. MGP-impacted liquids removed from the Site will be disposed of at a National Grid-approved disposal facility. Dewatering, purge, and development fluids will not be recharged back to the land surface or subsurface of the Site, and will be managed offsite, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (*i.e.*, a local pond, stream or river) will be performed under a State Pollutant Discharge Elimination System (SPDES) permit.

B-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities, the cover system will be restored in a manner that complies with the Record of Decision. The existing cover is comprised of a minimum of 1 to 7 inches of concrete, 1 inch of asphalt, or 1 to 3 inches of gravel. A figure showing the modified surface will be included in an updated [I]SMP.

B-10 BACKFILL FROM OFFSITE SOURCES

All materials proposed for import onto the Site will be approved by National Grid's QEP and will be in compliance with provisions in this EWP prior to receipt at the Site. A Request to Import/Reuse Fill or Soil form, which is attached to this appendix and at http://www.dec.ny.gov/regulations/67386.html, will be prepared by the property owner and submitted to the NYSDEC project manager by National Grid, allowing a minimum of 5 business days for review. This will include analytical sampling of the borrow source or existing documentation of agency approvals of the source (*i.e.*, NYSDOT virgin source certification and latest analytical sampling results). NYSDEC approval must be received before material is imported to the Site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Based on an evaluation of the land use (*e*.g., Restricted Residential) and protection of groundwater criteria, the resulting soil quality standards are listed in 6 NYCRR Table 375-6.8. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Samples will be collected from imported fill in accordance with the analytical sampling requirements of DER-10 and the frequency requirements in NYSDEC's Soil

Cleanup Guidance, CP-51. At a minimum, samples will be analyzed for Inorganics, Pesticides, PCBs, VOCs, SVOCs, per- and polyfluoroalkyl substances (PFAS), and 1,4-dioxane in accordance with the analytes for the Restricted Residential SCOs listed in Table 375-6.8(a) of 6 NYCRR Part 375. The frequency and type of the sampling (*i.e.*, discrete or composite) will be based on the quantity of material imported in accordance with Table 4 of CP-51.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases (Section B-3).

B-11 STORMWATER POLLUTION PREVENTION

For excavations less than one acre in area and that are not part of a larger disturbance, the following stormwater management practices will be completed in accordance with the requirements in the New York State Stormwater Management Design Manual, latest revision.

Silt fencing and/or hay bale checks will be installed around the entire perimeter of the construction area and will be inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the silt fencing and/or hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in this EWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible,

they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

In the event that the work on the property is part of a larger plan that disturbs more than 1 acre, the respective property owner must obtain coverage under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity.

B-12 EXCAVATION CONTINGENCY PLAN

Identification of unknown or unexpected potentially impacted media identified by screening during invasive site work will be promptly communicated by phone to National Grid and National Grid will notify NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline.

If underground tanks or other previously unidentified contaminant sources are found during subsurface excavations, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

In the event that potential impacts are encountered at unexpected depth or locations, site activities will be suspended and National Grid will be notified and will evaluate the observed conditions in a manner and timeframe that does not interfere with the property owner's schedule, to the extent reasonably feasible. National Grid may determine that laboratory testing is required to evaluate the observed conditions for concentrations and characteristics. If the encountered materials are determined to be MGP-impacted, then the encountered materials will be segregated and stockpiled for disposal at a National Grid-approved facility.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles, semi-volatiles, and pesticides and PCBs and cyanide). In the event that future sampling results provide a sufficient justification to limit the list of analytes. a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

B-13 Community Air Monitoring Plan

Intrusive work performed at the Site, under this EWP shall, at a minimum, include the procedures provided in the Community Air Monitoring Plan provided in ISMP Appendix I.

B-14 Odor Control Plan

Odors which derive from site impacts may cause a nuisance to some site workers and/or the surrounding community, even though the impacts are at levels well below the safety limits defined in the CAMP. This odor control plan is capable of controlling emissions of nuisance odors on- and offsite. Specific odor control methods to be used on a routine basis will include all reasonable and necessary means as described in the following paragraph. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified by National Grid of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the contractor performing the work.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors that cannot be corrected develop during intrusive work, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

B-15 Dust Control Plan

Dust which derives from site impacts may cause a nuisance to some site workers and/or the surrounding community, even though the impacts are at levels well below the safety limits defined in the CAMP. A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

In the event that complaints are received for dust, the contractor will take the appropriate response actions for dust suppression.

APPENDIX C

FRONT STREET HOLDER STATION

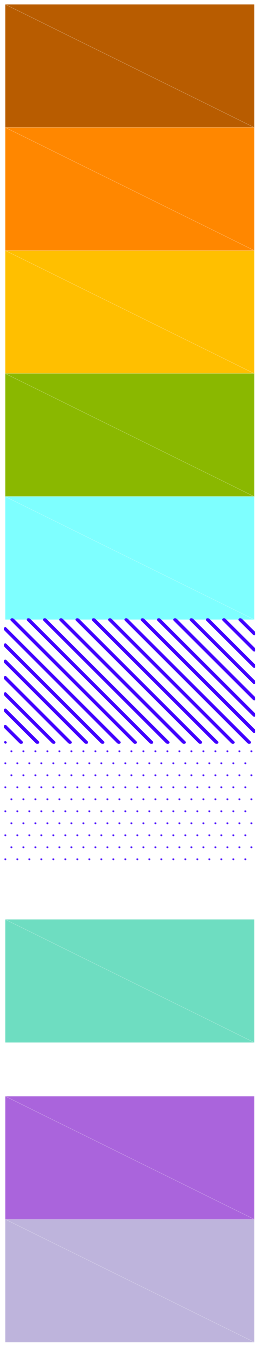
LIST OF SITE CONTACTS

Name	Phone/Email Address
Emily Wang Great Front Realty	(212) 577-2022 ewang14988@yahoo.com
Donald Campbell National Grid Project Manager	(718) 963-5453 donald.campbell@nationalgrid.com
Francis J. Murphy National Grid	(516) 545-3745 francis.murphy@nationalgrid.com
Kevin Connare, PG AECOM Project Manager and QEP	(716)-923-1165 kevin.connare@aecom.com
R. Scott Deyette NYSDEC DER Project Manager	(518) 402-9662 scott.deyette@dec.ny.gov
Jane O'Connell NYSDEC Regional HW Engineer	(718) 482-4599 jane.oconnell@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	(518) 402-9569 kelly.lewandowski@dec.ny.gov

APPENDIX D

FRONT STREET HOLDER STATION

BORING AND WELL CONSTRUCTION LOGS



NOTES:

1. USE ONLY THE COLOR KEYS FOR THE CONDITIONS THAT ARE ENCOUNTERED AT A GIVEN SITE. IF CONDITIONS DESCRIBED ABOVE DO NOT EXIST, DO NOT USE IN LEGEND.
2. THE COLOR DESCRIPTORS ABOVE ARE TO BE USED IN CONJUNCTION WITH THE "ENVIRONMENTAL TERMINOLOGY FOR SOIL DESCRIPTIONS" BY M. PASTER OF GEI CONSULTANTS, INC.

NATIONAL GRID IMPACT COLORS	**COLORS FOR NATIONAL GRID IMPACTS**
nationalgrid	February 2011

I:\Project\National Grid\All Sites\KeySpan & National Grid COLORS\ Nat Grid Impact Colors_2010-08-25.dwg \Feb 15, 2011

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-1
SHEET:	1 of 1
JOB NO.:	11176231
BORING LOCATION:	171 York St
	Lumber Yard, north side
DATE STARTED:	10/13/10
DATE FINISHED:	10/13/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

PROJECT: Front Street Former Gas Holder Site Characterization

CLIENT: National Grid

BORING CONTRACTOR: Zebra

GROUNDWATER: Not encountered

DATE	TIME	LEVEL	TYPE

	CAS.	SAMPLER	CORE	TUBE
TYPE		Macrocore		
DIA.		2"		
WT.		--		
FALL		--		

*** POCKET PENETROMETER READING**

DEPTH FEET	STRATA	Color Code	SAMPLE "S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
								0' Gravel and soil	FILL	0	dry
					100%	dk gray		0'-2' FILL- sand w/ silt & f-m gravel		0	
			1					2'-5' FILL- vf-c sand w/ brick		0	
						med brn		& wood, trace glass		0	
5								4' with cobbles		0	
								Same as 2'-5'		0	
										0	
			2		30%					0	
										0	wet
10										0	
						Black		FILL-c-vc sand, possible RCA, brick		0	
								with trace wood, no odor		0	
			3		38%					0	
										0	
15										0	
								FILL- clay and f-m sand w/ brick,			
			4		13%					0.5	
20											
								FILL- vf sand and clay, ft petroleum			
								odor		0.8	
			5		32%						
										1.8	
25											
					16%	Black		FILL- brick w/ some f-c sand, mod.			
			6			w/ red		napth. odor		84.7	
								Boring ended in refusal at 27' on			
30								concrete			
								Water appears to be perched.			

COMMENTS: Samples collected at 4'-5' and 25'-27' for VOC, SVOC, TAL metals, PCBs, Total and Free Cyanide. CAMP run during subsurface work. Geoprobe 6620DT used with 5' macrocores.

PROJECT NO. 11176231

BORING NO. FS-SB-1

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-1 (2)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	171 York St, Lumber Yard, north side
GROUNDWATER:	Not encountered	**DATE STARTED:**	4/14/11
DATE / TIME / LEVEL / TYPE		**DATE FINISHED:**	4/14/11
DRILLER:	Frank Cavella	**GEOLOGIST:**	Megan Dascoli
REVIEWED BY:	K. Connare		

	CAS.	SAMPLER	CORE	TUBE
TYPE		5' Sonic		
DIA.		4"		
WT.				
FALL				

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE: STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% / RQD%	DESCRIPTION: COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS: MOISTURE PID
								1" asphalt	FILL	dry, 0
						med. brn		FILL- sand, silt, bricks, wood		0
			1		100%	w/ red				0
										0
5										0
						dk brn		FILL- bricks, f-c sand, trace silt		0
										0
			2		20%					0
										0
10										0
								sample lost		0
										0
			3		0%					0
										0
15										0
						med. brn		FILL- f-c sand, fv-c gravel, brick		wet, 0
			4		20%			silt, trace wood, no odor		0
										0
										0
20										0
								FILL- same as above		0
										0
			5		20%			FILL- clay, f-vc gravel, no odor,		0
								trace sheen on water		0
25										0
								FILL- clay, trace wood, gravel		26.6
			6		20%			FILL-vf-m sand, mod napth. odor		140
			7					FILL- conc.,clay,mod napth. odor		241
30								Boring ended at 27.5'. Very hard drilling from 27-27.5', used rock bit for the last 0.5'.		

COMMENTS: Sonic rig used, no sample collected. Mod. MGP odor noted from 26'-28.5'. Concrete noted at 27'-27.5', assumed bottom of holder.

PROJECT NO. 11176231

BORING NO. FS-SB-1 (2)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-2
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 1
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	Zebra
BORING LOCATION:	171 York St
GROUNDWATER:	Not encountered
	Lumber Yard, middle of site

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		

DATE STARTED:	10/13/10
DATE FINISHED:	10/13/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	Moist
						m gray		0'-1' asphalt, FILL- sand & gravel	FILL	0	dry
						med brn		1'-3' FILL- sand & brick, trace metal		0	
			1		100%			glass, no odor		0	
						med brn		3'-5' FILL- brick w/ few sand, gravel			
5						w/ red		no odor		0	
						med bwn		5'-8' FILL- f-c sand w/ brick		0	
			2		32%			8'-10' FILL- brick, few sand, no odor		0	wet
10										0	
						m gray		FILL- brick, some sand, few clay		0	
			3		58%					0	
						lt gray				0	
15								FILL- vf-c sand			
								FILL- sand, brick, gravel		0.9	
								15'-17' no odor			
			4		48%			17'-19' strong napth. odor		29.8	
										201	
20											
								Refusal on concrete at 19'.			
								Strong napth. odor 17'-19'			
								Soil samples collected at 3'-5' and			
25								17'-19'. Water samples collected			
								from temporary tubing with check			
								valve.			
								Water may be perch layer.			
								CAMP run during subsurface work			
30											

COMMENTS: Soil samples collected at 3'-5' and 17'-19' for VOC, SVOC, TAL metals, PCBs, Total and Free Cyanide. Water sample collected from a temporary screen at 15'-19' for VOC, SVOC, TAL metals, and Total cyanide. Geoprobe 6620DT used with 5' macrocores.

PROJECT NO.	11176231
BORING NO.	FS-SB-2

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-2 (2)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	171 York St, Lumber Yard, middle of site
GROUNDWATER:	Not encountered	**DATE STARTED:**	4/14/11
DATE FINISHED:	4/14/11	**DRILLER:**	Frank Cavella
GEOLOGIST:	Megan Dascoli	**REVIEWED BY:**	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		5' Sonic		
				DIA.		4"		
				WT.				
				FALL				
				*** POCKET PENETROMETER READING**				

DEPTH FEET	STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS MOISTURE PID
			1		100%	med. brn w/ red		1" asphalt	FILL	dry, 0
								FILL- sand, brick, cobbles,		0
								gravel, trace wood		0
										0
5										0
			2		20%			FILL- bricks, cobbles, few sand		0
										0
								8'- cobble		0
										0
10										0
			3		27%	med. brn		FILL- sand, gravel, cobbles		wet, 0
								some brick, faint napth. odor,		0
								trace sheen on water		0
										0
15										0
			4		37%			FILL- brick, sand, silt, gravel,		3.4
								few silt, sand, faint napth. odor		10.3
								trace sheen on water		
								18'-18.5' w/ trace concrete		82
20										
								Boring ended at 18.5', very		
								hard drilling 18'-18.5', used		
								rock bit for the last 0.5'.		
25										
30										

COMMENTS: Sonic rig used, no sample collected. Faint MGP odor noted from 15'-18.5'. Concrete noted at 18'-18.5', assumed bottom of holder.

PROJECT NO. 11176231

BORING NO. FS-SB-2 (2)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-3 (1st try)
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 1
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	Zebra
BORING LOCATION:	218 Front Street
GROUNDWATER:	Not encountered
	North room in basement

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		

DATE STARTED:	10/14/10
DATE FINISHED:	10/14/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
						dk		6.5" concrete	FILL	0	dry
			1		100%	brown		6.5"-23" FILL- trace silt, f-m sand &		23	
								few f-c gravel, mod. fuel oil odor		38	
								23"- cobble			
5								Refusal on a cobble			
10											
15											
20											
25											
30											

COMMENTS: Hand cleared to 23", refusal on cobble. Sampled 1'-2' for VOC, SVOC, TAL metals, total and free cyanide, and PCBs. CAMP run during subsurface work

PROJECT NO.	11176231
BORING NO.	FS-SB-3 (1st try)

URS Corporation

TEST BORING LOG

BORING NO:										FS-SB-3 (2nd try)
PROJECT:	Front Street Former Gas Holder Site Characterization								**SHEET:**	1 of 1
CLIENT:	National Grid								**JOB NO.:**	11176231
BORING CONTRACTOR:	Zebra								**BORING LOCATION:**	218 Front Street
GROUNDWATER:	Not encountered			**CAS.**	**SAMPLER**	**CORE**	**TUBE**			North room in basement
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore			**DATE STARTED:**	10/14/10
				DIA.		2"			**DATE FINISHED:**	10/14/10
				WT.		--			**DRILLER:**	Charles Green
				FALL		--			**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

	SAMPLE					DESCRIPTION					
DEPTH FEET	**STRATA**	**Color Code**	**"S" NO.**	**BLOWS PER 6"**	**REC% RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
								5" concrete		0	dry
						dk		5"-5' FILL- trace silt, sand & few		0	
			1		100%	brown		f-c gravel, no odor, w/ bricks, wood,		0	
										0	
5										0	
			2		10%			FILL- same as above		0	
								Refusal at 5.5' on possible concrete slab			
10											
15											
20											
25											
30											

COMMENTS:	Hand cleared to 5'. Refusal at 5.5'. Geoprobe 5400.	**PROJECT NO.**	11176231
	Sample collected from FS-SB-3 1st try for this location.	**BORING NO.**	FS-SB-3 (2nd try)
	CAMP run during subsurface work		

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-3 (2)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	ADT	**BORING LOCATION:**	218 Front Steet
GROUNDWATER:	Not encountered		North room in basement

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		Macrocore			**DATE STARTED:**	4/11/11
				DIA.		2"			**DATE FINISHED:**	4/11/11
				WT.					**DRILLER:**	Shawn Miller
				FALL					**GEOLOGIST:**	Megan Dascoli
				* POCKET PENETROMETER READING					**REVIEWED BY:**	K. Connare

DEPTH FEET	STRATA SYMBOL	Color Code	"N" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
								Concrete, drilled at previous	FILL	dry
								location w/ refusal at 5.5'.		0
										0
					0%					0
5								Air hammering 4.75' to 9'		0
								Cobbles and bricks		0
										0
										0
										0
10			1		6"	red brn		9'-9.5'-FILL-vf-m sand,silt,		0.3
								bricks, wood, slight naph. odor		5
			2		3"	black		11'-13'- FILL- vf-m sand, silt,		7.3
								trace brick, slight napth. odor		0
			3		4"			13'-13.5'- 2" same as above		5.5
15						red brn		2" FILL- sand,silt, trace brick		5
								air hammering 13.5'-17'		0
										0
			4		0"			17-17.25' no recovery		0
20								Boring ended at 17.25'. Bricks		
								and other material falling in		
								over air hammer and sampler;		
								which were getting stuck in ground.		
25										
30										

COMMENTS: Geoprobe 420M used. Boring location advanced in same location of previous refusal at 5.5' in October 2011. Sample collected from 11'-13.5' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

PROJECT NO.	11176231
BORING NO.	FS-SB-3 (2)

URS Corporation

TEST BORING LOG

PROJECT:	Front Street Former Gas Holder Site Characterization								**BORING NO:**	FS-SB-4 (1st try)	
CLIENT:	National Grid								**SHEET:**	1 of 1	
BORING CONTRACTOR:	Zebra								**JOB NO.:**	11176231	
GROUNDWATER:	Not encountered				**CAS.**	**SAMPLER**	**CORE**	**TUBE**	**BORING LOCATION:**	206 Front Street	
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore				Middle room in basement	
				DIA.		2"			**DATE STARTED:**	10/14/10	
				WT.		--			**DATE FINISHED:**	10/14/10	
				FALL		--			**DRILLER:**	Charles Green	
				*** POCKET PENETROMETER READING**					**GEOLOGIST:**	Megan Dascoli	
									REVIEWED BY:	K. Connare	

	SAMPLE						DESCRIPTION					
DEPTH FEET	**STRATA**	**Color Code**	**"S" NO.**	**BLOWS PER 6"**	**REC% RQD%**	**COLOR**	**CONSIST HARD**	**MATERIAL DESCRIPTION**	**USCS**	**REMARKS PID**	**Moist**
			1		60%	dk brown		4" concrete 4"-3' FILL- vf-m sand w/ some vf-vc gravel, trace glass, bricks	FILL	0 0.2	dry
5								Refusal on bricks at 3'.			
10											
15											
20											
25											
30											

COMMENTS:	Hand cleared until refusal. Sample collected from 1'-3' for VOC,	**PROJECT NO.**	11176231
	SVOC, TAL metals, PCBs, and total and free cyanide.	**BORING NO.**	FS-SB-4 (1st try)
	CAMP run during subsurface work		

URS Corporation

TEST BORING LOG

BORING NO:										FS-SB-4 (2nd try)
PROJECT:				Front Street Former Gas Holder Site Characterization					**SHEET:**	1 of 1
CLIENT:				National Grid					**JOB NO.:**	11176231
BORING CONTRACTOR:				Zebra					**BORING LOCATION:**	206 Front Streer
GROUNDWATER:	Not encountered				**CAS.**	**SAMPLER**	**CORE**	**TUBE**		Middle room in basement
DATE	**TIME**	**LEVEL**	**TYPE**	**TYPE**		Macrocore			**DATE STARTED:**	10/14/10
				DIA.		2"			**DATE FINISHED:**	10/14/10
				WT.		--			**DRILLER:**	Charles Green
				FALL		--			**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

	SAMPLE						DESCRIPTION					
DEPTH			**"S"**	**BLOWS**	**REC%**			**CONSIST**	**MATERIAL**		**REMARKS**	
FEET	**STRATA**	**Color Code**	**NO.**	**PER 6"**	**RQD%**	**COLOR**		**HARD**	**DESCRIPTION**	**USCS**	**PID**	**Moist**
									4" concrete		0	dry
					70%	dk			4"-3.5' FILL- sand, bricks, gravel		0	
			1			brown					0	
5									Refusal at 3.5' on bricks.			
10												
15												
20												
25												
30												

COMMENTS:	Hand cleared until refusal. Sample collected from FS-SB-4 1st try.	**PROJECT NO.**	11176231
	CAMP run during subsurface work	**BORING NO.**	FS-SB-4 (2nd try)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-4 (2)
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 1
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	ADT
BORING LOCATION:	218 Front Street
GROUNDWATER:	Not encountered
	Middle room in basement

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		Macrocore			**DATE STARTED:**	4/12/11
				DIA.		2"			**DATE FINISHED:**	4/12/11
				WT.					**DRILLER:**	Jamie
				FALL					**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA SYMBOL	Color Code	"N" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
						white		7" concrete w/ 1" abandoned		dry
								pipes embedded in concrete	FILL	0
						dk brown		7"-1.5' FILL- f-m sand, silt, few		0
								f-m gravel, trace cinder block		0
5						m brown		1.5'-2' Concrete boulders		0
								w/ sand and silt		0
						m brown		2'-3' FILL- sand, silt, brick		0
						red		3'-4.5' brick floor, then concrete,		0
						white		rock, or boulder		0
10								Boring abandoned at 52"		
15										
20										
25										
30										

COMMENTS: New location was cleared by hand until brick floor at 3' bgs. Geoprobe 420M used with air hammer from 3'-4.5'. Two previous borings hit refusal at 3' in this area in October 2011.

PROJECT NO.	11176231
BORING NO.	FS-SB-4 (2)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-5 (1st try)
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 1
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	Zebra
BORING LOCATION:	Front St. sidewalk
GROUNDWATER:	Not encountered
	east of #218
DATE STARTED:	10/15/10
DATE FINISHED:	10/15/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	Color Code	SAMPLE "S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
								concrete	FILL	0	Dry
						lt brown		FILL- vf-f sand, few c-vc gravel,		0	
			1		100%			trace cobbles at 2'. No odor		0	
										0	
5										0	
						med brn		5'-6.5' FILL- vf-f sand, few silt/gravel		0.1	
								6.5'-9.5' FILL- vf-f sand & silt, few m		0.1	
			2		68%			gravel		0.1	
										0.1	
10								9.5'-10' FILL-bricks, sand, few gravel		0.1	
			3		40%	red		vf-f SAND, few silt, trace f. ang.	SP	0.1	
						brown		gravel		0.1	
								Refusal at 12' on cobble or boulder			
15											
20											
25											
30											

COMMENTS: Handcleared to 5'. Geoprobe 6620DT used with 5' macrocores.

Refusal at 12' on a boulder/cobble. Sample collected at 4'-5' for VOC, SVOC, TAL metals, PCBs, total & free cyanide (Duplicate also collected, not analyzed as per URS). CAMP running during subsurface work.

PROJECT NO.	11176231
BORING NO.	FS-SB-5 (1st try)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-5 (2nd try)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Zebra	**BORING LOCATION:**	Front St. sidewalk
GROUNDWATER:	Not encountered		east of #218

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		

DATE STARTED:	10/15/10
DATE FINISHED:	10/15/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

*** POCKET PENETROMETER READING**

DEPTH FEET	SAMPLE STRATA	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
						med		concrete	FILL	0	Moist
						brown		FILL- vf-f sand, few c gravel,		0	
			1		100%					0	
										0	
5								5' cobble		0	
								5'-9' FILL- vf-f sand, trace brick at 9'		0.1	Dry
										0	
			2		70%					0	
						med red				0	
10						brown		9'-10' FILL- vf-f sand w/ trace gravel		0	
								10'-15' vf-f SAND w/ few cobbles	SP	0	
								& f-m gravel, no odor		0	
			3		62%					0	
										0	
15										0	
								vf-f SAND, some clay, few cobbles		0	
								& few gravel. Very dense and		0	
			4		88%			compact sediment.		0	
										0	
20										0	
								Same as above.		0	
										0	
			5		100%					0	
										0	
25								Granite cobble		0	
								Location abandoned after sample			
								20'- 25' is retrieved.			
								See comments.			
30											

COMMENTS: Handcleared to 5'. Geoprobe 6620DT used with 5' macrocores.
Sample collected at 23'-25' not analyzed as per URS. CAMP running during sub-surface work. Difficulty removing macrocore from depth of 25'. Drillers fear sidewalk collapse. Location abandoned after 25'.

PROJECT NO.	11176231
BORING NO.	FS-SB-5 (2nd try)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-5/MW-1		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	Front St
GROUNDWATER:	~30' bgs		east of #218

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		5' Sonic			**DATE STARTED:**	5/3/11
				DIA.		4"			**DATE FINISHED:**	5/4/11
				WT.					**DRILLER:**	Frank Cavella
				FALL					**GEOLOGIST:**	David Swain
				* POCKET PENETROMETER READING					**REVIEWED BY:**	K. Connare

DEPTH FEET	STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS MOISTURE PID
								4" concrete		
								FILL- vf-m sand, silt, w/ some vf-c gravel, trace cobbles, #2 sand from previous drilling		
5										
								See previous boring log Oct, '10 for 0'-30'.		
10										
15										
20										
			1		100%	Red brn		F-C SAND, some gravel and cobbles	SP	Dry 0
25										0
			2					Gravel and cobbles, little m sand	GP	
30										6.0
			3		100%	Red brn		Coarsse GRAVEL and COBBLES, little sand, no odors		Wet 0
										0

COMMENTS: Sonic rig by Boart Longyear used. Sample collected from 36'-38' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

PROJECT NO. 11176231

BORING NO. FS-SB-5/MW-1

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-5/MW-1		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	2 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	Front Street
GROUNDWATER:	~38' bgs		east of #218

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE	
				TYPE		5' Sonic			**DATE STARTED:** 5/3/11
				DIA.		4"			**DATE FINISHED:** 5/4/11
				WT.					**DRILLER:** Frank Cavella
				FALL					**GEOLOGIST:** David Swain
				*** POCKET PENETROMETER READING**					**REVIEWED BY:** K. Connare

DEPTH FEET	SAMPLE STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	uscs	MOISTURE PID
						Red brn		Coarse GRAVEL and COBBLES	GP	Wet
			4		100%					0
40										0
						Red brn			GP	
			5		100%					
45								SILT with v fine sand and few cobbles		
						Red brn			GP	
			6		100%			GRAVEL, some coarse sand		0
50										0
								Boring ended at 50'.		
								Monitoring well installed to 50'.		
55										
60										
65										

COMMENTS:

PROJECT NO.	11176231
BORING NO.	FS-SB-5/MW-1

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-6 (1st try)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Zebra	**BORING LOCATION:**	York St. sidewalk
GROUNDWATER:	Not encountered		east of #171
DATE STARTED:	10/15/10		
DATE FINISHED:	10/15/10		
DRILLER:	Charles Green		
GEOLOGIST:	Megan Dascoli		
REVIEWED BY:	K. Connare		

DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE
				DIA.		2"		
				WT.		--		
				FALL		--		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	Color Code	SAMPLE "S" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
								3" Concrete	FILL	0	
						dk brown		3"-5' FILL- f-m sand w/ few gravel,		0	dry
			1		100%			no odor		0	
										0	
5										0	
								5'-6' same as above		0.1	
						gray		6'-9.5' vf-f SAND, two 2"-3" clay	SP	0.1	
			2		70%	brown		layers noted		0	
										0	
10						red brn		9.5'-10' CLAY & vf-f SAND layers		0	
								10'-12.5' vf-f SAND w/ some clay		0.1	
								layers		0.1	
			3		58%			12.5'-15' vf-m SAND w/ few ang.		0.1	
								gravel, 2" clay layer		0.1	
15										0.1	
			4		10%			15.5' cobble		0.1	
								Refusal at 15.5' on boulder or			
								cobbles			
20											
25											
30											

COMMENTS: 0'-5' handcleared. Geoprobe 6620 DT used with 5' macrocores.
CAMP run during subsurface work.

PROJECT NO. 11176231
BORING NO. FS-SB-6 (1st try)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-6 (2nd try)
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 1
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	Zebra
BORING LOCATION:	York St. sidewalk
GROUNDWATER:	Not encountered
	east of #171. 2' west of 1st try
DATE STARTED:	10/15/10
DATE FINISHED:	10/15/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		
				* POCKET PENETROMETER READING				

DEPTH FEET	STRATA	Color Code	"S" NO.	BLOWS PER 6"		REC% RQD%	COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
									3" Concrete	FILL	0.1	dry
							black		3"-5" FILL-trace asphalt, sand, gravel		0.1	
			1			100%	m brown		5"-5' FILL- trace brick, vf-f sand		0.1	moist
									no odor		0.1	
5											0.1	
			2			55%			5'-6' same as above		0.1	dry
							gray		6'-9.5' vf-f SAND, two 2"-3" clay	SP	0.1	
							brown		layers noted		0.1	
											0.1	
10							red brn		9.5'-10' CLAY & vf-f SAND layers		0.1	
									10'-12.5' vf-f SAND w/ some clay		0.1	
									layers		0.1	
			3			60%			12.5'-15' vf-m SAND w/ few ang.		0.1	
									gravel, 2" clay layer		0.1	
15											0	
									15'-18' vf-m SAND w/ some vc		0	
									gravel & cobbles, some clay		0	
			4			50%					0	
									18'-20' f-c SAND		0	
20											0	
									vf-c SAND, no odor		0.3	
			5			53%					0.4	
25											0.3	
									same as above		0.1	
											0.1	
			6			53%			w/ some cobbles and m-vc gravel		0.1	
											0	
30												
						30%			vf-f SAND w/ cobbles & m-c gravel			
			7						Refusal at 31.5' on cobble/boulder			

COMMENTS: Geoprobe 6620DT used with 5' macrocores. Refusal at 31.5'.
Sampled 3'-5' and 29.5'-31.5' for VOC, SVOC, TAL metals, PCBs, total and free cyanide. CAMP run during subsurface work.

PROJECT NO. 11176231
BORING NO. FS-SB-6 (2nd try)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-6/MW-2
PROJECT:	Front Street Former Gas Holder Site Characterization
SHEET:	1 of 2
CLIENT:	National Grid
JOB NO.:	11176231
BORING CONTRACTOR:	Boart Longyear
BORING LOCATION:	York Street
GROUNDWATER:	~38' bgs
	east of #171

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE	
				TYPE		5' Sonic			**DATE STARTED:** 4/15/11
				DIA.		4"			**DATE FINISHED:** 4/20/11
				WT.					**DRILLER:** Frank Cavella
				FALL					**GEOLOGIST:** Megan Dascoli
				* POCKET PENETROMETER READING					**REVIEWED BY:** K. Connare

DEPTH FEET	STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS MOISTURE PID
						med brn		4" concrete FILL- vf-m sand, silt, w/ some vf-c gravel, trace cobbles, #2 sand from previous drilling		
5								See previous boring log Oct, '10 for 0'-30'.		
10										
15										
20										
25										
30										
			1		50%	med brn		COBBLES w/few vf-m sand & silt, few vf-vc gravel	SP	0.1
										0.1
								Cobbles at 35 ft		0.1

COMMENTS: Sonic rig by Boart Longyear used. Sample collected from 36'-38' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

PROJECT NO. 11176231

BORING NO. FS-SB-6/MW-2

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-6/MW-2		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	2 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	York Street
GROUNDWATER:	~38' bgs		east of #171

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		5' Sonic			**DATE STARTED:**	4/15/11
				DIA.		4"			**DATE FINISHED:**	4/21/11
				WT.					**DRILLER:**	Frank Cavella
				FALL					**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE: STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION: COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
						med brn w/ red		35'-38' vf-m SAND w/ some silt, few cobbles, vf-vc gravel	SP	0.1
			2		60%					0.1
40								38'-40' GRAVEL & COBBLES some vf-m sand, silt		wet 0.1
			3		0%			BOULDER at 40', no sample collected		
45										
			4		42%	med brn w/ red		SILT w/ vf sand and cobbles		0.1
50										0.1
								Boring ended at 50'. Monitoring well installed to 50'.		
55										
60										
65										

COMMENTS:

PROJECT NO.	11176231
BORING NO.	FS-SB-6/MW-2

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-7 (#1)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Zebra	**BORING LOCATION:**	Front Street
GROUNDWATER:	Not encountered		west of #206

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		Macrocore		
				DIA.		2"		
				WT.		--		
				FALL		--		
				*** POCKET PENETROMETER READING**				

DATE STARTED:	10/18/10
DATE FINISHED:	10/18/10
DRILLER:	Charles Green
GEOLOGIST:	Megan Dascoli
REVIEWED BY:	K. Connare

DEPTH FEET	STRATA	SAMPLE Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
								5" concrete	FILL	0.1	dry
						m brown		0'-1' FILL- concrete gravel & cobbles		0.2	
			1		100%			few sand, no odor		0.1	
								1'-5' FILL- vf-m sand, some m-vc		0.1	
5								gravel, few cobbles, bricks		0.1	
								FILL- vf-c sand, some cobbles, bricks		0.1	
								and gravel		0.2	
			2		72%					0.3	
										0.2	
10										0.1	
								FILL-vf-f sand w/ some vf-m gravel		0.1	
								and silt, trace brick at 14'		0.2	
			3		63%					0.1	
										0.1	
15										0	
						red brown		vf-f SAND, some silt, some f gravel	SP	0.1	
										0.1	
			4		77%			17.5' w/ cobble		0.1	
										0.1	
20										0.1	
								After driller retrieves 15'-20' sample,			
								Zebra attempts to retrieve 20'-25'			
								but drill gets stopped at 13' on the			
								way down.			
25											
								Location #2 is drilled to 20' adjacent			
								to location #1.			
30											

COMMENTS: Geoprobe 6620DT used with 5' macrocores.
Sampled 4'-5' for VOC, SVOC, TAL metals, PCBs, total and free cyanide.
CAMP run during subsurface work.

PROJECT NO.	11176231
BORING NO.	FS-SB-7 (#1)

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-7 (#2)		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 1
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Zebra	**BORING LOCATION:**	Front Street
GROUNDWATER:	Not encountered		west of #206

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		Macrocore			**DATE STARTED:**	10/18/10
				DIA.		2"			**DATE FINISHED:**	10/18/10
				WT.		--			**DRILLER:**	Charles Green
				FALL		--			**GEOLOGIST:**	Megan Dascoli
				* POCKET PENETROMETER READING					**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSIST HARD	MATERIAL DESCRIPTION	USCS	REMARKS PID	REMARKS Moist
5								This boring was drilling adjacent to FS-SB-7 (#1). Sampling began at 20' where 1st location ended.			
10											
15											
20											
			5		75%	red brown		vf-vc SAND w/ some vf-vc gravel no odor	SP	0.1 0.1 0.1	dry
25								Refusal at 23' on boulder.			
30											

COMMENTS:	First 5' hand cleared. Geoprobe 6620DT used with 5' macrocores.	**PROJECT NO.** 11176231
		BORING NO. FS-SB-7 (#2)
	CAMP run during subsurface work.	

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-7/MW-3		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	Front Street
GROUNDWATER:	~38' bgs		west of #206

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		5' Sonic		
				DIA.		4"		
				WT.				
				FALL				
				*** POCKET PENETROMETER READING**				

DATE STARTED:	4/20/11	
DATE FINISHED:	4/21/11	
DRILLER:	Frank Cavella	
GEOLOGIST:	Megan Dascoli	
REVIEWED BY:	K. Connare	

SAMPLE						DESCRIPTION				REMARKS
DEPTH FEET	STRATA SYMBOL	Color Code	"N" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
								Concrete		
								See previous boring log Oct, '10 for 0'-20'.		
5								5'-10' very hard drilling		
					0%					
10								8" cobble		
15									SP	
20										
			1		53%	med brn w/ red		20'-25' COBBLES w/ vf-m SAND, few silt, few vf-vc gravel		dry, 0
25										0
			2		75%	med brn		25'-27' vf-m GRAVEL, w/ few vf-m sand, 6" boulder at 27'		0
					42%	med gray		27'-27.5' COBBLE 28'-30' vf-vc GRAVEL & COBBLES w/ boulders		0
30										0
			3		78%	med brn		30'-35'-vf-m SAND w/ few silt & few cobbles at 33', few c gravel	SP	0

COMMENTS: Sonic rig by Boart Longyear used. Sample collected from 33'-35' and DUP-1 for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

PROJECT NO.	11176231
BORING NO.	FS-SB-7/MW-3

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-7/MW-3		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	2 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	Front Street
GROUNDWATER:	~38' bgs		west of #206

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		5' Sonic			**DATE STARTED:**	4/20/11
				DIA.		4"			**DATE FINISHED:**	4/21/11
				WT.					**DRILLER:**	Frank Cavella
				FALL					**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

DEPTH FEET	STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
						med brn		35'-37' SILT & COBBLES, few		
			4		75%	w/ red		fv-vc gravel, few m-vc sand	SP	
40								no sample collected, cobbles evident during drilling		
45					0%			no sample collected, drilling proceeded smoothly		
50										
55										
60								Boring ended at 55'. Monitoring well installed.		
65										

COMMENTS:

PROJECT NO.	11176231
BORING NO.	FS-SB-7/MW-3

URS Corporation

TEST BORING LOG

BORING NO:	FS-SB-8/MW-4		
PROJECT:	Front Street Former Gas Holder Site Characterization	**SHEET:**	1 of 2
CLIENT:	National Grid	**JOB NO.:**	11176231
BORING CONTRACTOR:	Boart Longyear	**BORING LOCATION:**	York Street
GROUNDWATER:	~38' bgs		west of #171
DATE STARTED:			4/15/11
DATE FINISHED:			4/18/11
DRILLER:			Frank Cavella
GEOLOGIST:			Megan Dascoli
REVIEWED BY:			K. Connare

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE		5' Sonic		
				DIA.		4"		
				WT.				
				FALL				
				* POCKET PENETROMETER READING				

DEPTH FEET	SAMPLE STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS MOISTURE PID
								4" concrete		dry
						med brn		vf-m sand, vf-vc gravel, silt	Fill	0
			1		100%					0
										0
5										0
								5'-7' vf-m SAND & SILT, few		0
								vf-vc gravel		0
			2		47%	med gray		7'-10' vf- SAND & SILT		0
										0
10										0
						med brn				0
										0
			3		88%					0
								12'-14' COBBLE, gravel	SP	0
15								14'-15' vf-m sand and silt		0
						med gray		15'-18' SILT, vf sand, faint		0
								anaerobic odor		0
			4		25%			18'-20' same as above, no odor		0
						med brn				0
20										0
								vf-c SAND, few vf-c gravel,		0
								some silt		0
			5		92%					0
										0
25										0
								same as above		0
										0
			6		83%			at 23' and 25' COBBLES		0
										0
30							very dense			0
								30'-33' f-m SAND w/ some		moist, 0
								vf-c gravel		0
			7		53%					0
								33'-35' SILT w/ vf-vc gravel,		dry, 0
								few sand, cobbles		0

COMMENTS: Sonic rig by Boart Longyear used. Sample collected from 4'-5' and 31'-33' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

PROJECT NO. 11176231

BORING NO. FS-SB-8/MW-4

URS Corporation

TEST BORING LOG

PROJECT:	Front Street Former Gas Holder Site Characterization	**BORING NO:**	FS-SB-8/MW-4
CLIENT:	National Grid	**SHEET:**	2 of 2
BORING CONTRACTOR:	Boart Longyear	**JOB NO.:**	11176231
GROUNDWATER:	~38' bgs	**BORING LOCATION:**	York Street west of #171

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE		
				TYPE		5' Sonic			**DATE STARTED:**	4/15/11
				DIA.		4"			**DATE FINISHED:**	4/15/11
				WT.					**DRILLER:**	Frank Cavella
				FALL					**GEOLOGIST:**	Megan Dascoli
				*** POCKET PENETROMETER READING**					**REVIEWED BY:**	K. Connare

DEPTH FEET	SAMPLE STRATA SYMBOL	Color Code	"S" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	MOISTURE PID
									SP	0
										0
					0%					0
										0
40										0
						med. brn		f-c SAND & vf-vc GRAVEL,		dry, 0
						w/ red		w/ few cobbles, no odor		0
			8		73%					0
										0
45										0
								Boring ended at 45'.		
								Monitoring well installed to 45'.		
50										
55										
60										
65										

COMMENTS:

PROJECT NO.	11176231
BORING NO.	FS-SB-8/MW-4

DRILLING SUMMARY

Geologist:
David Swain

Drilling Company:
Boart Longyear

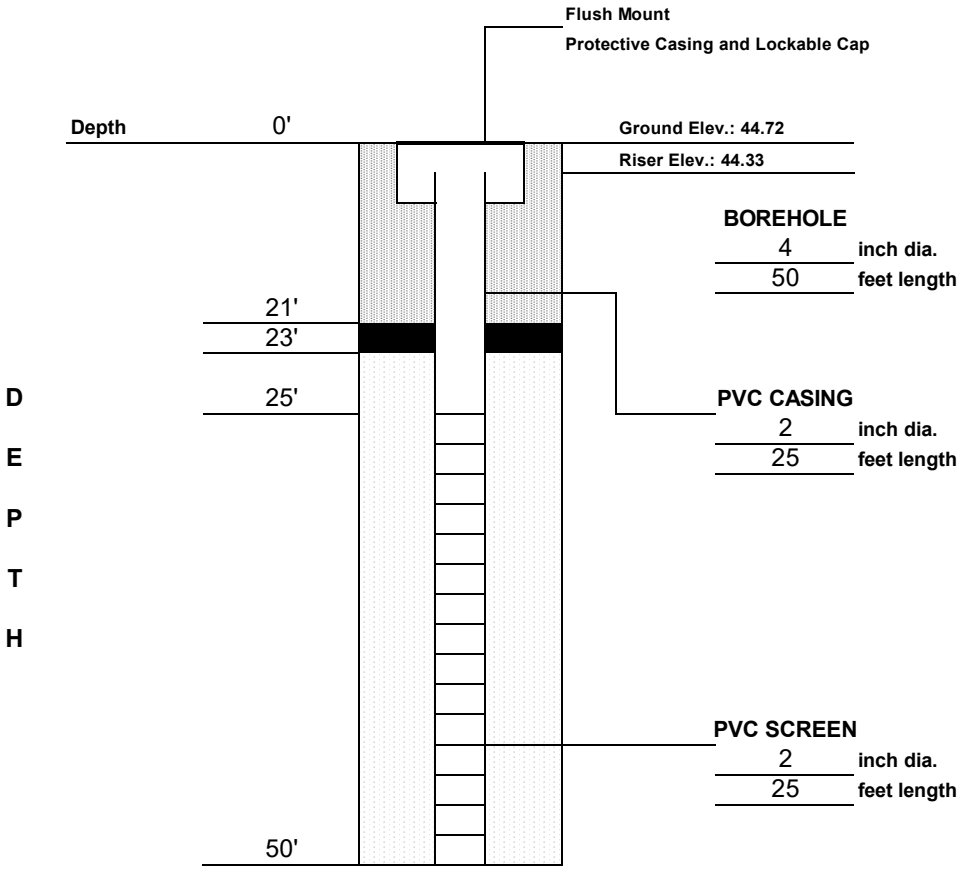
Driller:
Frank Cavella

Rig Make/Model:
Sonic rig, Boart Longyear

Date:
5/4/2011

GEOLOGIC LOG

Depth(ft.)	Description
	FS-SB-5
0'	Concrete
0'-5'	FILL
5'-50'	Gravel and Cobbles some course sands
50'	Boring ended



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 2" PVC	**Type:** #2 Sand **Setting:** 23'-50'
Monitor: 2" PVC	**Slot Size:** .020"	***SEAL MATERIAL*** **Type:** Bentonite **Setting:** 21'-23'

COMMENTS:
Sonic rig by Boart Longyear used. Sample collected from 28'-30' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

LEGEND
- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Location: York Street, Brooklyn**	**Project No.: 11176321**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well/Boring Number: MW-1/FS-SB-5**

DRILLING SUMMARY

Geologist:
Megan Dascoli

Drilling Company:
Boart Longyear

Driller:
Frank Cavella

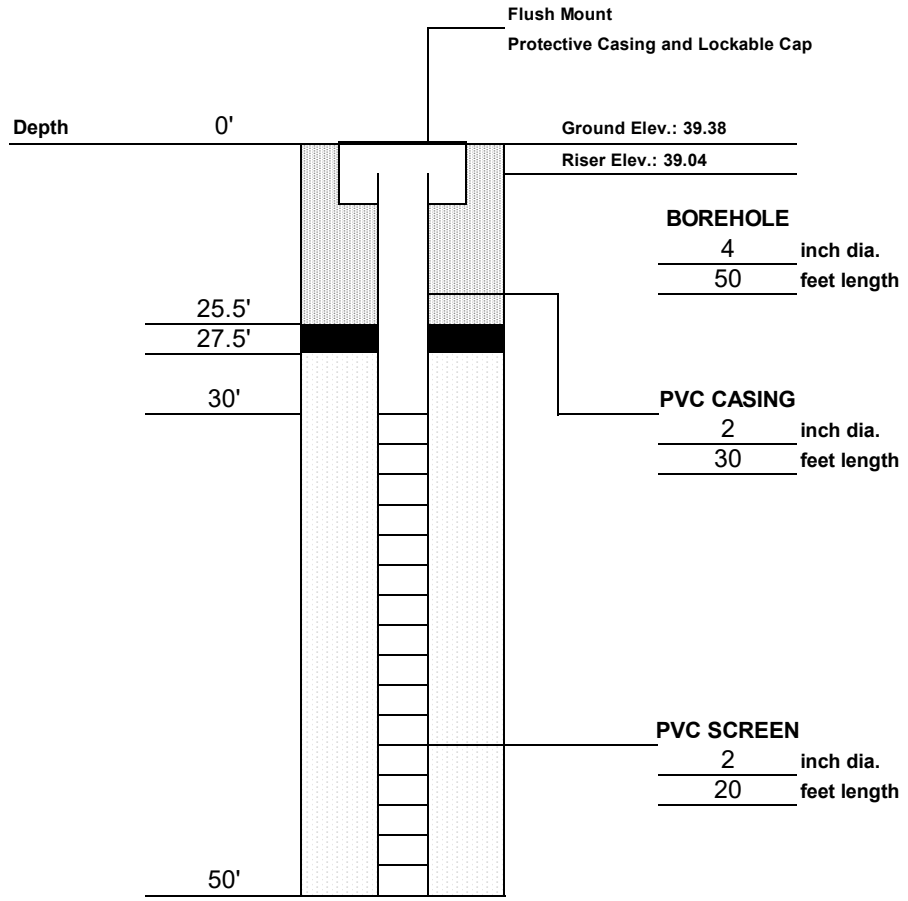
Rig Make/Model:
Sonic rig, Boart Longyear

Date:
4/20/2011

GEOLOGIC LOG

Depth(ft.)	Description
	FS-SB-6
0'	Concrete
0'-5'	FILL
5'-45'	COBBLES, sand, gravel
45'-50'	SILT w/ cobbles
	Boring ended

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 2" PVC	**Type:** #2 Sand **Setting:** 27.5'-50'
Monitor: 2" PVC	**Slot Size:** .020"	***SEAL MATERIAL*** **Type:** Bentonite **Setting:** 25.5'-27.5'

COMMENTS:
Sonic rig by Boart Longyear used. Sample collected from 36'-38' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

LEGEND
- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Location: York Street, Brooklyn**	**Project No.: 11176321**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well/Boring Number: MW-2/FS-SB-6**

DRILLING SUMMARY

Geologist:
Megan Dascoli

Drilling Company:
Boart Longyear

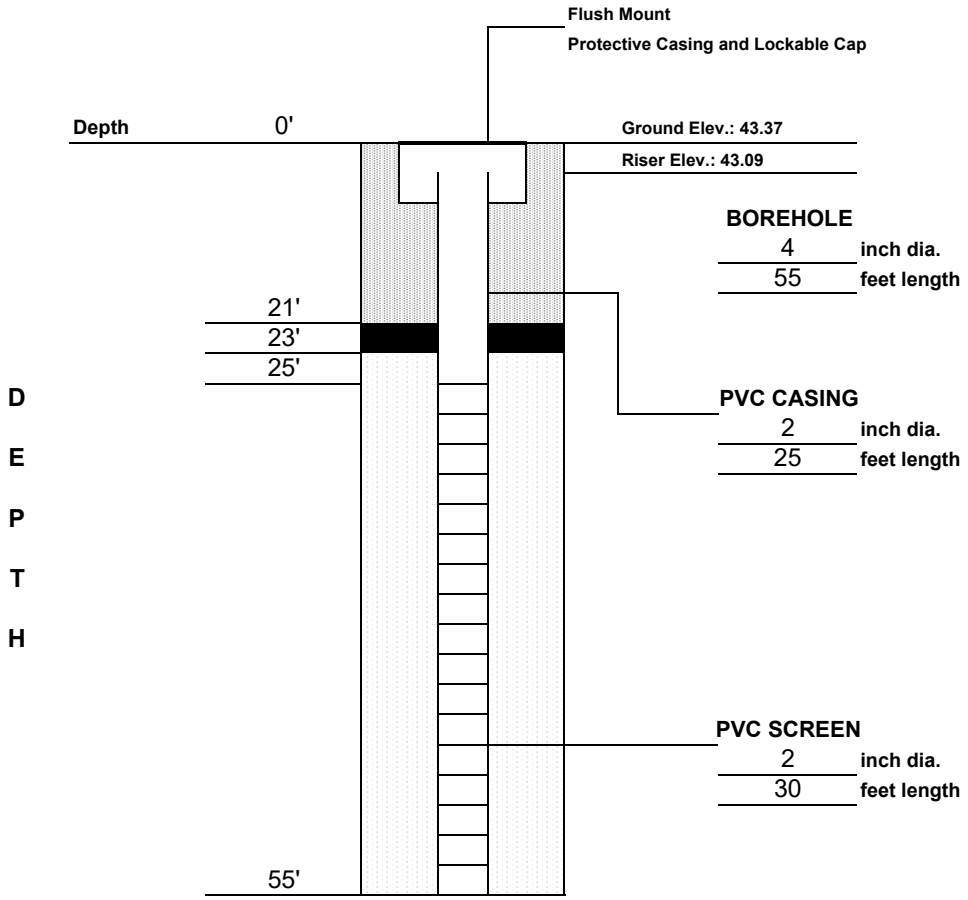
Driller:
Frank Cavella

Rig Make/Model:
Sonic rig, Boart Longyear

Date:
4/21/2011

GEOLOGIC LOG

Depth(ft.)	Description
	FS-SB-7
0'	Concrete
0'-14'	FILL- sand w/ trace brick
14'-25'	SAND and SILT, with cobbles
25'-45'	Boulders, gravel, cobbles w/ sand and silt
45'-55'	SAND and SILT
55'	Boring ended



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 2" PVC	**Type:** #2 Sand **Setting:** 23'-55'
Monitor: 2" PVC	**Slot Size:** .020"	***SEAL MATERIAL*** **Type:** Bentonite **Setting:** 21'-23'

COMMENTS:
Sonic rig by Boart Longyear used. Sample collected from 33'-35' and DUP-1 for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

LEGEND
- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Location: Front Street, Brooklyn**	**Project No.: 11176321**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well/Boring Number: MW-3/FS-SB-7**

DRILLING SUMMARY

Geologist:
Megan Dascoli

Drilling Company:
Boart Longyear

Driller:
Frank Cavella

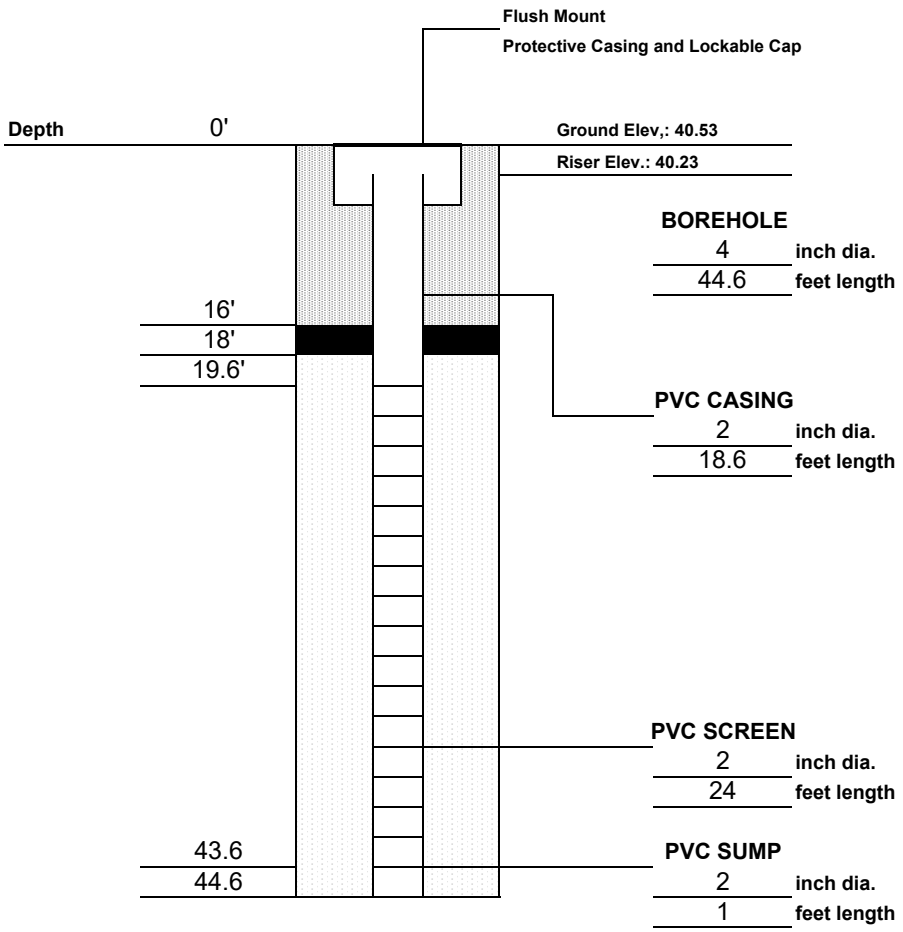
Rig Make/Model:
Sonic rig, Boart Longyear

Date:
4/18/2011

GEOLOGIC LOG

Depth(ft.)	Description
	FS-SB-8
0'	Concrete
0'-14'	SAND & SILT
12'-14'	COBBLES
14'-23'	SAND & SILT
23'-25'	w/ COBBLES
25'-40'	SAND & SILT
40'-45'	SAND & GRAVEL
	Boring ended

DEPTH



WELL DESIGN

CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 2" PVC	**Type:** #2 Sand **Setting:** 18'-19.6'
Monitor: 2" PVC	**Slot Size:** .020"	***SEAL MATERIAL*** **Type:** Bentonite **Setting:** 16'-18'

COMMENTS:
Sonic rig by Boart Longyear used. Sample collected from 4'-5' and 31'-33' for TCL/ STARS VOC and SVOC, TAL Metals, Total CN and Free CN.

LEGEND
- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client: National Grid	**Location: York Street, Brooklyn**	**Project No.: 11176321**
URS Corporation	**MONITORING WELL CONSTRUCTION DETAILS**	**Well/Boring Number:** **MW-4/FS-SB-8**

APPENDIX E

FRONT STREET HOLDER STATION

SITE AREA HISTORICAL LAND USES

NOTES:

1. THE PLYMOUTH STREET HOLDER SITE WAS LOCATED WITHIN 500 FEET OF THE FRONT STREET HOLDER SITE.
2. PREPARED BY GEI CONSULTANTS, INC. P.C.

SOURCES:

1. 2016 ESRI WORLD IMAGERY
2. NYC DEPARTMENT OF CITY PLANNING, MAPPLUTO, REV. JUNE 2015.
3. CONTAMINANT SOURCES IDENTIFIED USING SANBORN MAPS, AND AVAILABLE DIGITAL AND PHYSICAL NEW YORK PUBLIC LIBRARY ATLASES AND MAPS.

0 200 400

SCALE: 1" = 200'

LEGEND:

Former Site Boundary

Contaminant Source

J:\Projects\National_Grid\Front St\for_submittal\FrontSt_NearbyContaminantSources_.mxd

Table 1
Nearby Potential Contaminant Sources
Front Street Station Site

Source ID	Description/Title Brooklyn, New York	Source
9a	Maps of the City of Brooklyn Perris W 1855. [Plates 3, 4, & 12]	NYPL Digital Collection
9b	Map of the City of Brooklyn, Dripps M 1869.	NYPL Digital Collection
9c	Farm Line Map of the City of Brooklyn, Fulton H. 1874.	NYPL Digital Collection
9d	Atlas of the entire city of Brooklyn, Bromley, G.W. 1880 [Plate 2]	NYPL Digital Collection
9e	Detailed Estate and Old Farm Line Atlas. Hopkins 1880. [Plates A, & B vol 5]	NYPL Digital Collection
9f	Atlas of Brooklyn, E. Robinson 1886. [Plate 1]	NYPL Digital Collection
9g	Atlas 66. Vol. 2, Sanborn Map Company 1887. [Plates 34, 35, 36, & 37]	NYPL Digital Collection
9h	Atlas of the Brooklyn Borough of the City of New York, Ullitz H. 1898-99, Vol 1 [Plate 1]	NYPL Digital Collection
9i	Atlas of the Borough of Brooklyn, Hyde E.B 1903. [Plate 2]	NYPL Digital Collection
9j	Atlas 67. Vol. 2, Sanborn Map Company 1904. [Plates 7, 8, 9, 10, & 16]	NYPL Digital Collection
9k	Atlas of the Borough of Brooklyn, Bromley GW and Co. 1907-08. [Plate 1]	NYPL Digital Collection
9l	Atlas of the Borough of Brooklyn v. 1, Hyde E.B 1916. [Plate 1]	NYPL Digital Collection
9m, 9n, 9o, 9p, 9q, 9r, 9s, 9t, 9u, 9v, 9w, 9x, 9y, 9z, 9aa, 9ab, 9ac, 9ad, 9ae, 9af, 9ag, 9ah, 9ai, 9aj, 9ak, 9al, 9am, 9an, 9ao, 9ap	Sanborn Maps 1887, 1904, 1915, 1922, 1928, 1938, 1950, 1969, 1977, 1979, 1980, 1981, 1982, 1984, 1986, 1987, 1988, 1989, 1991, 1992, 1993, 1995, 1996, 2001, 2002, 2003, 2004, 2005, 2006, 2007	EDR - Certified Sanborn Map Report
9aq	Atlas of the City of Brooklyn, Bromley 1893	NYPL Physical Collection
9ar	Desk Atlas Borough of Brooklyn Vol 1, Hyde 1920	NYPL Physical Collection
9as	Desk Atlas Borough of Brooklyn Vol 1, Hyde 1929	NYPL Physical Collection
9at	Insurance Maps of Brooklyn Vol 2, Sanborn Map 1915, revised 1972	NYPL Physical Collection
9au	Google Maps (2013-2015)	Google
9av	OASIS/ACRIS	www.oasisnyc.org/map.aspx

APPENDIX F

FRONT STREET HOLDER STATION

HEALTH AND SAFETY PLAN

AECOM Imagine it. Delivered.

HEALTH AND SAFETY PLAN for the K - FRONT ST. STATION

SITE #224063

Prepared for:
National Grid
One Metrotech Center
Brooklyn, New York 11201

Prepared by:
AECOM USA, Inc.
257 West Genesee Street, Suite 400
Buffalo, New York 14202

Project Number: 60412543

Submittal Date:
November 2020

K - Front St Station

Health and Safety Plan

218 Front Street/171 York Street

Brooklyn, New York

Expiration Date: October 16, 2021

(Max. 1-Year from signature date)

Prepared for: National Grid
One MetroTech Center
Brooklyn, New York 11201

Prepared by: AECOM
257 West Genesee Street, STE 400
Buffalo, New York 14202

Prepared By:
Name Kevin Connare, PG — Signature:
Title Project Manager — Date: October 16, 2020

Area/Regional SHEM:
Name Kelly Dwyer — Signature:
Title Safety, Health and Environment Manager EBL — Date: October 16, 2020

Project Manager:
Name Kevin Connare, PG — Signature:
Title Project Manager — Date: October 16, 2020

Personnel Acknowledgement

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

Print Name	Signature	Organization	Date

HASP Summary

Note: This Summary is intended to provide key information only and cannot be substituted for reading, understanding, and complying with the full HASP. This summary may be continually updated as tasks and personnel change. Use Continuation Sheets if necessary.

Project Name:	K - Front St Station	**Project Number:**	60412543
Summary Revision Date:	October 13, 2020	**Client Name:**	National Grid

Report ALL SH&E Incidents, no matter how minor, to the Incident Hotline: 800-348-5046
Injury, Property Damage, Vehicle, Security, Regulatory Inspection, Environmental Impact, and any potentially work-related injury, discomfort/ pain, or damage.

Identify the nearest Occupational Clinic and Hospital to the site that accepts AECOM Workers Compensation Insurance (see **Attachment A** for instructions). If the nearest such clinic or hospital is an unreasonable distance from the site, identify nearer hospitals or clinics. Attach maps and directions to the clinics and hospitals in **Attachment A**.

Occupational Clinic:	Mobile Health	**Nearest Hospital:**	Brooklyn Hospital Center
Address:	50 Court Street, Brooklyn, NY 11201	**Address:**	121 Dekalb Ave, Brooklyn, NY 11201
Phone Number:	718-865-3643	**Phone Number:**	718-250-8000

Key Personnel

Project Manager (PM):	Kevin Connare	**Cell Phone:**	716-861-7661
Site Supervisor (SS)	TBD	**Cell Phone**	TBD
Safety Officer (SSO):	TBD	**Cell Phone**	TBD
AECOM SH&E Mgr.	Pete Wray	**Cell Phone:**	917-324-2554
Client PM:	Donald Campbell	**Cell Phone:**	347-452-5973

List ALL Short-Service Employees, including subcontractors (<6 Months with Company in Current Area/Job Description):
TBD

List ALL Subcontractors and their Site Safety Officers:
TBD

PM must positively verify subcontractors are approved in Subport for the work described. If there were any limitations/ conditions of approval, describe them and how they are being met.

☐ I have verified that all subcontractors are approved in Subport, and that all conditions of approval are met.

Kevin Connare		
Project Manager Name	**Project Manager Signature**	**Date**

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Figure 1 Site Location Map

Figure 2 Site Plan

Attachments

Attachment A Hospital/Clinic Maps; Incident Reporting and Response Flow Chart; National Grid Incident Reporting Requirements

Attachment B AECOM SH&E Procedures

Attachment C Stretch/Flex Manual and Poster

Attachment D Safety Data Sheets

Attachment E Site Orientation

Attachment F Risk Register/Hazard Assessment, Daily Tailgate Meeting Form and Task Hazard Assessment Forms

Attachment G Competent Person Designation Forms

Attachment H 2019-2020 Certificates of Liability Insurance for Rental Car Companies (Avis & Enterprise)

Attachment I Pandemic Procedures

Attachment J National Grid COVID-19 Health & Safety Plan

Template Revision Log

Version	Revised By	Date	Summary of Revisions
1.0	Kevin Connare	September 2017	Initial Version
1.1	Kevin Connare	November 2018	Annual revision: Updated to Template Version 1.3 and revised for consistency with HASPs for other AECOM National Grid projects
1.2	Melissa Saunders and Kevin Connare	September/October 2020	Updated with Coronavirus Pandemic Response Information and National Grid template alignment.

1. Introduction

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

This section of the HASP summarizes important AECOM SH&E Procedures that apply to all Design and Consulting Services (DCS) Americas jobs. See **Attachment B** for complete copies of applicable field SH&E Procedures. This template has been designed primarily for use in the United States; see procedure attachment S3AM-320-ATT2 for Canadian Specific Requirements on AECOM's ecosystem.

1.1 Applicable References

This Health and Safety Plan (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).
- 29 CFR 1926, Safety and Health Regulations for Construction.
- National Institute for Occupational Safety and Health/Occupational Safety and Hazards Administration/U.S. Coast Guard/U.S. Environmental Protection Agency, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.
- The requirements in this HASP also conform to AECOM's Safety for Life Program requirements as specified in the AECOM Safety, Health and Environment (SH&E) Manual.
- Former Front Street Gas Holder Station Interim Site Management Plan, AECOM, 2018
- Interim Guidance for Coronaviruses: AECOM Guidance for Coronavirus
    - Reference the flowchart in Appendix 1 of the Pandemic Procedure (SR1-003-PR2) included in **Attachment I** for information about steps to take in various situations, including potential exposure, confirmed exposure and self-quarantine

Project Assumptions

- The site is controlled by an active lumber yard and warehouse.
- No confined spaces will be entered on this project.
- No excavations will be entered.
- Work will be performed during daylight hours.
- Work shifts will be no more than 12 hours/day on-site

2. Site Information and Scope of Work

2.1 Site Description

The K - Front St Station site (the Site) is located at 218 Front Street and 171 York Street, in Brooklyn, New York (Figure 1 attached in the **Figures** section). The Site is approximately 1.13 acres in size, identified as Block 55, Lot 20, and is bordered by Front Street to the north, by Gold Street to the east, by York Street to the south, and by Bridge Street to the west (Figure 1).

The Site is fully developed. A one-story cinder block warehouse is located at 218 Front Street and an adjacent lumber yard is located at 171 York Street. The Site is located in mixed commercial/residential area in the heavily populated section of Vinegar Hill in Brooklyn, New York. The properties on the south side of Front Street, from 218 Front Street east to Gold Street and West to Bridge Street, are commercial businesses. The properties along the north side of York Street are mostly commercial businesses with apartments above. The properties on the north side of Front Street, across from 218 Front Street, and the south side of York Street across from 171 York Street, are mostly residential. Properties several blocks to the north and east are mostly industrial.

2.2 Site Background/History

In the late 1800's, two gas holders, No. 4 and No. 5, were constructed on the Site (Figure 2). The holders stored gas produced at manufactured gas plants (MGPs) operated by the Brooklyn Union Gas Company (BUG) and a predecessor. Gas storage at the Site began following the construction of the first gas holder in 1867 and discontinued prior to demolition of the holders around 1935. Demolition included removal of structures, including of the aboveground portions of the gas holders; the holder tanks and foundations were not removed. After that time, the Site was vacant, sold by BUG in 1951, and then later redeveloped. During redevelopment, the holder tanks and foundations were built over.

A Site Characterization was performed to identify environmental conditions, if any, on and immediately adjacent to the Site; to determine whether human health or the environment are being affected by the impacts, if any; and to guide any required measures to remediate the impacts, if any. The results of the SC are described in detail in the *Site Characterization for the Former Front Street Holder Station*, prepared by URS and dated July 2013, revised April 2015. The SC determined that the gas holder tanks were still present in the subsurface beneath the Site and that they had been backfilled with fill consisting of varying amounts of sand, gravel, brick, concrete, glass, metal, and wood. The presence of volatile organic compounds (VOCs) in the soil samples from borings into the gas holder, especially potential MGP indicators such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs), along with the field observations of naphthalene-like odors, suggests the presence of MGP-related impacts. However, as petroleum odors were also observed, the detected VOCs could indicate the presence of some petroleum impacts. Chlorinated VOCs were detected in one groundwater sample collected from an off-Site well. Chlorinated VOCs are not typically associated with MGP sites. A dry cleaner that was historically located upgradient of the Site may be the source of the chlorinated VOCs.

A developer is currently interested in acquiring the property and constructing a multi-story building.

2.3 Client or Third-Party Operations at Site

The Site is owned by Great Front Realty Corporation and is used as a warehouse and lumber yard.

2.4 Scope of Work

AECOM will be providing annual site inspections to asses and document Site conditions. There are no plans for Site investigation or remediation activities at this time. However, this HASP has been prepared to address provisions for potential

activities, such as subsurface work including drilling; test pit excavation; and soil, groundwater, and soil vapor intrusion sampling. This HASP will be revised, as needed, to address any site activities beyond the current scope of work.

Some Site work may be performed by a third party. In that event, AECOM may be requested to provide inspection, documentation, and sampling on behalf of National Grid.

2.5 Scope of Work Risk Assessment

- ☐ **Low Risk** *(examples: non-intrusive work, occasional exposure and/or low risk hazards)*
- ☒ **Medium Risk** *(examples: intrusive work, heavy equipment use, frequent exposure and/or moderate hazards)*
- ☐ **High Risk** *(examples: complicated scope, large/ multiple work crews, and/or constant exposure to hazards).*

The following tasks/ hazards automatically trigger high risk ranking. Check all which apply. Include hazard mitigation procedures later in the appropriate Physical, Chemical, or Environmental section of the HASP.

- ☐ Asbestos Removal / Contact
- ☐ ATV Use
- ☐ Bridge / Dam Inspections/ Snooper Truck Use
- ☐ Confined Space
- ☐ Cranes and Rigging Use
- ☐ Demolition
- ☐ Diving – Scientific or Commercial
- ☐ High Speed Traffic Exposure
- ☐ Hot Work
- ☐ Conditions Immediately Dangerous to Life or Health (IDLH)
- ☐ Laboratory Operations
- ☐ LOTO or Live Energy Source Work
- ☐ On-rail / Near Rail Work
- ☐ Ordinance, Munitions, Explosives Use
- ☐ Pile Driving
- ☐ Radiation or Radioactive Instrument Use
- ☐ Remote Location or Lone Worker
- ☐ Respirator Use (does not include dust mask)
- ☐ Scaffolding Use
- ☐ Use or Exposure to Toxic Chemicals
- ☐ Trenching / Excavation
- ☐ Tunnel / Underground Work
- ☐ UXO / MMR
- ☐ Work at Heights >4 ft.
- ☐ Work at Angle >30 deg.
- ☐ Work On / Over Water

3. AECOM Safety Health and Environment Program

3.1 AECOM Policy

AECOM Imagine it. Delivered.

Safety, Health & Environment Policy

Purpose

This policy establishes the framework to attain best-in-class Safety, Health and Environmental (SH&E) performance in the interest of benefitting AECOM's employees and stakeholders in the global marketplace.

Policy

AECOM is committed to exceptional levels of performance in safeguarding people and the environment as one of our Core Values. In recognition of the right to a safe and healthy working environment, keeping our people and stakeholders safe is our most important measure of success. We strive to be the beacon of safety excellence in the industries and global communities in which we work.

To advance our SH&E program, we are committed to:

- Zero work-related injuries to AECOM employees and stakeholders, and protection of the environment as a result of our activities.
- Providing a safe and healthy work environment, and a highly effective SH&E management system that drives continual review and improvement.
- Meeting client requirements and properly incorporating all applicable safety, health and environmental legal requirements and regulations at the local, state, provincial and national levels.
- Developing an exceptional safety culture where our people and stakeholders embrace ownership for the safety of themselves and others.
- Advancing our goals of pollution prevention, resource conservation and environmental sustainability.
- Setting and meeting aggressive SH&E performance goals and Core Value Metrics to promote continuous improvement.
- Working with employees and business partners in order to continuously improve SH&E performance.
- Recognizing and celebrating those who contribute to excellent SH&E performance.
- Striving to make AECOM the provider of choice for the safe execution of design, build, finance, operate and maintenance work globally.

The commitment to this policy by the leadership, management and employees of AECOM provides the foundation for a safe workplace, operational excellence and long-term business success.

Expectations

Safety is a core value and a key to our success. We demand continuous improvement in our journey toward a "zero" incident culture, where everyone is committed to safety, health and environmental excellence.

To that end, we demand our leaders, managers, supervisors, employees, and subcontractors:

- Demonstrate their commitment in their actions and decisions to assure that every person goes home safe every day.
- Embrace safety as a core value both on and off the job.
- Commit to his/her own safety and that of his/her fellow employees.
- Incorporate AECOM's Life-Preserving Principles into work planning and execution.
- Proactively and aggressively identify, manage and eliminate hazards and reduce risk in the workplace.
- Engage in training and preparations to have the knowledge, skills, competency and equipment required to work safely.
- Take action to stop work if the work cannot be executed safely or if conditions or behaviors on the work activity are unsafe.
- Immediately report safety, health and/or environmental incidents, near-misses, unsafe conditions, and at-risk behaviors to their supervisor; and that we diligently work to correct the problem.

Our SH&E expectations will be accomplished by the demonstrated leadership of management, compliance with regulatory requirements, and consultation with and participation of AECOM personnel.

Review and Communication

This Policy will be reviewed annually to ensure it meets the needs of the company, and will be made available and communicated to all persons under the control of the company.

M. Burke — March 6, 2020

Michael S. Burke — Date

Chairman and Chief Executive Officer

Safety, Health & Environment Policy (S1-001-PL1)
Revision 6 March 6, 2020
PRINTED COPIES ARE UNCONTROLLED. CONTROLLED COPY IS AVAILABLE ON COMPANY INTRANET

3.2 Safety For Life

"Safety for Life" is a comprehensive integrated AECOM Safety Management System that drives our nearly 100,000 employees toward AECOM's commitment to achieving zero work-related injuries and/or illnesses; preventing damage to property and the environment; and maintaining an environmentally friendly and sustainable workplace. Our Safety for Life program is supported by nine Life Preserving Principles that apply to all AECOM activities.

3.3 Life Preserving Principles

Demonstrated Management Commitment
Our Executive, senior and project managers will lead the SH&E improvement process and continuously demonstrate support and commitment.

Employee Participation
Our employees will be encouraged and empowered to become actively engaged in our safety processes through their active participation in safety committees, training, audits, observations and inspections. Employees will be encouraged to participate in health initiatives and adopt a healthy lifestyle.

Budgeting and Staffing for Safety
Our safety staff will be competent, fully trained and qualified to provide technical resources to our internal and external clients. A budget to support safety activities will be included in project proposals.

Pre-Planning
Our design, engineering, project and construction management staff will deploy effective risk mitigation efforts to design, plan and build safety into every project. Pre-Project and Pre-Task planning will be an effective tool in protecting our employees and the environment.

Contractor Management
Our project staff will work closely with our sub-consultants, subcontractors, contractors and Joint Venture Partners to provide a safe work environment for employees and members of the public. Our goal of SH&E performance excellence will be equally shared by all project participants.

Recognition and Rewards
Our employees will be recognized for their efforts in working safely and their support of our safety efforts.

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

Incident Investigation
Our managers and safety professionals will investigate all recordable incidents and serious near misses to identify contributing factors and root causes in order to prevent a reoccurrence. Lessons learned shall be identified, communicated and implemented.

Fit for Duty
Our employees are responsible to report to work each day fit for duty and not to pose a health and safety hazard to themselves or others.

3.4 Driving and Vehicle Safety

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

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

2. Electronic Devices Prohibited

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

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

3. Vehicle Inspections

The driver shall conduct pre-trip vehicle inspections prior to each trip. A vehicle inspection checklist, S3AM-005_FM2, can be used to guide and document the inspection process. Vehicle inspection is to include a 360-degree walk around and visual inspection under the vehicle for leaks and obstructions prior to moving the vehicle.

4. Training

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

5. Journey Management Plan

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

6. Secure Loads

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

7. Backing Up

Reversing the vehicle is to be avoided if at all possible. If backing up is necessary, use the following guidelines:

- Pre-plan all vehicle movements.
- If the pull-through method of parking is not possible, drivers will scan parking spot/area for hazards and back in; thereby, facilitating departure where the first move is forward.
- A light tap of the horn should be used to alert others of your intention to back up.
- Avoid tight spaces.
- Vehicles over 10,000 pounds gross vehicular weight are required to have a competent spotter in place when backing. A competent spotter is one that has received spotter training.
- All vehicles shall have a competent spotter in place when backing in an active work zone. Parking and public access areas are recommended but not required to have a spotter.

3.5 Fitness for Duty

One of AECOM's nine Life-Preserving Principles is Fitness for Duty (see Fitness for Duty procedure S3AM-008-PR). Fitness for Duty means that individuals are in a state (physical, mental, and emotional) that enables them to perform assignments competently and in a manner that does not threaten the health and safety of themselves or others. On certain projects or for specific tasks, fit for duty certifications may be requested of medical providers by SH&E Managers or Human Resources (HR). Employees should report to work fit for duty and unimpaired by substances or fatigue. Supervisors must observe their employees and work with the employee, SH&E staff, and HR to address deficiencies. AECOM will not tolerate retaliation against any employee for filing a complaint or concern regarding their fitness for duty or participating in any way in an investigation.

3.5.1 Medical Surveillance

AECOM's S3AM-128-PR, Medical Screening and Surveillance, details the requirements to participate in a medical monitoring program. Medical Surveillance provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable regulations. It is also designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs.

3.5.2 Proactive Health

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

Heart health;	Smoking cessation;	Diet; and
Stress management;	Diabetes prevention;	Exercise benefits.

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

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

3.5.3 Fatigue

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

3.5.4 Substance Abuse

Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment and facilities. AECOM is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable. AECOM Substance Abuse Prevention Procedure (S3AM-019-PR) prohibits the use, possession, presence in the body, manufacture, concealment,

transportation, promotion or sale of the following items or substances on company premises. Company premises refer to all property, offices, facilities, land, buildings, structures, fixtures, installations, aircraft, automobiles, vessels, trucks and all other vehicles and equipment - whether owned, leased, or used.

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

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

Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution and possession of marijuana are violations of federal law and AECOM policy, and will subject an employee to disciplinary action up to and including termination in accordance with controlling law.

3.6 Rewards and Recognition

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

There are several possible appropriate methods of rewarding and recognizing employees and contractors:

1. **Informal** – recognition via verbal acknowledgment, email, spot awards, luncheons, etc.
2. **Formal** – Safety Star Award nomination (link)
3. **Formal** – SH&E Challenge Coins (see local SH&E manager for details)

3.7 Hand Safety

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

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

3.8 Hazard Communication

Hazardous materials that may be encountered on-Site as existing environmental or physical/health contaminants are addressed in this HASP. Their properties, hazards, and associated required controls will be communicated to all affected staff and subcontractors in accordance with the requirements of AECOM Procedure S3AM-115-PR1 Hazardous Materials Communication including these key elements:

- All personnel shall be briefed on the hazards of any chemical product they use and shall be aware of and have access to the Safety Data Sheets (SDS).
- All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

In addition, any employee or organization (contractor or subcontractor) intending to bring any hazardous material onto this AECOM-controlled work site must first provide a copy of the item's SDS to the Site Supervisor or Site Safety Officer for review and filing. The Site Supervisor or Site Safety Officer will maintain copies of all SDS on site and in **Attachment D**. SDS may not be available for locally obtained products, in which case an alternate form of product hazard documentation will be acceptable.

3.9 Cell Phone Usage

Since the cognitive and visual distractions of a mobile device while performing the simplest tasks can put the person and others around them at risk of causing distraction and leading to accidents while driving or even while walking, the following measures shall be followed to avoid being distracted while working, driving, or walking.

While Working:

- Do not use mobile devices while working, particularly when operating or working near heavy machinery/equipment or performing gas or electric work.
    - Distractions caused by mobile devices can impair the ability to recognize and react to hazards such as passing machinery or employees working within a job site.
    - The use of a mobile device in an area with a high concentration of natural gas could trigger an explosion.
- If you have to talk, text or use an electronic device, stop and move to a safe location away from others and oncoming hazards.

While Driving:

- Enable the Do Not Disturb While Driving feature on your mobile device while driving:
- The use of a wireless system to dial into meetings is not deemed essential. If you have an important meeting scheduled or an emergency call comes in while driving:
- Do not answer the call while driving. Safely pull off the road and park in order to take accept/return emergency calls.
- Send a delegate in your place and follow up when you are safely at your destination;
- Plan your travel around critical meetings. If you must participate in a meeting, ensure you are safely parked at a rest stop or adjust your travel schedule accordingly; and/or

While Walking:

- If you have to talk, text or use an electronic device, stop and move to a safe location. Distracted walking can cause you to miss potential hazards, like a change in the walking surface, stairs, people and other obstacles – including traffic.
- Do not walk with your headphones in your ears so you can hear emergency sirens and vehicle warnings.

3.10 Hazardous Material Handling and Waste Management

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 and SH&E Procedure S3AM-116-PR Hazardous Materials Shipping. It should be noted that AECOM is not authorized to sign shipping papers for the work covered by this HASP.

3.11 Housekeeping and Personal Hygiene

Basic housekeeping requirements for offices and work sites, as well as personal hygiene and sanitation standards can be found in S3AM-013-PR Housekeeping. Inspections should be performed at the regular interval specified below. The housekeeping inspection form S3AM-013-FM1 is available for use.

Housekeeping:	*Inspection Frequency:*	Daily (Inspection findings to be documented in field notes)	*Inspector:*	Site Supervisor/ Site Safety Officer or designee
Eating, Drinking, Smoking:	Permitted only in designated area(s).			
Handwashing:	Water, soap and paper towels or equivalent supplies are located off-site. Site personnel will wash hands and face after completing work activities and prior to breaks or meals. Due to COVID-19 wash hands more frequently: • Wash hands with soap and water for 20 seconds. • Wash hands after sneezing, coughing, blowing your noise, or being in a public place. • Use hand sanitizer that contains at least 60% or up to 95% of alcohol.			

	• Avoid touching face, mouth, nose, and eyes. 
Toilets:	**Toilets** are located at nearby restaurants. However, if a task requires multiple people (i.e. greater than 10), then a portable toilet will be made available. Each contractor on-Site is to provide their own portable toilets, and portable toilets should be cleaned and disinfected regularly as per New York State guidance. Ensure hand sanitizer is carried when attending a public restroom and limit contact with frequently touched items (i.e. door pulls and toilet seats). *NOTE: For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.*

Water:	**Water** is located off-site. A water supply meeting the following requirements will be utilized: *Potable Water:* Field personnel will need to bring their own supply of potable water to the Site as it is not readily available at the Site. Potable water containers will be properly identified in order to distinguish them from non-potable water sources. *Non-Potable Water:* Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. If brought to Site, all containers of non-potable water will be marked with a label stating ***"Non-Potable Water, Not Intended for Drinking Water Consumption"***
Illumination:	**Illumination** will be provided in the form of spotlights if natural light or installed lighting fixtures are not sufficient in the work area, toilet, and/or break area.

3.12 Lone Worker

AECOM discourages employees from working alone (i.e. where AECOM personnel are out of visual and audio range of others) when performing field tasks (see SH&E Procedure S3AM-314-PR, Working Alone). If lone work is to be performed, a communications/check-in plan must be developed and implemented using the table below.

Lone Worker:	Annual site Inspections
Justification:	Certain tasks (i.e., inspections, etc.) only require a Lone Worker.
Check-In Requirement:	The following MINIMUM check ins are required: ▪ Within one hour of arrival to Site ▪ Within one hour of departure from Site Verbal contact is preferred, all messages- voicemail, email, text- must have an exchange confirming receipt by the check-in contact.
Check-In Contact:	Kevin Connare, Project Manager; 716-861-7661
Hazard Summary:	▪ Hazardous substances or materials ▪ Traffic
Response Plan:	Dispatch backup employee (TBD), call police.

3.13 Safety Observations

Safety observations are observations made by employees or subcontractors of a condition or behavior which could contribute to an incident, prior to the incident occurring. Observations can also identify positive behaviors or interventions which contribute to the prevention of incidents. Large, long-term projects may benefit from the use of LifeGuard to track and trend observations on a site level. All other projects should log their observations using IndustrySafe. Both reporting systems can be accessed on any safety page of ecosystem. Or the QR codes below can be used while off the AECOM network from a smartphone/ device.

LifeGuard

IndustrySafe
Safety Management Software

3.14 Stop Work Authority

AECOM empowers and expects all employees to exercise their Stop Work Authority (see Stop Work Authority Procedure S3AM-002-PR) if an incident appears imminent, or when hazardous behaviors or conditions are observed. A stop work request can be informal if the situation can be easily corrected or may require shutting down operations if revised procedures are necessary to mitigate the hazard. AECOM employees are expected to stop their or a National Grid-retained contractor, if they observe something that is not safe or that is imminently hazardous. Employees also may attempt to stop work to avoid allowing the contractor to come to harm by immediately notifying the contractor foreman or site engineer, or if necessary, the client or party managing the contractor.

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

4. Roles and Responsibilities

Roles and responsibilities for the project team are defined in SH&E Procedure S3AM-117-PR1, Hazardous Waste Operations. The Project Manager (PM) is ultimately responsible for the development of this HASP and establishing a budget to implement the controls and training required. The PM is also responsible for ensuring that the plan is implemented, that appropriate documentation is generated, and that records are maintained. The SH&E Manager is responsible for reviewing and approving this HASP and assisting with other SH&E matters upon request. A Site Safety Officer may be appointed to oversee implementation of the HASP in the field. All project team members are responsible for reviewing and abiding by this HASP, performing daily (or more frequent) task hazard assessments, stopping work when necessary to correct unsafe behaviors or conditions, and reporting incidents promptly to the PM and AECOM Incident Reporting Hotline (Incident Hotline 800-348-5046).

4.1 Project Manager

The 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. Some of the PM's specific responsibilities include:

- Verifying that personnel, to whom this HASP applies, including AECOM subcontractors, have received a copy of it, with ample opportunity to review the document and to ask questions.
- Providing the concurring SH&E Manager with updated information regarding conditions at the site and the scope of site work if changes occur that will affect the accuracy of this HASP.
- Providing adequate authority and resources to the Site Supervisor or Site Safety Officer to allow for the successful implementation of all necessary SH&E Procedures.
- Maintaining regular communications with the Site Supervisor or Site Safety Officer and, when necessary, the AECOM Client SH&E Program Manager.
- Coordinating the activities of AECOM subcontractors and ensuring that they are aware of the pertinent health and safety requirements for these projects, when applicable.
- Conducting Safety System Auditing by way of Management Site Visits and/or Project Manager Self-Assessments on a regular basis.
- Approving amendments to the HASP (in conjunction with the Site Supervisor or Site Safety Officer).
- Coordinating activities with the client as needed to ensure the safe implementation of this HASP.

4.2 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 HASP. The Project Manager may act as the Site Supervisor while on site. The Site Supervisor's responsibilities include:

- Discussing deviations or drift from the work plan with the Site Safety Officer and PM.
- Discussing safety issues and development and implementation of the corrective actions with the PM, Site Safety Officer, and field personnel.
- Assisting the Site Safety Officer with the development and implementation of corrective actions for site safety deficiencies.
- Assisting the Site Safety Officer with the implementation of this HASP and ensuring compliance.

- Assisting the Site Safety Officer with inspections of the site for compliance with this HASP and applicable SH&E Procedures.
- Reviewing Project Risk Register and and Task Hazard Assessments (THAs) with the work crew.
- Reporting incidents and ensuring incidents and observations are logged into Lifeguard or IndustrySafe.
- Verifying that all operations are in compliance with the requirements of this HASP and halting any activity that poses a potential hazard to personnel, property, or the environment.
- Temporarily suspending individuals from field activities for infractions against the HASP pending consideration by the Site Safety Officer, the SH&E Manager, and the PM.

4.3 Site Safety Officer

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

- Updating the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the SH&E Manager and PM.
- Inspecting the site for compliance with this HASP and the SH&E Procedures using the appropriate field audit inspection checklist found in IndustrySafe.
- Coordinating with Site Supervisor to review THAs with the work crew.
- Assisting as needed to report incidents and verify that incidents and observations are logged into Lifeguard or IndustrySafe.
- Working with the Site Supervisor and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contacting the SH&E Manager for technical advice regarding safety issues.
- Determining emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Checking that all site personnel and visitors have received the proper training, orientation and medical clearance prior to entering the site.
- Establishing controlled work areas (as designated in this HASP or other safety documentation).
- Facilitating or co-leading daily tailgate meetings and maintaining attendance logs and records.
- Discussing potential SH&E hazards with the Site Supervisor, the SH&E Manager and the PM.
- Selecting an alternate Site Safety Officer by name and informing him/her of their duties, in the event that the Site Safety Officer must leave or is absent from the site.
- Verifying that all operations are in compliance with the requirements of this HASP.
- Issuing a "Stop Work Order" under the conditions set forth in this HASP.
- Temporarily suspending individuals from field activities for infractions against the HASP pending consideration by the SH&E Manager, Site Supervisor, and the PM.

4.4 Employees

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

- Understanding and abiding by the SH&E Procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to SH&E management for continuous improvement relating to omissions and modifications in the HASP or other safety policies and procedures.
- Notifying the Site Supervisor or Site Safety Officer of unsafe conditions and acts.
- Stopping work if there is doubt about how to safely perform a task or if unsafe acts or conditions are observed (including subcontractors or team contractors).
- Speaking up and refusing to work on any site or operation where the SH&E procedures specified in this HASP or other safety policies are not being followed.
- Contacting the Site Supervisor or Site Safety Officer or the SH&E Manager at any time to discuss potential concerns.

4.5 Subcontractors

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in AECOM Procedure *S3AM-213-PR Subcontractor Management*. 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 as well as all other requirements applicable to their work. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, and with this HASP, 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 on-Site activities.

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.

Subcontractor personnel also have stop work authority.

4.6 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 PM, Site Supervisor, or Site Safety Officer on the hazards present at that location and will sign the Visitor Sign In Record form. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and PPE that are required for entry to any controlled work area; visitors must comply with these requirements at all times.

If the site visitor requires entry to any exclusion zone (EZ), but does not comply with the above requirements, all work activities within the EZ must be suspended.

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

5. Training and Documentation

The following sections describe the standard practices or programs that AECOM will establish to prepare employees to perform work safely and consistent with AECOM policy and Procedures.

5.1 HASP/SITE Orientation

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

5.2 Daily Tailgate Meetings and THA Review

The Site Supervisor, Site Safety Officer or designee shall facilitate a tailgate meeting to discuss the specific requirements of this HASP, review the applicable THAs prior to the commencement of daily project activities. Attendance at the daily tailgate meeting is mandatory for all employees and subcontractors at the site contracted to AECOM. Simultaneous operations are encouraged to attend each other's tailgate meetings or at the very least the supervisors shall discuss the coordination of activities and associated hazards of each other's tasks. The supervisor will then convey the information to the work crew. The Tailgate Meeting must be documented by the Site Supervisor or Site Safety Officer on a Daily Tailgate Meeting form, a blank copy of which is included in **Attachment F**.

As part of the daily tailgate meeting, employees and subcontractors will be encouraged to voluntarily warm up and stretch select muscle groups to the best of their ability and within each person's individual limitations. Stretching is particularly beneficial to warm and loosen muscles before repetitive work, manual handling of loads, and when working in cold temperatures or with static postures. The exercises included in Attachment C may be used to facilitate these efforts.

5.3 Worker Training and Qualifications

All personnel at this site must be qualified and experienced in the tasks they are assigned. SH&E Training Procedure S3AM-003-PR establishes the general training requirements for AECOM employees. In addition, S3AM-117-PR, Hazardous Waste Operations, explains the HAZWOPER training and S3AM-128-PR, Medical Screening and Surveillance, details the medical surveillance requirements.

Check all required training on the table below. Verify training records of employees and subcontractors.

Site-Specific Training Requirements	
Training	**Applies to**
☒ HASP Orientation	All Employees and Subcontractors
☒ HAZWOPER 40 –HR and 8 - HR Annual Refresher	On HAZWOPER sites, in EZ, exposed to hazardous contamination
☒ HAZWOPER Supervisor	Employees managing others in HAZWOPER activities
☒ Field Safety	Anyone visiting the field that does not require HAZWOPER
☒ Speak-Up/Listen Up	All Field Employees and Supervisors
☐ Fit Test/ Respiratory Protection	Employees needing to wear respirators
☒ Hazardous Materials Shipping	Employee responsible for shipping HZM/HZW/DG and/or signing manifests

Site-Specific Training Requirements	
Training	**Applies to**
☒ Annual Medical Surveillance/ Clearance	Employees working in an exclusion zone and the regulatory required exposure limit **is** exceeded for 30 or more days a year
☐ Biennial Medical Surveillance/ Clearance	Working in an exclusion zone more than 30 days a year and the regulatory required exposure limit is **not** exceeded
☒ OSHA 10 hr. Construction	Employees working near construction equipment and/ or industrial hazards, which includes, but is not limited to, excavators, bull dozers, graders, articulated dump trucks, pile drivers, and large air or mud rotary drill rigs. Smaller equipment like bobcats, road worthy commercial trucks and hollow-stem auger drill rigs would not be considered heavy construction equipment.
☐ OSHA 30 hr. Construction	
☐ Local requirements:	
☐ Client requirements:	

5.4 Competent Person

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

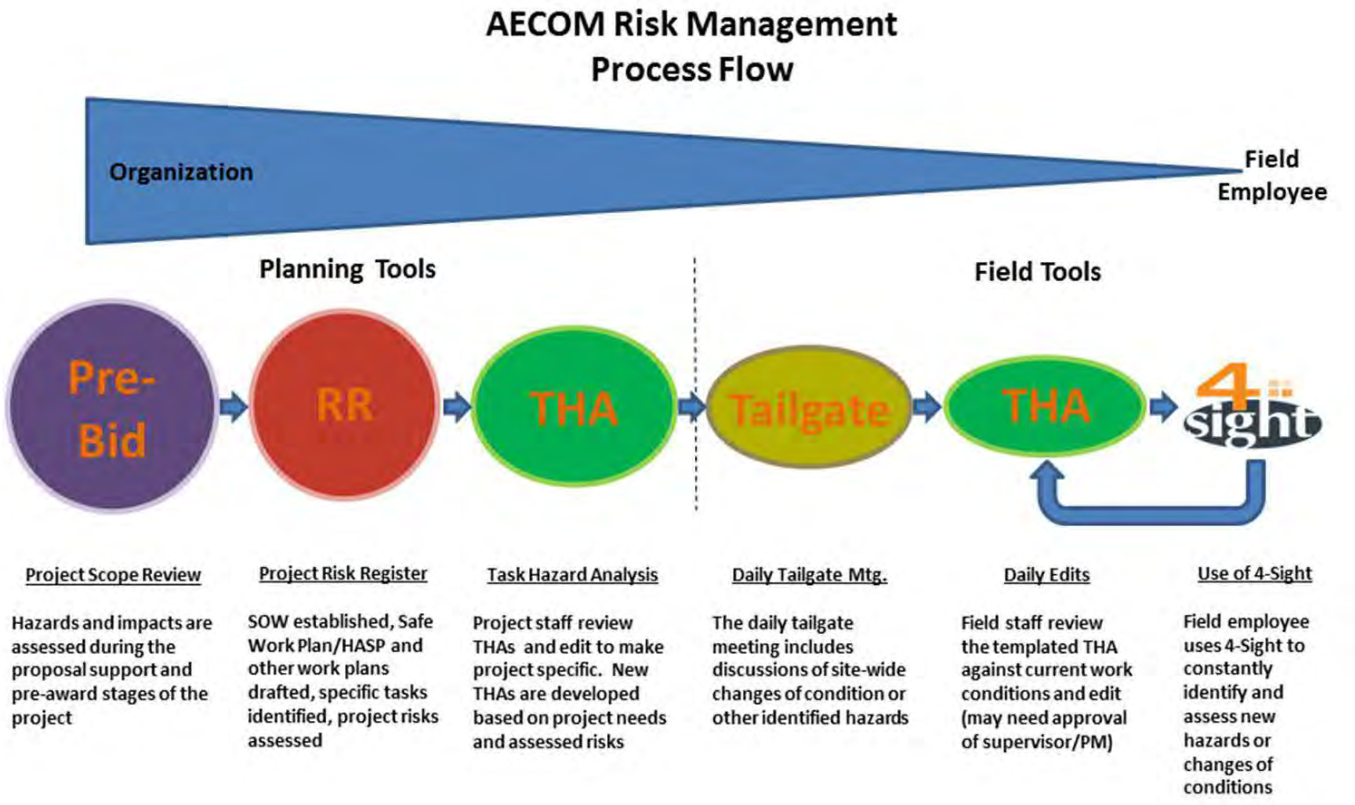
AECOM's Competent Person Designation Procedure, S3AM-202-PR, explains the roles, responsibilities and procedures of naming a competent person. A S3AM-202-FM1 Competent Person Designation Form is included for each AECOM competent person (subcontractors to use an equivalent process) listed below and can be found in **Attachment G**.

	Activity	Name of Person
☐	**Asbestos**	
☐	**Assured Equipment Grounding Conductor**	
☐	**Blasting & Explosives**	
☐	**Concrete & Masonry Construction**	
☐	**Confined Spaces**	
☐	**Control of Hazardous Energy (Lockout-Tagout)**	
☐	**Crane Assembly / Disassembly**	
☐	**Cranes & Derricks**	
☐	**Demolition**	
☐	**Electrical Wiring Design & Protections**	
☐	**Elevated Work Platforms & Aerial Lifts**	
☐	**Fall Protection**	
☒	**Hearing Protection**	SS/SSO - TBD
☒	**Heavy Equipment**	SS/SSO - TBD
☐	**Ionizing Radiation**	
☐	**Lead**	
☐	**Material Hoists & Personnel Hoists**	
☐	**Respiratory Protection**	
☐	**Rigging Equipment**	
☐	**Scaffolds**	
☐	**Stairways & Ladders**	

	Activity	Name of Person
☐	**Steel Erection**	
☒	**Trench & Excavations**	SS/SSO - TBD
☐	**Underground Construction**	
☐	**Welding & Cutting**	

6. Hazard Assessment and Control

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



6.1 SH&E Procedures

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

6.2 Project Risk Register/ Hazard Assessment

Project start-up activities require appropriate SH&E planning prior to work commencing, including identification of hazardous tasks required to complete the Scope of Work (SOW). A Project Risk Register/Hazard Assessment shall be developed to guide work. Form S4[DCS]AM-209-FM4-A may be used and should be included in **Attachment F**.

6.3 Task Hazard Assessment

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

In the field, the THA forms are to be reviewed daily. Many times when employees arrive in the field, situations are different than originally planned for or additional job steps are required. The THA asks workers update or 'dirty up' the THA in the 'On-Site Edits' rows to assess the risks presented by the changed condition and requires the worker to describe steps to reduce the risk. If the hazard(s) cannot be successfully mitigated, the work is not allowed to proceed.

6.3.1 Hazard Categories

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

- Biological
- Chemical
- Electrical
- Gravity
- Mechanical
- Motion
- Pressure
- Noise
- Radiation
- Thermal

6.4 4-Sight

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

1) **What am I about to do?**
2) **What could go wrong?**
3) **What could be done to make it safer?**
4) **What have I done to communicate the hazards?**

6.5 Speak Up/Listen Up

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

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

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

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

7. Physical Hazard Assessment

7.1 Physical Hazards

A physical hazard is a hazard that threatens the physical safety of an individual; contact with the hazard typically results in an injury. The following table summarizes the physical hazards or activities containing physical hazards present at the site and the associated procedures that address protection and prevention of harm.

All checked procedures MUST be included in **Attachment B** for implementation and reference.

Check all applicable hazards/ activities and add site specific description of the hazard.

	Hazard/ Activity *(note: text in this column links to procedure)*	Site Specific Description *[where, what phase of work, frequency, etc.]*	Applicable Procedure
☐	**Abrasive Blasting**		S3AM-335-PR
☐	**Aerial Work Platforms**		S3AM-323-PR
☐	**All-Terrain Vehicles**		S3AM-319-PR
☒	**Biological – Pandemic Procedures**	All Field Activities	SR1-003-PR2
☐	**Blasting and Explosives**		S3AM-336-PR
☒	**Bloodborne Pathogens**	First aid providers.	S3AM-111-PR
☐	**Cofferdams**		S3AM-344-PR
☒	**Cold Stress**	Working during winter.	S3AM-112-PR
☐	**Compressed Air Systems and Testing**		S3AM-337-PR
☐	**Compressed Gases**		S3AM-114-PR
☐	**Concrete Work**		S3AM-338-PR
☐	**Confined Spaces**		S3AM-301-PR
☒	**Corrosive Reactive Materials**	Handling pre-preserved bottle ware for sampling.	S3AM-125-PR
☐	**Cranes and Lifting Devices**		S3AM-310-PR
☐	**Demolition**		S3AM-339-PR
☐	**Diving (scientific and commercial)**		S3AM-334-PR
☒	**Drilling, Boring & Direct Push Probing**	Installing borings.	S3AM-321-PR
☒	**Electrical Safety**	Working with generators and batteries.	S3AM-302-PR
☒	**Excavation**	Utility trenches, site development	S3AM-303-PR
☐	**Fall Protection**		S3AM-304-PR
☒	**Flammable and Combustible Liquids**	Portable generator.	S3AM-126-PR
☐	**Gauge Source Radiation**		S3AM-122-PR
☒	**Hand and Power Tools**	Drilling	S3AM-305-PR
☒	**Hazardous Waste Operations**	Generating hazardous investigation derived waste (IDW).	S3AM-117-PR
☒	**Heat Stress**	Working during summer.	S3AM-113-PR
☒	**Heavy Equipment**	Working alongside drilling equipment.	S3AM-309-PR
☐	**High Altitude**		S3AM-124-PR
☒	**Highway and Road Work**	Working alongside roadways and sidewalks.	S3AM-306-PR
☐	**Hoists Elevators and Conveyors**		S3AM-343-PR
☐	**Hot Work**		S3AM-332-PR
☐	**Ladders**		S3AM-312-PR
☐	**Lockout Tagout**		S3AM-325-PR

	Hazard/ Activity *(note: text in this column links to procedure)*	Site Specific Description *[where, what phase of work, frequency, etc.]*	Applicable Procedure
☐	**Machine Guarding Safe Work Practice**		S3AM-326-PR
☐	**Marine Safety and Vessel Operations**		S3AM-333-PR
☐	**Material Storage**		S3AM-316-PR
☐	**Mine Site Activities**		S3AM-341-PR
☐	**Mining Operations**		S3AM-345-PR
☐	**Non Ionizing Radiation**		S3AM-121-PR
☐	**Overhead Lines**		S3AM-322-PR
☐	**Powder-Actuated Tools**		S3AM-327-PR
☒	**Powered Industrial Trucks**	Forklifts operating at the lumber yards by third parties.	S3AM-324-PR
☐	**Radiation**		S3AM-120-PR
☐	**Railroad Safety**		S3AM-329-PR
☒	**Respiratory Protection**	Drilling and sampling.	S3AM-123-PR
☐	**Scaffolding**		S3AM-311-PR
☐	**Steel Erection**		S3AM-340-PR
☐	**Temp. Floors, Stairs, Railings, Toe-boards**		S3AM-342-PR
☒	**Underground Utilities**	Manual preclearing prior to drilling.	S3AM-331-PR
☐	**Underground Work**		S3AM-330-PR
☒	**Wildlife, Plants and Insects**	Sampling.	S3AM-313-PR
☐	**Working Alone**		S3AM-314-PR
☐	**Working On and Near Water**		S3AM-315-PR

7.2 Biological Hazards

Potential biological hazards include illnesses and/or injuries transmitted by plants, insects, animals and pathogenic agents. There are many plants, animals and insects that are potentially harmful to humans including ticks, poison ivy/poison oak, spiders, bees and wasps, mosquitoes and poisonous snakes. Given the Site is located in an urban setting with no vegetation coverage, the likelihood of encountering ticks, poison ivy/poison oak and poisonous snakes is low.

The following measures are to be implemented to manage potential biological hazards:

- Use an insect repellant containing DEET.
- Bloodborne pathogens include diseases that can be transmitted by contact with blood or other bodily fluids as well as contaminated items that may be encountered on the Site (e.g. used syringes). Universal precautions should be used when administering First Aid. Good hygiene practices and proper decontamination of non-disposable PPE will minimize potential for transmission of bloodborne pathogens.
- Stings of bees and wasps may cause serious allergic reactions in certain individuals. The SSO should be made aware of all personnel with known insect allergies or sensitivities before field work begins.
- Ticks are parasites that feed on the blood of an animal/human host and can carry several severe diseases, the least bringing several days of fever and pain and the worst causing brain damage. Deer tick bites may result in the transmission of Lyme disease. A characteristic rash may develop a few days to a few weeks after the bite of an infected tick. The rash generally looks like an expanding red ring with a clear center, but it can vary from a blotchy appearance to red throughout the rash. However, it is important to note that some victims never exhibit a rash. Lyme disease symptoms include flu-like symptoms such as a headache, stiff neck, fever, muscle aches and/or general malaise. Long-term effects of Lyme disease may include arthritis of the large joints, meningitis, neurological complications (such as numbness or tingling of the extremities, loss of concentration and memory retention or Bell's Palsy), withdrawal and lethargy, or cardiac symptoms. Site workers should use the following prevention tactics in accordance with S3NA-313-PR1 Wildlife, Plants & Insects. Other suggested behaviors to reduce the hazards posed by ticks include:

- avoid walking through brush, woods or grassy areas; try to avoid contact with plants if you must walk through these areas;
- dress in light-colored clothing to make adhering ticks more visible. Wear long-sleeved shirts and tuck pants into socks. Wear a hat and tie back long hair;
- use a tick repellant containing permethrin or DEET; and
- perform self or assisted searches each day to check for ticks. If field personnel discover an embedded tick on their skin, report it immediately to the Site Manager or SSO.

Over the past number of years, the dangers from tick bites (specifically deer ticks) have been put in the forefront of field safety guidelines. This is because they are the primary carriers of Lyme disease. AECOM procedure S3AM-313-PR1 (Wildlife, Plants and Insects), located in **Attachment B**, summarizes the health impacts from tick bites, as well as methods of preventing tick bites, tick detection and removal.

- Tyvek® coveralls and gloves will be worn in the presence of poison ivy and ticks. Remove coveralls and gloves from the inside out to prevent contact with clothing contaminated with poisonous plant oils. Consider the use of poisonous plant barrier and/or cleanser creams if needed. If working in vegetated areas of the Site, tape coveralls to boots and gloves. Use an insect repellant containing DEET. Check frequently for the presence of ticks and perform a thorough inspection for possible ticks prior to leaving the Site. If field personnel discover an embedded tick on their skin, report it immediately to the Site Manager or SSO.
- Pigeon nesting and roosting habits may result in an accumulation of excrement at some sites. Exposure to pigeon excrement can cause illness in humans. Of primary concern is the contracting of psittacosis which is a flu-like illness which can cause death in vulnerable individuals. All workers should avoid coming in contact with these materials and, if exposed to them, should thoroughly wash areas of contact as soon as possible.
- Assume that all animals are dangerous. A person who is bitten by an animal may become infected by tetanus or rabies. Warm-blooded animals such as dogs, cats and rats can transmit rabies. Rabies can also be transmitted when the saliva of an infected animal contacts an open wound (even a scratch) or any normal body opening such as the mouth or eye. S3NA-313-PR Wildlife, Plants & Insects, presents additional information on this subject.

7.2.1 Pandemic Virus – COVID-19

Coronavirus 19 (COVID-19) is the result of a virus identified as SARS-CoV-2. Coronaviruses are large family of viruses found in both animals and humans. Some infect people and are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) with symptoms such as fever, cough and shortness of breath. There currently is no human vaccine available for this virus.

Refer to Attachments I and J and the latest – Interim Guidance for Coronaviruses: AECOM Guidance for Coronavirus and the AECOM Pandemic Procedure: SR1-003-PR2:

	Hazard/ Activity	Project Specific Description	Applicable Procedure
☒	Pandemic Virus / All Activities	All activities (Include Project Specific Description)	SR1-003-PR2

Visit the WHO webpage for coronavirus outbreak, for tips, posters and information.

The World Health Organization (WHO) coordinates health issues for the United Nations and provides leadership on global health matters. The WHO assists member nations with recommendations regarding global pandemics and declares global pandemic phases to help organizations to plan for the impacts. The WHO has declared a global Pandemic due to the spread of COVID-19. The declaration of a global pandemic is Phase 6, the highest level. Phase 6 is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase indicate that a global pandemic is under way.

7.2.1.1 COVID-19 Exposure

The following is noted with regard to potential COVID-19 exposure pathways:

- Spreads from Person to Person:
    - Between close contact (within 6 feet) of one another
    - Respiratory droplets produced when an infected person coughs or sneezes
- With contact of infected surfaces:
    - Touching surfaces with the virus
    - Touching own face, mouth, nose

The following actions are to be taken to minimize the potential for exposure to yourself and others:

- Stay home if sick except to get medical help.
- All workers will practice social distancing which includes keeping at least 6 feet from others. Social distancing is to be maintained at all times including within Site trailers, during breaks and at tailgate meetings.
- Wear a face covering if you must work within 6 feet of others.
- Cover coughs and sneezes with a tissue. Ensure proper disposal of tissues by disposing tissue in toilet (preferred) or trash (preferable covered foot operated trash can).
- Wash hands regularly with soap and water.
- Clean and disinfect frequently touched surfaces daily.
- Dispose of trash generated on-Site daily.
- Avoid sharing vehicles.

7.2.1.2 COVID-19 Symptoms Monitoring

Any employee experiencing any symptoms of COVID-19 must not work at the office or at any client location and must seek medical attention immediately. COVID-19 symptoms include:

- Fever or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue
- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

Refer to the Centers for Disease Control and Prevention website: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

7.2.1.3 Steps to Take for Potential and Confirmed Exposure and Self-Quarantine

Consult S2-001-ATT6 Potential Coronavirus Exposure Management and Reporting for additional detail.

8. Chemical Hazard Assessment

AECOM will perform tasks that can expose personnel to a variety of hazards due to the operational activities, physical conditions of the work locations, and potential presence of environmental contaminants. This section presents a variety of potential chemical hazards, exposure pathways, and related mitigation actions. See S3AM-110-PR, Toxic and Hazardous Substances, for information on planning, training, monitoring, and details on several specific chemicals (Benzene, Cadmium, Chromium, Hydrogen Sulfide, Lead, and Silica).

8.1 Potential Chemical Hazards

The chemicals in the table below are known or suspected to be present at the Site.

		Chemical Name	Media	Primary Routes of Exposure	PEL	TLV	IP electron volts (eV)	Minimum PID Lamp Needed (eV)
Metals	☒	Cyanides	Soil, GW	Dermal	5 mg/m^3	5 mg/m^3	N/A	N/A
	☒	Arsenic	Soil, GW	Dermal	0.5 mg/m^3	0.2 mg/m^3		
	☒	Chromium III	Soil, GW	Dermal	0.5 mg/m^3	0.5 mg/m^3		
	☒	Chromium VI	Soil, GW	Dermal	0.005 mg/m^3	0.005 mg/m^3		
	☒	Lead	Soil, GW	Dermal	0.05 mg/m^3	0.05 mg/m^3		
	☒	Mercury	Soil, GW	Dermal	0.1 mg/m^3	0.025 mg/m^3		
VOCs/ SVOCs	☒	1,3,5-Trimethylbenzene	GW	Inhalation	25 ppm	25 ppm	8.39	10.6
	☒	Benzene	Soil, GW	Inhalation	1 ppm	0.5 ppm	9.25	9.6
	☒	Coal tar pitch hydrocarbons PAH	Soil, GW	Inhalation	0.2 mg/m^3	0.2 mg/m^3	N/A	10.6
	☒	1,2-Dichloroethene	GW	Inhalation	5 mg/m^3	5 mg/m^3	9.64	10.6
	☒	1,2,4-Trimethylbenzene	GW	Inhalation	n/a	25 ppm	8.27	10.6
	☒	Naphthalene	Soil, GW	Inhalation	10 ppm	10 ppm	8.12	10.6
	☒	Isopropylbenzene	GW	Inhalation	50 ppm	50 ppm	8.75	10.6
	☒	Ethylbenzene	Soil, GW, Vapor	Inhalation	100 ppm	20 ppm	8.77	9.6
	☒	Trichloroethylene (TCE)	GW	Inhalation	100 ppm	50 ppm	9.45	10.6
	☒	Tetrachloroethylene (PCE)	GW	Inhalation	100 ppm	25 ppm	9.32	10.6
	☒	Toluene	GW	Inhalation	200 ppm	20 ppm	8.82	9.6
	☒	Xylene	Soil, GW	Inhalation	100 ppm	100 ppm	8.56	9.6

Notes: 1 - Permissible Exposure Limits; 2 - Threshold Limit Values; GW – groundwater

8.2 Potential Exposure Pathways

Occupational exposure to chemical hazards associated with the work activities could potentially occur by two primary routes (inhalation and skin contact) and one indirect route (incidental ingestion).

8.2.1 Inhalation

The primary risks associated with AECOM's scope of work pertain to potential exposure to airborne contaminants and explosion hazards. Constituents that potentially pose an occupational concern to employees by the inhalation route are carbon monoxide, hydrogen sulfide, methane, and volatile organic compounds. Air monitoring will be performed within the employee breathing zone to assess the need to implement appropriate control measures or stop work. In addition, air monitoring will be performed at the source to assess potential explosion hazards.

8.2.2 Skin Contact

Personnel handling residual product or waste and associated equipment may be exposed to chemical hazards by skin contact or adsorption. However, exposure is expected to be limited since workers will be required to wear appropriate PPE (i.e. appropriate work gloves, body clothing, and/or face shield).

8.2.3 Ingestion

Personnel handling residual product or waste and associated equipment, including project hazardous materials, may be exposed by incidental ingestion. Typically, this exposure occurs if proper PPE was not used or personal hygiene was not practiced. Personal protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas as well as using the correct PPE.

8.3 Decontamination

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities. Decontamination steps are outlined in Hazardous Waste Operations procedure S3AM-117-PR. Some key elements are as follows:

- All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to exiting to clean areas of the site.
- Avoid reactions between the solutions and contaminated materials. Review the applicable SDS.
- All contaminated PPE and decontamination materials shall be contained, stored and disposed of in accordance with site-specific requirements determined by site management.
- Use caution while working around decontamination stations, including the decontamination pad, which may be a slip or trip hazard.
- Use disposable equipment when possible and practical.
- All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the level of PPE required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors.
- All decontaminated equipment shall be visually inspected for contamination prior to leaving the Contaminant Reduction Zone (CRZ).

Decontamination Procedures & Equipment	
Procedure	***Equipment Needed***
The following procedure is to be implemented: • Remove all equipment, sample containers, and notes to the CRZ. • Obtain decontamination solutions and decontaminate the tools (shovels, auger flights, etc.) by brushing them under a water rinse. A high-pressure steam cleaner also may be used for decontamination. All waste and spent decontamination solutions will be properly contained. • Remove disposable booties, or scrub boots with a stiff bristle brush and water, when necessary. Washtubs and chairs will be provided. • Remove outer gloves (and boot covers, if used). • Remove Tyvek® coveralls; discard in provided container. • Remove hardhat and eye protection.	• Alconox solution • Deionized water • Brushes • Plastic sheeting

Decontamination Procedures & Equipment	
Procedure	***Equipment Needed***
• Remove respirator. • Remove inner gloves. • Wash hands and face. The decontamination area will be covered with plastic sheeting that will be replaced when torn or heavily soiled and at the end of each shift.	

Equipment Decontamination Procedures		
Type Equipment	***Decontamination Solution***	***Procedure***
Respirator	Alconox solution and deionized water	• **Washing**: Disassemble and wash with an Alconox solution in deionized water. A stiff bristle (not wire) brush may be used. • **Rinsing**: Rinse in deionized water to remove all traces of detergent. This is important to prevent dermatitis. • **Disinfecting**: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. • **Final Rinsing**: Rinse thoroughly in clean water to remove all traces of disinfectant. • **Drying**: Drain and dry by hanging by the straps from racks or by towel drying with clean, soft cloths or paper towels.
Water quality meter, oil/water interface probe, down-hole water sampling pumps, reusable sampling tools/ equipment	Alconox solution and deionized water	• **Washing**: Disassemble and wash with an Alconox solution in deionized water. • **Rinsing**: Rinse in deionized water to remove all traces of detergent.
Drilling Equipment/ Tools	High-pressure steam cleaner	Apply steam cleaner to used equipment/ tools

Waste Handling for Decontamination	
Waste Streams/Products	***Disposal Procedures***
Wash water	Containerize in 55-gallon, seal drums and stage drums in temporary location pending shipment off-Site for treatment/ disposal.
Used PPE	
Spent plastic sheets/ consumables from decontamination procedures	

8.4 Air Monitoring

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 in accordance with Exposure Monitoring Procedure S3AM-127-PR and specified in the work permit and/or THAs for the tasks. Key elements of the procedure include:

- Calibration of monitoring equipment and/or daily bump tests to verify calibrations and confirm alarm function.
- Personal monitoring and result evaluation must be directed by a Certified Industrial Hygienist or Certified Safety Professional.

8.4.1 Real-Time Exposure Measurement/Equipment

The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in the work permit and THA as work is performed. All instrumentation needs to be rated intrinsically safe to prevent fire or explosion. Check which real-time monitoring equipment will be used and update the model type if needed:

	Instrument	Manufacturer/Model	Substances Detected
☒	**Photo Ionization Detector (PID)**	RAE Systems mini-RAE (min. 10.6 eV bulb)	• Petroleum hydrocarbons • Organic Solvents
☒	**Multi or 4 Gas Detectors**	RAE Systems Multi-RAE	• Lower Explosive Limit • Oxygen • Carbon Monoxide • Hydrogen Sulfide
☐	**Combustible Gas Indicator (CGI)** *May be combined with individual or multi-gas detectors.*		• Explosivity
☒	**Particulate Monitor**	MIE Model PDM-3 mini-RAM	• Aerosols, mist, dust, and fumes
☒	**Noise Meter**	3M	• dB

8.4.2 Health and Safety Action Levels

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

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigation actions to limit, etc.) must be implemented prior to commencing activities at the specific work area. Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of Site Supervisor or Site Safety Officer or the Safety Manager.

Reasons to Upgrade:

- Known or suspected presence of dermal hazards;
- Occurrence or likely occurrence of gas, vapor, or dust emission; or
- Change in work task that will increase the exposure or potential exposure to hazardous materials.

Reasons to Downgrade:

- New information indicating that the situation is less hazardous than was originally suspected;
- Change in site conditions that decrease the potential hazard; or
- Change in work task that will reduce exposure to hazardous materials.

8.4.3 Monitoring Procedures

The monitoring procedures shown below are general guidelines for sampling activities. A reading in excess of action level outlined below will require additional ventilation for 30 minutes, followed by re-monitoring.

Monitoring Procedures and Action Levels

Parameter	Zone Location and Monitoring Interval	Response Level	Response Activity
Volatile Organic Compounds (VOCs) and volatile hydrocarbons (total by PID)	Breathing zone, continuously during tasks where exposure to VOCs and volatile hydrocarbons is possible	< 5 ppm	Continue monitoring, may continue work in required PPE
		5- 25 ppm (sustained for 5 minutes)	STOP WORK and notify PM. Investigate the cause of elevated VOC measurements and identify measures to reduce concentrations (cover impacted soils, ventilation, etc.). Work activities shall only continue once levels have decreased to or below 5 units above background. If levels continue above 5 units, only individuals who are medically qualified to wear respiratory protection are permitted to continue work activities with Project Manager approval. Don Level C PPE (organic vapor respirator

Parameter	Zone Location and Monitoring Interval	Response Level	Response Activity
			cartridges), continue monitoring, and initiate continuous air monitoring for benzene.
		> 25 ppm (sustained for 5 minutes)	Cease work, exit, and contact the Site Safety Officer, Site Supervisor and Project Manager.
Combustible Gas (multi-gas meter or individual combustible gas indicator, CGI)	Breathing zone or in the immediate work area continuously during tasks where explosive atmospheres are possible	> 5% of LEL	Cease work, exit, and contact the Site Safety Officer, Site Supervisor, and Project Manager.
Sound (Noise Meter)	Within 25 feet of source	> 85 dB	Put on hearing protection
Benzene (by PID with benzene-specific separation tube)	Breathing zone, continuously where indicated by VOC readings	> 0.25 ppm	Cease work, exit the area, and contact the Site Safety Officer, Site Supervisor and Project Manager.
Dust not otherwise classified (total by aerosol monitor)	Breathing zone every 30 minutes during field activities where exposure to excessive dusts are possible	< 5 mg/m^3	Continue work in Level D and continue monitoring
		> 5 mg/m^3	Upgrade to Level C (P100 respirator cartridges), implement dust suppression measures; contact the Site Safety Officer & Site Supervisor.
		> 10 mg/m^3	Cease activities, implement more effective dust suppression measures; contact the Site Safety Officer & Site Supervisor.
Dust not otherwise classified (total by aerosol monitor)	Edge of Exclusion Zone, every 30 minutes during excavation activities	< 5 mg/m^3	Continue work in required PPE, monitor air, and implement engineering controls
		> 5 mg/m^3	Cease activities and contact the Site Safety Officer & Site Supervisor.

9. Environmental Impact Prevention

AECOM strives to avoid or control environmental impacts from our operations through planning and implementation of best practices as well as preparing responses to react to environmental incidents. Environmental Compliance procedure S3AM-204-PR provides details on permitting and planning requirements.

	Potential Environmental Impact	Description of Hazard and Permit or Control Being Implemented
☒	**Hazardous Waste Management**	Waste minimization is practiced at the site. Waste materials are containerized and stored in a secure area pending analysis. All wastes generated during site activities are to be contained in appropriately labelled 55-gallon drums, sealed and staged in a temporary location pending transport off-Site for treatment/ disposal by National Grid's waste transport and disposal contractor. No "hazardous waste" is assumed to be encountered.

9.1 Incidental Spill Prevention and Containment

Spill prevention and containment planning must be conducted, and appropriate control measures established, consistent with regulatory requirements. Personnel are not expected to perform a response action related to an uncontrolled release of a hazardous substance. However, in the event of an incidental release of a hazardous material, a response will be performed to absorb, neutralize or otherwise control the release within the immediate work area. Procedures contained in the SDS of the hazardous material will be implemented to perform the response.

AECOM employees are not expected to take action or to participate in rescues or responses to chemical releases (including of petroleum products) 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), unless there is a contractual provision for this response and specially trained employees.

9.1.1 Spill Prevention and Containment Practices

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. When these activities exist, the procedures outlined below will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers and labelled.
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- Drums/containers will be secured and handled in a manner which minimizes spillage and reduces the risk of musculoskeletal injuries.
- Equipment will be inspected daily for signs of leaks, wear, or strain on parts that, if ruptured or broken, would result in a spill.
- Refueling should occur in designated areas where incidental spills can be prevented from reaching permeable ground surfaces.
- Whenever possible, position parked or stationary equipment over secondary containment and/ or absorbent materials to prevent spills from reaching permeable ground surfaces.

- A spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri, absorbent pads, etc.) will be available on the project site and positioned for quick and easy access.

9.1.2 Environmental Spill/Release Reporting

All environmental spills or releases of hazardous materials (e.g., fuels, solvents, etc.), whether in excess of the Reportable Quantity or not, will be reported according to the incident reporting procedure. Spills should be reported to National Grid per the same requirements as mentioned in Section 9.1.3. Reporting to the regulating agency may be done by National Grid. **If reporting to a US state or Federal regulatory agency is required, AECOM has 15 minutes from the time of the spill/release to officially report it.**

Chemical-specific Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Reportable Quantities can be found at: http://www.epa.gov/oem/docs/er/302table01.pdf.

9.1.3 NYSDEC Petroleum Spill Requirements

All petroleum spills that occur at the Site must be reported to National Grid first. National Grid may report the spill to the NYSDEC Spill Hotline (1-800-457-7362) within 2 hours of discovery, except spills which meet all of the following criteria:

- The quantity is known to be less than 5 gallons; and
- The spill is contained and under the control of the spiller; and
- The spill has not and will not reach the State's water or any land; and
- The spill is cleaned up within 2 hours of discovery.

A spill is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. A spill in a dirt or gravel parking lot is considered to have impacted land and is reportable.

NYSDEC's Spill Regulations/Guidelines can be found at: https://www.dec.ny.gov/chemical/8692.html.

The spill containment program addresses the following site-specific information:

- Potential hazardous substance spills and available controls;
- Initial notification and response;
- Spill evaluation and response; and
- Post-spill evaluation.

9.1.4 Spill Evaluation and Response

The SSO is responsible for evaluating spills and determining the appropriate response. When this evaluation is being made, the spill area is isolated and demarcated to the extent possible. When an incidental release occurs, clean-up personnel receive instructions in a pre-clean-up meeting as to spill conditions, PPE, response activities, decontamination, and waste handling.

The procedures of the Emergency Response section of this HASP are immediately implemented when the spill is determined to require emergency precautions and action. If necessary to protect those outside the clean-up area, notification of the appropriate authorities is made.

The following are general measures that response/clean-up personnel take when responding to a spill:

- To minimize the potential for a hazardous spill, hazardous substances, control/absorbent media, drums and containers, and other contaminated materials are properly stored and labeled;
- When a spill occurs, only those persons involved in overseeing or performing spill containment operations will be allowed within the designated hazard areas. If necessary, the area will be roped or otherwise blocked off. Unauthorized personnel are kept clear of the spill area;
- Appropriate PPE is donned before entering the spill area;
- Appropriate spill control measures are applied during spill response. For small spills on pavement or concrete, sorbent materials such as sand, sawdust, or commercial sorbents will be placed directly on the spill to prevent further spreading and aid in recovery;
- Whenever possible without endangerment of personnel, the spill is stopped at the source or as close to the source as possible;
- Ignition points are removed if fire or explosion hazards exist;
- Surrounding reactive materials are removed;
- Drains or drainage in the spill area are blocked or surrounded by berms to exclude the spilled waste and any materials applied to it;
- Provisions are made to contain and recover a neutralizing solution, if used;
- Small spills or leaks from a drum, tank, or pipe will require evacuation of non-essential personnel from the spill to allow clean-up and to prevent employee exposure;
- Spill area is sprayed with appropriate foam where the possibility of volatile emissions exists;
- If the spill results in the formation of a toxic vapor cloud, from vaporization, reaction with surrounding materials, or the outbreak of fire, further evacuation may be required;
- To dispose of spill waste, all contaminated sorbents, liquid waste, or other spill clean-up will be placed in small quantities in approved drums for proper storage or disposal as hazardous waste;
- Inform the Project Manager or Site Supervisor of the spill, location, contents, quantity, etc.; and
- Spills that cannot be managed safely by onsite personnel will require support from National Grid's emergency contractor, Miller Environmental. If this is the case, call the National Grid Project Manager and the AECOM Project Manager to organize additional help.

9.1.5 Post Spill Evaluation

As part of the incident investigation and reporting documentation, a written spill response report shall be prepared at the conclusion of clean-up operations. Additional report information required by National Grid is outlined in **Attachment A**. The AECOM report will include, at a minimum, the following information:

- Date of spill incident;
- Cause of incident;
- Spill response actions;
- Any outside agencies involved, including their incident reports; and
- Lessons learned or suggested improvements.

The spill area is inspected to ensure the area has been satisfactorily cleaned. The use of surface and air sampling is utilized in this determination as necessary. The root cause of the spill is examined, and corrective steps taken to ensure the engineering and control measures in place have performed as required. If alternative precautions or measures are needed, they are made available and implemented.

All durable equipment placed into use during clean-up activities is decontaminated for future utilization. All spill response equipment and supplies are re-stocked as required.

10. Personal Protective Equipment

PPE is considered the last line of defense in hazard control. PPE is meant to protect workers when all other methods (elimination, substitution, engineering, and administrative) have been exhausted. All employees must be trained in the proper use and maintenance of PPE. See Procedure S3AM-208-PR, Personal Protective Equipment.

A PPE assessment (see S3AM-208-FM1) can be performed to help determine PPE requirements. PPE upgrades for individual tasks or steps of a task are to be identified in appropriate THAs.

Minimum Required PPE (per AECOM PPE and HAZWOPER Procedures):

- Hard hat
- Safety glasses w/ side shields (may be clear or shaded)
- Safety toe work boots
- Long pants and shirts with sleeves (short or long- cover shoulders no tank or muscle shirt styles)

Please refer below for Site-specific PPE:

Additional PPE Needed On-Site

Face/ Eyes

- ☐ Spoggles (Safety Glasses with foam liner for dust protection)
- ☐ Welding Mask/Goggles
- ☐ Chemical Goggles
- ☐ Face Shield (splash)
- ☐ Face Shield (impact)

Head/ Ears

- ☐ Helmet with Chin Strap
- ☐ Wide Brimmed Hat
- ☒ Earplugs
- ☒ Over-ear Hearing Protection

Hands

- ☒ Nitrile
- ☒ Leather
- ☐ Cut, Abrasion and Puncture Resistant
- ☐ Impact-resistant
- ☐ Other Chemical Resistant : *(specify)* _____

Legs/ Feet

- ☐ High Ankle Boots
- ☐ Snake Guards
- ☐ Rubber Boots/Waders
- ☐ Metatarsal Guards
- ☐ Electrically-resistant boots

Body

- ☒ Sunscreen
- ☐ Insect Repellent (DEET)
- ☐ Permethrin Applied to Clothing
- ☒ Long-sleeved Shirt
- ☒ High-visibility Vest
- ☐ High-visibility Pants
- ☒ Disposable Coveralls
- ☐ Flame Retardant Clothing
- ☐ Fall Protection
- ☐ Personal Floatation Device
- ☒ Other: *(specify)* Face Covering (COVID-19 precaution, refer to THA in **Attachment I**)

Equipment

- ☒ **Air/Noise Monitoring Equipment:** *(specify)* See Section 8.4.1
- ☒ **Traffic/Work Zone Control Equipment:** *(specify)* Traffic Cones
- ☐ **Communication Beyond Cell Phones:** *(specify)*
- ☐ **Fire Controls:** *(specify)* Fire extinguisher

11. Site Control

The purpose of site control is to protect the public from inadvertently coming into contact with site hazards and to protect AECOM employees from being impacted by hazards. This section details the equipment and actions needed to promote optimal Site control.

11.1 Site Work Zones

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

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

Check the description of the site controls **already** in place:

- ☒ Work area is within a facility/ property with secure and restricted access provided by client or third party
- ☐ Work area is enclosed within facility/ property, but access is not restricted via locks, guards, or gates
- ☐ Work area is on a property that is open and access by the public is likely
- ☐ Work area is on a property that is open but access by the public is unlikely
- ☐ Work area is in a roadway or right of way of a roadway (Traffic Control Plan required S3AM-306-PR)
- ☐ Work area is on or near railroad (including right of way, active lines, and crossings)
- ☐ Other: *(describe)*

_____

_____

Check and describe the site controls that need to be added to protect the public and the AECOM work team.

	Control Item	Description of Type and Application
☐	**Fence**	
☐	**Locks**	
☐	**Barricades**	
☒	**Cones**	Cones will be applied if working adjacent to a road.
☒	**Tape**	Caution tape will be used to establish a barrier around the work zone during heavy equipment use.
☒	**Hole Covers**	Boreholes left open overnight will be covered with a steel plate or other acceptable means.
☐	**Other:**	

11.2 Site Control Map/ Diagram

As individual tasks within this project vary in location and scope (i.e., inspections, test pits, etc.), a single diagram showing the EZ, CRZ, muster location, etc. is not practical. Such controls will be established on a task by task basis.

11.3 Simultaneous and Neighboring Operations

Simultaneous and neighboring operations present a need for added coordination and communication to address hazards that are presented by multiple operations.

	Activity/ Company	Hazard	Controls/Mitigations and Communication Methods
Simultaneous Operation *(within the site)*	Warehousing and lumber yard	Working in an active storage area	Coordinate with supervisor of warehousing and lumber yard activities when performing work
Neighboring Operation *(outside/ bordering the site)*	NA		

11.4 Site Security

All projects should be reviewed for the potential for personal security issues (e.g., assault, robbery, threat, etc.). Check all of the following that apply:

- ☒ Project site located in a higher crime area or has a history of security incidents
- ☐ Working outside of regular cellular telephone service
- ☐ Idle property with potential for trespasser(s) to shelter in buildings/structures and assault personnel
- ☐ Working at night

If possible, all equipment will be off-Site at the end of each workday. If a piece of equipment cannot leave the Site, then that piece equipment will be secured as not to be stolen or tampered (i.e., locked).

12. Emergency Response

AECOM requires that all projects plan for reasonably foreseeable emergencies (see Emergency Response Planning Procedure S3AM-010-PR). Prior to the start of site operations, all personnel shall review the table below for site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures. An Incident Response Flow Chart is included in **Attachment A**.

12.1 Incident/ Emergency Contact Information

AECOM Contacts			
Name	**Title**	**Telephone Number**	**Mobile Phone**
Kevin Connare	Project Manager	(716) 861-7661	(716) 861-7661
TBD	Site Supervisor	TBD	TBD
TBD	Site Safety Officer (unless when provided by client)	TBD	TBD
Lisa Rygiel	SH&E Director	720-621-2211	
Pete Wray	Northeast EBL SH&E Manager	302-660-9178	
Incident Reporting	DCS Incident Reporting & Help Line	800-348-5046	
AECOM Nurse direct	Use only after incident reporting line	512-419-5016	
Client Contacts			
Name	**Title**	**Telephone Number**	**Mobile Phone**
Donald Campbell	Client Project Manager	718-963-5453	347-452-5973
William Ryan	National Grid SIR Regional Safety Lead	516-545-2586	516-790-1660
Organization/Agency			
Police Department (local)			911
Fire Department (local)			911
Ambulance Service (EMT will determine appropriate hospital for treatment)			911
Hospital: (Site personnel to use for emergency care) Brooklyn Hospital Center,121 Dekalb Ave, Brooklyn, NY 11201			718-250-8000
Occupational Clinic: (Site personnel to use for non-emergency care) Mobile Health,50 Court Street, Brooklyn, NY 11201			718-865-3643
Poison Control Center			800-222-1222
Pollution Emergency NYSDEC Spill Hotline			800-457-7362
INFOTRAC (AECOM's account number 74984)			800-535-5053
AECOM Hazardous Material Shipping Help Line			800-381-0664
Public Utilities			
ConEd (Gas/Electric)			800-752-6633
National Grid (Gas)			718-963-5612

Time Warner Cable Company (Cable)	718-888-4261
New York City Department of Environmental Protection Bureau of Water Distribution (Water)	718-595-6616
New York City Department of Environmental Protection Sewer Regulation and Control (Sewer)	718-286-2610
New York City Fire Department Bureau of Fire Communication (Fire)	718-624-3752
Cablevision Systems of New York (Cable)	718-975-1713
Verizon (Phone/Internet)	718-977-8130
AT&T (Phone)	914-397-3744
Call Before You Dig	811

12.2 Muster Location

TBD – dependent on active investigation location (i.e., 218 Front Street or 171 York Street).

12.3 Communication Procedures

Cell phones and others as dictated by the work assignment and THAs will be used for emergency communications between all project personnel.

12.4 Incident Reporting

Incidents involving or affecting an AECOM employee, subcontractor or National Grid contractor will be reported in a prompt manner verbally to the site supervisor and project manager.

1. If the incident is a significant or life-threatening emergency, the employee or supervisor shall immediately dial 911 or the appropriate emergency contact phone number for your site.
2. The employee or supervisor shall contact the Incident Hotline (800-348-5046).
3. The employee or supervisor must notify their operational leaders and the Area SH&E Manager.
4. The supervisor, or delegate, must make initial notification in IndustrySafe within 4 hours for significant incidents, or 24 hours for less significant events event.
5. Client and account management notifications may also apply. **Per the National Grid Incident Reporting Requirements in Attachment A**, “The Incident Reporter will notify the Project-Specific National Grid Project Manager (PM) verbally within 1 hour of the incident”. This is for all incidents, not just "significant" ones.

Any injury, even if no treatment is required, and any incident for which assistance by SH&E Management is needed must be immediately communicated to the Incident Hotline at 1-800-348-5046.

All incidents are also to be reported to IndustrySafe within the timeframes listed below:

Incident Type	IndustrySafe Reporting Time Frame
Significant Incident, including any injury	➔ 4 Hours
All Other Incidents	➔ 24 Hours

Significant Incident:

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

All Other Incidents:

- Any injury or illness to an AECOM employee, subcontractor or National Grid contractor, even if it does not require medical attention, including work-related injuries/illnesses that have become significantly aggravated by the work environment;
- An injury to a member of the public, or clients, occurring on an AECOM-controlled work site;
- Re-occurring conditions such as back pain or cumulative trauma disorders (e.g., carpal tunnel syndrome);
- Fire, explosion, or flash that is not an intended result of a planned event (e.g., remediation process, laboratory Procedure);
- Any incident involving company-owned, rented, or leased vehicles (including personal vehicles used for company business); and/or
- Any failure to comply with the requirements of a regulatory permit issued to AECOM.
- Scan the QR code below to access IndustrySafe reporting system from your smartphone/ device.

IndustrySafe
Safety Management Software

12.5 Medical Emergencies

In the event of a life-threatening or critical emergency, AECOM employees should dial 911 and follow the recommended instructions. However, in less serious situations, an injured employee or a co-worker should contact the Incident Hotline at 800-348-5046 to ensure that the employee receives the best care at the best time (i.e., within the first hour following an injury or potential injury). By contacting the Incident Hotline, the worker can be connected with AECOM’s nurses for first aid advice. If recommended by the nurse, the supervisor or a co-worker should drive the injured employee to the project-designated clinic or

hospital. A map to the designated hospital and clinic is attached as **Attachment A** and the locations and addresses are included in the table above as well as in the HASP Summary on Page i.

12.6 Vehicle Incidents

All vehicles should be rented through TripActions (accessible via Ecosystem) to ensure that AECOM insurance is included in the rental rate. All other insurances should be declined. AECOM's rental vehicle insurance policy for National/Enterprise or Avis can be found on the DCS Americas United States or Canada travel pages. **Drivers MUST print and carry the applicable insurance policy for the rental**.

The most recent Certificate of Liability Insurance for AECOM's rental car partners are in **Attachment H** and can be found at: "https://myecosystem.aecom.com/dept/travel/a/usa/Pages/default.aspx?SectionId=49" on the right side of the screen under "Vehicle Insurance- U.S."

In the event of a vehicle incident (including collisions as well as mechanical difficulties such as breakdowns and flat tires) the following responses are recommended:

- For breakdowns and flat tires, contact an emergency provider.
- For rental vehicles, contact the rental company.
- To the extent possible, AECOM personnel should not change flat tires or perform similar repairs.
- If a collision has occurred, assess the situation and move all occupants (except the injured) out of further harm's way. If safe to do so, remove the car from the traveled way. Call 911 if necessary and report the incident to the Incident Hotline at 800-348-5046 as soon as practical. If appropriate, wait for police to arrive before moving vehicles. Provide insurance information to other drivers if necessary or requested and collect the same. If possible, obtain names and phone numbers of witnesses. Take photographs of the scene if possible. DO NOT ADMIT LIABILITY, AGREE TO PAY FOR DAMAGE, OR SIGN A DOCUMENT RELATED TO AN INCIDENT EXCEPT AS REQUIRED BY LAW.

12.7 Fire

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

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

12.8 Pandemic Precautions

AECOM and National Grid recognize the widespread incidents of COVID-19 caused by a novel coronavirus that started in the United States in early 2020. New York State has issued various executive orders and directives that will be updated throughout

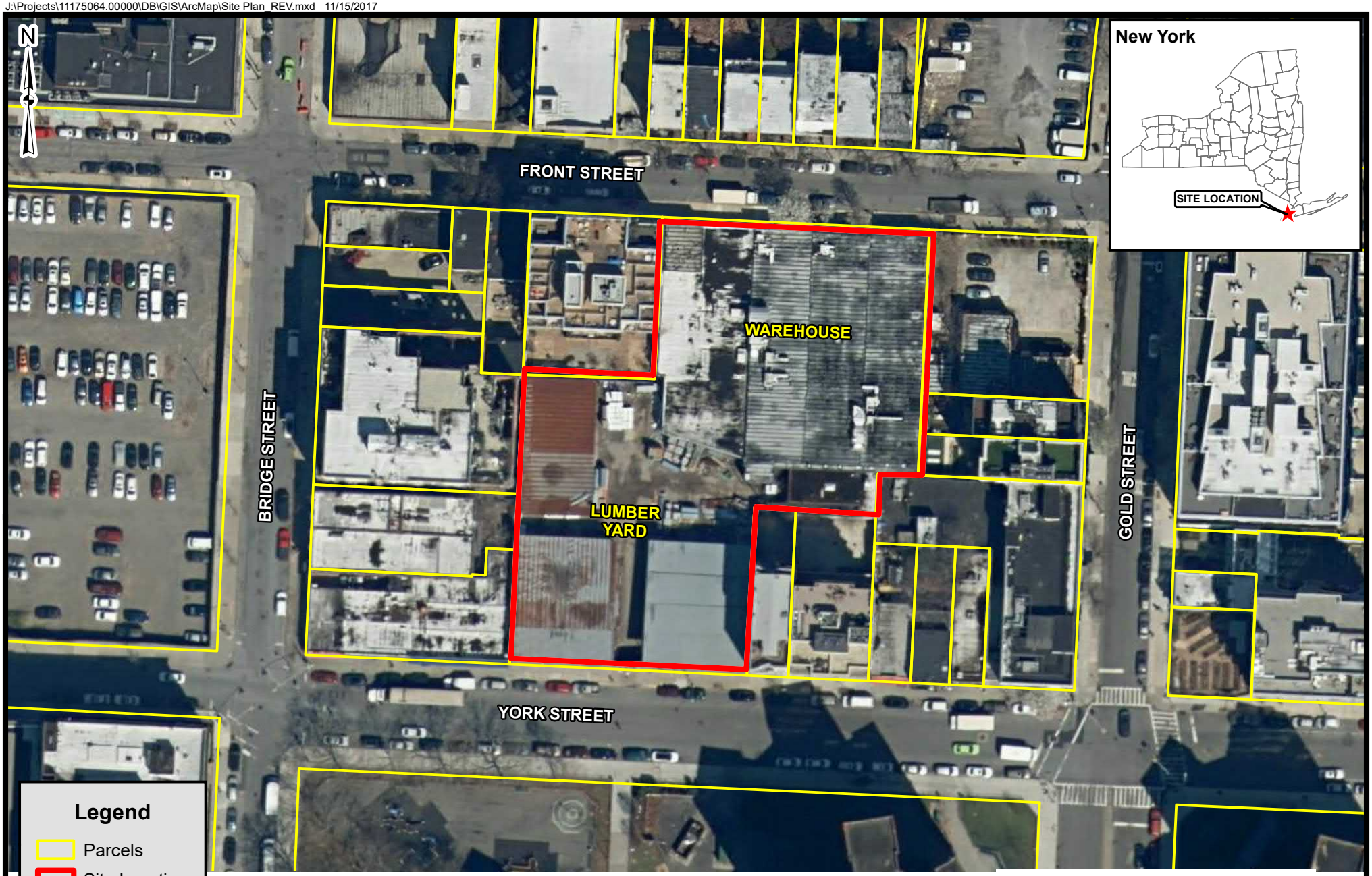
this disease outbreak, employees can find the latest information on the following New York State website: https://coronavirus.health.ny.gov/home.

Work and Site visits will be coordinated with the AECOM and National Grid Project Managers and will be allowed if it is safe to do so. Guidance and training has been developed to ensure the safest work and interaction procedures. Refer to **Attachment I** for the AECOM *Pandemic Procedures* and COVID-19 THAs. In addition, the National Grid COVID-19 Health & Safety Plan is provided in **Attachment J**. The National Grid HASP is to be read by all project personnel and referenced in conjunction with AECOM guidance. These documents will be updated as new information becomes available.

The status of the pandemic and the risks of COVID-19 will be monitored by AECOM and National Grid, and responses may be modified due to evolving circumstances.

Figures

J:\Projects\11175064.00000\DB\GIS\ArcMap\Site Plan_REV.mxd 11/15/2017



AECOM

FRONT STREET FORMER GAS HOLDER SITE
SITE LOCATION MAP

FIGURE 1

J:\Projects\11175064.00000\DB\GIS\ArcMap\Site Plan Area of Concern_REV.mxd 11/13/2017

AECOM

FORMER FRONT STREET HOLDER STATION SITE PLAN

FIGURE 2

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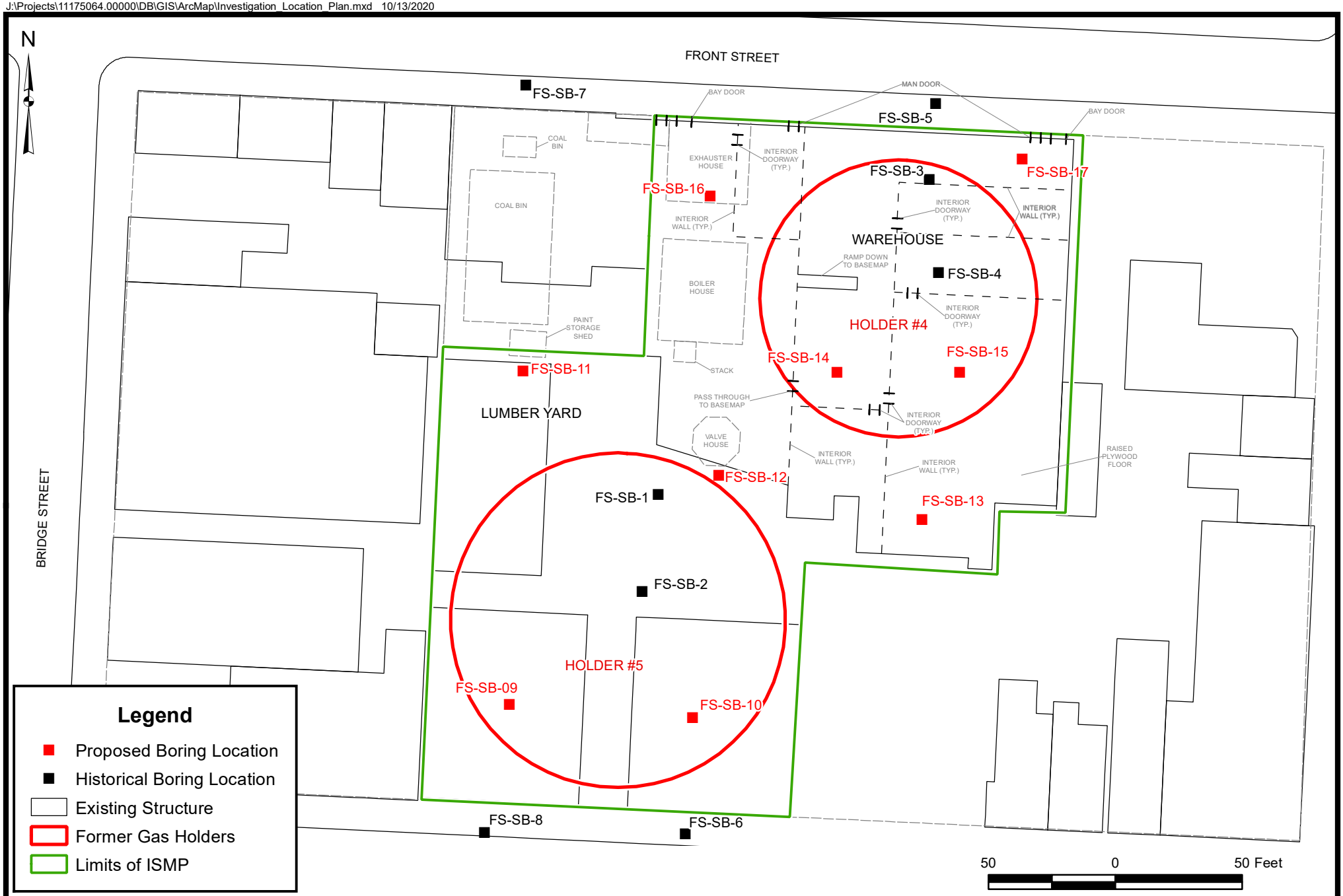


AECOM

FORMER FRONT STREET HOLDER STATION
PROPOSED INVESTIGATION LOCATION PLAN

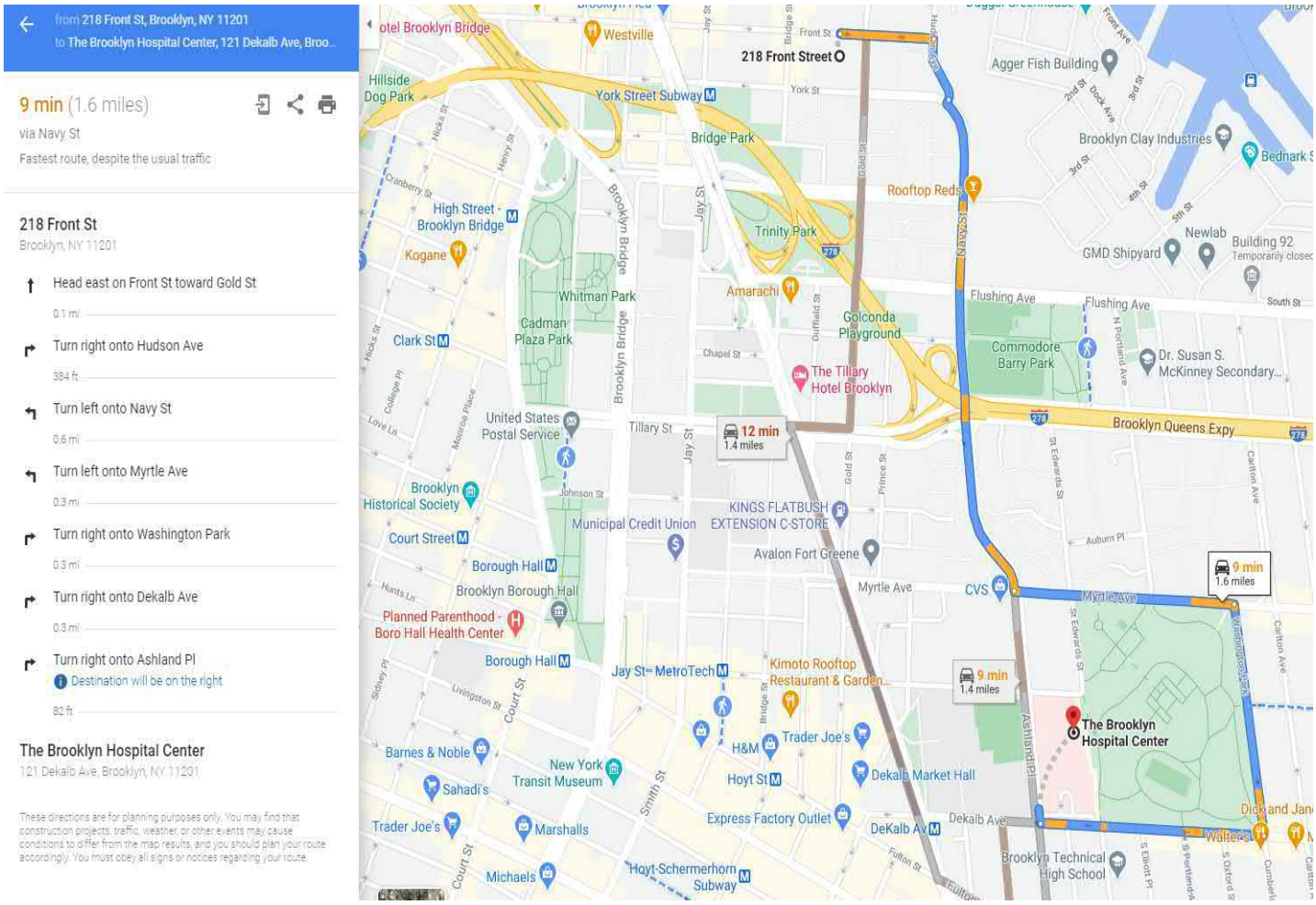
FIGURE 3

Attachment A

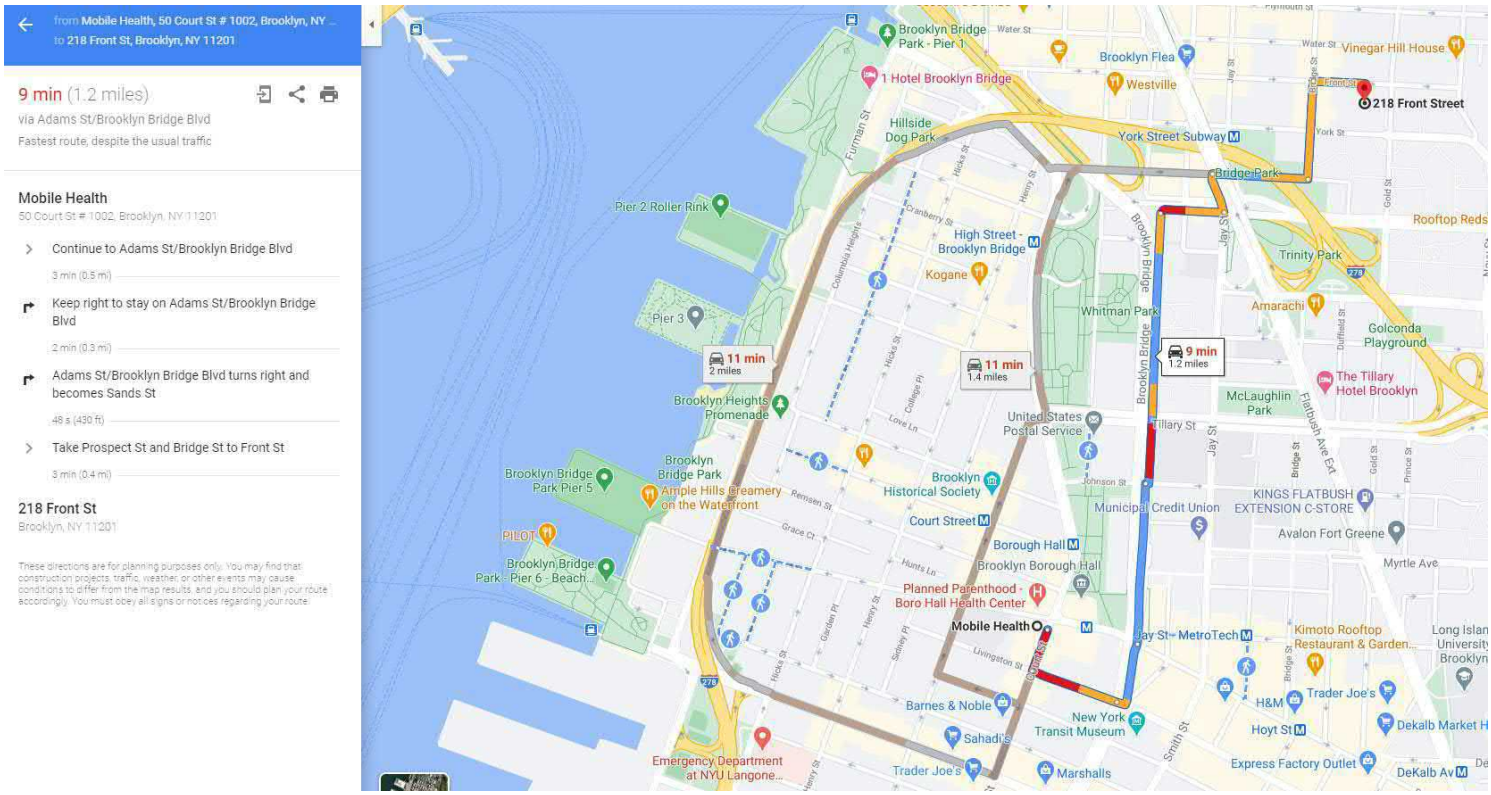
Hospital and Clinic Directions/ Maps; Incident Reporting and Response Flow Chart; National Grid Incident Reporting Requirements

Attachment A — Hospital and Clinic Directions/ Maps; Incident Reporting and Response Flow Chart; National Grid Incident Reporting Requirements

Brooklyn Hospital Center, 121 Dekalb Avenue, Brooklyn, New York; Ph: 718-250-8000



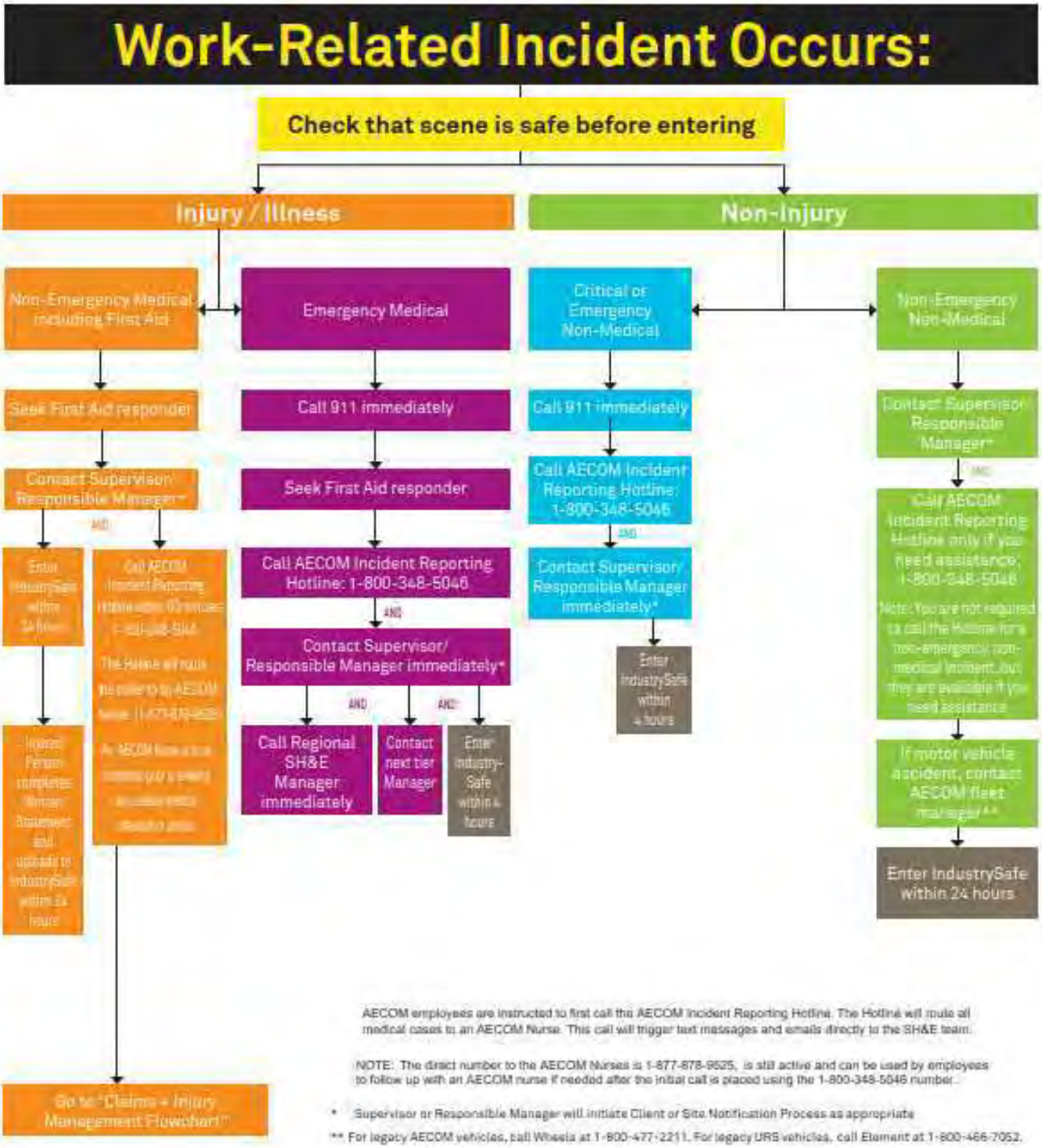
Mobile Health, 50 Court Street, Brooklyn, New York; Ph: 718-865-3643



AECOM

Work-Related Incident Flowchart for Employees

DCS - Americas



AECOM employees are instructed to first call the AECOM Incident Reporting Hotline. The Hotline will route all medical cases to an AECOM Nurse. This call will trigger text messages and emails directly to the SH&E team.

NOTE: The direct number to the AECOM Nurses is 1-877-878-9525, is still active and can be used by employees to follow up with an AECOM nurse if needed after the initial call is placed using the 1-800-348-5046 number.

* Supervisor or Responsible Manager will initiate Client or Site Notification Process as appropriate

** For legacy AECOM vehicles, call Wheels at 1-800-477-2211. For legacy URS vehicles, call Element at 1-800-466-7052.

Attachment B

AECOM SH&E Procedures

Attachment B AECOM SH&E Procedures

	Hazard/ Activity *(note: text in this column links to procedure)*	Site Specific Description *[where, what phase of work, frequency, etc.]*	Applicable Procedure
☒	**Biological – Pandemic Procedures**	All Field Activities.	SR1-003-PR2
☒	**Bloodborne Pathogens**	First aid providers.	S3AM-111-PR
☒	**Cold Stress**	Working during winter.	S3AM-112-PR
☒	**Corrosive Reactive Materials**	Handling pre-preserved bottle ware for sampling.	S3AM-125-PR
☒	**Drilling, Boring & Direct Push Probing**	Installing borings and monitoring wells.	S3AM-321-PR
☒	**Electrical Safety**	Working with generators and batteries.	S3AM-302-PR
☒	**Flammable and Combustible Liquids**	Portable generator.	S3AM-126-PR
☒	**Hand and Power Tools**	Accessing monitoring wells.	S3AM-305-PR
☒	**Hazardous Waste Operations**	Generating hazardous investigation derived waste (IDW).	S3AM-117-PR
☒	**Heat Stress**	Working during summer.	S3AM-113-PR
☒	**Heavy Equipment**	Working alongside drilling equipment.	S3AM-309-PR
☒	**Highway and Road Work**	Working alongside roadways and sidewalks.	S3AM-306-PR
☒	**Powered Industrial Trucks**	Forklifts operating at the on-Site warehouse and lumber yards by third parties	S3AM-324-PR
☒	**Underground Utilities**	Drilling and test pit excavations.	S3AM-331-PR
☒	**Wildlife, Plants and Insects**	Sampling and monitoring wells.	S3AM-313-PR
☒	**Driving**	SH&E Procedures for general awareness as referenced in HASP	S3AM-005-PR1
☒	**SH&E Training**		S3AM-003-PR1
☒	**Fitness for Duty**		S3AM-008-PR1
☒	**Fatigue Management**		S3AM-009-PR1
☒	**Substance Abuse Prevention**		S3AM-019-PR1
☒	**Hand Safety**		S3AM-317-PR1
☒	**Safe Alternative Tools**		S3AM-317-ATT1
☒	**Hazardous Materials Communication**		S3AM-115-PR1
☒	**Stop Work Authority for Unsafe Work**		S3AM-002-PR1
☒	**Subcontractor Management**		S3AM-213-PR1
☒	**Medical Screening Surveillance**		S3AM-128-PR1
☒	**Competent Person Designation**		S3AM-202-PR1
☒	**Exposure Monitoring**		S3AM-127-PR1
☒	**Environmental Compliance**		S3AM-204-PR1
☒	**Personal Protective Equipment**		S3AM-208-PR1

AECOM Global

Pandemic Procedure

SR1-003-PR2

1. Purpose and Scope

Providing the requirements for preparation and planning for potential pandemic emergencies that may occur while AECOM staff are working.

Applies to all AECOM staff working inside and outside an AECOM office, including location and project environments as well as business related travel.

2. Background

2.1 Pandemic

A pandemic virus emerges because of a process called antigenic shift, which causes an abrupt or sudden and major change in flu-like viruses. Public health officials closely monitor the movement of flu-like viruses through avian and swine populations. The public health fear is that the virus may obtain the ability to shift and incorporate the ability to infect humans directly through human-to-human contact. At that point, the threat of a regional epidemic, or a global pandemic may be realized.

Flu-like viruses can weaken the immune system, making the person more vulnerable to serious infections such as pneumonia, or can worsen chronic medical conditions. Public health officials watch both avian and swine flu outbreaks closely to monitor potential for an antigen shift and progression to a human transmissible disease.

Government health agencies continually monitor flu-like viruses and other diseases worldwide. Human cases are reported and updated by the World Health Organization (WHO) and U.S. Centers for Disease Control (CDC). This information is used by responsible government agencies for planning and response actions as required to minimize the spread and effects of disease outbreaks. It is important that information provided by CDC or WHO is made available to employees when there is potential for impact on work conditions or local community health.

2.1.1 Swine Influenza

Influenza A (H1N1) is a flu virus of swine origin that first caused illness in March and April, 2009. Influenza A (H1N1) flu spreads in the same way that regular seasonal influenza viruses spread, mainly through the coughs and sneezes of people who are sick with the virus, but it may also be spread by touching infected objects and then touching your nose or mouth. Influenza A (H1N1) is now established in human populations as a seasonal influenza virus. There is an Influenza A vaccine available for humans.

2.1.2 Avian Influenza

Avian influenza (bird flu) occurs mainly in wild birds but can spread to domestic birds and can cause outbreaks. Human cases are rare but have occurred from direct close contact with infected birds and poultry or contaminated materials. There is no vaccine available for humans related to this virus at this time.

2.1.3 Coronavirus

Coronavirus (COVID-19) is the result of a virus identified as SARS-CoV-2. Coronaviruses are large family of viruses found in both animals and humans. Some infect people and are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) with symptoms such as fever, cough and shortness of breath. There currently is no human vaccine available for this virus.

2.2 Flu-Like Contingency Planning

2.2.1 Roles & Responsibilities of Governing Agencies

2.2.1.1 Global Health Monitoring

The WHO coordinates health issues for the United Nations and provides leadership on global health matters. The WHO assists member nations with recommendations regarding global pandemics and declares global pandemic phases to help organizations to plan for the impacts. The major phases are:

a. Phase 1:	No viruses circulating among animals have been reported to cause infections in humans.
b. Phase 2:	An animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.
c. Phase 3:	An animal or human-animal flu-like reassortment virus (the process by which viruses swap gene segments) has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver.
d. Phase 4:	There is verified human-to-human transmission of an animal or human-animal flu-like reassortment virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed, and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
e. Phase 5:	There is human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
f. Phase 6:	The pandemic phase is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.
g. Post-peak period:	During the post-peak period, pandemic disease levels in most countries with adequate surveillance will have dropped below peak observed levels. The post-peak period signifies that pandemic activity appears to be decreasing; however, it is uncertain if additional waves will occur and countries will need to be prepared for a second wave.
h. Post-pandemic period:	Flu-like disease activity will have returned to levels normally seen for seasonal flu-like illness. At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required.

2.2.1.2 Country Specific Pandemic Plans

Most nations have developed pandemic plans that include monitoring the regional spread of disease, the recommended medical practices, and related guidance. AECOM operations outside the US must keep abreast of country specific requirements and recommendations.

2.2.1.3 United States

The federal government is responsible for coordinating a nationwide flu-like pandemic response.

a. The U.S. Department of Homeland Security coordinates all non-medical support and response actions.

b. The Department of Health and Human Services (HHS) coordinates overall public health and medical emergency response. Under Executive Order 13295 (revised April 1, 2005), the Secretary of Health and Human Services has the authority for apprehension, detention and conditional release of individuals to prevent the spread of a flu-like illness caused by a novel or re-emergent flu-like virus that causes or has the potential to cause a pandemic. Under HHS, the CDC is responsible for controlling the introduction and spread of infectious diseases and provides information to help health care providers, public health officials and the public. CDC's Division of the Strategic National Stockpile (SNS) distributes antiviral drugs, personal protective equipment, and respiratory protection devices to all 50 states and U.S. territories to help them respond to outbreaks.

c. Under the Department of Defence (DOD) Directive 6200.3, military facilities require identification of a Public Health Emergency Officer who coordinates Military Treatment Facilities emergency response plans with local emergency planning.

2.2.1.4 State and Local Governments

Each state has authority to manage and respond to pandemic conditions. It is important that projects and offices contact their local and state governments for emergency contact information.

3. Procedure and Responsibilities

AECOM Managers, HR (Human Resources), SH&E (Safety, Health and Environment) including Occupational Health, Legal Counsel, and Resilience Coordinators will collaborate and drive efforts to plan for, respond to, manage and recover from pandemic disruption to the business. This collaboration may also require input and cooperation from various other support functions who should be consulted in a timely fashion in order to expedite a return to normal business operations or to provide alternate solutions such as remote work. In the event of a declared Stage 5 or Stage 6 of a Pandemic event, the AECOM Managers, HR, SH&E, Occupational Health, Legal Counsel and Resilience Coordinators will make decisions and take necessary steps to protect the business from the pandemic, up to, and including, travel bans to/from certain areas, telecommuting, and other decisions as needed for business continuity with a focus on the health and welfare of the employee. Local Resilience Teams will take the lead in responding to pandemic-related business disruptions with overarching guidance provided by Global Resilience.

3.1 Corporate Roles and Responsibilities

AECOM offices will be prepared to respond to either a global, national or regional pandemic condition in accordance with the Organizational Resilience Standard - AECOM Global. The standard provides the common platform to organize mission-critical, Resilience Teams to prepare for, actively navigate and / or recover from significant business disruptions. It also provides the context for plans and procedures to minimize any impact on AECOM's business in terms of severity and duration.

3.1.1 Prevention and Containment

a. If a pandemic condition exists or is imminent within a local office or field location, consult the location specific Emergency Response Plan (ERP) or Business Continuity Plan for immediate response guidelines.

b. Upon notification from State Emergency Planning agency that a national or regional pandemic condition exists or is reasonably expected to occur, the facilities and administration teams working with the SH&E Department will provide sufficient and accessible infection control supplies in all local affected business locations in keeping with AECOM's Infectious Disease and Pandemic Cleaning Instruction - AECOM Global.

c. Face masks may be supplied, if recommended by WHO/CDC. Supplies of anti-viral medications will not be stockpiled, distributed, or administered unless specified by community health administrators.

d. Annual influenza vaccinations are encouraged.

e. As applicable, communications through email or intranet, training programs, or work place postings may be utilized to provide information concerning prevention and containment. Information may include, but is not limited to:

   i. Initial symptoms of the disease, disease prevention techniques, how to respond if an individual suspects infection and when return to work is appropriate after the illness.

   ii. Personal practices and habits for minimizing exposure, such as: frequent hand washing, avoiding exposing other employees when sick, annual flu vaccinations if appropriate, and consulting a personal physician to determine personal risk.

   iii. Social distancing techniques such as minimizing large group gatherings, reducing employee face-to-face meetings through the use of video / phone conferencing/ Microsoft Teams, and eliminating unnecessary travel during severe outbreaks.

   iv. Flexible worksite and flexible work hours options should be implemented as appropriate.

   v. Employees shall notify their supervisor if they are going to miss work because of illness. Information concerning sick leave and health benefits can be obtained through the employee's HR representative, by consulting applicable policies and procedures specific located on the AECOM Integrated Management Systems (IMS) platform, and through MyHR.

   vi. As applicable, business and meeting travel may be limited to "business essential" only.

   vii. Management will notify any applicable clients or suppliers of potential business impacts that may be experienced as a result of a pandemic. Management will update clients/suppliers once operations are restored to full capacity.

3.1.2 Anti-Viral Medication

a. Media coverage of flu-like outbreaks has focused on the availability of oral anti-viral medications (not vaccines). These prescription medications are known to help with treating uncomplicated flu-like virus effects in limited applications. There are potential side effects of the drugs, and some viruses have shown resistance to the drug.

b. Based on this information, unless legally mandated by a country's government, AECOM will not attempt to stockpile sources of anti-viral drugs to be used for employees in the event of a pandemic. Resources of these drugs may be maintained by a country's National Strategic Stockpile.

c. Employees should contact their personal health care provider regarding recommendations for support medications that may be necessary in the event of a flu pandemic.

3.2 General AECOM Employee Guidelines

3.2.1 Employee Illness

a. Employees should report the illness to your Supervisor immediately.

b. Employees who are ill with flu-like symptoms (Fever >100.4 F/38 C, cough, shortness of breath0 should stay home. If they have a fever, they should stay home until at least 24 hours after they are free of fever without the use of fever reducing medications.

c. Employees should not travel if they are ill.

d. Employees who become sick during work hours should immediately go home.

e. Employees at higher risk of complications, or who become seriously ill, should contact their health care provider immediately.

3.2.2 Employee Family Member Illness

a. Employees who are well but who have a family member at home with the flu may choose to stay home or can go to work as usual. Employees with ill family members should monitor their health daily before coming to work and stay home if they become ill.

b. Employees who choose to stay home to care for ill family members should contact their supervisor or HR representative to discuss flu-related issues such as using sick time/paid time off or if telecommuting is an option.

c. Employees should not bring an ill family member with them to the office, even for brief periods.

3.2.3 Supervisors

a. If an employee calls in sick because of the flu or a flu-like illness, the supervisor is to advise them to stay home. Expect employees to be out of work for 3-5 days (in most cases). Additional quarantine may be required based on the recommendations of CDC / WHO.

b. Should the supervisor be informed by the employee that he/she has the flu or flu-like symptoms, the supervisor should report the employee illness to HR and SH&E representative only, maintaining the employee's privacy.

c. Because symptoms may not appear until after an incubation period, (24 hours prior to symptoms), the supervisor should try to account for any close contacts (3ft/1m for 30 minutes) the affected employee might have had in order to evaluate if co-workers may have been exposed. Report the potential exposure of co-workers to your HR or SH&E representative.

d. Do not allow employees with the flu or flu-like symptoms to remain at work. In-office quarantine (isolation) of an employee with flu-like symptoms (e.g., work in a secluded office area) is not permitted.

Important Reminder: **The names of employees who are ill with the flu are CONFIDENTIAL and can only be discussed with HR representatives or company nurses.**

3.2.4 HR or SH&E Representatives

a. During Phase 5 and 6 of a potential / actual Pandemic, the SH&E representative will track cases of flu illness at your location using the Coronavirus Affected Employee Form obtained from the AECOM Occupational Health Nurse and submit to nurse@aecom.com upon identification of employee/s who are confirmed positive for the virus, exhibiting symptoms of the virus or on self-quarantine and provide updates at least weekly. These numbers also to be reported to your Local Resilience Coordinator (LRC) to allow Resilience Teams (RT) to assess appropriate responses in accordance with the Disruptive Event Response Instruction - AECOM Global. Each state/country has specific resilience reporting contacts located on the Global Resilience Team contact list.

b. Inform fellow employees if a co-worker possibly exposed them to a flu-like illness, while maintaining strict confidentially regarding the identity of the co-worker, so that employees can self-monitor for symptoms and stay home if they become sick. (Sample notification: We have been notified that there has been a potential exposure to the coronavirus in this office/building. As a precaution, it is recommended that all employees potentially affected begin self-monitoring for symptoms and to stay home if you become ill. Ensure that you follow the office procedure for notification of management of unexpected absences). For additional information, refer to the AECOM Global update through the Ecosystem

c. A medical release of a clearance to return to work (following an extended absence) may not be available because of a busy health care system. Requiring a physician's release to return to work should be considered in cases of hospitalization or medical leave of absence in line with local HR protocols.

d. Address staff rumours immediately through investigation and follow-up, then inform management of communication with employee and onward reporting to the Local Resilience Coordinator.

3.2.5 HR Representative

a. Advise employees and supervisors regarding sick time or paid time off options.

b. Discuss with supervisors if telecommuting is an option for the employee.

3.2.6 Managers/SH&E Representative

a. Provide information to staff regarding good hygiene, including cough and sneeze etiquette and proper hand washing. Hold periodic meetings to refresh awareness of prevention measures.

b. Remind employees to check with their health care provider to determine if flu inoculations are recommended.

c. Follow-up with facilities and office managers to provide tissues, disinfectant wipes, hand sanitizers and no-touch receptacles for disposal.

d. Coordinate with facilities managers to arrange for commonly touched surfaces such as doorknobs and countertops to be cleaned frequently in accordance with AECOM's Infectious Disease and Pandemic Cleaning Instruction - AECOM Global.

3.3 Travel Worldwide to Areas Affected by a Pandemic

AECOM's Global Security & Resilience (GSR) shall be consulted to obtain advice, approvals or restrictions, and support, for employees traveling worldwide to and returning from areas affected by a pandemic or potential pandemic. Travel to high risk locations as defined by the Country Risk Score Index will also require approval. AECOM's Corporate guidance can be found on the Ecosystem and is updated weekly.

Persons visiting areas with reports of outbreaks of concern can reduce their risk of infection by observing the following measures:

3.3.1 Before Traveling to an Affected Area

a. Educate yourself and others who may be traveling with you through consultation with AECOM's GSR Travel Security Portal (Drum Cussac) and AECOM's policies and procedures located on the AECOM Integrated Management Systems (IMS) platform.

b. Confirm applicable and routine vaccinations are current. See your doctor or health-care provider, or (for employees) follow the international business and travel requirements on the International Travel Procedure. When traveling from the US, contact our travel resource, WorkCare Travel Consultant directly at 800-455-6155 and outside the US, contact iSOS (International SOS) at +1 215 942 8226 (Membership # 11BMMS000147), ideally 4-6 weeks before travel, to get any additional vaccination medications or information you may need. In many cases, a medical examination may be required prior to travel.

c. Assemble a travel health kit containing basic first aid and medical supplies. Be sure to include a thermometer and alcohol-based hand gel or wipes for hand hygiene. See the AECOM Travel Health- Pack Smart Checklist.

d. Identify in-country health-care resources in advance of your trip. Employees may contact iSOS, HR or WorkCare for assistance in identifying available resources.

3.3.2 During Travel to an Affected Area

a. As with other infectious illnesses, one of the most important preventive practices is careful and frequent hand washing for at least 20 seconds. Cleaning hands often with soap and water removes potentially infectious material from skin and helps prevent disease transmission. Waterless alcohol-based hand gels or wipes may be used when soap is not available, and hands are not visibly soiled.

b. If an employee becomes sick with symptoms such as a fever accompanied by cough and sore throat, or difficulty breathing or if they develop any illness that requires prompt medical attention, a consular officer (refer to the country's representatives on the GSR Travel Portal-Drum Cussac) or iSOS can assist you in locating approved medical services and informing your family or friends. The employee should defer any further travel until they are free of symptoms, unless traveling locally for medical care or instructed to evacuate by your project management, security, or upon advice of occupational health nurses. AECOM employees on foreign travel should notify their HR representative of any serious illness. Local employees should contact their supervisor according to their specified reporting policy.

c. In the event of a flu outbreak, avoid all direct contact with birds or swine and avoid farms and markets. There is the possibility that other animal groups may become reservoirs of the infection in the future so current information from WHO/CDC should be checked for updated guidance.

3.3.3 After Return from Travel

a. Monitor your health for 14 days after return for any fever or breathing difficulties.

b. If you become ill with a fever plus a cough and sore throat, or trouble breathing during this 14-day period, consult your primary care physician. Do not come into work until advised by your primary care physician that it is safe to do so. Communicate the following:

   i. your symptoms;

   ii. where you travelled; and

   iii. if you have had direct contact with animals, birds, or severely ill persons.

c. Do not travel while ill, unless you are seeking medical care. Limiting close physical contact (<3ft/1 meter) with others as much as possible can help prevent the spread of an infectious illness.

4. Help & Training

The following resources provide an overview of AECOM's Organizational Resilience framework and process (titles also available at AECOM University).

a. Global Resilience Team Framework

b. Organizational Resilience: Redefining What's Possible

c. Powering Organizational Resilience through Functional Readiness

d. Resilience Coordinator Overview

e. Resilience Readiness: Disruptive Event Guidance

5. Terms and Definitions

a.	Local Resilience Coordinator	A manager designated as the Office or Worksite lead for local level organizational resilience who may or may not be the emergency response coordinator. The LRC is the point of contact with the Region Resilience Team in determining further action, including notifications, following an initial emergency response.
b.	Pandemic	An epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people as declared by the World Health Organization

c.	Resilience Team (RT)	Interdependent networks of necessary and essential business functions collaborating at the enterprise, region and/or local levels to achieve organizational resiliency. Functions include but are not limited to communications, facilities, finance, human resources (HR), information technology, legal, procurement, safety, health, and environment, and security. Refer to the Organizational Resilience Standard - AECOM Global

6. References

This procedure forms a sub-set of AECOM's overall Organizational Resilience framework and should be read and executed as such. This procedure is to be applied in conjunction with the following Procedures and Instructions.

a. Organizational Resilience Standard - AECOM Global – SR1-003-PR1

b. Disruptive Event Response Instruction - AECOM Global – SR1-003-WI2

c. Infectious Disease and Pandemic Cleaning Instruction – AECOM Global - SR1-003-WI4

7. Appendices

The following appendices are designed to assist business leads, people managers, HR partners, SH&E representatives and Resilience Coordinators assess processes to follow when presented with potentially symptomatic employees, visitors, locations and provide useful resources for communicating prevention methods in the workplace.

a. Appendix 1 – Manager Resilience Checklist.

b. Appendix 2 – Virus Prevention Posters and Flyers

8. Change Log

Rev #	Change Date	Description of Change	Location of Change
0	March 11, 2020	Initial Release as SR1-003-PR2	

Appendix 1 – Manager Resilience Checklist

AECOM Managers Guideline on 2019-nCoV Scenarios						
	CASE	**SUB-CASE**	**What Business Leader should ask the "Case" Employee to do**	**What Business Leader should ask other employees potentially affected by "Case" Employee**	**What Admin should do to the Office**	**Notice and Announcement (To ensure privacy, any notifications/announcements regarding specific cases must be approved by AECOM Legal)**
1	Employee confirmed to have contracted COVID-19.		Employee to stay away from the office and seek medical treatment. Employee may not return to work without medical clearance.	Without disclosing the identity of the infected employee, persons with workstations within 1m/ 3 ft of the "Case" Employee are to observe 14-day quarantine or as recommended by the governing health agency.	Sanitization of whole floor.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
2A	Employee having close contacts (2) with a person of a clinically diagnosed/confirmed case.	Not feeling well/ Exhibiting Sign/symptoms (5).	Employee to not attend work and seek medical attention and observe any quarantine as instructed by governing health agency.	Persons with workstations within 1m/ 3 ft of the "Case" Employee to observe 14-day quarantine in accordance with governing health agency recommendations or provide medical clearance to return to work prior to the end of the quarantine period.	Sanitization of the whole floor.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
2B		Feeling Well/ not exhibiting any signs/symptoms.	Employee to observe 14-day quarantine or as instructed by governing health agency.	Persons with close contact with the "Case" employee to self-monitor. If begin having any symptoms see 2A.	Sanitization over an area of 6m (18 ft) radius from the workstation of the "Case" Employee.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.

AECOM Managers Guideline on 2019-nCoV Scenarios

	CASE	SUB-CASE	What Business Leader should ask the "Case" Employee to do	What Business Leader should ask other employees potentially affected by "Case" Employee	What Admin should do to the Office	Notice and Announcement (To ensure privacy, any notifications/announcements regarding specific cases must be approved by AECOM Legal)
3	Employee being a suspected case (1).		Employee to seek medical attention and observe 14-day quarantine. If at work they should obtain a suitable face-mask as available, notify their supervisor and leave straight away.	Persons with close contact with the "Case" Employee are to observe 14-day quarantine in accordance with governing health agency recommendations or provide medical clearance to return to work prior to the end of the quarantine period.	Sanitization over an area of 6m (18 ft) radius from the workstation of the "Case" Employee.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
4A	Employee visited a location (3) of a confirmed case but had no contact with the confirmed person.	Not feeling well/ Exhibiting Sign/symptoms (5).	Employee to seek medical attention and observe 14-day quarantine or provide medical clearance to return to work prior to end of the quarantine period.	Persons in close contact with the "Case" Employee put under observation – self-observe for COVID-19 Symptoms (6).	Sanitization of the work stations of the "Case" Employee and of persons with close contact.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
4B		Feeling Well/ not exhibiting any signs/symptoms.	Employee put under observation – self-observe for COVID-19 Symptoms.	Persons in close contact with the "Case" Employee put under observation – self-observe for COVID-19 Symptoms.	Sanitization of the work stations of the "Case" Employee and of persons with close contact.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions.

AECOM Managers Guideline on 2019-nCoV Scenarios

	CASE	SUB-CASE	What Business Leader should ask the "Case" Employee to do	What Business Leader should ask other employees potentially affected by "Case" Employee	What Admin should do to the Office	Notice and Announcement (To ensure privacy, any notifications/announcements regarding specific cases must be approved by AECOM Legal)
5A	Employee having close contact with a suspected case, i.e. with a person having symptoms of COVID-19.	Not feeling well/ Exhibiting Sign/symptoms (5).	Employee to seek medical attention and observe self-quarantine until outcome of the suspected case is confirmed and symptoms resolved.	Persons in close contact with the "Case" Employee put under observation – self-observe for COVID-19 Symptoms.	Sanitization of the work station of the "Case" Employee, and of those persons in close contact with the "Case" Employee.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
5B		Feeling Well/ not exhibiting any signs/symptoms.	Employee observes self-quarantine until outcome of the suspected case is confirmed.	Persons in close contact with the "Case" Employee put under observation – self-observe for COVID-19 Symptoms.	Sanitization of the work station of the "Case" Employee.	• Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions.
6A	Employee having visited a location of a suspected case.	Not feeling well/ Exhibiting Sign/symptoms (5).	Employee to seek medical attention and stay home until symptoms resolved.	Persons in close contact with the "Case" Employee put under observation – self-observe for COVID-19 Symptoms or until outcome of the suspected case is confirmed as negative. If "Case" employee confirmed positive, refer to 5A.	Sanitization of the work station of the "Case" Employee.	• *Resilience Team to Inform Organizational Resilience Executive resilience@aecom.com and to issue internal announcement reporting the case and our actions. • Use the Tracking Form to communicate information to Corporate Occupational Injury Management Team by submitting to nurse@aecom.com. • Business Leaders to inform stakeholders who may have employees in contact with a confirmed case.
6B		Feeling Well/ not exhibiting any signs/symptoms.	Employee put under observation – self-observe for COVID-19 Symptoms.	Observe general hygiene.		If condition changes, see above.
7	Employee not of the above cases having fever or feeling unwell but without symptoms of COVID-19.		Employee to stay home until symptoms resolved. Seek medical attention if necessary.	Observe general hygiene.		

Note:

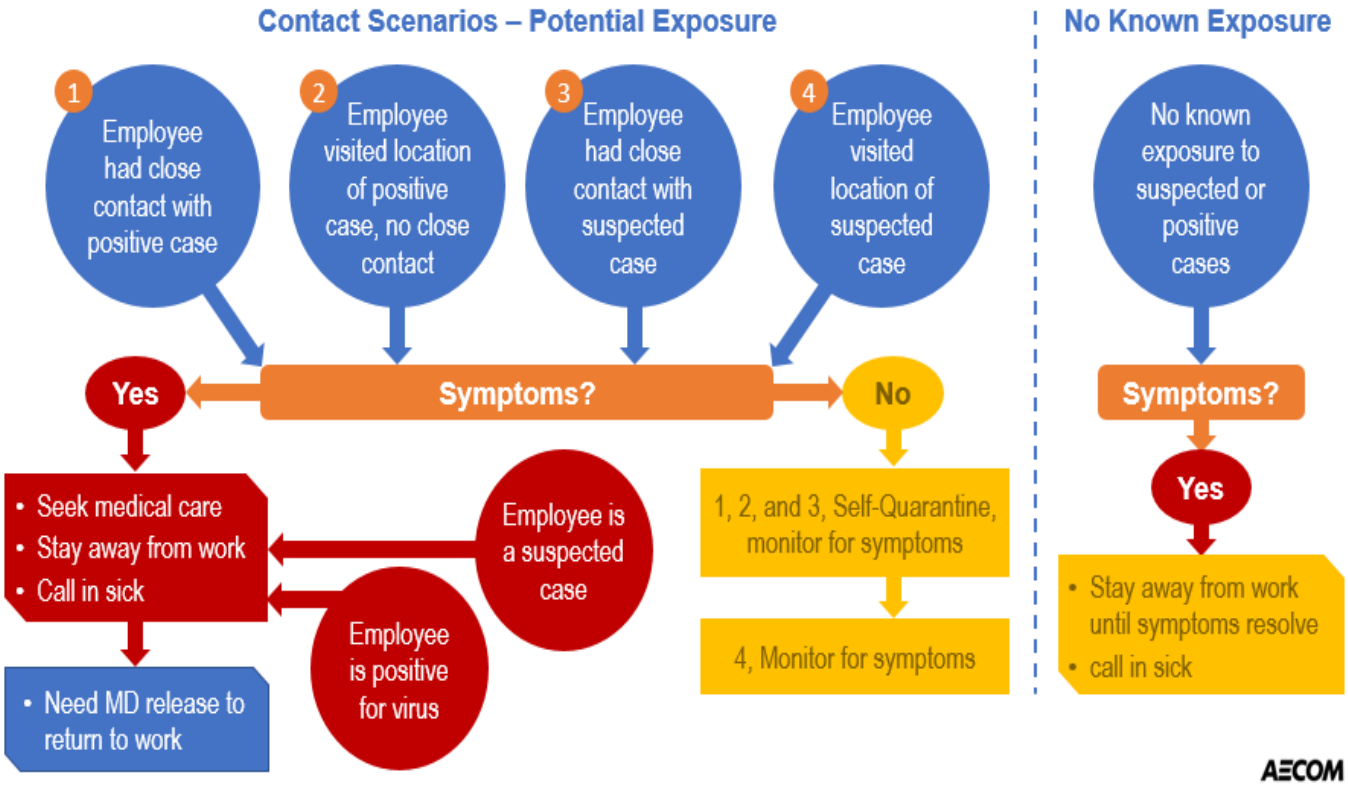
For Cases 1-6, the Employee shall report to the People Manager, HR and Business Unit Leader. The Business Unit Leader shall report to the Regional Resilience Coordinator.

For Case 7, the Employee should report to the People Manager. The People Manager should report to the Business Unit Leader.

1. Definition of Suspected Case: an individual fulfilling the following should report to a local medical facility for further investigation:
    a. Presented with fever OR acute respiratory illness OR pneumonia; AND
    b. any one of the following conditions within 14 days BEFORE ONSET OF SYMPTOMS:
        i. With travel history to Hubei Province* (irrespective of any exposure to a wet market or seafood market); OR other location where COVID-19 is active.
        ii. Visited a medical hospital in an area that has elevated numbers of the virus as identified by the World Health Organization.
        iii. Had close contact with a confirmed case of novel coronavirus infection while that patient was symptomatic.
2. Close contact refers to contact within 1meters (3 ft) for a period ≥ 30 min; or having meeting ≥ 30 min within a confined meeting room regardless of distance.
3. Location refers to, places other than the AECOM Office, the same meeting room or the same confined common area where our Employee and the concerned person (of confirmed or suspected case) have visited during the concerned time and stayed for > 30 min.
4. For all notices and announcements, Business Unit Leader shall give the facts (details of the Case and Sub-case, date, place) to Comms Partner. Resilience Administrator, to inform Comms Partner what action is being taken, or has been planned, on the same date the case is known. Comms Partner will prepare the draft for the Regional Resilience Coordinator. Formal notice and updates to Organizational Resilience Executive via Disruptive Event Briefing Agenda Template - AECOM Global will be issued by the Regional Resilience Coordinator. Business Leaders may forward the announcement to stakeholders (e.g. Client and authorities) as a response to their queries on an as needed basis.
5. Staff feeling unwell or experiencing symptoms who stay home shall apply for leave/PTO. Staff being required to observe quarantine in the above cases will be considered as working from home. Business Leaders to report the status of quarantine and work from home cases to HR and to assess the impact on work progress and efficiency.
6. This guideline provides the minimum requirements to be observed. Business Leaders may exercise discretion to adopt more cautious measures if they consider the case is of a higher risk (e.g. for other staff affected by the concerned employees where close contact is regular/frequent).
7. To ensure privacy, any notifications/announcements regarding specific cases must be approved by AECOM Legal.

This document constitutes internal guidelines compiled based upon general external advice and publications to assist management and staff in dealing with and making management decisions in relation to the Coronavirus (COVID-19). The document should not be construed as providing medical or legal advice and should not be shared outside of AECOM. To the extent that you require any further clarification or have any queries in relation to the content set out therein, please seek further guidance from Legal or the Resilience Team.

AECOM Pandemic Flow Chart



Appendix 2 - Virus Prevention Posters & Flyers

World Health Organization | Patient Safety | SAVE LIVES Clean Your Hands

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE: USE HANDRUB

Duration of the entire procedure: 40-60 seconds

0 Wet hands with water;

1 Apply enough soap to cover all hand surfaces;

2 Rub hands palm to palm;

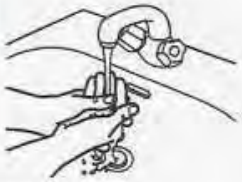
3 Right palm over left dorsum with interlaced fingers and vice versa;

4 Palm to palm with fingers interlaced;

5 Backs of fingers to opposing palms with fingers interlocked;

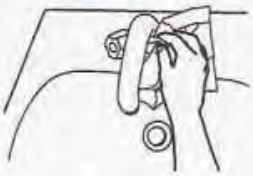
6 Rotational rubbing of left thumb clasped in right palm and vice versa;

7 Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



8 Rinse hands with water;

9 Dry hands thoroughly with a single use towel;



10 Use towel to turn off faucet;

11 Your hands are now safe.

Wash your hands

Wash your hands with soap and running water when hands are visibly dirty

If your hands are not visibly dirty, frequently clean them by using alcohol-based hand rub or soap and water

World Health Organization

Protect yourself and others from getting sick

Wash your hands

- after coughing or sneezing
- when caring for the sick
- before, during and after you prepare food
- before eating
- after toilet use
- when hands are visibly dirty
- after handling animals or animal waste

World Health Organization

STAY HEALTHY WHILE TRAVELLING

If you become sick while travelling, inform crew and seek medical care early

If you seek medical attention, share travel history with your health care provider

World Health Organization


STAY HEALTHY
WHILE TRAVELLING
Avoid travel if you have a fever and cough
If you have a fever, cough and difficulty breathing seek medical care early and share previous travel history with your health care provider
World Health Organization

Americas

Bloodborne Pathogens

S3AM-111-PR1

1.0 Purpose and Scope

1.1 Define the AECOM procedures for eliminating and/or controlling occupational exposure to Bloodborne Pathogens on AECOM projects and activities.

1.2 A written Exposure Control Plan shall be developed and implemented during all AECOM operations where there is a reasonable potential for occupational exposure of AECOM employees and/or subcontractors to bloodborne pathogens as a regulated waste.

1.3 This procedure's requirements apply to all AECOM Americas employees and operations and any other entity and its personnel contractually required to comply with this document's content. Any jurisdictional requirements exceeding those identified in this procedure shall be met when conduction work in the given jurisdiction.

2.0 Terms and Definitions

2.1 **Blood** – Human whole blood; human blood components such as plasma or platelets; and human blood products such as clotting factors.

2.2 **Bloodborne Pathogens (BBP)** – Pathogenic microorganisms that are present in human blood and that can infect and cause disease in persons who are exposed to blood containing these pathogens including but not limited to hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, syphilis, babesiosis, brucellosis, leptospirosis, arboviral infections, relapsing fever, human T-lymphotropic virus Type I, and viral haemorrhagic fever (Ebola).

2.3 **Exposure Control Plan** *(S3AM-111-ATT1)* – A plan that addresses the requirements applicable to specific AECOM projects and activities designed to eliminate or minimize employee exposure. The Exposure Control Plan shall be incorporated into the location specific SH&E Plan and shall be accessible to all employees. The Exposure Control Plan shall include:

- Exposure determination.
- The schedule and method of implementation for:
  - Methods of compliance;
  - Hepatitis B Vaccination;
  - Post exposure Evaluation;
  - Communications of Hazards to employees; and
  - Record Keeping.
- Documentation methods for exposure incidents, to include:
  - Routes of exposure; and
  - The circumstances for which and exposure incident occurred.

Note: In the State of California this plan shall also address exposures to airborne pathogens.

2.4 **SH&E Plan** – A document prepared for a specific project or program that details the hazards, precautions, emergency planning, medical, and training requirements for that project or program.

2.5 **Occupational Exposure (Exposed) –** Reasonably anticipated skin, eye mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties. Employees will be considered to be potentially exposed, even though they are using the universal precautions specified for the project or program.

2.6 **Other Potentially Infectious Materials (OPIM)** – Body fluids and tissues including: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, saliva, and any other body fluid that is visibly contaminated with blood. When it is difficult or impossible to differentiate between body fluids, all body fluids should be treated as if they are potentially infectious.

Note: In the State of California airborne pathogens are also considered infectious materials.

2.7 **Regulated Waste** – (1) liquid or semi-liquid blood or other potentially infectious materials; (2) contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; (3) items that are caked with dried blood or other potentially infectious materials and are capable of being released during handling; (4) objects contaminated with blood that can pierce the skin; and (5) pathological and microbiological wastes containing blood or other potentially infectious materials.

2.8 **Source Individual** – An individual, typically one who has been injured, whose blood or saliva has come in contact with another individual, typically one who has rendered first aid or Cardio Pulmonary Resuscitation (CPR) to the injured party.

2.9 **Universal Precautions** – All body fluids and materials potentially contaminated by body fluids will be considered to be infectious unless the fluids were from the person performing the clean up or decontamination activities. All employees coming in contact with another person's body fluids shall assume that the fluids are infectious and shall wear prescribed Personal Protective Equipment.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

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

3.3 S3AM-017-PR1 Injury & Illness Recordkeeping

3.4 S3AM-128-PR1 Medical Screening & Surveillance

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Occupational Health Manager**

- Will review and maintain all medical records generated as a result of post-exposure follow-up and maintain all medical records related to the follow-up.
- Will, where appropriate, consult with AECOM's local medical providers about follow-up recommendations.

4.1.2 **SH&E Manager**

- Will review project / program-specific Exposure Control Plans (normally part of the SH&E Plan) prior to the initial mobilization, at least annually for continuing projects or programs, and whenever necessary to reflect modified tasks or procedures that affect occupational exposure to bloodborne pathogens.
- Will consult with the Occupational Health Manager regarding all bloodborne pathogens exposure incidents.
- Will maintain training records and post-exposure follow-up information.
- Will confirm that site-specific training is conducted for all employees working at sites where regulated wastes were disposed or for employees who may be occupationally exposed while working at a facility that handles regulated wastes.

- Will confirm the Hepatitis B vaccine is made available to all employees with a potential occupational exposure (e.g. paramedic, medical laboratory employee, etc.).
- Will review all incident reports and arrange for post-exposure follow-up with AECOM's local medical provider.
- Will offer recommendations on how to prevent an incident from recurring.

4.1.3 **Manager**

- See that all recommendations made by the SH&E Manager are implemented.
- Support the SH&E Manager in their efforts to prevent occupational and non-occupational exposures to bloodborne pathogens.

4.1.4 **Employee**

- Use all PPE and universal precautions required to prevent exposure to infectious materials.
- Follow the exposure control methods outlined in their Exposure Control Plan.
- Report potential exposure incidents to their Supervisor or Manager immediately.

4.2 Potential Exposure Situations

4.2.1 There are a few activities within AECOM where potential occupational exposures to blood or other potentially infectious materials are of concern. These activities may include:

- Investigations of properties that received regulated wastes.
- Site visits or audits at Treatment Storage and Disposal facilities where medical waste is handled.
- Site visits or audits at medical or health care facilities.
- The provision of first-aid or cardiopulmonary resuscitation (CPR) to AECOM, subcontractor, or client personnel (if the action is part of the employee's occupations duties [e.g. paramedic] and not provided as a voluntary action).

4.2.2 Although AECOM does offer first-aid and CPR training to its employees on a regular basis, providing such aid is often on a voluntary basis and not directed by AECOM. As such, potential exposures may not be considered occupational exposures within the context of the OSHA Bloodborne Pathogens Standard. Site-specific Exposure Control Plans shall differentiate voluntary first-aid duties from occupational exposures as a component of the exposure determination. Refer to *S3AM-209-PR1 Risk Assessment & Management.*

4.3 Unforeseen Exposure Situations

4.3.1 Occasionally, potentially infectious material is encountered during a activity where none was expected; when this happens, the work shall be stopped, employee training conducted, and an exposure control plan prepared prior to resuming activities with potential exposures.

4.4 Employee Training

4.4.1 All personnel who will work on projects or programs which involve potential contact with regulated wastes will be required to attend a training class prior to the start of the project or program and annually for continuing projects or programs. Refer to *S3AM-003-PR1 SH&E Training.* The specific requirements and provisions of the written Exposure Control Plan shall be provided to each AECOM Employee and subcontractor assigned to work at the program / project.

4.4.2 Either of the following two sources of employee training will be used by AECOM to educate Employees on the hazards of exposure to bloodborne pathogens:

- The local chapter of the American Red Cross or other recognized training provider.
- AECOM's in-house training program.

4.4.3 Training sessions will review the following:

- Requirements of OSHA's Bloodborne Pathogens Standard or equivalent, applicable jurisdictional requirements.
- Review of AECOM's Bloodborne Pathogen Procedure (this document).
- Situations within AECOM that may involve exposure to bloodborne pathogens.
- Bloodborne diseases and symptoms of disease.
- Means of transmission.
- Work practice controls to reduce risk.
- Use of personal protective equipment to reduce risk.
- Incident reporting.
- AECOM's Post-Exposure Medical Follow-Up Procedures:

4.4.4 When contracting for CPR and first-aid training sessions, AECOM will request that each session include a section on the hazards associated with exposure to bloodborne pathogens and protective measures that shall be followed when administering first aid, CPR, or other emergency medical care. At the end of the session, Employees will be provided with a copy of this procedure. This procedure will be reviewed and a question-and-answer session will be conducted at the end of the presentation.

4.4.5 If the training provider cannot provide such training, AECOM will conduct a Blood Borne Pathogen training session prior to the start of the first aid or CPR class.

4.4.6 AECOM has and will have little control over employees who have not received AECOM provided first aid or CPR training, but who choose to perform Good Samaritan acts. Any Employee who does perform a Good Samaritan act that results in exposure to blood or other potentially infectious materials will, however, be provided with post-exposure medical follow-up as described in this procedure.

4.5 Personal Protective Equipment

4.5.1 All body fluids and materials potentially contaminated by body fluids will be considered to be infectious. All Employees coming in contact with another person’s body fluids shall assume that the fluids are infectious and shall wear prescribed personal protective equipment (PPE), refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.5.2 The use of PPE to prevent exposure is more appropriate for the types of occupational and non-occupational exposures Employees might encounter than is the use of engineering or work practice controls that are more effectively instituted in medical care or laboratory facilities where employees are actually handling blood and other potentially infectious materials.

4.5.3 PPE such as Tyvek coveralls, shoe covers, and gloves will be provided to all field team members involved in site activities where regulated wastes may be present. Site-specific PPE requirements will be identified in the written Exposure Control Plan. The same type of PPE will also be available, if it is deemed necessary, for Employees involved with activities at TSD facilities that handle regulated wastes.

4.5.4 PPE will be provided to affected Employees at no cost.

4.6 Universal Precautions Kits

4.6.1 In those work areas where there is the potential for exposure to infectious materials, a universal precaution kit shall be readily available. The kit shall permit the clean-up, neutralization, transportation, and disposal of up to 1 litre of blood or body fluids. The kit shall contain the following items at a minimum:

- Safety shield/mask combination
- Liquid proof apron
- Medical-grade vinyl/nitrile gloves
- Liquid solidifier/deodorizer
- Pickup scoop with scraper
- Red biohazard waste bag with tie
- Germicidal solution with dry wipe
- Antimicrobial hand wipe
- ID tag
- Instructions for use

4.7 Personal Hygiene

4.7.1 Special provisions will be made so that hand washing facilities are available on-site for sites that are known to be contaminated with regulated wastes. Alcohol wipes will be available in the event that hand washing facilities are not immediately available.

4.7.2 To reduce the potential for infection, if skin contact with blood or other potentially infectious materials occurs, the exposed area should be washed with non-abrasive soap and water as soon as possible. Hand washing will also help to prevent the transfer of contamination from the hands to other areas of the body or other surfaces that may be contacted later. Even when protective gloves are worn, hands should be washed with non-abrasive soap and running water as soon as possible after the gloves are removed.

4.7.3 The use of an alcohol wipes should not be relied upon as the primary means of personal hygiene. Hands should be thoroughly washed with soap and running water as soon as possible.

4.7.4 If mucous membranes, such as the eyes, come in direct contact with blood or other potentially infectious materials, the area should be washed or flushed with water as soon as possible and reported immediately.

4.8 Reporting Exposure Incidents

4.8.1 All incidents in which an employee has been exposed to blood or other potentially infectious materials shall be reported to the employee's Supervisor and to the SH&E Manager immediately. An IndustrySafe on-line report shall be completed in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*. After reviewing the report, the SH&E Manager will provide recommendations, when appropriate, for preventing recurrence of the incident.

4.9 Medical Follow-Up to Exposure Incidents

4.9.1 Once notified, the SH&E Manager will in turn discuss the incident with AECOM's Occupational Health Manager and/or medical provider and make arrangements for an evaluation, refer to *S3AM-128-PR1 Medical Screening & Surveillance*. Prompt medical attention is important in the event of an exposure incident. If the incident occurs in the field, the Employee will either be asked to visit the local hospital or, if he/she chooses, return immediately to the office to visit AECOM's local medical provider.

4.9.2 An attempt will be made to test the affected employee, and if applicable, the source individual's blood, for bloodborne pathogens. No testing will be performed without the written consent of the exposed Employee or the source individual. If initially, the exposed Employee or the source individual does not consent to HIV serological testing, but does consent to HBV serological testing, AECOM will make provisions with the local medical provider to preserve the blood sample for at least 90 days in the event that after counselling efforts, the Employee voluntarily consents to HIV testing.

4.9.3 AECOM will rely on the professional judgment of its Occupational Health Manager and/or local medical providers in the event of an exposure incident. Evaluations and follow-up procedures will be provided according to the recommendations of the United States Public Health Service (USPHS), World Health Organization, or other Public Health organization in Canada and other countries in the Americas current at the time these evaluations and procedures take place. Minimally, a post-exposure evaluation and follow-up will include the following elements:

- Documentation of the route(s) of exposure
- Circumstances under which the exposure incident occurred
- Identification and documentation of the source individual in the case of first aid or emergency medical treatments
- Collection and testing of source individuals and exposed employee's blood for HBV and HIV serological status as soon as feasible and upon consent
- Post-exposure vaccination when medically indicated, as recommended by the USPHS
- Counselling, if necessary
- Evaluation of reported illnesses

4.9.4 Any and all follow-up recommendations offered by the physician will be immediately instituted by the SH&E Manager with the guidance of the Occupational Health Manager and/or the local medical provider and at no cost to the affected Employee. Repeat testing, counselling, and follow-up, if recommended, will also be provided at no cost to the Employee. AECOM will rely on the Occupational Health Manager and/or the local medical provider to provide counselling to Employees concerning infection status, including results of and interpretation of medical tests and advising the Employee about the protection of personal contacts.

4.9.5 All medical providers shall submit to AECOM's Occupational Health Manager and the affected Employee a written opinion of the post-exposure evaluation within 15 days of the completion of the evaluation.

4.9.6 All medical records generated as a result of the post-exposure evaluation will be retained in the office of the Occupational Health Manager, and as applicable AECOM's medical services provider, under lock and key and will be maintained with the strictest confidentiality. Refer to *S3AM-017-PR1 Injury & Illness Recordkeeping.*

4.10 Hepatitis Vaccination

4.10.1 Prior to performing site visits or field investigations where regulated wastes are stored, processed, or known to have been disposed of, AECOM will consult with the Occupational Health Manager and/or the local medical providers to determine if a hepatitis A or B vaccination is appropriate given the site conditions and the proposed scope of work. Where possible the first Hepatitis B vaccinations will be given prior to working at sites with known, potential occupational exposures.

4.10.2 Although AECOM does offer first-aid and CPR training to its Employees on a regular basis, providing such aid is often voluntary and not as a specified job duty of an Employee. As such, potential exposures may not be considered occupational within the context of the government Bloodborne Pathogens Standard. Pre-exposure hepatitis vaccinations will not typically be offered for voluntary roles.

4.10.3 Post-exposure hepatitis vaccination will be offered to Employees involved in an exposure incident within 24 hours of possible exposure.

4.10.4 The vaccinations discussed above shall be provided to Employees at no cost if required by the exposure determination.

4.11 Housekeeping

4.11.1 Other than through the provision of first aid or CPR, there is no potential for occupational exposure to blood or other potentially infectious materials within any of the AECOM offices. Therefore, the housekeeping requirements and requirements for warning signs and labels contained in the OSHA Bloodborne Pathogens standard are not applicable to our office operations.

4.11.2 When working at a site where regulated wastes have been disposed of, the specific housekeeping and warning sign requirements will be prescribed by the client and/or in the site-specific HASP.

4.11.3 When working at a client's facility, AECOM will review the facilities plan for compliance with all the requirements of the Bloodborne Pathogens Standard and will observe all housekeeping requirements, wear required PPE, and acknowledge all warning signs and labels as specified in the client's plan. If the client does not have an effective plan, AECOM will prepare a plan as part of the written Exposure Control Plan.

4.12 Regulated Waste Generated by AECOM

4.12.1 Any regulated waste generated by AECOM as a result of first aid activities or clean-up of potentially infectious material will be collected in sealed, watertight containers and disposed of according to the Host Employer's BBP program or disposed of through a permitted regulated waste facility.

4.12.2 Disposal manifests shall be maintained in accordance with local or governmental regulations.

4.13 Material Decontamination

4.13.1 Any areas or equipment that are contaminated by potentially infectious material will be decontaminated using a 10% solution of household bleach. Utilize appropriate personal protective equipment to control exposure to the bleach (e.g. safety goggles, gloves, etc.). Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.14 Procedure and Plan Review

4.14.1 All Exposure Control Plans for projects or programs extending over one year shall be reviewed annually by the SH&E Manager and affected Employees.

5.0 Records

5.1 Each SH&E Manager will maintain records and provide copies of the records to the Occupational Health Manager, related to bloodborne pathogens in accordance with the provisions of the standard and *S3AM-017-PR1 Injury & Illness Recordkeeping.*

5.2 Records maintained in accordance will include bloodborne pathogens exposure incidents, post-exposure follow-up, vaccination status, and training for all Employees with potential occupational exposure.

5.3 Employee medical and training records required by this procedure shall be provided upon request for examination and copying to the Employee, to anyone having written consent of the subject employee, or to State, Province, or Federal Occupational Safety and Health regulatory agencies.

6.0 Attachments

6.1 S3AM-111-ATT1 Bloodborne Pathogens Exposure Control Plan

6.2 S3AM-111-FM1 Hepatitis B Vaccination Declination

Americas

Cold Stress

S3AM-112-PR1

1.0 Purpose and Scope

1.1 To protect employees from the severest effects of cold stress (hypothermia) and cold injury and to identify exposures to cold working conditions under which it is believed nearly all employees can be repeatedly exposed without adverse health effects.

1.2 This procedure applies to all AECOM Americas based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, working outdoors in damp and cool (below 50 degrees Fahrenheit [°F] or 10 degrees Celsius [°C]) conditions or anytime temperatures are below 32°F or 0°C.

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 95ºF (35ºC) resulting in loss of dexterity, loss of mental alertness, collapse, and possible death.

2.6 **Wind Chill –** The combined effect of air temperature and wind. Also expressed as "equivalent chill temperature" (ECT), wind chill is defined as heat loss resulting from the effects of air temperature and wind velocity upon exposed skin.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-128-PR1 Medical Screening & Surveillance Program

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-314-PR1 Working Alone

3.5 S3AM-315-PR1 Working On or Near Water

3.6 S3AM-333-PR1 Marine Safety & Vessel Operations

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Ensuring the safety of employees on their project sites, consistent with regulatory standards.
- Implement cold stress prevention measures as applicable at each work site.
- Develop/coordinate a work-warning regimen, as applicable.
- Confirm cold stress hazard assessments/evaluations were completed for the planned activities.
- Assign employees physically capable of performing the assigned tasks. Consider acclimation to cold weather when evaluating employee capability.

- Confirm employees are properly trained to recognize the symptoms of cold stress.

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

- Conduct/support cold stress assessments/evaluations.
- Conduct/support incident investigations related to potential cold stress-related illnesses.
- Assist project teams develop appropriate work-warming regimens.
- Provide cold stress awareness training.

4.1.3 **Supervisor**

- Identify the tasks that may be most impacted by cold stress and communicate the hazard to the assigned employees.
- Confirm that employees have been trained on the recognition of cold stress-related illnesses.
- Confirm that adequate supplies of warm fluids/drinks are readily available to employees.
- Confirm that a warm/sheltered rest area is available, as applicable.
- Conduct cold stress monitoring, as applicable.
- Implement the work-warming regimen.
- Confirm that first aid measures are implemented once cold stress symptoms are identified.
- Confirm that employees are physically capable of performing the assigned tasks and are not in a physically compromised condition.

4.1.4 **Employee**

- Observe each other for the early symptoms of cold stress-related illnesses.
- Maintain an adequate intake of available fluids.
- Report to work in a properly rested condition.
- Report all suspected cold stress-related illnesses.

4.2 Requirements

4.2.1 Carefully plan work anticipated to be performed in cool or cold conditions. If possible, heavy work should be scheduled during the warmer parts of the day or when the wind is most calm. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.

4.2.2 Staff working in extreme cold (wind chill or ECT below 10ºF or -12ºC) shall not work alone. The Buddy System shall be utilized to keep an eye on each other and to watch for signs of cold stress. Refer to *S3AM-314-PR1 Working Alone*. Watch for symptoms and signs of hypothermia

4.2.3 Monitor weather forecasts and weather conditions such as ambient temperature, wind speed, and precipitation. Use observations prior to entering and while in the field to ensure appropriate protections are in place:

- If possible, move the work to a warm location.
- If possible and as applicable, erect shelters or screens around the work area.
- If possible, heat the work area.
- If possible, adjust schedule according to the cold conditions, work level and worker acclimatization.
- Implement a work-warming regimen by taking breaks out of the cold. As applicable, consult *S3AM-112 ATT1 Temperature Thresholds* to determine wind chill and work-warming schedule.
- Take frequent short breaks in warm dry shelters to allow your body to warm up. Limit time of exposure to the cold. If shelter is not readily available, consider supplying temporary shelters.

- Provide assistance to prevent body heat loss, such as:
  - Providing appropriate sources of heat (e.g. warm packs, portable heaters, etc.).
  - Use of insulating materials on equipment handles when temperatures drop below 30°F (-1°C).

4.2.4 All staff working in extreme cold or snow conditions should understand the following guidelines for preventing and detecting hypothermia and frostbite; refer to *S3AM-112-ATT2 Symptoms & Treatment*:

- Ensure appropriate PPE requirements are established and adhered to.
- 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.
- Eat high calorie snacks to help maintain body metabolism.
- Confirm extra blankets or sleeping bags are on-site.
- Drink plenty of warm liquids. It is easy to become dehydrated in cold weather.
- Avoid caffeine and alcohol, which can act as diuretics. Alcohol consumption, depending upon quantity, can dilate blood vessels enhancing body heat loss or constrict blood vessels decreasing heat delivery to extremities.
- NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.
- If you experience frost bite or hypothermia, find shelter and warmth and contact a medical practitioner if symptoms persist, refer to *S3AM-128-PR1 Medical Screening & Surveillance*.

4.3 Training

Before they begin work in a cold environment, employees that might be exposed to cold stress will be informed of the potential for cold stress and how to prevent cold stress. Employees that have not had the training within the twelve prior months shall repeat the training before exposure to cold stress, refer to *S3AM-003-PR1 SH&E Training*. Employees potentially exposed to cold stress will receive training including, but not limited to:

4.3.1 Sources of cold stress, the influence of protective clothing, and the importance of acclimatization.

4.3.2 How the body loses heat.

4.3.3 Recognition of cold-related illness symptoms.

4.3.4 Cold stress preventative/corrective measures including, but not limited to:

- Weather monitoring.
- Proper eating and drinking practices.
- Work-warming schedules and proper re-warming techniques.
- Buddy system.
- Safe cold work practices appropriate to the work that is to be performed.
- Proper use of cold environment personal protective clothing.

4.3.5 The harmful effects of excessive alcohol consumption in a cold stress environment.

4.3.6 The hazards associated with unstable snow or ice build ups.

4.3.7 First aid procedures for symptoms related to cold stress.

4.4 Personal Protective Equipment (PPE)

Wearing the right clothing is crucial to avoiding cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. Adequate insulating dry clothing will be required in air or wind chill temperatures below 40 °F (4.4°C)

All PPE will comply with the requirements of *S3AM-208-PR1 Personal Protective Equipment* and consider the following requirements:

4.4.1 Wear at least 3 layers of clothing to help prevent cold stress. It is important to preserve the air space between the body and the outer layer of clothing to retain body heat.

- Wear a middle layer of down, wool, or similar materials to provide insulation.
- Avoid cotton, especially blue jeans.
- Wear an outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)
- Do not wear tight clothing. Loose clothing allows better ventilation.

4.4.2 Wear proper clothing, including head coverings and gloves or mittens for cold, wet, and windy conditions.

4.4.3 Wear a hat or hardhat liner. Up to 40 percent of body heat can be lost when the head is left exposed.

4.4.4 Use insulated footwear with adequate traction to prevent slips and falls.

4.4.5 Wear insulated boots or other insulated footwear, and insulated gloves to help reduce the chance of frostbite.

4.4.6 Keep a change of dry clothing available in case work clothes become wet.

4.4.7 Eye and face protection for employees employed outdoors in a snow and/or ice-covered terrain should be supplied.

- Sunglasses (with UVA and UVB protection) and sunscreen should be used when there is a persistent combination of snow and direct sun.
- 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.
- Ensure face guards are used to protect skin in cold, windy conditions, including riding on an unshielded vehicle.

4.5 General Cold Stress Prevention Measures

4.5.1 In order to prevent hypothermia:

- Wear appropriate clothing and PPE as determined by the weather conditions.
- When active, ventilate excess heat by opening or removing outer layers of clothing to avoid sweating.
    - Start with the mitten or gloves, unless protection from ice, snow, or cold metal surfaces is needed.
    - Next remove head gear and neck wrappings.
    - Then coats/parkas should be opened at the waist and sleeves.
    - Finally, layers of clothing should be taken off.
    - When resting or tired, or colder conditions are encountered, add additional layers of clothing/ close outer layers in the reverse of the above order, or get out of the cold. Have a sweet drink but do not indulge in heavy eating.

- Garments worn to keep out rain and spray should also allow water vapor to escape.
- Take advantage of heat from the sun and stay out of the wind as much as possible.
- Have available emergency shelter providing protection from wind and rain and insulation from the ground.
- Replace wet clothing. If wet clothing cannot be replaced, then cover it with a layer of non-breathing material to prevent evaporation. Place an insulation layer over this non-breathing material.
- Get adequate rest; conserve energy.
- Get adequate nutrition to replenish energy stores; rest after meals.
- Drink adequate fluids to avoid dehydration.
- If any project / location 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 do not consume 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 employees if work is performed in air temperatures below 40°F (4.4°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 *S3AM-112-ATT1 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 employees, those with circulatory problems and those with previous cold injuries 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 (4.4°C) or less, it is imperative that employees who become immersed in water or whose clothing becomes wet be immediately removed from the cold environment, provided a change of clothing, and be treated for hypothermia.

4.5.7 If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

4.5.8 Adequate protection, such as general ventilation, shall be incorporated into any warming shelter design to prevent carbon monoxide poisoning.

4.5.9 Operation of internal combustion or similar devices within warming shelters is prohibited.

4.5.10 If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

4.5.11 Walking and working surfaces shall be cleared of ice and snow to prevent slips and falls.

4.5.12 Confirm that employees carry fire starter materials if working in remote areas.

4.5.13 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 Manager and made available. 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 60ºF (15ºC), special provisions should be established for keeping the employees' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30ºF (-1º C).
- If the air temperature falls below 60ºF (15ºC) for sedentary work, 40ºF (4.4º C) for light work, or 20ºF (-6ºC) for moderate work, and fine manual dexterity is not required, employees should use gloves.

4.6.2 To prevent contact frostbite, employees should wear anti-contact gloves:

- When cold surfaces below 20°F (-6°C) are within reach, each employee should be warned to prevent inadvertent contact by bare skin.
- If the air temperature is 0°F (-18°C) or less, employees should protect their hands with mittens or appropriate gloves. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens or gloves.
- Ensure an adequate supply of dry gloves is available to replace wet gloves.

4.6.3 Provisions for additional total body protection are required if work is performed in an environment at or below 40ºF (4.4ºC). The employees should wear cold protective clothing appropriate for the level of cold and physical activity.

4.6.4 Additional Cold Stress Prevention Measures:

For work practices at or below 10ºF (-12ºC) ECT, the following will apply:

- The employee should be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing. If heavy work is being performed, rest periods should be taken in heated shelters and opportunities to change into dry clothing should be provided.
- New employees should not be required to work full time in the cold during the first days of employment until they become acclimated to the working conditions and required protective clothing. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.
- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the employee.
- The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The employee should be protected from drafts to the greatest extent possible.

4.6.5 Employees handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 40ºF 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.

4.6.6 Trauma sustained in freezing or subzero conditions requires special attention, because an injured employee is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

4.7 Hypothermia in Water

4.7.1 Loss of body heat heat to the water is a major cause of deaths in boating and working near water incidents. Often the cause of death is listed as drowning; however, the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around 2 to 3 degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE		EXHAUSTION	SURVIVAL TIME
32.5°F	(0°C)	Under 15 minutes	Under 15 to 45 minutes
32.5 to 40°F	(0 to 4°C)	15 to 30 minutes	30 to 90 minutes
40 to 50°F	(4 to 10°C)	30 to 60 minutes	1 to 3 hours
50 to 60°F	(10 to 16°C)	1 to 2 hours	1 to 6 hours
60 to 70°F	(16 to 21°C)	2 to 7 hours	2 to 40 hours
70 to 80°F	(21 to 27°C)	3 to 12 hours	3 hours to indefinite
Over 80°F	(27°C)	Indefinite	Indefinite

4.7.2 Some points to remember when water is a potential hazard:

- Wear a personal flotation device when drowning is a potential hazard. Refer to *S3AM-315-PR1 Working On or Near Water*, and *S3AM-333-PR1 Marine Safety & Vessel Operations*.
- If the water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading, or if a significant potential to fall in water exists).
- While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep the head out of the water. This will increase survival time.
- Keep a positive attitude about rescue. This will increase chances of survival.
- If there is more than one person in the water, huddling is recommended to conserve body heat.

4.7.3 If an employee or equipment is to work on ice and the water beneath the ice is or may be more than 3¼ feet (1m) deep at any point:

- Test the ice prior to commencing to ensure it will support the load to be placed on it. Ongoing testing may be necessary.
- If there is any risk of falling through the ice employees must wear personal protective equipment that will ensure buoyancy and protect against hypothermia at all times while on the ice.

4.8 Work-Warming Regimen

4.8.1 If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below 19ºF (–7ºC), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The employees should be encouraged to use these shelters at regular intervals; the frequency will depend on the severity of the environmental exposure. Refer to *S3AM-112-ATT1 Temperature Thresholds* for guidance.

4.8.2 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.

4.8.3 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.

4.8.4 A change of dry work clothing should be provided as necessary to prevent employees from returning to the cold environment with wet clothing.

5.0 Records

5.1 Exposure assessments will be documented in the location's files.

6.0 Attachments

6.1 S3AM-112-ATT1 Temperature Thresholds

6.2 S3AM-112-ATT2 Symptoms & Treatment

Americas

Corrosive & Reactive Materials

S3AM-125-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content where corrosive and/or reactive materials are used or stored.

1.2 The purpose of this procedure is to protect employees from the hazards of corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-115-PR1 Hazardous Materials Communication

3.2 S3AM-116-PR1 Hazardous Materials Shipping

3.3 S3AM-123-PR1 Respiratory Protection

3.4 S3AM-208-PR1 Personal Protective Equipment

4.0 Procedure

4.1 Implementation of this procedure is the responsibility of the Manager directing activities of the facility, site, or project location.

4.2 Appoint a responsible person who will:

4.2.1 Inspect storage areas periodically.

4.2.2 Monitor the quantity of corrosive and reactive materials on site, as well as that of incoming materials.

4.2.3 Review work practices that involve corrosive and reactive materials.

4.3 Require that all employees working with corrosive or reactive materials, or who may be exposed to such materials, are trained in accordance with *S3AM-115-PR1 – Hazardous Materials Communication*.

4.4 Control the use of corrosive and reactive materials by AECOM personnel.

4.4.1 Order only those materials and quantities that are needed to complete a job.

4.4.2 Check incoming corrosive and reactive materials for proper labeling in accordance with *S3AM-115-PR1 Hazardous Materials Communication*.

- Label materials, if needed, as they arrive on site.
- Mark reactive materials containers with the date of receipt of the chemical.

4.4.3 Check incoming corrosive and reactive materials for safety data sheets (SDS). If SDSs are not provided or are already on file, order them from the manufacturer, distributor, or vendor.

4.4.4 Add incoming corrosive and reactive chemicals to the hazardous materials inventory, if not already present, following procedures set forth in *S3AM-115-PR1 Hazardous Materials Communication.*

4.4.5 Do not store any quantity of corrosive or reactive materials in an office (with the exception of limited quantities of consumer products). These materials are to be stored off site, or at an on-site laboratory or storage area.

4.5 Store corrosive and reactive materials as indicted in the MSDS:

4.5.1 In a cool, dry environment, free from extremes of temperature and humidity.

4.5.2 In a manner that separates them from other materials (including flammables and oxidizers) and from each other.

- Separate acids and bases.
- Separate reactive materials from acids and bases, and protect from contact with water.

4.5.3 On materials that are acid-resistant (Teflon-coated, plastic, etc.) for small containers.

4.5.4 Covered, not stacked on one another, on acid-resistant material for carboys (approximately 5 gallons/22 liters).

4.5.5 On individual racks or securely blocked on skids, with closure (plug) facing upward to prevent leakage from drums.

4.6 Require that labeling and signage are in place.

4.6.1 Label containers with the appropriate warning word to indicate the hazard, such as: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.

4.7 Use corrosive and reactive materials appropriately.

4.7.1 Prior to use and in accordance with MSDS, safe-handling procedures shall be developed for each operation, and type and concentration of the chemical. In all cases, review the MSDS and product information before use.

4.7.2 Follow *S3AM-208-PR1 Personal Protective Equipment* when working with or around corrosive and reactive materials. Review the MSDS for the chemical used to determine the specific type of PPE needed, to include at a minimum:

- Chemical-splash goggles
- Chemical-resistant gloves
- Chemical-resistant apron

4.7.3 Obtain medical care immediately in the event of:

- Skin or eye exposure (e.g., splash) to corrosive liquids
- Inhalation of vapors of corrosive liquids that cause respiratory discomfort.

4.7.4 Require an eyewash station to be located in all areas where acids or bases are used. Safety showers shall be nearby if significant acid or base quantities are involved.

- Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach, and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.
- Keep the areas surrounding eyewashes and safety showers free of stored materials or debris at all times.
- Mark emergency eyewashes and showers with a highly visible sign.
- Require the area around emergency eyewashes and showers to be well lighted and visible.
- Where portable eyewash units are used, a process shall be in place to change the water and clean the unit, as required by the manufacturer's instructions.
- Require emergency showers and shower/eyewash combinations connected to a self-contained water supply to deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.

- Require emergency showers and shower/eyewash combinations permanently connected to a potable water supply to deliver at least 30 gallons (127.5 liters) per minute continuously.
- Require emergency eyewashes to be capable of delivering to the eyes not less than 0.4 gallon (1.5 liters) per minute for 15 minutes.

4.8 Be prepared to clean up spills of corrosive and reactive materials.

4.8.1 Have a written spill response plan in place before materials are stored on site.

4.8.2 Have commercial spill kits available for cleanup of small quantities of materials. At a minimum, kits should contain appropriate protective clothing (including full-body suits, gloves, and boots) and spill control equipment (including absorbents, pillows, shovels, containers, etc.).

4.8.3 Where necessary, confirm that appropriate respiratory protection equipment is provided to spill responders. For additional information, see *S3AM-123-PR1 Respiratory Protection*.

4.8.4 Clean up or respond to spills promptly.

4.8.5 Confirm that personnel responding to a spill have been trained in the hazards associated with the spilled material, as well as use of the spill control equipment, including PPE required for the task.

4.8.6 Do not use combustible organic materials such as sawdust, excelsior, wood chips and shavings, paper, rags, or burlap bags to absorb or clean up spills.

4.9 Develop a waste management plan and procedures, including procedures for collection, storage, labeling, pick-up and transport, and final disposal.

4.10 Dispose of corrosive and reactive materials appropriately.

4.10.1 Segregate organic acids, inorganic acids, and basic wastes.

4.10.2 Contract hazardous waste disposal services should be obtained, as necessary, to dispose of waste materials. All waste shall be appropriately packaged for off-site transportation, if applicable.

4.10.3 Wastes shall be marked, labeled, and shipped in accordance with regulatory requirements. For additional information, see *S3AM-116-PR1 Hazardous Materials Shipping*.

4.11 Inspect corrosive and reactive storage and use areas periodically.

4.11.1 Inspect office, laboratory, and project settings quarterly.

4.11.2 Use the inspection sheet provided as *S3AM-125-FM1 Corrosive & Reactive Materials Inspection* or equivalent, to inspect sites.

5.0 Records

The following information will be maintained in the location or project file:

5.1 Completed Corrosive and Reactive Material Inspection Sheets.

5.2 Worker Right-to-Know training documentation.

5.3 Written Spill Response Plan.

5.4 Waste Management Plan.

5.5 Documentation of training for spill response personnel.

5.6 Documentation of hazard communication training for personnel exposed to corrosive and/or reactive materials.

6.0 Attachments

6.1 S3AM-125-FM1 Corrosive & Reactive Materials Inspection

Americas

Drilling, Boring & Direct Push Probing

S3AM-321-PR1

1.0 Purpose and Scope

1.1 This document provides procedures designed to help prevent injuries to personnel working on the project and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with drilling, boring and direct-push probing. These hazards include, but are not limited to, encountering underground utilities, subsurface installations, rotating equipment and potential overhead hazards.

1.2 This procedure provides the minimum requirements to be followed when drilling, boring, and probing work are performed.

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

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling, and communications, etc.

2.2 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.3 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits / trenches or other man-made cuts, cavity, trench, or depression in an earth surface formed by earth removal.

2.4 **Subsurface Installations –** Examples: Subterranean tunnels, underground parking garages, and other structures beneath the surface.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protection Equipment

3.4 S3AM-209-PR1 Risk Assessment & Management

3.5 S3AM-213-PR1 Subcontractor Management

3.6 S3AM-305-PR1 Hand & Power Tools

3.7 S3AM-306-PR1 Highway and Road Work

3.8 S3AM-322-PR1 Overhead Lines

3.9 S3AM-322-FM1 Overhead Electrical Lines Acknowledgement

3.10 S3AM-325-PR1 Lockout Tagout

3.11 S3AM-326-PR1 Machine Guarding

3.12 S3AM-331-PR1 Underground Utilities

3.13 S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Confirm the development of the project SH&E Plan and compliance with this procedure.
- Confirm the appropriate equipment and materials are available to conduct the drilling, boring or direct-push operations.
- Confirm compliance with *S3AM-331-PR1 Underground Utilities.*
- Review the *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* prior to authorizing work to proceed.
- Confirm that employees conducting drilling, boring or direct-push probing possess any required training, registrations or certifications.
- Confirm all employees involved and affected by the task review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

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

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the project SH&E Plan to confirm compliance with jurisdictional regulations**.** Provide technical guidance as needed when a variance is pursued related to this procedure. Confirm variance process meets requirements identified in *S2-001-SM1 Global SH&E Management System Manual*.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g., ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training.*
- Review the SH&E Plan, *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and / or repairs.

4.2 Training

4.2.1 All on-site employees involved with drilling, boring, and direct-push probing shall be trained, at a minimum, in these procedures and in the procedures of *S3AM-331-PR1 Underground Utilities*.

4.2.2 All operators and assistants shall have the appropriate safety training based on the SH&E Training Matrix and any additional training assessments developed at the business group**,** and be versed in the equipment to be utilized.

- Refer to *S3AM-003-PR1 SH&E Training.*

- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.
- Only qualified personnel shall operate and inspect equipment.

4.2.3 All on-site Employees involved with drilling, boring, and direct-push probing activities shall be provided with on-site orientation of the drill rig and its operation.

4.2.4 All Employees involved with drilling, boring and direct-push probing activities at a client site shall receive the applicable client-required training**.**

4.3 Planning

4.3.1 SH&E Plan – At a minimum, a SH&E plan that includes a pre-job hazard assessment shall be prepared and communicated to all involved personnel prior to any drilling, boring, and direct-push probing activities. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

- Assessment shall include both overhead and subsurface utilities and installations. Refer to *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities*.
- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- All SH&E Plan requirements will be followed by the project team.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 A Task Hazard Assessment (THA) shall be completed before every assigned task at the work location. The focus of the analysis shall be on the specific assigned task and the evaluation of risks and assignment of control measures based on actual work conditions.

4.3.3 *S3AM-321- ATT2 Pre-Drilling, Boring & Direct-Push Probing Flow Chart* summarizes the key Pre-Drilling, Boring, and Direct-push probing requirements addressed in this procedure.

4.3.4 Procedures and documentation as detailed in *S3AM-322-PR1 Overhead Lines* and *S3AM-331-PR1 Underground Utilities* shall be completed prior to any intrusive subsurface work.

- The locations of subsurface and overhead utilities and subsurface installations will be investigated, documented, mapped on a site plan and evidenced with appropriate surface markings.
- A site walk shall be conducted by the project team / site Manager and any other appropriate personnel, with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.
- All proposed subsurface activities will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.
- Appropriate clearance activities shall confirm location(s) of identified underground utilities and subsurface structures. Review the applicable completed *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist*.
- Site Walks should be repeated as necessary following the clearance of subsurface utilities and installations to confirm hazards are clearly identified.

4.3.5 Confirm drilling location(s) and / or bore entry and bore exit points are adequately identified on the worksite to enable appropriate equipment positioning.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 Access agreements will be obtained and adhered to as necessary.

4.5 Pre-Qualifying and Re-Qualifying Drilling Subcontractors

4.5.1 All drilling subcontractors will be properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management*.

4.5.2 The qualifications of the drilling crew performing the work will be evaluated prior to each mobilization and each day by AECOM's on-site representative to assure that their safety performance, training, qualifications, equipment, processes, and approaches reflect AECOM standards for excellence.

4.5.3 All drilling subcontractor equipment will be properly maintained and properly equipped, and the drilling subcontractor will verify their equipment is fully functional as a normal part of their daily and pre-work routine. Refer to *S3AM-321-FM1 Daily Drilling, Boring & Direct Push Equipment Inspection.*

4.6 General Health and Safety

4.6.1 Personal Protective Equipment – Refer to the *S3AM-208-PR1 Personal Protection Equipment* for best practices. These requirements may be modified or expanded in the SH&E Plan. Clothing shall be close fitting and comfortable without loose ends, straps, draw strings, belts, or otherwise unfastened parts that might catch on some rotating or translating component of the rig.

- Depending upon the hazards present, additional PPE may be required such as fire retardant clothing, specific hearing protection, respiratory protective equipment and chemical protective clothing.
- If the location has potential for underground electrical utilities to be present, workers shall ensure footwear has additional protection of shock resistant soles required (white rectangle with omega symbol).

4.6.2 Hearing Conservation – Hearing conservation program requirements may apply when working around operating equipment. Refer to *S3AM-118-PR1 Hearing Conservation*.

- Each worker shall wear noise-reducing ear protectors around operating equipment or during elevated noise levels. Distance from the elevated noise level is the primary measure of control for non-essential drilling personnel.

4.7 Drilling, Boring and Direct Push Equipment Maintenance and Inspections

4.7.1 All equipment will be inspected prior to the initiation of operations and daily during operations using the *S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection*. This inspection is the responsibility of the operator who will provide written documentation of the inspection prior to the start of drilling each day.

- Equipment that is deemed defective will immediately be repaired by a qualified person, or, if repair is not practicable, tagged "Out of Service" and sent for repairs or discarded.

4.7.2 Managers shall confirm an accurate inventory of the equipment within their operation requiring scheduled maintenance is developed. Using applicable regulations, industry standards, best practices, and manufacturer's recommendations, a maintenance schedule shall be developed with defined responsibility, required actions, and frequency. Refer to *S3AM-321-FM2 Drilling, Boring, & Direct-Push Equipment Maintenance Inventory.*

4.7.3 The maintenance program for equipment shall:

- Adhere to applicable regulations, standards, and manufacturers' specifications;
- Provide for service by appropriately qualified maintenance personnel; and,
- Require maintenance schedules and records of maintenance.

4.7.4 Employees or operators who are assigned equipment are required to review maintenance schedules for that equipment and will confirm that required maintenance has occurred or see that it is undertaken.

4.8 General Requirements

4.8.1 Excluding geoprobe activities, set up any sample tables and general work areas for employees at a safe distance from the rig.

- The recommended safe distance is the height of the fully extended mast plus 5 feet (1.5 meters), and no less than 30 feet (9.1 meters) from the rig.
- An increase to this distance may be required due to noise exposure hazards. Refer to *S3AM-118-PR1Hearing Conservation.*

4.8.2 Operation of the drilling, boring or direct-push equipment shall be restricted to the designated operator except to activate the emergency shut-off as required.

- All rotary drilling equipment shall have an emergency shut off / kill switch. The location of the switch and operation should be reviewed with all involved Employees.

4.8.3 Sit-on direct push rigs are not permitted on AECOM worksites unless the rig has been modified (in accordance with manufacturer's requirements) to be operated by remote control or the rig has been manufactured with a rollover protection system and seat belt.

4.8.4 Consult jurisdictional regulations as use of J-hooks and cat-heads may be prohibited. Examples:

- 29 CFR 1926 requires derricks and cranes to use hooks with self-closing latches and permits the use of J-hooks only for a task unrelated to this procedure (setting trusses).
- British Columbia and Saskatchewan prohibit the use of friction cat-heads**.**

4.9 Identifying the Work Area

4.9.1 Ensure the work area is adequately identified:

- Including zone around the drilling, boring, or direct push equipment, as well as fluid equipment, entry point, exit point and any excavated areas.
- Utilize barricades, signage, pylons, snow fence, etc. as appropriate.
- Implement traffic control as necessary.
- Coordinate with concurrent operations to identify their associated hazards and controls, and communicate those associated with AECOM tasks.

4.9.2 When operating near public vehicular and pedestrian traffic, the on-site personnel shall take every precaution necessary to see that the work zone is properly established, identified, and isolated from both moving traffic and passer-by pedestrians (refer to *S3AM-306-PR1 Highway and Road Work*).

4.9.3 All traffic control devices shall be installed, placed, and maintained in accordance with a Traffic Control Plan, client specifications, and / or the Manual of Uniform Traffic Control Devices and Manual of Uniform Traffic Control Devices for Canada in Canada. Traffic control devices shall consist of and not be limited to

- Directional and informational signage;
- High visibility barricades, cones, or barrels;
- Lighting; and
- Other equipment and devices as required.

4.10 Clearing Work Areas

4.10.1 In addition to any minimum requirements the drilling subcontractor may have, prior to set up, adequate site clearing and leveling shall be performed to accommodate the rig and supplies and provide a safe working area.

4.10.2 Clearing the site includes clearing the intended drilling area obstacles and of underground utilities in accordance with *S3AM-331-PR1 Underground Utilities*.

4.10.3 Drilling or probing shall not commence when tree limbs, unstable ground, or site obstructions cause unsafe tool handling conditions.

- The cleared / levelled area should be large enough to accommodate the rig and supplies.
- If the rig is positioned on a steep grade and levelling of the ground is impossible or impractical, the wheel of the transport vehicle shall be blocked and other means employed of preventing the rig from moving or toppling over.

4.11 Drilling Activities

4.11.1 Federal / State / Provincial / Territorial regulations that govern drill rig operations and exposed moving parts shall be adhered to.

4.11.2 All applicable client on-site safety procedures shall be understood and adhered to.

4.11.3 Minimum approach distances (MAD) from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These approach distances are a minimum; government regulations and utility requirements may dictate a greater set back distance and should be confirmed.

4.11.4 Verify that equipment / energy is isolated when lockout is required:

- Refer to operator's manual and *S3AM-325-PR1 Lockout Tagout*.
- Ensure stop switch is activated.
- Driller is out of the seat.
- Test controls to ensure they do not engage.

4.11.5 In addition to any identified minimum requirements (as applicable, client, drilling subcontractor), the following safety measures shall be taken during drilling, boring or probing operations on site:

- The operator and helper shall be present during all active rig operations.
- Site personnel shall remain within visual contact of the rig operator.
- Hard hats, approved safety boots, safety glasses, and hearing protection shall be worn in the work zone (minimum, the radius around the rig equal to the height of the drill rig mast) of a rig.
- Gas monitoring shall be conducted as appropriate.
- Hands, feet and other body parts shall be kept away from moving parts, (e.g. hoisted, rotating, pushing, etc.) including augers, drill rods and reamers.
- When observing drilling, stand upwind of the drill rig to prevent potential exposure to vapors that may be emitted from the borehole.
- The emergency shut-off switch on the rig shall be identified to site personnel and tested on a daily basis by the operator.
- Unauthorized personnel shall be kept outside of the established work zone.
- Rig crew and other worksite personnel shall not use a cell phone while operating the drill rig or other equipment or within the rig work zone.
- Do not drive the rig from hole to hole with the mast (derrick) in the raised position.
- Before raising the mast (derrick) look up to check for overhead obstructions. Refer to *S3AM-322-PR1 Overhead Lines*.

- Before raising the mast (derrick), all rig personnel (with the exception of the operator) and visitors should be cleared from the areas immediately to the rear and the sides of the mast. All rig personnel and visitors should be informed that the mast is being raised prior to raising it.
- Before the mast (derrick) of a drill rig is raised and drilling is commenced, the drill rig shall be first levelled and stabilized with levelling jacks and / or solid cribbing.
    - The drill rig shall be releveled if it settles after initial set up.
    - Lower the mast (derrick) only when the levelling jacks are down, and do not raise the levelling jack pads until the mast (derrick) is lowered completely.
- After the rig has been positioned to begin drilling, all brakes and / or locks shall be set before drilling begins.
- The operator of a rig shall only operate a drill rig from the position of the controls. The rig shall not be in operation if the operator of the rig leaves the area of the controls.
- Throwing or dropping tools shall not be permitted. All tools shall be carefully passed by hand between personnel or a hoist line should be used.
- If it is necessary to operate the rig within an enclosed area, make certain that exhaust fumes are conducted out of the area.
    - Exhaust fumes can be toxic and some cannot be detected by smell.
    - Air monitoring and, as necessary, noise monitoring shall be conducted.
- Clean mud and grease from boots before mounting a rig platform and use hand holds and railings. Watch for slippery ground when dismounting from the platform.
- During freezing weather, do not touch any metal parts of the rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- All unattended bore holes shall be adequately covered or otherwise protected to prevent rig personnel, site visitors, or animals from stepping or falling into the hole. All open bore holes shall be covered, protected, or backfilled adequately and according to Federal / State / Provincial / Territorial or local regulations on completion of the drilling project.
- When using a ladder on a rig, face the ladder and grasp either the side rails or the rungs with both hands while ascending and descending. Always use adequate fall protection and a full body harness when climbing above 6 feet (1.8 meters) of the ground. Do not attempt to use one or both hands to carry a tool while on a ladder. Use a hoist line and a tool “bucket” or a safety hook to raise or lower hand tools.

4.12 Drilling Fluid

4.12.1 Ensure drilling fluid is appropriate to the soil type and conditions to be encountered to enable smooth drilling.

4.12.2 Drilling fluid used in the boring process shall be contained at the entry and, as applicable, exit locations until recycled or removed from the site.

4.12.3 Confirm drilling fluid does not enter roadways, streams, municipal storm or sanitary sewer lines, and / or any other drainage system or body of water.

4.12.4 Monitor drilling equipment and fluid equipment for any leakage or spills. Confirm appropriate containment is in place and adequate spill response supplies are available.

4.12.5 It is important to monitor fluid flow and pressure gauges when drilling with any tooling, but it is essential when drilling with a mud motor (pump placed in the drill string to provide additional power to the bit while drilling).

4.13 Unanticipated Concrete / Debris or Void

4.13.1 The presence of subsurface installations and utilities requires special care when obstructions / refusal and voids are encountered and when unexpected absence of soil recovery occurs during

drilling operations. Other indicators of subsurface installations and utilities are the presence of warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill.

4.13.2 If unanticipated concrete / debris is encountered and / or if a void is encountered, drilling will be immediately discontinued and the Manager notified. Drilling may only proceed with Manager or SH&E Manager approval.

4.14 Use of Manual Slide Hammer

4.14.1 The following health and safety procedures should be followed when using a manual slide hammer to install shallow injection points, drive point piezometers, and drill tools:

- Only use a manual slide hammer that either attaches directly to the point / piezometer being driven or that incorporates a cap on the point / piezometer / drill tool that prevents the slide hammer from slipping off the point / piezometer / drill tool.
- Always grasp the manual slide hammer (handles if equipped with handles) with both hands while driving the point / piezometer / drill tool.
- Never allow hands or feet to get between the manual slide hammer and the drive plate or anvil.

4.15 Use of Augers

4.15.1 The following general health and safety procedures should be followed when supervising borings with continuous flight hollow-stem augers:

- Never place hands or fingers under the bottom of an auger section when it is being hoisted over the top of the auger section in the ground or other hard surfaces such as the drill rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When augers are rotating, stay clear of the rotating auger and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.
- Use a long-handled shovel to move auger cuttings away from a rotating auger. Never use hands or feet to move cuttings away from a rotating auger.
- Do not attempt to remove earth from rotating augers. Augers should be cleaned only when the drill rig is in neutral and the augers are stopped from rotating.
- Loud noises may occur while driving split spoons. At minimum hearing protection shall be worn when driving split spoons.
- When pulling / lifting augers, a clevis pin or other closed device shall be used. Use of J-hooks is prohibited.

4.16 Attaching and Breaking Rods

4.16.1 Do not use manual tools (e.g., pipe wrenches) in combination with rotation of the drill stem. Manual tools are not designed for the load, and may break.

- The use of such tools creates a significant impact hazard for those in the work area, because they rotate with the drill stem. Manual tool use in combination with a rotating drill stem to attach or break rods is therefore prohibited.
- Manual tools may be used if the drill stem is isolated / positively disengaged.
- Mechanical means of rod separation that are permitted include:
  - Opposing hydraulic controls.
  - Rod locking devices or machine's power vice.
  - Hydraulic breakout tools.
  - Hydraulic foot clamps.

4.16.2 Rod box changes present severe crushing hazards. Operators shall ensure all crew members are clear of the machine and hoisting equipment while they are changing rod boxes.

4.17 Rotary, Sonic and Core Drilling

4.17.1 In addition to the health and safety procedures identified above, the following general health and safety procedures should be followed when supervising borings with rotary, sonic and core drilling:

- Drill rods should not be braked during lowering into the hole with drill rod chuck jaws. Drill rods should not be held or lowered into the hole with pipe wrenches.
- If a string of drill rods are accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- When drill rods are rotating, stay clear of the rotating components of the drill rig. Never reach behind or around a rotating drill rod for any reason.
- Use a long-handled shovel to move cuttings away from the top of the borehole. Never use hands or feet to move cuttings away from the borehole.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Keep away from area where drill rods are being moved or raised to the rig. Do not stand in the area where a drill rod will fall or slide if it should be dropped.
- Loud noises may occur during drilling. Hearing protection shall be worn.

4.18 Direct-push

4.18.1 The following general health and safety procedures should be followed when supervising drilling borings with direct-push drilling:

- Loud noise may occur during direct-push drilling. Appropriate hearing protection shall be worn.
- When drill rods are hoisted from the hole, they should be cleaned for safe handling with a suitable rod wiper. Do not use hands to clean drilling fluids from drill rods.
- If work shall progress over a portable drilling fluid (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with rough-surfaced, fitted cover panels of adequate strength to hold drill rig personnel.
- Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay the rods down.

4.19 Horizontal Directional Drilling

4.19.1 During surface to surface operations a 16.4’ (5 meters) safe zone shall be established and identified at both the entry and exit locations; no personnel are permitted to be within this zone unless the drill is locked out and the operator is out of the seat.

4.19.2 Machine shall be locked out before entering an excavation, changing tools, adding or removing drill stem or doing any other work on tools or the drill stem at the exit end of the bore.

4.19.3 A tracking head shall be installed on the drill stem:

4.19.4 Assemble drill head using components appropriate to the soil conditions to be encountered (e.g. nozzle, bit, beacon housing, etc.).

4.19.5 Ensure all personnel are clear of the bore entry point (outside of identified work zone).

4.19.6 At all times two way communication will be maintained at entrance and exit points using two way radios or equally effective communication means. If at any time communication is lost, all work will be stopped until communication is re-established

4.19.7 Locate drill head with tracking device at least every half-length of pipe. Adjust direction as necessary to follow the intended bore path.

4.19.8 Any drilling fluid returning to the surface shall be cleaned up promptly.

4.19.9 Drill pipe should exit the bore at an angle of 5 to 10° from the ground surface.

4.19.10 Turn off fluid flow as soon as drill head emerges.

4.19.11 Lockout machine and remove drill head using appropriate breakout tools.

4.19.12 Select and attach a reamer that allows the return of drilling fluids and cuttings, to reduce frictional pullback forces, and to allow for bend radius of the pipe. Reamer shall be:

- The smaller of 1.5 times the outside diameter (O.D.) or 12 inches (300mm) larger than the diameter of the product pipe.
- A diameter less than 1.5 times the diameter of the product may be necessary in collapsing soil formations.
- Reamed diameter may need to be increased by up to 25% if substantial swelling of the soil is expected to occur.

4.19.13 All personnel shall clear the trench or the designated surface zone (16.4 feet [5 meters]) once the reamer is attached. Operator shall only reverse lockout and commence pullback when communication is received from personnel on exit hole side and operator has confirmed the message.

4.19.14 Personnel on exit hole side shall ensure reamer is pulled the entire way back to the exit hole.

- If rotation is started when drill rod and reamer are away from the exit hole, very fast sideways movement of the rod and reamer can occur.
- Larger reamers and longer lengths of exposed drill rod increase the speed and distance of this movement.

4.19.15 If working with trailing drill stem, swivels shall be verified as lubricated and rotating freely by hand prior to use:

- A freely moving swivel prevents trailing drill stem or product from rotating / whipping.
- If the swivel does not move freely by hand it shall be removed from service and repaired or replaced.
- Only use swivels with limited articulation to prevent whipping or cranking action between the reamer and trailing drill pipe or product.

4.19.16 It is important to clean and lubricate the tool and drill stem joint threads before each use.

4.19.17 Any individual drill pipes that are bent or damaged shall be immediately taken out of service.

4.19.18 Occasionally change the order of the lead drill pipe (i.e. move the lead pipe to the end of the stem, or other pipe rotation procedures) to extend drill stem life.

4.19.19 Operator should avoid stalling the pipe rotation to avoid stress damage from shock loading.

4.20 Drilling at Potential MEC / UXO Sites

4.20.1 If the project site is suspected of containing munitions and explosives of concern (MEC) or unexploded ordnance (UXO), the UXO team will conduct a reconnaissance and MEC / UXO avoidance to provide clear access routes to each site before drilling crews enter the area. The following procedures will be implemented:

- Drilling operations on an MEC / UXO site will not be conducted until a complete plan for the site is prepared and approved by the AECOM UXO Safety Officer. MEC / UXO avoidance shall be conducted during drilling operations on known or suspect MEC / UXO sites.
- The UXO team will identify and distinctly mark the boundaries of a clear approach path for the drilling crews, vehicles, and equipment to enter the site. This path will be, at a minimum, twice the width of the widest vehicle. No personnel will be allowed outside any marked boundary.
- If MEC / UXO is encountered on the ground surface, the UXO team will clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
- The UXO team will conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of MEC / UXO that may be in the subsurface. If a magnetic anomaly is encountered, it will be assumed to be MEC / UXO, and the approach path will be diverted around the anomaly. UXO personnel only will operate the appropriate geophysical instrument and identify MEC / UXO.
- An incremental geophysical survey of the drill-hole location(s) will be initially accomplished by the UXO team using a hand auger to install a pilot hole. If MEC / UXO is encountered or an anomaly cannot be positively identified as inert material, Hazardous, Toxic, and Radioactive Waste (HTRW) sampling personnel will select a new drill-hole location.
- Once the surface of a drilling site has been cleared and a pilot hole established as described above, the drilling contractor will be notified that the site is available for subsurface drilling.

4.21 Movement and Transport of Drilling, Boring or Direct-Push Equipment

4.21.1 Personnel transporting equipment shall be properly licensed and shall operate the vehicle according to Federal / State / Provincial / Territorial, and local regulations. Refer to *S3AM-005-PR1 Driving* and *S3AM-320-PR1 Commercial Motor Vehicles*.

4.21.2 Confirm the traveling height (overhead clearance), width, length and weight of the equipment with the carrier. Identify highway and bridge load, width and overhead limits, to confirm these limits are not exceeded and with adequate margin.

4.21.3 Allow for overhang of any drilling, boring or direct-push equipment when cornering or approaching other vehicles or structures.

4.21.4 Be aware that the canopies of service stations and motels are often too low for equipment loaded on a trailer to clear

4.21.5 Watch for low hanging electrical lines, particularly at the entrances to drilling sites or restaurants, motels, other commercial sites.

4.21.6 Never travel on a street, road, or highway with any part of the drilling, boring or direct-push equipment in a raised or partially raised position.

4.21.7 Remove all ignition keys if rig is left unattended unless client requirements specify that the keys remain in the ignition switch at all times.

4.21.8 Before moving a rig on location, the operator shall do the following:

- To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
- Check the brakes of the truck / carrier, especially if the terrain along the route of travel is rough or sloped.
- Discharge all passengers before moving on rough or steep terrain.

4.21.9 Engage the front axle (on 4x4, 6x6, etc., vehicles) before traversing rough or steep terrain

4.21.10 Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator shall conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility shall be considered that the presence of

drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).

4.21.11 Logs, ditches, road curbs, and other long and horizontal obstacles should be approached and driven over squarely, not at an angle.

4.21.12 When close lateral or overhead clearance is encountered, or when backing up, the driver of the rig shall be guided by another person on the ground.

4.21.13 Loads on the drill rig and truck shall be properly stored while the truck is moving, and the mast shall be in the fully lowered position.

4.22 Loading and Unloading

4.22.1 Consult applicable manufacturer's recommendations for loading and unloading of the equipment.

4.22.2 Use ramps of adequate design that are solid and substantial enough to bear the weight of the rig with carrier, including tools.

4.22.3 Load and unload on level ground.

4.22.4 Use the assistance of someone on the ground as a guide.

4.22.5 Check the brakes on the rig carrier before approaching loading ramps.

4.22.6 Distribute the weight of the rig, carrier, and tools on the trailer so that the center of weight is approximately on the centerline of the trailer and so that some of the trailer load is transferred to the height of the pulling vehicle. Refer to the trailer manufacturer's weight distribution recommendations.

4.22.7 The rig and tools should be secured to the hauling vehicle with ties, chains, and / or load binders of adequate capacity.

5.0 Records

5.1 All employee training files shall be maintained in accordance with *S3AM-003PR1 SH&E Training*.

5.2 Completed inspections and maintenance inventories shall be maintained the site or project files.

6.0 Attachments

6.1 S3AM-321-ATT1 Core Drilling Machine

6.2 S3AM-321-ATT2 Pre-Drilling, Boring, & Direct-Push Probing Flow Chart

6.3 S3AM-321-FM1 Daily Drilling, Boring & Direct-Push Equipment Inspection

6.4 S3AM-321-FM2 Drilling, Boring & Direct-Push Equipment Maintenance Inventory

Americas

Electrical Safety

S3AM-302-PR1

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near electric equipment and installations to minimize and control electrical hazards such as electrical shock, arc flash, and electrical fires in the workplace.

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

1.3 As a general rule, AECOM employees shall not work on exposed, energized systems with a potential greater than 50 volts. This work should be performed by a qualified electrician.

2.0 Terms and Definitions

2.1 **Arc Flash –** A dangerous condition associated with the release of energy during an electrical arc.

2.2 **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 National Fire Protection Act 70E of the National Electric Code and Canadian Standards Association Z462.

2.3 **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).

2.4 **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 **Licensed Electrician –** A person who possesses the local licenses and certifications to work on electrical circuitry, panels or equipment if full compliance with local legislation.

2.9 **Portable Electric Equipment –** Cord- and plug-connected equipment and extension cords.

2.10 **Qualified Persons** – Individuals who have specific and documented training and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations to avoid the hazards of working on or near energized electrical equipment. Qualified Persons shall have been specifically permitted to near exposed energized and parts. Even an experienced electrician is unqualified unless he or she knows the particular equipment and has received specific safety training on the potential hazards involved.

2.11 **Shock Hazard –** A dangerous situation associated with the possible release of energy caused by contact or approach to live parts**.**

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-202-PR1 Competent Person Designation

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-209-PR1 Risk Asssessment & Management

3.5 S3AM-218-PR1 Permit to Work

3.6 S3AM-305-PR1 Hand & Power Tools

3.7 S3AM-322-PR1 Overhead Lines

3.8 S3AM-325-PR1 Lockout Tagout

3.9 S3AM-410-PR1 Hazardous Energy Control

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Approve all Energized Electrical Work Permits.
- Confirm that all projects under their direct control or authority have a written SH&E Plan prepared for the activity.
- Confirm communication with client / owner of hazards presented by the work conducted by AECOM and controls measures in place.
- Provide technical guidance in support of this procedure.
- Confirming employees are informed of and comply with the provisions of this procedure.
- Supporting employees in the reporting of incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations,* including the entry of the incident into the on-line incident management system (e.g. IndustrySafe).

4.1.2 **SH&E Manager**

- Provide technical guidance and support to the Manager or Supervisor.
- Assist the Manager or Supervisor in compliance with the requirements of this procedure.
- Assist in the incident investigation and review process

4.1.3 **Employees**

- Comply with requirements of this procedure.
- Stop work if workers, other than Qualified Persons, are exposed to live electrical systems at unknown voltages or potentials greater than 50 volts.
- Only open electrical panels only if they are a Qualified Person.
- Employees designated as a Qualified Person, conduct work on or near energized electrical equipment in accordance with applicable training and jurisdictional requirements.
- Employees designated as a competent person in relation to the Assured Equipment Grounding Conductor Program, administer testing and recording in accordance with jurisdictional requirements.
- Immediately report incidents per *S3AM-004-PR1 Incident Reporting, Notifications & Investigations*, including the entry of the incident into the on-line incident management system (e.g., IndustrySafe).

4.2 Training

4.2.1 Employees who have potential exposures to electrical hazards shall be trained in and be familiar with the electrical safety-related work practices required by the applicable regulations. Refer to the *S3AM-003-PR1 SH&E Training* for specific required training.

4.2.2 Employees shall have reviewed and acknowledged the applicable SH&E plan specific to the project or location.

4.2.3 Refer to *S3AM-302-ATT1 Live Electrical Work* for qualifications if working on or near exposed electric conductors or circuit parts that can be energized.

4.3 General Requirements

4.3.1 Electrical equipment installed to provide electric power and light at worksites (both temporary and permanent) shall contain markings durable to the expected environment to inform workers of the equipment's:

- Manufacturer, trademark, or party responsible for the equipment.
- Voltage, current, or wattage.
- Any other ratings as necessary.
- Equipment / installations not appropriately marked shall not be used.

4.3.2 Electrical outlets utilized to supply power for electrical equipment during field operations shall be of the three-wire grounding type. 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 must not be used until serviced by a licensed electrician.

4.3.3 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 (i.e., circuits that are not part of a permanently installed facility electrical system, such as on a construction site or temporary field installation).

4.3.4 Unqualified personnel are not permitted to work on electrical equipment unless it has been de-energized, verified as being free of hazardous energy and locked and tagged out in accordance with *S3AM-325-PR1 Lockout Tagout*.

- Electrical equipment that has been de-energized but not locked and tagged out shall be treated as energized.

4.3.5 After a circuit is de-energized by a circuit protective device, the circuit may not be repeatedly manually reenergized until it has been determined that the equipment and circuit can be safely energized.

4.3.6 Temporary or permanent light fixtures that present a shock or burn hazard shall be guarded.

4.3.7 Confirm power switches are properly labeled to identify what they control, unless this is clearly confirmed through switch proximity or location. Electric conductors shall be protected from damage.

4.4 Classified Locations

Electrical equipment and wiring may be installed in locations where any of the following may be present: flammable vapors, liquids, or gases; combustible dusts or fibers; or a concentration or quantity of flammable or combustible material. Below is a list of each type of location and the associated hazards.

4.4.1 Class I Locations

Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

A. Class I, Division 1 location is a location:

1. In which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions; or
2. In which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or

3. In which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

B. Class I, Division 2 location is a location:

1. In which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or

2. In which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or

3. That is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

4.4.2 Class II Locations

Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:

A. Class II, Division 1 location is a location:

1. In which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or

2. There mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or

3. In which combustible dusts of an electrically conductive nature may be present.

B. B. Class II, Division 2 location is a location in which:

1. Combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or

2. Dust may be in suspension in the air as a result of infrequent malfunction of handling or processing equipment, and dust accumulations resulting therefrom may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

4.4.3 Class III Locations

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

A. Class III, Division 1 location is a location in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.

B. Class III, Division 2 location is a location in which easily ignitable fibers are stored or handled, except in process of manufacture.

4.5 Distribution System Setup

4.5.1 Under no circumstances shall electrical lines be routed through doorways, hatches, windows, or other openings.

4.5.2 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.

4.5.3 Circuit breakers shall be labeled to indicate their use.

4.5.4 All circuit breaker panels shall have no openings or uncovered knockouts and shall be kept covered when not in use.

4.5.5 All live parts of electrical equipment operating at 50 volts or more shall be properly guarded against accidental contact.

4.5.6 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 “OUT OF SERVICE” and removed from service. Manufacturer-installed insulated electrical cords will not be repaired except by a licensed electrician.
- 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 cord sets for use in field operations should be of the three-wire grounding type and will be rated for the intended load.
- Use of extension cords is allowed only for temporary installations not to exceed 90 days.
- “Daisy chaining” or connecting a series of extension cords together is not permitted.
- 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.
- Ground fault circuit interrupters shall be used or, if permitted by legislation, an “assured equipment grounding conductor program” is to be established for all nonpermanent wiring needed for construction purposes or when working outdoors, in wet or moist areas or elsewhere as required by legislation.

4.5.7 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 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.

4.6.2 Any work on exposed, live electrical systems above 50 volts shall be conducted by a licensed electrician who is a Qualified Person.

4.6.3 Refer to *S3AM-302-ATT1 Live Electrical Work*.

4.6.4 Prior to performing any work near exposed, energized systems, the Qualified Person shall:

- Confirm with the Licensed Electrician that it is safe to do so.
- Perform a Shock Hazard Analysis.
- Perform an Arc Flash Analysis.
- Establish emergency contacts.

- Complete and have approved the Energized Electrical Work Permit. Refer also to *S3AM-218-PR1 Permit to Work* for additional guidance related to Safe Work Permits.
- 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.

4.6.5 Working Near Overhead Power Lines

- Personnel working in the vicinity of overhead power lines, either on the ground or elevated, shall comply with *S3AM-322-PR1 Overhead Lines.*
- All workers and equipment including cranes and drill rigs shall maintain a clearance distance of at least 50 feet (15.24m meters) from overhead power lines unless a detailed assessment has been completed demonstrating that a smaller clearance distance provides protection.

4.7 Grounding

4.7.1 “Ground fault protection” is required on construction sites. To provide this protection, either “ground fault circuit interrupters” (GFCI) are to be used with temporary receptacles, or if permitted by legislation 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.

4.7.2 Ground Fault Circuit Interrupters

- 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.
- GFCIs may trip from many causes including but not limited to:
  - Electrical leakage in the tool from internal defects, damaged insulation or from normal leakage in long runs of cords.
  - Moisture in the air or cords lying in water or on moist dirt.
  - Too many tools on one GFCI circuit.
  - Faulty wiring of the GFCI into the circuit.
  - Defective GFCI.
  - Any such tripping will require the problem to be corrected before the protected circuit can be re-set.

4.7.3 All 120-volt, single-phase, 15- and 20-ampere temporary receptacles shall be protected with “approved” GFCIs. “Approved” means listed by Underwriters Laboratories.

4.7.4 There are several types of GFCIs.

- A combination circuit breaker and GFCI that is installed in place of the ordinary circuit breaker.
- A receptacle containing a built-in GFCI.
- A portable GFCI that plugs into a receptacle and allows the extension cord or tool to be plugged into the GFCI.
- A portable unit containing several GFCI protected receptacles.

4.7.5 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).

4.7.6 Assured Equipment Grounding Conductor Program

- If allowed by local legislation, 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.
- Temporary receptacles shall be electrically grounded in accordance with the temporary wiring requirements of the National Electrical Code (United States)/Canadian Electrical Code.
- Extension cords shall be three-wire cords containing an equipment grounding conductor (ground wire).
- 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.)
- The Manager or Supervisor is required to designate one or more competent persons to administer this testing and recording program. Refer to S3AM-202-PR1 Competent Person Designation.
- 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 three 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 months months.)
- 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.
- 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.
- 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.
- Color coding shall be used in the following manner:
  - After a plug-connected piece of equipment or an extension cord has been inspected and 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

- 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.
- 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 given a daily visual inspection, but it is a good idea to do the daily visual inspection anyway.)
- 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.
- 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.
- A copy of this program is to be kept at the worksite.

4.8 PPE/Work Practices

4.8.1 PPE requirements shall be determined based on the results of each of the following: Task Hazard Analysis, Shock Hazard Analysis, and Arc Flash Analysis. Refer to the *S3AM-208-PR1 Personal Protective Equipment* and *S3AM-302-ATT1 Live Electrical Work*.

4.8.2 PPE

2 – Required PPE (range based on maximum voltage)	
50 to 240 volts	• **Eye/Face: Safety glasses with side shields or goggles and Arc-Flash Face Shield *or* Arc-Flash Suit Hood (4 cal/cm^2)** • **Body: Flame-Retardant long-sleeved shirt/pants or coverall (4 cal/cm^2)** • **Hand: Electrical Hazard (EH) gloves (Class 00 with leather protectors)** • **Foot: EH-rated footwear** • **Head/Ears: Class E hard hat, hearing protection (ear canal inserts)** • **Tools: ANSI/CSA-approved, voltage-rated**
Above 240 to 480 volts	• **Eye/Face: Safety glasses with side shields or goggles and Arc-Flash Face Shield and Sock Hood (8 cal/cm^2) *or* Arc-Flash Suit Hood (8 cal/cm^2)** • **Body: Flame-Retardant long-sleeved shirt/pants or coverall (8 cal/cm^2)** • **Hand: EH gloves (Class 00 with leather protectors)** • **Foot: EH-rated footwear** • **Head/Ears: Class E Hard hat, hearing protection (ear canal inserts** • **Tools: ANSI/CSA-approved, voltage-rated**

480 to 600 volts	• **Eye/Face: Safety glasses with side shields or goggles and Arc-Flash Suit Hood (8 cal/cm^2)** • **Body: Flame-Retardant long-sleeved shirt/pants or coverall (8 cal/cm^2)** • **Hand: EH gloves (Class 0 or higher with leather protectors)** • **Foot: EH-rated footwear (carbon fiber recommended)** • **Head/Ears: Class E Hard hat, hearing protection (ear canal inserts)** • **Tools: ANSI/CSA-approved, voltage-rated**

4.9 Portable Electrical Equipment

4.9.1 Refer to *S3AM-305-PR1 Hand & Power Tools*.

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 *S3AM-302-FM1 Energized Electrical Work Permit* or equivalent shall be retained in the project file.

6.0 Attachments

6.1 S3AM-302-FM1 Energized Electrical Work Permit

6.2 S3AM-302-FM2 Electrical Hazard Checklist

6.3 S3AM-302-ATT1 Live Electrical Work

6.4 S3AM-302-ATT2 Generator Safety

Americas

Excavation

S3AM-303-PR1

1.0 Purpose and Scope

1.1 To evaluate all excavation operations to provide proper protective systems for employee protection from associated hazards.

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

2.0 Terms and Definitions

2.1 **Benching (Benching system)** – One or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels to protect employee from cave-ins.

2.2 **Cave-in (collapse)** – The separation of a mass of soil or rock material from the side of an excavation or the loss of soil from under a trench shield or support system and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

2.3 **Competent person** – Person, who, by way of training, knowledge, and/or experience, is capable of classifying soils and is also capable of identifying existing and predictable hazards in excavation/trenching work area and who has the authority to take prompt corrective measures to eliminate them. The person shall also be familiar with the requirements in the regulation.

2.4 **Excavation** – A manmade cut, cavity, trench, or depression in an earth surface formed by earth removal. Examples include trenches, tunnels, shafts, caissons and open cut holes.

2.5 **Faces (or sides) –** The vertical or inclined earth surfaces formed as a result of excavation work.

2.6 **Failure** – A structural member's integrity and supportive capabilities is compromised, causing a breakage, displacement, or permanent deformation.

2.7 **Hazardous Atmosphere** – An atmosphere that by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen-deficient, toxic, or otherwise harmful may cause death, illness, or injury.

2.8 **Protective Systems** – Devices or methods in protecting employees in an excavation from cave-ins, a collapse or falling material. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

2.9 **Ramp** – An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

2.10 **Professional Engineer** – A registered engineer who can authorize any state of work by his professional designation. A **Professional Engineer** registered in the State, Province, or territory is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

2.11 **Shield (Shield system)** – A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

2.12 **Shoring (Shoring system) –** A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and that is designed to prevent cave-ins.

2.13 **Sloping (Sloping system)** – An alternative to shoring is trench sloping. This means that the trench walls are cut back to decrease the possibility of cave-ins. The angle of incline required to prevent a cave-in varies with such factors as soil type, environmental conditions of exposure, and application of surcharge loads.

2.14 **Stable rock** – A natural solid mineral material that can be excavated with vertical side wall; unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against cave-in or movement by rock bolts or by another protective system that has been designed by a **Professional Engineer**.

2.15 **Support system** – A structure such as underpinning, bracing, or shoring that provides support to an adjacent structure, underground installation, or the sides of an excavation.

2.16 **Trench** – An open narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width (measured at the bottom) is often not greater than 15 feet (4.57 meters). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.57 meters) or less (measured at the bottom of the excavation), the excavation is also considered a trench.

2.17 **Trench Box –** A trench box is a unit of shoring that is an engineered shoring system capable of protecting workers in case of cave-in of trench walls. The space between the trench wall and the trench box shall be backfilled.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-202-PR1 Competent Person Designation

3.3 S3AM-218-PR1 Permit to Work

3.4 S3AM-322-PR1 Overhead Lines

3.5 S3AM-331-PR1 Underground Utilities

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers**

- Shall confirm that all projects under their direct control or authority and which involve excavations or trenching are conducted in a safe and efficient manner and in accordance with the requirements of this procedure and local legislation.
- Shall confirm that all projects under their direct control or authority have a written Safe Work Plan (SWP)/Health and Safety Plan (HASP) prepared for the activity.
- Confirm the applicable *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* or equivalent has been completed and is reviewed prior to commencing any excavation activities.

4.1.2 **Professional Engineer**

- The professional status and the actual practice of professional engineering is legally defined and protected by law. In some jurisdictions, only licensed engineers (sometimes called registered engineers) are permitted to "practice engineering.
- For the purposes of this procedure, determination of soil condition and the safe management of the shoring, sloping or benching may require consultation, specifications and/or design by a Professional Engineer.

4.1.3 **Competent Person**

- Shall be present during all work that involves entry by AECOM personnel into trenches or excavations greater than 5 feet (1.52 meters) in depth (as above).
- Does not have to be an AECOM employee; however, an AECOM competent person shall be qualified per *S3AM-202-PR1 Competent Person Designation*.
- Shall identify prompt corrective measures to eliminate recognized present or anticipated hazards.
- The competent person shall be identified in the SH&E Plan for the location or project, and the Task Hazard Assessment for the particular task.
- The competent person:
  - Will determine the maximum allowable slope for the walls of the trench or excavation.
  - Will classify the soil in the trench or excavation in accordance with the requirements specified in the applicable legislation prior to determining that a maximum allowable slope, other than 34 degrees with the horizontal is selected.
  - Will inspect the excavation or trench on a daily basis when the potential for employee exposure to the hazards of the trench or excavation exists (*S3AM-303-FM1 Daily Excavation Checklist*).

4.1.4 **Employees**

- Maintain appropriate training for the excavation and the applicable tasks, and competency in the associated procedures (e.g. communication, rescue, etc.) and use of the necessary personal protective equipment (PPE). Refer to *S3AM-003-PR1 SH&E Training* and *S3AM-208-PR1 Personal Protective Equipment.*
- Know the location specific Emergency Response Plan and be able to recognize the potential for real hazards associated with the Excavation.
- Refrain from making any attempt to enter an excavation without approval and first meeting the requirements of this procedure and the applicable SH&E Plan (SWP)/Health and Task Hazard Assessment (THA).

4.2 Restrictions

4.2.1 Because of their inherent dangers, entry into trenches and excavations shall not be performed if there are means other than entry to perform the work. Where entry into trenches and excavations is necessary, strict adherence to the procedures specified below is extremely important. Whenever there are questions regarding the safety of trench or excavation entry, contact shall be made with the Competent Person or the SH&E Manager.

4.2.2 No one shall enter any trench or excavation until the walls have been adequately cut back or temporary protective structures have been installed unless the trench or excavation is shallower than stabilized.

4.2.3 Excavation work shall be completed and inspected in accordance with the written instructions of a qualified professional and in accordance with jurisdictional legislative regulations.

4.3 Excavation and Trenching Permit

4.3.1 If required by the applicable jurisdiction, confirm notification of the proposed excavation is provided within the required timeframe to the appropriate agencies or governing bodies prior to commencing excavation (e.g. California – CAL/ASHA Excavation Permit for the construction of trenches or excavations that are 5 feet (1.5 meters) or deeper that will be entered; Manitoba WHS Branch notification in order to obtain registration number, etc.).

4.3.2 An Excavation and Trenching Permit (*S3AM-303-FM2 Excavation & Trenching Permit* or equivalent) shall be completed prior to all excavation or trenching activities

4.3.3 The Excavation and Trenching Permit shall be completed and signed by all applicable parties as indicated on the permit. The Project Manager shall determine which signatures are required.

4.3.4 Excavation and Trenching Permits may be valid for up to one week; however the permit shall be reviewed at the beginning of each shift.

4.3.5 Refer also to *S3AM-218-PR1 Permit to Work* for additional guidance related to Safe Work Permits.

4.4 Planning and Preparation

4.4.1 Prior to beginning any excavation work at a site, the location of all underground and overhead utilities shall be identified and work locations will be carefully planned to avoid any potential for inadvertent contact with them.

4.4.2 Clearance, including hand exposure, of underground utilities shall be completed in accordance with *S3AM-331-PR1 Underground Utilities*. The associated *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist* or equivalent shall be available and reviewed with all employees expected to be involved in the excavation prior to commencing any excavation activities.

4.4.3 Identify any overhead power lines and de-energize or protect by other appropriate means. Refer to *S3AM-322-PR1 Overhead Lines*.

4.5 Excavation Requirements

4.5.1 A Professional Engineer shall be engaged if specified by the applicable jurisdiction and as appropriate to the soil conditions and proposed excavation considerations (e.g. wall slope, shoring requirements, load calculations, etc.).

4.5.2 All personnel involved in the excavation activities shall be appropriately trained to their respective activities and associated hazards. Refer to *S3AM-003-PR1 SH&E Training*.

4.5.3 All personnel involved in the excavation activities shall wear the required PPE, including reflective clothing if mobile equipment or vehicular traffic. Refer to *S3AM-208-PR1 Personal Protective Equipment.*

4.5.4 The Task Hazard Assessment (THA) or Safe Work Plan (SWP) identifying applicable hazards and appropriate control measures shall be completed and clearly communicated to all involved personnel as well as to any concurrent operations potentially affected. The work environment shall be monitored for changing conditions and the THA / SWP updated accordingly.

4.5.5 Excavation shall be conducted in a manner that minimizes environmental impact.

4.5.6 Excavated (spoil) material shall be kept at least 3.2 feet (1 meter) from the edge of the excavation, or further if local regulations are more stringent.

- Excavated (spoil) material shall be piled in a manner to prevent sloughing of loose material. Various jurisdictions provide specific spoil pile sloping requirements.

4.5.7 If the walls of an excavation or trench are not sloped or cutback, barriers shall be placed around the perimeter. The barrier shall be at least 3.6 feet (1.10 meters) in height.

4.5.8 If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored regularly to confirm proper operation.

4.5.9 If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require regular inspections.

4.5.10 All excavations shall be appropriately secured at the end of the day to prevent unauthorized entry or inadvertent entry into the excavation. This may require a protective covering, barriers, fencing, signage or other measures appropriate to the excavation and associated conditions.

4.5.11 Backfill trenches as soon as reasonably possible after work is complete.

4.6 Soils Classifications

4.6.1 Soil classification shall be conducted to confirm appropriate measures are taken to protect workers and to secure excavation walls. Measures may include, but are not limited to:

- Sloping, shoring or shielding.
- Relocation of equipment or materials.
- Scheduling to minimize concurrent operations.

4.6.2 Soil characteristics evaluated when classifying include, but are not limited to:

- Cohesiveness / compaction / compressive strengths (e.g. fissured, hardpan, fractured rock, etc.).
- Composition (sand, clay, gravel, layered, etc.).
- Moisture content / submersion.
- Compaction.
- Exposure to vibration (e.g. traffic, pile driving, etc.).
- Previous disturbances.

4.6.3 Consult the applicable jurisdictional requirements as classification methods, definitions and terms can vary. In general classifications or types include:

- Stable soil that is dense and heavy and consists primarily of clay.
- Soil with a medium level of stability and generally includes soils such as silt, sandy loam, and medium clay.
- Unstable soil which generally includes gravel, loamy sand, and soft clay.

4.7 Protective System Requirements

4.7.1 Protective systems shall be used to protect workers entering an excavation when there is a potential for cave in, and is required when:

- An excavation is greater than 4 feet (1.22 meters) in depth and is not entirely in stable rock.
- A worker is required to be closer to a trench wall than the height of the trench wall.
- A worker will approach closer to the side or edge of the excavation that the distance equal to the depth of the excavation.

4.7.2 The protective system may include sloping the excavation walls, shoring the excavation walls, and/or installing a shielding system. The protective system(s) chosen shall have the capacity to resist, without failure, all loads to be applied to the system.

4.7.3 Slope angle, or type of shoring or shielding shall be determined by:

- Soil classification – including structure, strength, moisture content.
- Depth of the excavation
- Weather and environmental conditions.
- Anticipated duration of excavation activities.
- Loading of soil and soil stress (e.g. proximity of structures, location of equipment, stored material, anticipated vibration, etc.)

Factor	Description / Examples
Soil Structure and Strength	Proper classification of soil is necessary in order to select appropriate protection methods. Trench walls, at first glance, may appear to have strength, particularly if rock is encountered. Fractures in the rock can develop because of construction and soil strength may fail when subjected to undercutting or high-energy impacts. Irregular slopes on stratified soils that appear stable can fail if lower materials do not have adequate strength.
Excavation Depth	Jurisdictional requirements may specify the type of protective methods that are required at given depths. Additionally, consultation of a professional engineer may be necessary.
Soil Moisture Content	Soil may be moist even though the weather has been dry. Care shall be taken and appropriate protection methods employed if the soil appears to be moist.
Weather and Humidity	These can have a significant impact on excavation wall stability and effectiveness of protection methods. Frozen stable soil may collapse if warm mild weather persists. Percolation of water into the soil can increase the load on shoring due to the increased weight and mobility of saturated soils. Frozen ground does not preclude the need to appropriately slope, shore or shield unless the freezing process is designed and approved by a Professional Engineer.
Loading and Soil Stress	Stress can originate from many sources. Heavy machinery passing close to the excavation creates vibrations that decrease the soil strength and can result in wall collapse or shoring failure if it is inadequate to these conditions. Stationary equipment at the edges of the excavation can transmit loads and additional stresses to the excavation wall and method of protection.
Trench Depth and Width	These directly influence the choice of materials and the spacing of support bracing. The shoring requirements of a wide and deep trench differ substantially from those of a narrower trench.
Erosion Time	If excavations are to be left for extended periods, different methods of protection may be required and shoring materials may have to be increased.

4.7.4 If an excavation may affect the stability of an adjacent building or structure, precautions shall be taken to prevent damage to the structure. The precautions shall be specified in writing by a Professional Engineer.

4.7.5 All sloping, shielding, or shoring shall be conducted in accordance with applicable Federal, State, Provincial, Territorial or Legislative regulations.

4.7.6 Exceptions. Each individual in an excavation shall be protected from cave-ins and trench collapse by an adequate protective system except when:

- Excavations are made entirely in stable rock.
- Excavations are less than 4 feet (1.22 meters) in depth and an examination of the excavation by a Competent Person reveals no indication of a potential cave-in.

4.7.7 The depth of the excavation or trench is to be measured at its greatest vertical dimension. Be aware that crouching or kneeling in a trench that is less than 3 feet (0.91 meter) in depth may still pose significant hazard for the employee involved.

4.7.8 Consult the applicable jurisdiction's requirements concerning the standards that protective systems shall meet; this may include design and certification by a Professional Engineer.

4.7.9 A Professional Engineer can properly assess the need for and the type of shoring required for specific applications. Shoring may not be needed in all cases, but failure to recognize the need for shoring can be catastrophic.

4.8 Use of Sloping as a Means of Protection

4.8.1 Sloping the walls of the trench or excavation is the preferred, and typically simplest, means of protecting employees who shall enter trenches or excavations which are greater than 4 feet (1.22 meters) in depth or where there is danger of collapse.

4.8.2 If sloping is used as the means of protection, the trench or excavation walls shall be sloped back so that the ratio of the horizontal distance to the vertical rise (H:V ratio) of the sloped wall or degree from horizontal is appropriate to the soil type and in compliance with jurisdictional requirements.

4.8.3 In many cases, determining the maximum allowable slope may allow the use of a steeper slope, which will result in a narrower excavation. However, determination of soil classification is complicated and requires that the Competent Person be familiar with the manual and visual tests. Since incorrect soil classification may result in the use of a steeper, and potentially unsafe, slope, it

is recommended that an angle of 34 degrees (or less given specific jurisdictional requirements and unstable soil types) with the horizontal typically be selected.

4.9 Use of Shoring or Shielding as a Means of Protection

4.9.1 Where sloping the walls of the trench or excavation is unfeasible (e.g., when there are dimensional constraints or adjacent structures), the use of shoring or shield systems (e.g., trench boxes) may be necessary.

4.9.2 Soil classification is required. The excavation shall comply with one of the four options below:

- The soil shall be classified and the timber shoring be constructed in accordance with applicable legislative regulations.
- Other protective systems meeting applicable legislative regulations shall be utilized (e.g., shield systems, trench jacks, aluminum hydraulic shoring, etc.) and the manufacturer's data shall be explicitly followed.
- A protective system meeting applicable legislative regulations shall be utilized based on tabulated data which has been approved by a Professional Engineer.
- A protective system meeting applicable jurisdictional requirements and designed by a Professional Engineer shall be utilized and installed in accordance with the engineer’s written plans.

4.9.3 In all cases listed above, the SH&E Manager shall be contacted before proceeding.

4.9.4 Workers shall be protected whenever shoring is being installed or removed.

4.9.5 Shoring, stringers or bracing shall be installed from the top of the trench or excavation down. Removal shall be completed from the bottom up unless conditions exist that would make doing so unsafe. A removal method shall be developed that does not require worker entry.

4.9.6 Check hydraulic shoring once per shift at a minimum (leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, other damaged or defective parts) and more frequently as required.

4.9.7 Hydraulic or pneumatic trench jacks shall have a means of ensuring that they will not collapse in the event of loss of internal pressure.

4.9.8 Shielding and Trench Boxes differ from shoring in that their design is intended primarily to protect workers from cave-ins and similar incidents. They may be used in combination with sloping and benching.

- The excavated area between the outside of the trench box and the face of the trench should be as small as possible and may be backfilled to prevent lateral movement of the shield.
- The box shall extend at least 18 inches (0.45m) above the surrounding area, or as specified by the applicable jurisdiction, if there is sloping toward excavation. This can be accomplished by providing a benched area adjacent to the box.
- Earth excavation below the shield is permitted only if:
  - The excavation does not exceed a depth of 2ft (0.61m) below the shield,
  - The shield is capable of withstanding the forces calculated for the full depth of the trench, and
  - There are no indications while the trench is open of possible loss of soil from behind or below the bottom of the support system.
- A shield shall not be subjected to loads exceeding those for which it was designed to withstand.

4.9.9 Bell-bottom pier holes that are to be entered by workers shall be designed and supported according to written instructions of a registered professional engineer.

- Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, should wear a harness with a retrieval line securely attached to it.
    - Retrieval lines shall not be used to handle materials.
    - Rescue equipment shall be individually attended at all times while the employee wearing the retrieval line is in the excavation.

4.10 Work Around the Trench/Excavation

4.10.1 Structural ramps used for excavation access or egress of equipment shall be constructed in accordance with jurisdictional requirements and the instructions or designs of an individual competent and qualified in structural design.

4.10.2 If the ramp has an open side, it shall have a curb or a restraining device.

4.10.3 Confirm equipment placement does not compromise the integrity of the excavation wall and optimizes visibility of work zone and any contact hazards (spoil placement should also take these into consideration). Use wheel chocking or barricades as necessary to prevent encroachment of edge.

4.10.4 If the appropriate setback of equipment is not possible confirm appropriate blocking or matting is used to disperse weight. These requirements may need to be determined by a professional engineer.

4.10.5 While workers are in a trench, an aboveground observer or spotter shall be present to warn of earth movements and to advise equipment operators of the presence and location of those in the trench so as to avoid vibrating equipment near trenches or excavations.

4.10.6 If there is a danger of a worker or equipment falling into an excavation, or whenever the edge is not clearly visible, identify the trench or excavation perimeter with visual markers (e.g., barricade tape, wooden railings, stop logs, etc). If the trench or excavation is 4 feet (1.22 meters) or greater in depth, the visual barrier shall be a minimum of 6 feet (1.83 meters) from the edge.

4.10.7 Personnel shall notify workers of the excavation through flagging, marking, safeguards, or other appropriate and effective means.

4.10.8 If walkways are permitted over excavations or trenches (e.g. trench over 6 feet [1.8 meters] in depth and wider than 30 inches [76 centimeters]), the installation shall be in such a manner as to not compromise the stability of the excavation.

4.10.9 Walkways shall be equipped with guardrails and constructed in accordance with jurisdictional requirements.

4.10.10 If vehicle crossings over excavations are required, they shall be designed by and installed under the direction of a Professional Engineer.

4.10.11 Precautions shall be taken to isolate or remove loose rocks, trees, or other materials that may slide, roll, or fall into the trench and onto workers prior to entry by workers into an excavation.

4.10.12 While operating heavy equipment in the work area, the equipment operator shall maintain communication with a designated signal person through either direct voice contact or approved standard hand signals.

4.10.13 When mobile equipment is operated adjacent to an excavation or when such equipment is required to approach the edge of an excavation and the operator does not have a clear and direct view of the edge of the excavation, a warning system such as barricades, hand or mechanical signals, or stop logs shall be used. If possible, the grade should be away from the excavation.

4.10.14 All site personnel should maintain a safe distance and remain clear of the swing of operating excavation equipment.

4.10.15 Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles

being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

4.10.16 All materials such as pipe, rebar, etc., shall be kept out of traffic lanes and access ways. Materials and equipment shall be stored in a designated area so as not to endanger personnel at any time.

4.10.17 A flagman with roadwork, signs, cones, and high-level warning signs shall be provided when it is necessary to control normal vehicular traffic due to vehicles, such as end-dumps, entering, or leaving the site.

4.11 Work Within the Trench/Excavation

4.11.1 Personnel shall not be permitted on the faces of sloped or benched excavations at levels above other workers unless those workers at lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

4.11.2 Employees shall not work in excavations in which there is accumulated water or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and retrieval line.

4.11.3 A stairway, ladder, ramp, or other safe means of egress shall be located in excavations or trenches that are 4 feet (1.22 meters) or more in depth so as to minimize lateral travel for employees. Jurisdictional maximum lateral travel distances vary between 25 feet (7.6 meters) and 49 feet (15 meters). In the absence of jurisdictional specification, travel distance shall not exceed 25 feet (7.6 meters). Ladders should extend at least 3 feet (0.91 meters) above the trench top.

4.11.4 Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design and shall be constructed in accordance with the design.

4.11.5 Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement. Structural members used for ramps and runways shall be of uniform thickness. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

4.12 Confined Spaces and Hazardous Atmospheres

4.12.1 An excavation may contain hazardous gases, vapors, dusts, fumes or an oxygen deficient or enriched atmosphere.

- To prevent exposure to harmful levels of atmospheric contaminants, the hazard assessment shall evaluate atmospheric hazards when workers are required to enter trenches and excavations:
  - Greater than 4 feet (1.22 meters) in depth in which a hazardous atmosphere exists, or could reasonably be expected to exist, such as in excavations in landfill areas, where equipment is exhausting nearby, or where hazardous substances are stored nearby.
  - Less than 4 feet (1.22 meters) in depth if workers could be exposed to a hazardous atmosphere (e.g. crouching).
- Appropriate atmospheric testing is necessary to accurately identify these hazards. Ongoing atmospheric monitoring, use of attendants and rescue equipment may be necessary to address the identified hazards.

4.12.2 Confined spaces may exist in excavations where there is limited access or egress and in which a hazardous gas, vapor, dust, or fume or an oxygen-deficient atmosphere may occur. Confined

space entry shall be performed in accordance with the requirements specified in *S3AM-301-PR1 Confined Spaces*. Consult the applicable jurisdictional requirements as the excavation may or may not be subject to confined space requirements.

4.12.3 Adequate precautions, such as mechanical ventilation or appropriate respiratory protection, shall be taken prior to entry into trenches and excavations in which hazardous atmospheres exist or could reasonably be expected to exist.

4.12.4 When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to confirm that the atmosphere remains safe. Atmospheric testing will be conducted in the anticipated breathing zone of the work area to determine oxygen content, combustible gas, and toxic gases and vapors, if applicable.

4.12.5 Appropriate respiratory protection shall be donned prior to entry into any trench or excavation in which airborne levels of toxic substances are present at concentrations in excess of their Threshold Limit Value/Occupational Exposure Limit or Permissible Exposure Limit.

4.12.6 Confirm appropriate emergency response measures are in place as necessary, including but not limited to:

- Location Specific Emergency Response Plan shall include procedures applicable to the potential emergencies the excavation work may present.
- Communication methods shall be established.
- Equipment such as spill kits, breathing apparatus, and retrieval equipment, shall be readily available.
- Where hazardous atmospheres are present rescue equipment shall be attended when workers have entered the excavation.

4.13 Stability of Adjacent Structures

4.13.1 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to confirm the stability of such structures for the protection of employees.

4.13.2 Excavation below the level of the base or footing of any foundation or retaining wall that could reasonably be expected to pose a hazard to employees shall not be permitted except when:

- A support system, such as underpinning, is provided to confirm the safety of employees and the stability of the structure; or
- The excavation is in stable rock; or
- A Professional Engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
- A Professional Engineer has approved the determination that such excavation work will not pose a hazard to employees.

4.13.3 In addition, sidewalks, pavements, and secondary structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

4.14 Inspections

4.14.1 Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a Competent Person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. Refer to *S3AM-303-FM1 Daily Excavation Checklist.*

4.14.2 An inspection shall be conducted by the Competent Person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-

increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

4.14.3 Where the Competent Person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to confirm their safety and the permit reissued or revised.

4.15 Backfilling

4.15.1 Perform any required notifications within the necessary timeframes prior to backfilling.

4.15.2 Confirm accurate classification of soil types of backfill material and absence of signs of contamination, discoloration and smell.

4.15.3 Confirm the re-establishment of the original soil integrity using the original material (if suitable) or designated fill material(s). A small cap of material on top of the ditch/hole should be left to allow for sloughing and settling of material.

4.15.4 Backfilling shall be done with care to prevent damage to any exposed utilities or facilities.

4.15.5 A spotter may be necessary to avoid encroachment (e.g. working around other equipment, traveling under overhead lines, working in close conjunction to underground facilities and other workers, compromised line of vision) and to watch for any rocks falling into the excavation, which may damage exposed facilities. If fill contains rocks or hard material, a shield or alternate fill material may be used to protect the facilities

4.15.6 Confirm piping or facilities are properly supported prior to backfilling.

4.15.7 If shoring was used, remove from the bottom up.

4.15.8 If a trench box has been used it should be placed no more than 24” above the base of the excavation or a sub-trench bed containing the pipe.

4.15.9 Appropriate measures shall be taken to confirm proper backfilling and compaction of the soil below the trench box. Removing and reinserting the trench box multiple times may be necessary to accomplish this.

4.15.10 Dragging of a trench box shall only be permitted if it will not damage facility or disturb the backfill, otherwise it shall be lifted vertically. No worker shall occupy a trench box while it is being moved.

4.15.11 If compaction is required confirm the appropriate method is employed and compaction testing is conducted in a manner that does not damage any facilities or pipelines in the excavation.

4.15.12 Final grading and cover of the ground disturbance should confirm corrosion control. Original state of the area and access shall be considered in completion of backfilling.

4.15.13 Any excess excavation material shall be properly disposed of.

5.0 Records

5.1 Completed Daily Excavation Checklist, Permits and applicable notifications shall be retained in the project files for +1 year.

6.0 Attachments

6.1 S3AM-303-FM1 Daily Excavation Checklist

6.2 S3AM-303-FM2 Excavation & Trenching Permit

Americas

Flammable & Combustible Liquids

S3AM-126-PR1

1.0 Purpose and Scope

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

1.2 The purpose of this procedure is to provide information regarding the proper storage, handling, and work practices associated with flammable and combustible liquids.

2.0 Terms and Definitions

2.1 **Flashpoint** – The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. The flash point is normally an indication of susceptibility to ignition.

2.2 **Safety can** – Safety can: an approved container, of not more than 5 gallons (18.9 liters) capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure

3.0 References

3.1 S3AM-011-PR1 Fire Protection

3.2 S3AM-115-PR1 Hazardous Material Communication

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-332-PR1 Hot Work

4.0 Procedure

4.1 Implementation of this standard is the responsibility of the AECOM manager directing activities of the facility, site, or project location.

4.2 Appoint a Responsible Person who will:

4.2.1 Determine if flammable or combustible liquids are stored on-site. Flammable liquids and combustible liquids are classified or categorized differently by jurisdiction. As a general definition that aligns the different classifications or categories, flammable and combustible liquids are any liquid that has a flashpoint at or below 199.4°F (93°C). Refer to *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications.*

4.2.2 Inspect storage areas monthly.

4.2.3 Monitor the quantity of flammable and combustible liquids on the site.

4.2.4 Review work practices involving flammable and combustible liquids.

4.2.5 Safety data sheets (SDS) for all hazardous substances, including flammable and combustible liquids, must be provided by vendors or subcontractors, and maintained on site. For more information, see *S3AM-115-PR1 Hazardous Material Communication*.

4.2.6 Furnish portable fire extinguishers in such quantities, sizes, and types as needed for the special hazards of operation and storage. For more information, see *S3AM-011-PR1 Fire Protection*.

4.3 Control flammable and combustible liquids entering the site by ordering only those materials and quantities needed to complete a job.

4.4 Cylinders – General Use & Transport

4.4.1 Open and close cylinder valves using the appropriate tools provided by the cylinder supplier.

4.4.2 Remove regulators and replace caps before transporting cylinders.

4.4.3 Do not roll or drop cylinders. Transport cylinders in a vertical and secured positing using a cylinder basket, cylinder cart or other secure equipment.

4.4.4 Do not use cylinders if the cap cannot be removed by hand. Do not use tools (e.g., hammer) to loosen caps. Tag the cylinder "Do Not Use" and return the cylinder to a designated storage area to be returned to the cylinder supplier.

4.5 General Storage

4.5.1 Use only approved containers, tanks, and pumping equipment for storage and handling of flammable and combustible liquids. Use approved (UL or FM) metal safety cans (with spring-closing lid and spout cover, and optional flash-arresting screen) for the handling and use of flammable liquids in 1- to 5-gallon (3.8- to 18.9-liter) quantities. For additional information, see *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications.*

4.5.2 Place all rags, waste, etc., soiled by combustible or flammable materials in tightly closed metal containers for daily disposal.

4.5.3 Take precautions, including proper ventilation, to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to: open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition; chemical reactions; and radiant heat.

4.5.4 Require approved personal protective equipment for all persons handling flammable or combustible liquids, as outlined by the appropriate SDS.

4.5.5 Train employees exposed to flammable or combustible liquids in the hazards of these materials; in their safe handling, use and disposal; in their protection from ignition sources; in the type, use, and placement of containers and cabinets; in the location of fire extinguishers; in the protection against toxic vapors; and in the procedures to follow in case of spill or fire.

4.6 Indoor Storage

4.6.1 Keep indoor storage of flammable liquids to a minimum. Do not store more than 25 gallons (95 liters) of flammable or combustible liquids outside of an approved storage cabinet.

4.6.2 Do not store flammable or combustible liquids in areas used for exits, stairways, or normally used for the safe passage of people.

4.6.3 Do not store more than of flammable and combustible liquids in a single flammable storage cabinet in excess of that specified by the applicable jurisdiction. Refer to *S3AM-126-ATT1 Flammable & Combustible Liquid Classifications*.

4.6.4 Do not store oxidizers and other reactive chemicals in flammable cabinets.

4.6.5 Up to three cabinets may be grouped together. Groups of cabinets must be separated by at least 100 feet (30.5 meters).

4.6.6 Conspicuously label all cabinets "Flammable — Keep Fire Away."

4.6.7 Indoor flammable liquid storage rooms must conform to NFPA codes, including requirements regarding fire ratings, spill containment, maximum capacity, electrical classifications, and ventilation requirements.

4.7 Outside Storage

4.7.1 Maintain a minimum of 20 feet (6.1 meters) between flammable and combustible storage areas and any building.

4.7.2 Maintain a minimum distance of 50 feet (15.2 meters) between flammable and combustible storage areas and hot work activities. Refer to *S3AM-332-PR1 Hot Work*.

4.7.3 Grade the storage area in a manner to divert possible spills away from buildings, and curb or dike so as to contain entire volume of liquids and prevent spills from impacting soil or groundwater.

4.7.4 Keep the entire storage site free from accumulation of unnecessary combustible materials. Closely cut weeds and grass, and establish a regularly scheduled cleanup procedure for the whole area.

4.7.5 Maintain adequate access-ways to open-yard storage to allow access by fire-fighting equipment. Equipment that is blocking access must be manned at all times so that it may be readily moved if necessary.

4.8 Labeling and Signage

4.8.1 Post a "NO SMOKING OR OPEN FLAME" sign in all areas where flammable and combustible materials are stored, handled, and processed.

4.8.2 Require all containers and cylinders to be labeled with the contents and adequate hazard warnings per *S3AM-115-PR1 Hazardous Materials Communication.*

4.9 Use of Materials on Site

4.9.1 Use flammable and combustible liquids in a manner that is consistent with the label and SDS for the product.

4.9.2 Use only those amounts of materials needed for the job. Transfer of these materials to ready-to-use containers is encouraged.

4.9.3 Use personal protective equipment stated on the product label and SDS. For additional information, consult *S3AM-208-PR1 Personal Protective Equipment*.

4.9.4 For dispensing and/or fueling operations, ensure:

- Signs are posted with instructions on the dispensing or fueling process.
- Operators have been trained in the dispensing or fueling process.
- Equipment being refueled has the engine shut off prior to fueling.
- Smoking is prohibited in vehicle and equipment refueling areas.
- Adequate protection is provided to safeguard dispensing pumps from physical damage from vehicles.
- Dispensing nozzles have auto shut-off or self-closing valves and provisions for containing or controlling over-spillage.
- Heating equipment installed in lubrication or service areas, where flammable liquids are dispensed, is of an approved type, and where feasible, is installed at least 8 feet (2.4 meters) above the floor.
- Tank cars and trucks being loaded or unloaded and flammable storage tanks and systems are properly bonded and grounded.
- Transfer of flammable liquids from one container to another is done only when containers are electrically interconnected (bonded).
- Proper PPE is required during the dispensing or fueling process. For additional information, see *S3AM-208-PR1 Personal Protective Equipment*; and *S3AM-126-FM1 Flammable and Combustibles Inspection.*

4.10 Spill Control

4.10.1 Have a written spill response plan in place before materials are stored or used on site.

4.10.2 Have spill clean-up materials in the vicinity of the materials being stored.

4.10.3 Clean up or respond to spills promptly according to applicable local, state, and federal regulations. This may require notification of authorities if a Reportable Quantity (RQ) is exceeded.

4.10.4 Move leaking cylinder to a ventilated area away from ignition sources. Do not attempt to repair a leaking cylinder. Contact the cylinder supplier to determine proper response methods.

4.11 Disposal

4.11.1 Keep solvent waste and flammable liquids in fire-resistant, covered containers until they are removed from the worksite.

4.11.2 Do not place flammable or combustible waste in municipal garbage.

4.11.3 Do not pour flammable or combustible liquids down drains or onto the ground.

4.11.4 Dispose of flammable or combustible hazardous materials with a licensed and approved hazardous material disposal company.

4.12 Inspection

4.12.1 Inspect flammable and combustible storage and use areas on a monthly basis.

4.12.2 Use *S3AM-126-FM1 Flammable & Combustibles Inspection* or equivalent to inspect the storage areas.

4.12.3 Inspect cylinder regulators, gauges, valves, hoses and connections before use. Any damaged equipment shall be tagged out-of-service.

4.13 Training

4.13.1 Require that hazard communication training includes specific hazard information for the flammables and combustibles used.

4.14 Compliance

4.14.1 Review and comply with country and client/customer-specific requirements.

5.0 Records

5.1 The following information will be maintained in the project file.

5.1.1 Location of the SDS inventory.

5.1.2 Completed *S3AM-126-FM1 Flammable & Combustibles Inspection* or equivalent.

6.0 Attachments

6.1 S3AM-126-ATT1 Flammable & Combustible Liquid Classifications

6.2 S3AM-126-FM1 Flammable & Combustibles Inspection

Americas

Hand & Power Tools

S3AM-305-PR1

1.0 Purpose and Scope

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

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

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-118-PR1 Hearing Conservation

3.3 S3AM-208-PR1 Personal Protective Equipment

3.4 S3AM-302-PR1 Electrical Safety

3.5 S3AM-325-PR1 Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers/Supervisors**

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

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

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

4.1.3 **Employees**

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

4.2 Requirements

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

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

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

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

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

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

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

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

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

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

4.2.10 Avoid placing fingers and hands in danger zones:

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

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

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

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

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

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

4.2.15 Do not throw tools from place to place or from person to person, or drop tools from heights. Hand them, handle first, directly to other workers.

4.2.16 Use non-sparking and intrinsically safe tools in atmospheres with flammable or explosive characteristics and where highly volatile liquids, and other explosive substances are stored or used.

- Iron or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials shall be used.
- Electrical tools shall be identified as intrinsically safe.

4.2.17 If the task presents electrical hazards, worker must be competent and use the appropriate insulated tools to perform work that includes the risk of electrical shock. Cushioned grip handles do not protect against electrical shock.

4.2.18 The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

4.2.19 All tools designed to accommodate guards must have the guard(s) in place when the tool is in use. Do not modify, remove, or disable any machine guards.

4.2.20 Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools.

4.2.21 Make provisions to prevent tools from automatically restarting upon restoration of power. Refer to *S3AM-325-PR Lockout Tagout*.

4.3 Training

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

- Assess the employee's training needs as per *S3AM-003-PR1 SH&E Training* procedure.
- Refer to the applicable work instructions associated with this procedure for any additional training specifics.
- Training shall include applicable manufacturer's recommendations and guidelines.

4.3.2 Employees shall demonstrate knowledge and competency in the use, safe handling and maintenance of the applicable tool prior to operation.

4.4 Personal Protective Equipment (PPE)

4.4.1 Utilize basic PPE appropriate to the task; gloves, safety-toed boots, hard hats and safety glasses with side shields. Refer to *S3AM-208-PR1 Personal Protective Equipment*.

4.4.2 Ensure lockout devices (padlocks, multiple lock hasps, tags) are utilized as necessary. Refer to *S3AM-325-PR Lockout Tagout*.

4.4.3 Ensure PPE is appropriate to the work and use additional PPE as required (e.g. mono-goggles, hearing protection, respiratory protection, etc.).

- Dual eye protection is required to be worn by any employee undertaking or within 3 ½ feet (1 meter) of a task that produces projected particles or material.
- Head and face protection is recommended for employees working with pneumatic tools.
- Noise hazard is associated with pneumatic and many other tools. Working with noisy tools such as jackhammers requires proper, effective use of appropriate hearing protection.

4.4.4 Screens shall also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.

4.4.5 Refer to the applicable work instructions associated with this procedure for any additional specialized PPE.

4.5 Inspections

4.5.1 All tools must be inspected prior to each use.

- Any tool that is defective or has missing parts must not be used.
- Every broken or defective tool must be tagged 'out of service' or 'do not use' and immediately removed from service.
- Tagged tools will be returned to the supervisor for repair or replacement.

4.5.2 All tools must be inspected to manufacture's specifications and according to tool rests and guard adjustment tolerances. All tools will be inspected to ascertain that all safety devices are present and functioning properly. Refer to *S3AM-305-FM1 Hand & Power Tool Maintenance Inventory* and *S3AM-305-FM2 Hand & Power Tool Inspection Report*.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-305-ATT1 Chainsaw

6.2 S3AM-305-ATT2 Circular Saw

6.3 S3AM-305-ATT3 Cut Off Saw

6.4 S3AM-305-ATT4 Handheld Grinder

6.5 S3AM-305-ATT5 Impact Wrench

6.6 S3AM-305-ATT6 Nail Gun

6.7 S3AM-305-ATT7 Dustless Vacuum

6.8 S3AM-305-ATT8 Power Drill

6.9 S3AM-305-ATT9 Pressure Washer

6.10 S3AM-305-ATT10 Reciprocating Saw

6.11 S3AM-305-ATT11 Sander

6.12 S3AM-305-ATT12 Knives

6.13 S3AM-305-ATT13 Clearing & Grubbing Equipment

6.14 S3AM-305-ATT14 Pneumatic Tools

6.15 S3AM-305-ATT15 Manual Hand Tools

6.16 S3AM-305-ATT16 Small Engines

6.17 S3AM-305-ATT17 Electric & Battery Hand Tools

6.18 S3AM-305-FM1 Hand & Power Tool Maintenance Inventory

6.19 S3AM-305-FM2 Hand & Power Tool Inspection Report

Americas

Hazardous Waste Operations

S3AM-117-PR1

1.0 Purpose and Scope

1.1 Provides requirements for AECOM operations pertaining to hazardous waste and emergency response (HAZWOPER) services. In Canada and South America, there is no direct counterpart to HAZWOPER; however, as due diligence and in compliance with applicable duty of care/general duty clauses, staff working in Canada and South America will comply with this procedure as far as it aligns with the location's respective legislation.

1.2 Provides a procedure intended to address small incidental spills from work related equipment and supplies. For operations with bulk quantities of fuels, chemicals, oils, and for operations where AECOM is providing emergency response services for spills, the SH&E Manager or designee shall specify spill prevention and preparedness criteria including training, equipment, and proficiency.

1.3 To define appropriate procedures to decontaminate both equipment and personnel when exposure to hazardous chemicals or physical agents has occurred.

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

2.0 Terms and Definitions

2.1 **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 **Emergency Response** – A response effort by employees from outside the immediate release area or by other designated responders (e.g.., 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 or whenever a release requires that a federal, state, territorial or provincial agency be notified, such as:

- A release at or above a reportable quantity (RQ) of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance (40 CFR 302.8) is required to be reported to the National Response Center (NRC).
- A release at or above provincial reporting thresholds, if any, or alternatively those specified under the Canadian Transportation of Dangerous Goods Act are reportable under the Canadian Environmental Protection to the respective provincial or territorial Environmental Regulatory Agency .
- 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).

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.

2.4 **Exclusion Zone (EZ)** – The area where contamination does or could occur.

2.5 **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.

2.6 **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, pyrophoric, unstable-reactive, or water-reactive; and chemicals that in the course of normal handling, use, or storage may produce or release dusts, gases, fumes, vapor, 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 by-product materials or radioactive substances.

2.7 **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.

2.8 **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.

2.9 **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 sludge. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes. Hazardous waste are divided into:

- Listed wastes (http://www.epa.gov/osw/hazard/wastetypes/listed.htm);
- Characteristic wastes (http://www.epa.gov/osw/hazard/wastetypes/characteristic.htm);
- Universal wastes (http://www.epa.gov/osw/hazard/wastetypes/universal/index.htmwastes); and
- Mixed wastes;
- Specific procedures determine how waste is identified (http://www.epa.gov/osw/hazard/wastetypes/wasteid/index.htm), classified, listed, and delisted.

2.10 **Health and Safety Plan (SH&E PLAN)** – A document prepared for each project that contains site-specific information including the Emergency Response Plan for the project.

2.11 **Incidental Releases** - A response to a spill or release of a hazardous substance (in quantities below its RQ) where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area using equipment and materials available to them at the time or the spill or release. Any spill or release that cannot be managed with the personnel, materials, and equipment at the site shall be considered an Emergency Response.

- Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses. Handling of incidental releases shall be in accordance with applicable standard operating procedures.

2.12 **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.

2.13 **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.

2.14 **Support Zone (SZ)** – An uncontaminated zone where administrative and other support functions (e.g. first aid, equipment supply, emergency information, etc.) are located.

3.0 References

3.1 SR1-003-WI2 Disruptive Event Response Instruction

3.2 S3AM-003-PR1 SH&E Training

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

3.4 S3AM-010-PR1 Emergency Response Planning

3.5 S3AM-012-PR1 First Aid

3.6 S3AM-017-PR1 Injury & Illness Recordkeeping

3.7 S3AM-127-PR1 Exposure Monitoring

3.8 S3AM-128-PR1 Medical Screening & Surveillance

3.9 S3AM-208-PR1 Personal Protective Equipment

3.10 S3AM-209-PR1 Risk Assessment & Management

3.11 S3AM-213-PR1 Subcontractor Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Enforces and supports the implementation of SH&E Plans, Location Specific Emergency Response Plans, and Spill Response Plans;
- Prepare or request a SH&E Plan for every AECOM project with Hazardous Waste Operations and Emergency Response Activities, refer to *S3AM-209-PR1 Risk Assessment & Management*;
- Verify that all personnel working on the project are qualified to perform the activities they are assigned (see HAZWOPER and Emergency Spill Response Training requirements below);
- Request client's emergency response procedures;
- Appoint a Site Safety Officer (SSO) with appropriate qualifications for the specific hazardous waste project;
- Confirm that the SSO for complex projects, such as those with complicated remediation activities, has no duties other than site safety and health of the field team;
- Confirm the communication of the location-specific emergency response plan details to all employees assigned to a field project;
- Authorize the procurement of the necessary decontamination supplies;

- Verify that the applicable decontamination steps are clearly defined in the approved SH&E Plan;
- Verify staff are appropriately trained to execute the defined decontamination procedures;
- Verify that adequate staffing is available to safely conduct the applicable decontamination steps;
- Confirm that the necessary communications equipment for the project is available;
- Confirm that incident investigations are performed as required and a report is filed. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*;
- During spill response, all AECOM emergency responders and their communications shall be coordinated and controlled through the Manager. The individual in charge shall implement the and shall be responsible for the following tasks:
    - Become the individual in charge at the incident until relieved by more qualified personnel;
    - Notify the appropriate agency, the AECOM incident Reporting line, and operations. Refer to *S3AM-117-ATT1 Spill Notification Numbers North America* for US and Canadian required notifications;
    - Designate a safety supervisor who is knowledgeable about the operations being implemented at the emergency response site and who will have specific responsibility to identify and evaluate hazards and to provide direction on the safety of operations for the emergency at hand. If the safety supervisor judges activities to be an Immediately Dangerous to Life or Health (IDLH) and/or to involve an imminent danger condition, the safety supervisor shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene;
    - Identify all hazardous substances or conditions present and address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance, and handling procedures;
    - Implement appropriate emergency operations. Refer to *S3AM-010-Emergency Response Planning*;
    - Limit the number of emergency response personnel at the emergency site;
    - Implement the buddy system in groups of two or more;
    - Confirm 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.
- Confirm appropriate communications concerning an emergency event are initiated as per *S3AM-010-PR1 Emergency Response Planning* and *SR1-003-WI2 Disruptive Event Response Instruction*.

4.1.2 SH&E Manager or designee

- Provide technical guidance for:
    - The development and implementation of SH&E Plans and Emergency Response Plans;
    - The Incident Commander regarding the correct way to respond to the spill;
    - Project-specific Spill Response Plans when required;

- Prepare emergency action plans as part of project SH&E Plans and emergency reference sheets;
- Interface with the local emergency responders when necessary;
- Interface with clients regarding facility emergency response procedures;
- Decide whether AECOM or an outside emergency response company will clean up the spill;
- Report spills, as necessary, to state/provincial environmental agencies;
- Review the incident report and facilitate the post-response discussion;
- Review and revise this procedure as necessary based on recommendations from post-response discussions;
- Advise Managers and Supervisors on the necessary decontamination procedures for 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 protective measures are in-place (e.g. Engineering Controls, Administrative Controls, Personal Protective Equipment, etc.).

4.1.3 **Site Safety Officer (SSO)**

- Verify that a SH&E PLAN is available for the project and is reviewed prior to the commencement of site activities;
- Conduct pre-entry briefing and daily tailgate meetings and review facility, site-specific emergency procedures, and site specific decontamination procedures;
- Communicate the site-specific emergency response details to all employees assigned to a field project;
- Establish the designated site work zones (e.g., EZ, CRZ, SZ, etc.);
- Enforce the applicable decontamination steps as defined in the approved SH&E Plan;
- Initiate Stop Work and emergency response procedures as required;
- Account for all AECOM and subcontractor employees after site evacuation;
- Brief on-site and off-site responders in the event of an emergency;
- Conduct site-specific training on the applicable decontamination steps/procedures;
- Procure the necessary decontamination supplies and establishing the decontamination line;

4.1.4 **Employees**

- Maintain HAZWOPER training, or equivalent training as it relates to the given jurisdiction;
- Follow the SH&E Plan and emergency procedures prepared for the project;
- Initiate Stop Work if necessary;
- Initiate emergency response via verbal communications or the alarm system if first to encounter an emergency;
- Follow the defined decontamination steps as stated in the approved SH&E Plan;
- Follow precautions and safe handling practices to avoid spills;
- Alert Manager to any deteriorating hazardous materials containers within the office or project area;
- Report all spills and leaks to the 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; and

4.1.5 **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 shall 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 SH&E Plan.

4.2 Project SH&E Documentation—SH&E Plan

4.2.1 The project SH&E documentation prepared for HAZWOPER activities is referred to as a site-specific SH&E Plan, and shall meet the requirements presented in 29 CFR 1910.120(b)(4).

4.2.2 A safety and health risk or hazard analysis for each on-site task that will be performed.

4.2.3 The required SH&E 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;
- Identified risks shall 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**.** Refer to *S3AM-208-PR1 Personal Protective Equipment*;
- 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, *S3AM-010-PR1 Emergency Response Planning*, 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 shall address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

4.2.4 Responsibility for development of each AECOM SH&E Plan will be coordinated between the Manager and the SH&E Manager or SH&E Department designee as part of project initiation. Regardless of where the SH&E Plan is developed, it will be reviewed and approved by the SH&E Manager prior to submission to any agency outside of AECOM.

4.2.5 Contractors and Subcontractors

- The health and safety of the employees of any contractor or subcontractor who does not have a contract directly with AECOM, and for whom AECOM does not have contractual safety oversight, is the responsibility of that contractor or subcontractor. The contractor or subcontractor shall evaluate the hazards and potential hazards to their own employees and shall adhere to their own Health and Safety Plan;
- Subcontractors who maintain a contract directly with AECOM shall comply with AECOM SH&E program requirements. Refer to *S3AM-213-PR1 Subcontractor Management*;
- In addition, all AECOM subcontractors' Health and Safety Plans shall, at a minimum conform to the requirements of the AECOM SH&E Plan. The AECOM SH&E Plan does not, nor is it intended to, address procedures of contractors or subcontractors during their site activities.

4.3 Personnel Qualifications— Training and Medical Surveillance

4.3.1 HAZWOPER-qualified employees shall participate in the following medical surveillance and training requirements. Medical surveillance and SH&E training requirements are further described in *S3AM-128-PR1 Medical Screening & Surveillance* and *S3AM-003-PR1 SH&E Training* respectively.

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 in accordance with the *S3AM-003-PR1 SH&E Training*.

4.3.3 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 shall 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; and
        - 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;
- If an Employee does not wish to participate in part or in the complete medical surveillance program, and is permitted by the given jurisdiction, the employee shall provide a written statement of refusal. Refer to *S3AM-128-PR1 Medical Screening & Surveillance*;

4.3.4 Training - HAZWOPER

All personnel assigned to work at a hazardous waste site, sampling at Treatment, Storage and/or Disposal Facilities (TSDFs), or are performing Remediation and Investigation Activities, shall participate in training meeting the requirements of 29 CFR 1910.120(e), or equivalent training as it relates to the given jurisdiction. All personnel shall have the following training:

- 40-hour initial Training — Before being assigned to a HAZWOPER site, AECOM Employees shall 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 shall be provided to the employee's SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 3 days of on-the-job training — The Employee shall receive 3 days of actual supervision by a trained experienced supervisor;
- 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 shall be provided to the employee's SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 8-hour Supervisor 8-Hour Training - any AECOM Employee acting in a management capacity for HAZWOPER activities (e.g., project manager, site safety officers, etc.), including oversight of subcontractor HAZWOPER activities, shall 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 shall 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 shall be provided to the SH&E Manager. Employees are responsible for maintaining their own copy of this certificate and for presenting it to the SSO when working on any HAZWOPER site;
- 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 SH&E Manager shall approve the substitution of 24-hour training for initial 40-hour training. Persons qualifying for 24-hour training shall provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training shall complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work and shall provide proof of this training (as necessary to demonstrate retraining) prior to beginning work on site.

Available Training Sources:

- On-site training provided by the SH&E Department;
- Outsourced training providers approved by the SH&E Department;

4.3.5 Training – Emergency Response

On an as-needed basis, if a project requires AECOM to provide a HAZMAT emergency response team, the following training requirements shall be met:

- Operations Level – a minimum of 8 hours of initial and refresher training for those responsible for acting defensively in the case of a release, attempting to contain the release from a safe distance;
- HAZMAT Technician – at least 24 hours of initial training and 8 hours of refresher training. They will participate in operations-level training and know how to implement the emergency response plan for the facility/site/project location;
- HAZMAT Specialist – at least 24 hours of initial training and 8 hours of refresher training. They will be trained in the same content as the HAZMAT Technician, as well as in how to develop a site safety and control plan;
- Incident Commander – will have at least 40 hours of training covering the Operations Level training and techniques for implementing the emergency response plan and directing the incident. They will be knowledgeable in relevant regulations. The Incident Commander will become the individual in charge of a site-specific incident command system and will coordinate and control communications with external agencies;

4.3.6 Subcontractor Personnel Training Records

Any subcontractor organization whose employees will support AECOM operations at a HAZWOPER site will:

- Provide the Manager with a copy of their written HAZWOPER medical surveillance and training program requirements. The elements of the program(s) shall be similar to those for AECOM's own program, as detailed above. Refer to *S3AM-213-PR1 Subcontractor Management*;
- Provide the Manager with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
  - A copy of the physician's signed medical clearance for each employee (preferred); or
  - A letter identifying the medical status and clearance expiration date of every employee, signed by the company's safety director or an officer of the company.
  - A copy of the each employee's training certifications, which will include:
    - The initial 40-hour training certificate (24-hour training may be substituted with SH&E Manager approval);
    - The most current Refresher training certificate (shall 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., project manager, site safety officers, etc.).

4.4 HAZWOPER and Spill Response Equipment

4.4.1 Specific HAZWOPER activity and spill response equipment shall be identified in the site specific SH&E PLAN. All AECOM offices and project sites that store chemicals at their location shall have the appropriate spill response equipment. Such equipment may include the following:

- Over-pack 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;
- Poly-coated Tyvek coveralls;
- Safety goggles;
- Respiratory protection;

4.4.2 Spill response equipment shall be placed adjacent to areas where chemicals are routinely handled, stored, and/or where shipments are received. Similar types of spill response equipment shall also be available in any AECOM vehicle or rented vehicle in which chemicals are being transported. Location of spill response equipment shall be selected to permit access outside of likely spill locations.

4.4.3 Spill Response Equipment for Field Programs

- The amount of chemicals being used during a field program will dictate the types and quantity of spill response equipment that is brought to the site;
- If several squirt bottles of decontamination solution are all that is being brought to a site, a few spill pillows and a one-gallon bucket (3.8 liters) 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 or site specific SH&E Plan, and will provide a greater level of detail regarding the specific spill response effort for that field program. Refer to *S3AM-209-PR1 Risk Assessment & Management*;

4.5 Personal Protective Equipment (PPE) Ensembles

4.5.1 Defined HAZWOPER PPE ensembles are specified for general use on all AECOM HAZWOPER operations. The project SH&E Plan may specify modifications to these requirements to meet site-specific conditions. Refer also to *S3AM-208-PR1 Personal Protective Equipment* for additional information concerning PPE requirements.

4.5.2 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 to be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering hazardous substances or health hazards while working in controlled work areas.

Level D Equipment List:

- Hard hat;
- Eye protection;
- Safety-toe work boots;
- Shirts with sleeves and long pants (shorts are unacceptable for use); and
- Hearing protection (as required).

4.5.3 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:

- Full faceshield;
- Plain (uncoated) disposable coveralls;
- Chemical-resistant disposable outer coveralls;

- Chemical-resistant outer gloves taped to outer coveralls;[1]
- Chemical-resistant inner gloves; and[1]
- Chemical-resistant safety-toe boots (taped to outer coveralls).

4.5.4 Level C Ensemble

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 SH&E PLAN;[2]
- Plaind (uncoated) disposable coveralls;
- Chemical-resistant disposable outer coveralls;
- Chemical-resistant outer gloves taped to outer coveralls;[3]
- Chemical-resistant inner gloves;
- Hard hat;
- Safety-toe boots taped to coveralls; the use of boot covers (e.g., booties) or chemical-resistant boots may be specified; and
- Hearing protection (as required).

4.5.5 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 SH&E Manager.

Level B Equipment List:

- Supplied air respirator (SCBA or airline system with Grade D or better breathing air);
- Chemical-resistant disposable outer coveralls;
- Chemical-resistant outer glove taped to outer coveralls;[3]
- Chemical-resistant inner gloves;[3]
- Hard hat;
- Chemical resistant safety-toe boots taped to coveralls; and
- Hearing protection (as required).

1 Selection of specific glove types/materials will be provided in the project SH&E Plan based on consideration of the contaminants and the physical conditions of the work.

2 Selection of specific cartridges will be made by the SH&E Department (or Competent Person – Respiratory Protection as designated by the SH&E manager) based on contaminants present. A cartridge change-out frequency will also be specified in the SH&E based on the manufacturer's cartridge performance data.

3 Selection of specific glove types/materials will be provided in the project SH&E based on consideration of the contaminants and the physical conditions of the work.

4.5.6 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.

4.6 Emergency Response Plans

4.6.1 A Location Specific 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 SH&E Manager prior to issue.

4.6.2 AECOM'S *S3AM-010-PR1 Emergency Response Planning* shall apply and employees shall evacuate from the danger area whenever an emergency occurs, provided the associated contract does not require AECOM to provide emergency response services

4.6.3 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 shall be a contractual provision for this response and the Employees shall be specifically trained for this response;
- This document is designed to provide guidelines on how to prepare a written plan that will confirm 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.

4.6.4 Site specific SH&E plans that are prepared to comply with the HAZWOPER standard (29 CFR 1910.120) shall address emergency response. This standard specifically outlines the elements that shall 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 SH&E PLAN 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).

- There are two types of emergency situations that AECOM personnel shall be prepared for and that shall be addressed in the emergency response 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.
- Employees are not to accept the role of Incident Commander without specific authority from the SH&E Manager and the Manager responsible for the project. Assuming the role of the Incident Commander requires training beyond the scope of this Procedure.

4.6.5 The HAZWOPER standard does not prohibit AECOM Employees from performing limited response activities.

- Appropriately trained AECOM Employees can provide voluntary First Aid services;
- AECOM Employees can provide response assistance by placing absorbent pillows or vermiculite around a small, contained spill that occurs during sampling efforts;
- Refer to Spill Response, Incidental procedures contained herein which describes the specific procedures that AECOM will follow when responding to an incidental chemical spill.

4.6.6 Field Project Preparation

- Every SH&E Plan that is prepared by AECOM will contain a Location Specific Emergency Response Plan in which the required elements of an emergency action plan will be addressed. Refer to *S3AM-010-PR1 Emergency Response Planning*;
- When AECOM is working at an operating facility, the emergency response procedures of the facility will be appended to the SH&E Plan or the Location Specific Emergency Response Plan;
- As a minimum, each emergency response plan shall 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;
    - Pre-emergency planning and coordination with outside parties;
    - Emergency escape procedures and emergency escape route assignments;
    - Procedures to be followed by employees who remain to operate critical site operations before they evacuate;
    - Procedures to account for all employees after emergency evacuation is complete;
    - Rescue and medical duties for those employees who are trained 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);
    - Site security and control;
    - 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;
    - Emergency medical treatment and first aid;
    - Emergency alerting and response procedures;
    - Critique of response and follow-up.
- In addition, each plan shall 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.

4.6.7 Client Facility Emergency Response Procedures

- AECOM implements field programs on active properties, including manufacturing facilities. These facilities have typically developed an emergency response plan that is specific to facility-related emergencies. If AECOM is working at an operating facility, emergency procedures established by the facility shall be followed in the event of a facility catastrophe.

AECOM personnel shall be aware of and familiar with the alarm signals used at the facility to alert personnel to an emergency. AECOM personnel shall also know where to assemble in the event of a facility evacuation as the facility shall 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 confirm 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 shall be made available to AECOM so that the information can be incorporated into the SH&E Plan or attached to the Location Specific Emergency Response Plan. If this information is not available to AECOM prior to arriving on site, the SSO shall meet with client representatives upon arrival to the facility to review procedures in the event of an emergency related to plant operations.

4.6.8 Escape Routes and Procedures

Although emergency evacuation procedures are included in AECOM's initial 40-hour HAZWOPER training, emergency procedures at each site will be different. Employees shall be instructed about the location specific emergency response plan. Updating 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.

Prior to the commencement of on-site activities, the SSO shall 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 shall be identified. Multiple routes are necessary in case one is blocked by fire or chemical spill. These routes shall 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 shall 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 shall meet at the facility's assembly area so that the client can verify that AECOM has evacuated the property.

4.6.9 Alarm Signals

An emergency communication system shall 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 shall be supplemented any time voices cannot be clearly perceived above ambient noise levels and any time a clear line of sight cannot be easily maintained among all AECOM personnel because of distance, terrain, or other obstructions;
- Portable two-way radio communications may be used when employees shall work out of the line of sight of other workers;
- When it is necessary to supplement verbal communications, Employees shall be informed of the established emergency signals. The following emergency signals, or other appropriate signals, shall be implemented using handheld portable air horns, whistles, or similar devices.

Signals shall 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 shall 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 Providers 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 shall stop. All personnel shall 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 Location Specific Emergency Response 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.

4.6.10 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 SSO. All employees shall 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 or equivalent should be referenced when attempting to account for more than 10 people. In the event of a facility-related emergency, the SSO shall notify facility representatives that all AECOM employees and AECOM subcontract employees have successfully evacuated the work area(s);
- The SSO shall 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.

4.6.11 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 shall 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 shall 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.

4.6.12 Rescue and Medical Response

- Only currently trained individuals will administer first aid, CPR or an AED. Refer to *S3AM-012-PR1 First Aid*.
- In the event of an incident, refer to material's SDS labels to confirm proper first aid is administered for the hazardous material and call the nearest Poison Centre or 911. Refer to *S3AM-012-PR1 First Aid*.
    - The American National Standards Institute (ANSI) Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1-1998) recommends that the affected body part shall 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 non-penetrating corrosives;
        - 60 minutes for penetrating corrosives;
        - If irritation persists, repeat the flushing procedure.
- 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.
- 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 cannot 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 Manager and SH&E Manager.

4.6.13 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).

A reliable and approved form of communication (e.g. two way radio, cell phone, etc.) is 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 communication device shall be available for each team that is working in a separate area of the site.

When AECOM is working at an occupied facility, a telephone may be accessible. When AECOM is working on abandoned properties or when there is no access to a phone, as appropriate, a cellular telephone, two-way radio, or satellite telephone shall be brought to the work location.

4.6.14 Preferred Means of Reporting

Employees shall immediately notify the Supervisor of incidents and emergencies, and report in accordance with *S3AM-004-PR1 Incident Reporting, Notification & Investigation*:

- 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 Location Specific Emergency Response Plan;
- Additional communications within AECOM concerning an emergency event may be required as per *S3AM-010-PR1 Emergency Response Planning* and *SR1-003-WI2 Disruptive Event Response Instruction*;
- "Dangerous occurrences" shall 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;
- Confirm and seek direction on external reporting requirements. Each jurisdiction has regulations governing the minimum quantities for reporting based on the type of product spilled or release refer to *S3AM-117-ATT1 Spill Notification Numbers for North America*;

Individuals who have knowledge of a spill, release, or unlawful discharge, shall notify authorities immediately. Reporting does not imply guilt or assign blame. The following details are to be reported:

- 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.

4.6.15 First Responder

First responders shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

- An understanding of what hazardous substances are, and the risks associated with them in an incident;
- An understanding of the potential outcomes associated with an emergency;
- The ability to recognize the presence of hazardous substances and physical hazards in an emergency;
- An understanding of the role of the first responder;
- The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

4.6.16 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;

4.6.17 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, refer to *Federal Emergency Management Agency—FEMA: Incident Command System*;
- Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician;
- Understand hazard and risk assessment techniques;
- Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit;
- Understand and implement decontamination procedures;
- Understand termination procedures;
- Understand basic chemical and toxicological terminology and behavior.

4.6.18 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 or applicable jurisdictional emergency response plan;
- Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist;
- Understand in-depth hazard and risk techniques;
- Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available;

- Be able to determine and implement decontamination procedures;
- Have the ability to develop a site safety and control plan;
- Understand chemical, radiological, and toxicological terminology and behavior.

4.7 Decontamination Procedures

4.7.1 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).

4.7.2 All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. An attendant may not be required for Level D equipment removal and decontamination. 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.

4.7.3 All persons and equipment entering the EZ shall be considered contaminated, and thus, shall be properly decontaminated prior to entering the SZ. No equipment, including personal protective equipment or contaminated clothing shall be taken or worn into the SZ.

4.7.4 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 shall assess the potential exposures created by the decontamination chemical(s) or solutions. The safety data sheets shall be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

4.7.5 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.

4.7.6 For all Level A and B ensembles, adequate supplied air shall be available to allow the employee to safely complete all necessary decontamination steps.

4.7.7 Where decontamination procedures involving radioactive materials are required, the removable limits for both personnel and equipment will be specified by a Certified Health Physicist or Certified Industrial Hygienist in the project's approved Radiation Protection Plan or approved safety planning document.

4.7.8 Materials Needed to Decontaminate Personnel and/or Equipment

- 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.

4.7.9 Personal Decontamination Steps

- The decontamination plan shall be in writing and shall specify the exact steps in either wet or dry decontamination or personnel exiting the EZ to the SZ. The decontamination plan shall also address respirator cartridge change out, SCBA bottle changes and equipment decontamination.

4.7.10 Decontamination Steps during a Medical Emergency

- If decontamination can be done:
  - Wash, rinse and/or cut off protective clothing and equipment.
- 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;

4.7.11 Equipment Decontamination Steps

- All equipment leaving the EZ shall be considered contaminated and shall 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;
- 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;
- 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 confirm proper decontamination. Personnel operating a high pressure washer will be trained in the operation of the equipment and follow the manufacturer's operational instructions;
- For smaller equipment, use the following steps for decontamination:
  - Remove majority of visible gross contamination in EZ;
  - Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment;
  - Rinse equipment;
  - Visually inspect for remaining contamination;
  - Follow appropriate personal decontamination steps outlined above.
- All decontaminated equipment shall be visually inspected for contamination prior to leaving the 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.

4.8 Employee Exposure Monitoring

4.8.1 Explosive levels, oxygen levels, and airborne contaminants may 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.

4.8.2 As appropriate, 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.

4.8.3 Specific exposure monitoring requirements will be established in individual SH&E Plans. Refer to *S3AM-127-PR1 Exposure Monitoring*. All monitoring efforts using direct reading instruments and will remain part of the project file.

4.8.4 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 SH&E Plan.

4.8.5 Perimeter Exposure Monitoring

- Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site and will be collected near the work zones when performing work at an active client facility. Refer to *S3AM-127-PR1 Exposure Monitoring*;
- 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).

4.8.6 Exposure results will be posted on site and explained in a safety briefing.

4.8.7 Employees will receive a written statement of results within 15 days of receipt from the laboratory.

4.8.8 Results of all personal exposure monitoring will be provided to the SH&E department for inclusion in the employee medical records, refer to *S3AM-017-PR1 Injury & Illness Recordkeeping*.

5.0 Records

5.1 All forms and documents generated during a HAZWOPER project will be maintained in the project file.

5.2 All medical screening and surveillance documentation shall be retained for 30 years.

6.0 Attachments

6.1 S3AM-117-ATT1 Spill Notification Number for North America

Americas

Heat Stress

S3AM-113-PR1

1.0 Purpose and Scope

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

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

2.0 Terms and Definitions

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

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

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

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

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

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

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

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

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

3.0 References

3.1 S3AM-003-PR1 SH&E Training

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

3.3 S3AM-010-PR1 Emergency Response Planning

3.4 S3AM-121-PR1 Non-Ionizing Radiation

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedures

4.1 Roles and Responsibilities

4.1.1 Managers

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

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

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

4.1.3 Supervisor

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

4.1.4 Employee

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

4.2 Restrictions

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

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

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

4.3 Exposure Controls

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

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

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

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

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

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

4.4 Heat Stress Planning

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

4.4.2 The project and site specific risks need to be planned using the SH&E Plan and the Task Hazard Assessments (THA). Refer to the *S3AM-209-PR1 Risk Assessment & Management* procedure.

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

work demands, clothing, and state of acclimatization shall also be accounted for, as described in the following steps.

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

Table 1
Examples of Activities within Workload Categories

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

- Determine the approximate proportion of work within an hour during a typical shift. Typically, the initial work schedule will be 60 minutes of work per hour (100 percent work) with a small break in the morning and afternoon, as appropriate, and a 30-minute lunch break mid-day.
- For workers wearing cloth coveralls (e.g., Nomex fire resistant clothing), add 3 to the measured WBGT. For impermeable clothing, such as Tyvek or Saranex, the WBGT procedures cannot be used. For these situations, workers should begin physiological monitoring as soon as the temperature in the work area exceeds 70ºF (21°C).
- Use the collected information to develop appropriate work to rest schedules as detailed in *S3AM-113-ATT1 Temperature Threshold*.

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

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

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

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

4.5 Symptoms and Treatment

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

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

4.5.3 Anyone exhibiting symptoms of heat stroke (red dry skin, or unconsciousness) shall be taken immediately to the nearest medical facility. Steps shall be taken to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.).

4.5.4 Severe heat stress (heat stroke) is a life-threatening condition that shall be treated by a competent medical authority.

4.6 Prevention

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

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

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

4.6.2 Personal Protective Equipment

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

4.7 Work-Rest Schedule Practices

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

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

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

4.7.3 Replacement fluids should be cool and fresh, but not cold.

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

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

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

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

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

4.7.7 Other controls that may be used include:

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

4.8 Evaluating the Work-Rest Schedule's Effectiveness

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

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

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

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

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

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

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

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

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

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

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

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

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

4.9 Training

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

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

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

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-113-ATT1 Temperature Thresholds

6.2 S3AM-113-ATT2 Symptoms & Treatment

6.3 S3AM-113-ATT3 Dehydration Chart

6.4 S3AM-113-FM1 Heat Stress Monitoring Log

Americas

Heavy Equipment

S3AM-309-PR1

1.0 Purpose and Scope

1.1 Outline the safe working requirements for working with and near heavy equipment and heavy equipment operation.

1.2 Military related vehicles and equipment (e.g. tanks) are not covered under this standard.

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

2.0 Terms and Definitions

2.1 **Heavy equipment** –All excavating equipment (e.g. scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, graders, agricultural and industrial tractors, etc.), cranes, lift trucks, drills, etc. This may include off-highway trucks (e.g. dump truck, heavy haul truck, etc.). For requirements related to crew trucks refer to *S3AM-005-PR1 Driving*.

2.2 **Operator** – Any person who operates the controls while the heavy equipment is in motion or the engine is running.

2.3 **Ground personnel/workers** – Personnel performing work on the ground around heavy equipment (note: operators are considered ground personnel when outside of the equipment cab).

3.0 References

3.1 S3AM-005-PR1 Driving

3.2 S3AM-202-PR1 Competent Person Designation

3.3 S3AM-213-PR1 Subcontractor Management

3.4 S3AM-303-PR1 Excavation

3.5 S3AM-322-PR1 Overhead Lines

3.6 S3AM-325-PR1 Lockout Tagout

3.7 S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for confirming all equipment is in good working order and all equipment operators are verified as qualified on the piece of machinery they are assigned.
- As applicable, review as-built drawings.
- Maintain operation manuals at the site for each piece of equipment that is present on the site and in use.
- Maintain a list of operators for the project, and the specific equipment that they are authorized to operate.
- Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.

- Confirm an equipment maintenance inventory is maintained, schedules adhered to and appropriate inspections of equipment are conducted.
- Confirm subcontractors are properly pre-qualified in accordance with *S3AM-213-PR1 Subcontractor Management.*
- Require that subcontractor employees follow established safety procedures in operation, inspection, and maintenance of vehicles and equipment.
- Inform AECOM and subcontractor machinery operators about applicable local regulations restricting the consecutive minutes of engine idling time allowed.
- Confirm subcontractor machinery and mechanized equipment is approved for use in accordance with the requirements of *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*.
- Confirm that all rented equipment bears any required current certification marks and arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Confirm that AECOM and subcontractor machinery and mechanized equipment is certified, as applicable, in accordance with manufacturer specifications and/or regulatory requirements.
- Visually observe the subcontractors' vehicles and equipment, for any unsafe conditions or practices. Equipment or operation not in compliance with applicable safety standards is prohibited.

4.1.2 **Employees / Ground Personnel**

- Confirm that all rented equipment arrives in proper working order with the manufacturer's operating manual before acceptance from the supplier.
- Ground personnel when working in the vicinity of heavy equipment shall have received training, and comply with the applicable rules of engagement.

4.1.3 **Operators (of heavy equipment)**

- Operate the equipment safely, maintain full control of the equipment, and comply with manufacturer's operation manual and the laws governing the operation of the equipment.
- Inspect equipment and immediately report defects and conditions affecting the safe operation of the equipment to the appropriate Supervisor.
- Trainees may operate equipment in accordance with jurisdictional requirements and under the direct supervision of a trainer.

4.2 Communication

4.2.1 Communication between site Managers / Supervisors, heavy equipment Operators, and site Employees / Ground Personnel is a key method of preventing serious injury or death during heavy equipment operations.

4.2.2 Managers shall confirm the Industrial site or project specific SH&E Plan is developed and communicated to all affected and involved employees. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

4.2.3 Task Hazard Assessments and Daily Tailgate meetings shall be conducted in accordance with *S3AM-209-PR1 Risk Assessment & Management.*

4.2.4 Concerning worksites in which other employers control concurrent operations and SH&E issues related to the worksite, the manager shall coordinate with those conducting concurrent operations to confirm appropriate control measures are in place to protect employees from the hazards associated with activities to be performed.

- Coordination shall occur prior to work commencing, periodically thereafter, and as necessary given changes in scope and/or working conditions.
- Affected employees (including managers and supervisors) shall seek to participate in all site SH&E meetings related to concurrent operations.

4.2.5 The following points outline the communication requirements during heavy equipment operations:

- Site Supervisors/t Managers shall confirm that all operators are notified/informed of when, where, and how many ground personnel will be working on site.
- Site Supervisors/ Managers shall inform all ground personnel before changes are made in the locations of designated work areas.
- Prior to work initiating on site, the Site Supervisor/ Manager is to confirm all operators and ground personnel are trained on the hand signals that will be used to communicate between operators and ground personnel.
- Ground Personnel working around heavy equipment operations are to maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment whose backup view can be obstructed shall be equipped with reverse warning devices (e.g., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a signal person shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

4.3 Ground Personnel

4.3.1 Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations.

4.3.2 The following points outline the clearance requirements during heavy equipment operations:

- Ground Personnel shall always yield to heavy equipment.
- Ground Personnel shall maintain a suitable “buffer” area of clearance from all active heavy equipment.
- A task hazard assessment that identifies any special precautions shall be completed and communicated to all AECOM personnel associated with or affected by the activity.
- Site Supervisors/ Managers shall designate areas of heavy equipment operation and confirm that all ground personnel are aware of designated areas.
    - Designated areas shall include work zone boundaries and travel routes for heavy equipment.
    - Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
    - Work zone boundaries shall consider line of fire hazards related to the equipment and associated activities. Refer also to *S3AM-309-ATT2 Operator Line of Sight.*
    - If working near heavy equipment, Ground Personnel shall stay clear of loads to be lifted or suspended loads, and out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
    - During winch use, all swampers or other personnel will remain outside the “whip area” of the winch line or tow cable.

  - At a minimum, employees shall maintain a distance of at least two pile lengths from where piles are being cut and dropped, other than in situations where cut piles are being guided to the ground utilizing mechanical means (e.g., pile driver and shackle) to control the direction and speed of fall of the cut pile.

- When feasible, Site Supervisors/ Managers shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and confirm that unauthorized ground personnel do not enter such areas.
- Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
- Ground Personnel shall never stand between two pieces of operating heavy equipment or other objects (e.g., steel support beams, trees, buildings, etc.).
- Ground Personnel shall never stand directly below heavy equipment located on higher ground unless it can be verified ground stability is not a factor and grade of slope is such that it would not contribute to equipment tip-over.
- Ground Personnel may only enter the swing area, work area or path of travel of any operating equipment when:
  - They have attracted the operator's attention and established eye contact, and
  - The operator has idled the equipment down, placed it in neutral, grounded engaging tools, set brakes and communicated entry is permitted.
- Employees shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.
- Employees shall not talk, text, or otherwise use a cell phone while standing or walking on a roadway or other heavy equipment path.

4.3.3 At a minimum, all Ground Personnel and Operators outside of heavy equipment shall wear the following:

- High visibility safety vest (fluorescent background material and retro-reflective striping) meeting jurisdictional requirements that is visible from all angles.
  - Background material: should be fluorescent yellow-green, fluorescent orange-red or fluorescent red.
  - Combined-performance retro-reflective material (e.g. the stripes): should be fluorescent yellow-green, fluorescent orange-red or fluorescent red - and shall be in contrast (that is, have a distinct color difference) to the background material.
  - Hazards may require high visibility garments that cover torso, legs and arms.
  - Confirm that vest is not faded or covered with outer garments, dirt, etc.
- American National Standards Institute/Canadian Standards Association- (ANSI/CSA-) approved hard hat
- ANSI/CSA-approved safety glasses with side shields
- At a minimum, CSA or ASTM approved, high-cut (min. 6"), puncture, impact and compression resistant footwear.
- ANSI/CSA-approved hearing protection as needed
- Appropriate work clothes (e.g., full-length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).

4.4 Prior to work commencing

4.4.1 All heavy equipment will be inspected pre-shift and then regularly as required with the details of the inspection recorded in a log book.

- Roll-over protection systems (ROPS) and appropriate overhead protection (Fall Object Protection FOP) shall be in place given the specific equipment requirements. Utilize equipment with enclosed cabs where feasible or accessible.
    - Where use of equipment with enclosed cabs is not feasible or said equipment is not accessible, operators shall use any additional personal protective equipment determined as necessary (e.g. goggles, additional hearing protection, etc.).
- Equipment operated in hazardous atmosphere environments shall be equipped with the proper safety equipment (e.g., spark arrestors, positive air shut off, etc.).
- Operation of equipment that has or had cab glass (per the manufacturer's specifications) that is cracked/broken (obstructing the operator's view) or missing is prohibited.
- A locking device shall be provided that will prevent the accidental separation of towed and towing vehicles on every fifth-wheel mechanism and two-bar arrangement.
- Trip handles for tailgates of dump trucks and heavy equipment shall be arranged so that when dumping, the operator will be in the clear.
- The Operator will report defects and conditions affecting the safe operation of the equipment to the Site Supervisor or employer. Any repair or adjustment necessary for the safe operation of the equipment will be made before the equipment is used.
- Exposed moving parts on heavy equipment (belts, gears, shafts, pulleys, sprockets, spindles, drums, fan belts, flywheels, chains, or other reciprocating, rotating or moving parts) which are a hazard to the operator or to other workers will be guarded.
    - If a part will be exposed for proper function it will be guarded as much as is practicable consistent with the intended function of the component.

4.4.2 An approved 4A40BC fire extinguisher shall be present on all heavy equipment. An approved 4A40BC fire extinguisher of appropriate rating shall be present and readily accessible on all heavy equipment.

- Fire extinguishers shall be inspected by the operator prior to heavy equipment operation each shift. Monthly and annual inspections shall be documented.

4.4.3 All Operators shall inspect the area adjacent to the machine prior to starting.

- Evaluate ground conditions, concurrent operations and obstructions to identify approved routes of travel and work areas.
- As applicable, check that there is sufficient swing room and that the outriggers are adequately supported on solid and stable ground

4.4.4 Managers / Supervisors shall inform the operators of the equipment that AECOM employees are in the area and inquire if there are any restricted areas or specific rules or requirements. In some industrial facilities, heavy equipment has the 'right of way'.

4.4.5 Where the Operator will not have a full view of the path of travel, a signal person will be used on the ground that has a full view of the load, the operator, and the path.

4.4.6 All heavy equipment with limited visibility (operator cannot directly or by mirror or other effective device see immediately behind the machine) operated around workers or on a construction site:

- Shall have an audible back-up alarm installed that functions automatically when the vehicle or equipment is put into rear motion.

- All bi-directional equipment shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction.
- Backing up or movement in both directions for bidirectional equipment shall occur only when a signal person communicates that it is safe to do so if alarms or horns are not feasible.

4.5 Operation

4.5.1 The Operator of heavy equipment is the only worker permitted to ride the equipment unless the equipment is equipped by the manufacturer for passengers. Manufacturer operator's manual shall be complied with.

4.5.2 A person will not operate heavy equipment unless the person has received adequate instruction and training in the safe use of the equipment, and has demonstrated to a qualified supervisor or instructor competency in operating the equipment.

- Oilers, apprentices, and other operators will not be allowed to operate equipment unless authorized by the Manager.

4.5.3 The Operator of heavy equipment will operate the equipment safely, maintain full control of the equipment, and comply with the manufacturer's operator manual and the laws governing the operation of the equipment.

- Operation of company-owned, leased, or rented vehicles or equipment while under the influence of alcohol or illegal drugs or otherwise impaired is prohibited.
- Do not operate any equipment beyond its safe load or operational limits.
- Operator shall not talk on, text, or otherwise use mobile phones while operating heavy equipment.
- Never use bucket teeth or boom for lifting or moving heavy objects.

4.5.4 When heavy equipment is used for lifting or hoisting or similar operations there shall be a permanently affixed notation stating the safe working load capacity of the equipment and the notation shall be kept legible and clearly visible to the operator.

4.5.5 A Supervisor or Manager will not knowingly operate or permit a worker to operate heavy equipment which is, or could create, an undue hazard to the health or safety of any person. Where compliance is refused, the Manager or his or her designate should be notified immediately.

4.5.6 The Operator of heavy equipment will not leave the controls unattended unless the equipment has been secured against inadvertent movement.

- The Operator is not to leave suspended load, machine or part or extension unattended, unless it has been immobilized and secured against inadvertent movement.
- Turn off heavy equipment, place gear in neutral and set parking brake prior to leaving vehicle unattended.
- Buckets and blades are to be placed on the ground and with hydraulic gears in neutral when not in use.
- Brakes shall be set and, as necessary, wheels chocked or equivalent (as applicable) when not in use.

4.5.7 The Operator will maintain the cab, floor and deck of heavy equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.

4.5.8 If heavy equipment has seat belts required by law or manufacturer's specifications, the Operator and passengers will use the belts whenever the equipment is in motion, or engaged in an operation which could cause the equipment to become unstable.

- Seat belts shall be maintained in functional condition, and replaced when necessary to ensure proper performance.

4.5.9 All vehicles transporting material or equipment on public roads shall comply with local laws pertaining to weight, height, length, and width. Obtain any permits required for these loads.

4.5.10 Never jump on to or off of a piece of heavy equipment, always maintain 3-points of contact at a minimum.

4.5.11 Never exit heavy equipment while it is in motion.

4.5.12 Do not ride with arms or legs outside of the truck body of equipment cab.

- Never ride on the outside of a piece of heavy equipment (e.g. in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck bed, on the load, bucket, etc.).

4.5.13 Have vehicle headlights on at all times when driving in the area.

4.5.14 Park motor vehicles off the haul roads, or away from the work areas.

4.5.15 Do not wear loose clothing or jewelry where there is a danger of entanglement in rotating equipment.

4.5.16 Do not enter the swing area of machines such as cranes, heavy drill rigs, or excavators, without first making eye contact with the operator, and receiving permission to do so. Refer to *S3AM-309-ATT2 Operator Line of Sight*.

4.5.17 Stay out of the blind areas around heavy equipment and never assume that the equipment operators have seen you or are aware of your presence.

4.5.18 Maintain a distance of at least 2 feet (60 centimeters) between the counterweight of swing machines and the nearest obstacle. If this distance cannot be maintained, a spotter shall observe and be in constant communication with the operator to prevent contact.

4.5.19 Vibrations from moving traffic or heavy equipment can cause excavations or spoil piles to become unstable.

- Excavation activity shall be conducted according to *SOP S3AM-303-PR1 Excavation*.
- Equipment not involved in the excavating activity or not required to be in the vicinity shall keep clear. Equipment that shall operate in the vicinity shall maintain appropriate setback distances from edges of excavations or spoil piles.

4.5.20 All heavy equipment shall be operated in a safe manner that will not endanger persons or property.

- When ascending or descending grades in excess of 5 percent, loaded equipment shall be driven with the load upgrade.
- When operating an electric-powered, remote controlled, hydraulic device used for demolishing concrete structures and refractory linings as well as excavating, refer to the *S3AM-309-ATT1 Brokk 180* for more specifics.

4.5.21 All heavy equipment shall be operated at safe speeds. Do not drive any vehicle at a speed greater than is reasonable and safe for weather conditions, traffic, intersections, width, and character of the roadway, type of motor vehicles, and any other existing condition.

4.5.22 Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.

4.5.23 Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.

4.5.24 When feasible, Operators shall travel with the “load trailing”, if the load obstructs the forward view of the operator.

4.5.25 Slow down and sound horn when approaching a blind curve or intersection. Signal people equipped with 2-way radio communications may be required to adequately control traffic.

4.5.26 All haulage equipment / trucks, whose payload is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cable shield and/or canopy adequate to protect the operator from shifting or falling material. If protection is not available for the operator, the operator shall leave the vehicle and wait in a designated safe location until it is loaded..

4.5.27 Equipment shall be shut down prior to and during fueling.

- Confirm proper grounding/ bonding between equipment and fuel vehicle prior to fueling operations.
- During fuel operations confirm fuel nozzle remains in contact with the tank.
- Do not smoke, use electrical devices or have an open flame present while fueling.
- Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.

4.5.28 Site vehicles will be parked in a designated parking location away from heavy equipment.

4.5.29 Operators shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.

4.5.30 If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.

4.5.31 Equipment left unattended at night adjacent to travelled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (1.8m) (or the regulatory requirement for the work location) to the active roadway.

4.5.32 Rubber / pneumatic-tired earthmoving haulage equipment shall be equipped with fenders on all wheels. Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

4.5.33 Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not to be exceeded.

4.5.34 Steering or spinner knobs shall not be attached to steering wheels.

4.5.35 High-lift rider industrial trucks shall be equipped with overhead guards.

4.5.36 All hot surfaces of equipment, including exhaust pipes or other lines, that present a possible injury or fire hazard, shall be guarded or insulated.

4.5.37 All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

4.5.38 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

4.5.39 Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

4.5.40 In an effort to reduce air emissions, fuel costs, and run-time hours (that can impact equipment warranty), operators shall limit heavy equipment engine idling to not more than five consecutive minutes. Local regulations at the location of the vehicle operation could require less than five consecutive minutes idling time. The idling limit does not apply to:

- Idling when queuing.
- Idling to verify that the vehicle is in safe operating condition.

- Idling for testing, servicing, repairing or diagnostic purposes.
- Idling necessary to accomplish work for which the vehicle was designed (cranes, man-lifts, forklifts, etc.)
- Idling required to bring equipment/vehicle to operating temperature, as specified by the manufacturer. Engine heaters shall be used for cold weather starting to avoid engine idling where feasible.
- Idling necessary to ensure safe operation of the vehicle.
- Idling to keep equipment (including windows) clear of ice and snow.
- Idling to provide air conditioning or heat to ensure the health and safety of the operator, but only when seated inside the equipment or vehicle.

4.6 Utilities

4.6.1 When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. Refer to the *S3AM-322-PR1 Overhead Lines* procedure for more specifics.

4.6.2 The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities.
- Confirm all equipment (e.g., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath aboveground utilities.
- Confirm utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work. Confirm documentation of the contact is made; date, number; contact name, organization, etc. Refer to *SOP S3AM-303-PR1 Excavation* and *S3AM-331-PR1 Underground Utilities & Subsurface Installation Clearance.*

4.7 Training

4.7.1 The Operator or other qualified supervisor will provide all on-site personnel with an orientation to the heavy equipment and its associated hazards and controls.

4.7.2 Only designated, qualified personnel shall operate heavy equipment.

4.7.3 Operators shall have all appropriate jurisdictional licenses or training to operate a designated piece of heavy equipment.

4.7.4 Operators shall be evaluated through documented experience and routine monitoring of activities unless the equipment is operated by an AECOM operator in which case a practical evaluation is required. Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

4.8 Inspection and Maintenance

4.8.1 Maintenance records for any service, repair or modification which affects the safe performance of the equipment will be maintained and be reasonably available to the operator and maintenance personnel regulatory agencies upon request during work hours.

4.8.2 Maintenance records will be maintained on the site or project for heavy equipment.

4.8.3 Conduct maintenance as prescribed by the manufacturer in the Operation Manual for each piece of equipment.

4.8.4 Servicing, maintenance and repair of heavy equipment will not be done when the equipment is operating.

- Lockout and tagout safety procedures are followed. Refer to *S3AM-325-PR1 Lockout Tagout*.

- Motors are turned off, unless required for performing maintenance or repair.
- All ground-engaging tools are grounded or securely blocked.
- Controls are set in a neutral position and brakes are set.
- Electrically driven equipment is installed with provision for tagging and locking out the controls while under repair.
- Manufacturer's requirements for maintenance and repair are followed.
- If continued operation is essential to the process, a safe means of protection shall be provided.
- Provide and use a safety tire rack, cage, or equivalent protection when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

4.8.5 All heavy equipment shall have a documented inspection and if necessary, repaired prior to use.

- Operators shall not operate heavy equipment that has not been cleared for use.
- All machinery and mechanized equipment will be verified to be in safe operating condition (refer to *S3AM-309-FM1 Approval of Machinery & Mechanized Equipment*) by a competent person (refer to *S3AM-202-PR1 Competent Person Designation*) within seven days prior to operation on a new site or project. Clearance is valid for up to one year for the given site or project.
- As applicable, all machinery and mechanized equipment shall be inspected / certified and tested at appropriate intervals as required by the manufacturer and/or regulatory requirements.

4.8.6 All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the Supervisor/ Manager immediately.

- Defective heavy equipment shall be immediately tagged and taken out of service until repaired.
- Inspection, maintenance, service and repair records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use *S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist*.
- Records shall be made available for review upon request. Note: Documents may be electronically stored in the project files.

4.9 Fueling and batteries

4.9.1 A well-ventilated area shall be used for refueling.

4.9.2 Only the type and quality of fuel recommended by the engine manufacturer shall be used.

4.9.3 Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.

4.9.4 If there is potential to spill fuel on hot surfaces, the surfaces shall be permitted to cool down prior to fueling. Any spillage shall be cleaned before starting engine.

4.9.5 Spilled fuel shall be cleaned with cotton rags or cloths and disposed of in the proper receptacle; do not use wool or metallic cloth.

4.9.6 Open flames, lighted smoking materials, sparking equipment or any other type of ignition source shall remain a minimum of 35' (10.7m) from the fueling area and/or fuel source. This clearance shall be increased if required or conditions warrant.

4.9.7 Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.

4.9.8 Portable containers to be filled shall be placed directly on the ground or be properly grounded prior to filling to prevent creation of a static charge. Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.

4.9.9 Control electrostatic hazards.

- Before activating fuel pump, touch some part of vehicle / equipment to de-energize any static electricity that may be present.
- The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent build-up of a static charge.

4.9.10 Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.

4.9.11 Batteries shall be serviced in a ventilated area while wearing appropriate Personal Protective Equipment.

4.9.12 When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first. Consult the SDS applicable to the battery and/or contents for additional information including; handling, precautions, and first aid measures.

- Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water. Battery storage or maintenance areas shall have readily accessible eye wash stations.
- Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention shall be sought immediately.

4.9.13 When installing a battery, the battery shall be connected ground post last.

4.9.14 When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.

4.9.15 When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.

4.9.16 To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around batteries by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least a minimum of 35 feet (10.7 meters) away from battery-charging stations.

5.0 Records

5.1 Inspection, maintenance, service and repair records shall be maintained with the equipment.

6.0 Attachments

6.1 S3AM-309-ATT1 Brokk180 Safety Card

6.2 S3AM-309-ATT2 Operator Line of Sight

6.3 S3AM-309-FM1 Approval of Machinery & Mechanized Equipment

6.4 S3AM-309-FM2 Heavy Machinery Pre-Operation Checklist

6.5 S3AM-309-FM3 Rubber Tire Backhoe Operator Skill Evaluation

6.6 S3AM-309-FM4 Scraper Operator Skill Evaluation

6.7 S3AM-309-FM5 Bull Dozer Operator Skill Evaluation

6.8 S3AM-309-FM6 Dump Truck Operator Skill Evaluation

6.9 S3AM-309-FM7 Roller Compactor Operator Skill Evaluation

6.10 S3AM-309-FM8 Front End Loader Operator Skill Evaluation

6.11 S3AM-309-FM9 Grader Operator Skill Evaluation

6.12 S3AM-309-FM 10 Excavator Operator Skill Evaluation

6.13 S3AM-309-FM11 Water Truck Operator Skill Evaluation

6.14 S3AM-309-FM12 Heavy Equipment Maintenance Inventory

6.15 S3AM-309-FM13 Heavy Equipment Inspection Report

Americas

Highway and Road Work

S3AM-306-PR1

1. Purpose and Scope

To address potential hazards that may occur while working on public or private roadways or within the right-of-way of a public or private roadway.

- This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content.
- This procedure is designed to assure that work on highway and roads meets the requirements established in federal, state, provincial, territorial, and local department of transportation laws, regulations, and guidance (jurisdictional requirements and guidance). If discrepancies exist between this procedure and other applicable materials, the most stringent option shall be selected.

2. Procedure

2.1 Planning Work in a Highway or Road Setting

2.1.1 The Project Manager will prepare an SH&E Plan consistent with *S3AM-209-PR1 Risk Assessment & Management* and include a thorough assessment of all hazards. Priority shall be placed on eliminating the need to place workers on an active roadway, followed by using barriers to physically separate workers from traffic. PPE and other warning devices that do not offer substantial protection from moving vehicles and equipment will be selected and used in combination with more advanced controls.

2.1.2 For work that occurs in the right-of-way (area that includes the traveled way, shoulders, and clear zone) or may otherwise expose workers to the motoring public, a Traffic Control Plan shall be developed and incorporated directly into the SH&E Plan or included as a separate Plan by attachment or reference. This applies to both long and short duration activities in/or adjacent to roadways even when not required by a local jurisdiction.

2.1.3 For work within a worksite that involves the movement of vehicles or equipment, a Traffic Protection Plan shall be developed and incorporated directly into the SH&E Plan by or included as a separate Plan by attachment.

2.1.4 Applicable jurisdictional requirements and guidance as well as industry standards and best practices shall be consulted during plan development and appropriate control measures established. These include the Occupational Health and Safety regulations and associated standards or guidebooks, and local jurisdictional manuals on the uniformity of traffic control devices in temporary construction, maintenance, and utility work zones.

2.1.5 Additional risk-specific plans may be necessary for specialized work. Examples include fall protection, respiratory protection, work over water, confined spaces, hazardous materials/waste, tunneling/blasting, heat/cold stress, excavation, heavy equipment operation, aerial lifts, and hearing conservation.

2.1.6 Emergency response plans specific to roadway emergencies that take into account limited access/egress areas such as bridges will be developed and included in the SH&E Plan. Refer to *S3AM-010-PR1 Emergency Response Planning – Americas*.

2.1.7 A system for checking workers in and out at a worksite and the work zone should be included in the SH&E Plan.

2.1.8 PPE requirements shall be designated on a task hazard assessment for each task performed on a project (surveying, inspection, environmental, management, equipment operation). Refer to *S3AM-208-PR1 Personal Protective Equipment*.

2.1.9 Where several projects occur simultaneously, the coordination of vehicle routes and communication between contractors shall occur to reduce vehicular struck-by and backing incidents.

2.1.10 A Traffic Control Plan shall be prepared by or reviewed by a Competent Person with credentials, certifications, and experience required by jurisdictional requirements and guidance.

2.1.11 A Traffic Protection Plan shall be prepared by a Competent Person with credentials, certifications, and experience required by jurisdictional requirements and guidance.

- For long-term duration work activities that are performed at construction projects, the constructor of the project is required to develop a Traffic Protection Plan.
- If AECOM has assumed the role of constructor for the project, the Traffic Protection Plan shall be developed and implemented prior to the commencement of work activities at the project.
- If AECOM is not the constructor for the project, the Traffic Protection Plan for the project shall be developed by our client or a constructor designated by the client.
- The Traffic Protection Plan should be reviewed with AECOM employees during orientation to the project.

2.2 Selecting Protective Measures

Protective measures for traffic control and worker protection shall be selected in accordance with work conditions and prevailing requirement of jurisdictional requirements and guidance. Additionally, the Project Manager, Traffic Control Engineer (if applicable), and/or Competent Person shall reduce risk to Roadway Workers by employing the Hierarchy of Controls as described in *S3AM-209-PR1 Risk Assessment & Management*. Below are examples:

- Elimination: Completely eliminate public traffic from the work area and construction traffic. This can occur by locating survey monuments and other data gathering points outside of roadways, utilizing alternative data collection methods, constructing detours and alternate routes, or otherwise isolating the work zone.
- Substitution: Substitute the use of an exposed worker with an alternate method to perform the work such as aerial photography, remote sensing, and remote control such as Automated Flagger Assistance Devices (AFADs).

- Engineering Controls: Use prescribed temporary traffic control devices and layouts to effectively control traffic, through a work zone, permitting public traffic and construction to interact without the use of Flag Persons or other exposed workers. Positive protection, or devices that contain and redirect vehicles preventing their intrusion into the work zone. Please also refer to *S3AM-306-ATT1 Protective Devices for Temporary Traffic Control* and *S3AM-306-ATT2 Short and Long Duration Work Zones*.
- Administrative Controls: Schedule the work at times when traffic volume is low, reducing the exposure to traffic. This may also include requiring workers to perform work in a prescribed way such as facing traffic or using a Spotter. Training and emergency procedures are also considered administrative controls. Please also refer to *S3AM-306-ATT4 Safe Work Practices for Roadway Workers*.

- Personal protective equipment: Traffic vests, safety glasses, and high visibility clothing should always be worn to increase visibility but rarely, if ever, solely relied upon as a protective measure for moving traffic.

3. Responsibilities

3.1 Manager or Supervisor

- Verify development and administration of the procedures, communication methods, and 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. Please also refer to *S3AM-306-ATT1 Protective Devices for Temporary Traffic Control*.
- Confirm the SH&E Plan, Traffic Control Plan, and as applicable, the Traffic Protection Plan are developed and communicated to all involved and affected employees.
- Confirm compliance with the SH&E Plan, Traffic Control Plan, Traffic Protection Plan (if applicable), and this procedure.
- Confirm compliance with jurisdictional requirements and guidance governing highway and road work.
- Confirm site-specific or client-required safety training is completed and documented for all assigned Roadway Workers.
- Confirm employees assigned to work zones are trained in safe work practices and the use of traffic control systems, communication systems, and PPE. Please also refer to *S3AM-306-ATT3 Safe Work Practices for Roadway Workers.*
- Lead inspections or investigations, as appropriate.
- Identify the Competent Person and, as applicable, Traffic Control Engineer for the project.

3.2 Flag Person

- Comply with the applicable SH&E Plan, Traffic Control Plan, and Traffic Protection Plan (if applicable), and with communication requirements.
- Maintain training and competency in traffic control and flagging procedures.
- Receive and communicate specific instructions clearly, firmly, and courteously to other Roadway Workers and the public.
- Maintain alertness at their points of duty until relieved. Report to work “Fit-for-Duty” and able to move and maneuver quickly in order to avoid danger from errant vehicles.
- Properly use signaling devices (such as paddles and flags) in order to provide clear and positive guidance to drivers.
- Properly use PPE and communication devices and signals.
- Monitor work area for new and changing conditions and effectively communicate information to other Roadway Workers and Supervisors, including emergency or rapidly changing situations.
- Test and verify emergency procedures within a work zone.

3.3 SH&E Representative/Site Safety Officer

- Assist the Project Manager with implementation of SH&E Plan, Traffic Protection Plan (if applicable), and Traffic Control Plans at the work zone.
- Coordinate safety on the specified project to include traffic and non-traffic hazards.
- Conduct hazard assessments, inspections, and safety observations.

- Develop mitigating strategies, and review and monitor their implementation.
- Conduct worksite inspections including the use of traffic control devices as required, make recommendations for improvement, and coordinate changes with the Project Manager and, as applicable, the Traffic Control Engineer.
- Coordinate the modification of traffic control devices with the Project Manager and Traffic Control Engineer (if applicable), Flag Person, and Competent Person in order to provide mobility and positive guidance to road users and Roadway Workers.
- Stop work in the event of an unsafe act or condition.

3.4 Spotter

- Comply with the applicable SH&E Plan, Traffic Control Plan, and Traffic Protection Plan (if applicable), and with communication requirements.
- Facilitate the safe movement of equipment and vehicles within and between work zones.
- Spotters are not permitted to act as a Flag Person.
- Monitor surrounding areas for moving vehicles and provide warning to workers.
- Maintain training and competency in spotting procedures.
- Receive and communicate specific instructions clearly, firmly, and courteously to other workers and the public.
- Maintain alertness at their points of duty until relieved. Report to work “Fit-for-Duty” and able to move and maneuver quickly in order to avoid danger from moving vehicles.
- Properly use PPE, and communication devices and signals.
- Maintain a position that is visible to moving equipment and vehicles.
- Monitor work area for new and changing conditions and effectively communicate information to other workers and Supervisors, including emergency or rapidly changing situations.

3.5 Traffic Control Engineer

- Maintain certifications and credentials to perform duties.
- Maintain knowledge on current traffic control devices and methods.
- Perform engineering studies to evaluate best methods for traffic control and protection.
- Develop traffic protection and control strategies consistent with local jurisdiction guidance and requirements.
- Incorporate best practices and more conservative safety measures when they provide increased protection for workers and/or the public.
- Monitor effectiveness of traffic control strategies.

3.6 Competent Person, Traffic Control

- Maintain knowledge and experience in traffic control consistent with the work environment assigned.
- Determine communication methods (hand signals, warning alarms) to be used within a worksite.
- Provide training to workers on communication methods.
- Perform inspections of traffic control devices, make recommendations for improvement, and coordinate changes with the Project Manager and Traffic Control Engineer.
- Stop work in the event of an unsafe act or condition.

4. Help & Training

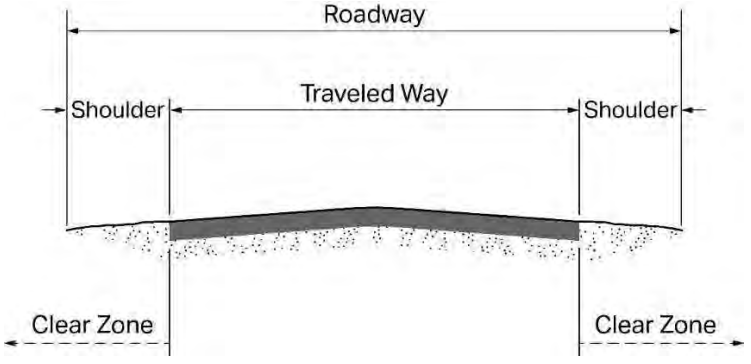
- All Roadway Workers shall be trained on how to work next to motor vehicle traffic in a way that eliminates or minimizes their exposure. Refer to *S3AM-003-PR1 SH&E Training* and *S3AM-306-ATT3 Safe Work Practices for Roadway Workers.*
- Individuals that oversee work occurring on highways and roads shall receive appropriate training per jurisdictional requirements and guidance.
- Workers with specific responsibilities and duties (Competent Person, Flag Person, Spotter, Supervisor) shall have additional training, experience, and authorization to perform assigned duties.
- All Roadway Workers shall receive a site-specific orientation to the hazards and controls, including as applicable, Traffic Protection Plan, Traffic Control Plan, and communication requirements for the site(s) to which they are assigned. No personnel shall be allowed onto the site without first reviewing the project-specific Traffic Control Plan and/or Traffic Protection Plan. Additional orientation topics are specified in the SH&E Plan.
- Only persons designated by the Project Manager, with appropriate training and experience will serve as a Flag Person (traffic control). Flag Person training shall comply with jurisdictional requirements and guidance, which may vary between work locations.
- Flag Persons and Spotters shall be instructed by the Competent Person on the specific project Traffic Protection Plan (if applicable) and Traffic Control Plan.
- Flag Persons shall be trained / certified in signaling methods. Training shall comply with jurisdictional requirements and guidance (American Traffic Safety Services Association or equivalent).
- Roadway Workers, Equipment Operators, and Drivers in internal work zones shall be trained to their respective tasks and know the routes of construction vehicles. Where AECOM is not a controlling contractor at the site, training should be provided by the controlling contractor or owner.
- Equipment Operators and Spotters shall know the hand signals to be used, and the communication methods and requirements applicable to the worksite.
- Equipment Operators, Spotters, and Roadway Workers shall be trained on the visibility limits and the "blind spots" for each vehicle on site.
- Roadway Workers shall be trained on the hazards associated with shift work and night work. Please also refer to *S3AM-306-ATT4 Safe Work Practices for Night Work*.

5. Terms and Definitions

a.	Channeling Device	devices to warn road users of conditions created by work activities in or near the roadway and to guide road users. Channelizing devices include cones, tubular markers, vertical panels, drums, barricades, and longitudinal channelizing devices.
b.	Clear Zone	the total roadside border area, starting at the edge of the traveled way that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out area at its toe. See Figure 1.
c.	Competent Person	those who are knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed, and who have the authority to propose and implement corrective measures to eliminate hazardous situations associated with temporary traffic control.
d.	Flag Person	a person who actively controls the flow of vehicle traffic into and/or through a temporary traffic control zone using hand-signaling devices or an Automated Flagger Assistance Device (AFAD).

e.	Highway	a general term for denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
f.	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.
g.	Right-of-Way	a general term for denoting the traveled way, and adjacent clear zone, berms, shoulders, and sidewalks that encompass public space potentially impacted by construction, maintenance, or other activities.
h.	Roadway	that portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes. Excludes the sidewalk, berm, or areas used solely by persons riding bicycles or other human-powered vehicles. See Figure 1.
i.	Roadway Worker	a person on foot whose duties place him or her within the right-of-way.
j.	Temporary Traffic Control Zone	an area of a highway where road user conditions are changed because of temporary traffic control devices, flag persons, uniformed law enforcement officers, or other authorized personnel.
k.	Temporary Traffic Control Device	a sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, private road open to public travel, pedestrian facility, or shared-use path by authority of a public agency or official having jurisdiction, or, in the case of a private road open to public travel, by authority of the private owner or private official having jurisdiction.
l.	Traffic Control Engineer	a person who by qualification, experience, and certification is licensed and authorized to perform the duties associated with the design of traffic control systems, including temporary traffic control.
m.	Traffic Protection Plan	a detailed plan for the protection of workers within a work zone. The plan shall contain a written description of the traffic hazards to which workers may be exposed within the confines of a work zone. Traffic Protection Plans are commonly referred to as Internal Traffic Control Plans.
n.	Traffic Control Plan	a detailed plan for the control of traffic (public) during construction, maintenance, or utility operations on a highway/road, taking into account the organized, systematic, safe conduct of the project, including, as applicable, detours, staging sequences, work vehicle access and egress from worksites, temporary barriers, removal of old pavement markings, and selection and planned implementation of appropriate typical layouts for traffic control. Plan shall be written to meet jurisdictional requirements and guidance. Traffic Control Plans are commonly referred to as Traffic Management Plans.
o.	Traveled Way	the portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes. See Figure 1.
p.	Work Zone	a controlled access area due to the presence of construction, maintenance, or operational activity.

Figure 1. Depiction of Traveled Way, Roadway, Shoulder, Clear Zone



6. References

List other procedures or external standards/regulations that apply to carrying out the process in this document. List using 'Alpha List' option from the AECOM Procedure List dropdown on the Home tab.

a. S3AM-003-PR1 SH&E Training

b. S3AM-208-PR1 Personal Protective Equipment

c. S3AM-209-PR1 Risk Assessment & Management

d. S3AM-202-PR1 Competent Person Designation

e. S3AM-008-PR1 Fitness for Duty

f. S3AM-008-PR1 Emergency Response Planning – Americas

7. Records

Traffic Protection Plans, Traffic Control Plans, and completed Equipment Checklists shall be maintained in project files.

8. Appendices

a. S3AM-306-FM1 Equipment Checklist

b. S3AM-306-ATT1 Protective Devices for Temporary Traffic Control (TCC)

c. S3AM-306-ATT2 Short and Long Term Work Zones

d. S3AM-306-ATT3 Safe Work Practices for Roadway Workers

e. S3AM-306-ATT4 Safe Work Practices for Night Operations in Work Zones

9. Change Log

List the change history pertaining to this document including if it was identified differently throughout its life-cycle:

Rev #	Change Date	Description of Change	Location of Change
2	Mar 1, 2016	AECOM URS integration of legacy documents	
3	Dec 15, 2016	See Level III Americas Revision Summary - December 15, 2016	Various locations
4	Jul 31, 2019	See Level III Americas Revision Summary – July 31, 2019	Scope & Purpose
5	Nov 13, 2019	Complete rewrite & formatting – tracked changes document on file	Comprehensive changes

Americas

Powered Industrial Trucks

S3AM-324-PR1

1.0 Purpose and Scope

1.1 Provides the requirements for the safe operation and maintenance of powered industrial trucks.

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

1.3 This procedure does not apply to aerial lifts, cranes, or vehicles intended primarily for earth-moving or over-the-road hauling

2.0 Terms and Definitions

2.1 **Powered Industrial Truck** - a mobile, power-propelled truck used to carry, push, pull, lift, stack, or tier materials. Forklifts, pallet trucks, rider trucks, fork trucks, lift trucks, pallet jacks, motorized hand trucks, and skid steer loaders are all types of powered industrial trucks.

3.0 References

3.1 S3AM-304-PR1 Fall Protection

3.2 S3AM-323-PR1 Aerial Work Platforms

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Operator**

- Complete the *S3AM-324-FM1 Pre-Operation Powered Industrial Truck Checklist* or equivalent, prior to daily use to confirm that truck systems are fully functional (e.g., brakes, lights, horn, operations).
- Report any equipment deficiencies to supervisor. Confirm unsafe equipment is not operated until deficiencies are corrected.
- Complete and maintain applicable Powered Industrial Truck training specific to the type of truck to be operated according to the regulatory requirements prior to operating the equipment.
- Operate powered industrial truck according to manufacturer's operating manual.

4.1.2 **Manager** or **Supervisor**

- Strictly enforce all powered industrial truck operation procedures.
- Confirm that all authorized personnel are trained in the operation of the trucks.
- Verify certification for operating a forklift through training and evaluation. Review certification and completed *S3AM-324-FM2 Powered Industrial Truck Skill Evaluation* or equivalent.
- Train all other employees on the applicable pedestrian safety rules.
- Confirm equipment meets the applicable jurisdictional standards and requirements. Remove any defective trucks from service.
- Maintain the truck according to manufacturers' specifications.

4.1.3 **Employees (other than operator)**

- Wear high visibility apparel when working around powered industrial trucks.
- Yield to powered industrial trucks.
- Stay outside of work area or swing zone of any operating equipment.

- Enter work area or swing zone only if eye contact with the operator has been made and the operator has clearly communicated permission.
- If working from an elevated work platform:
  - Trained to use the platform and regarding fall protection, refer to *S3AM-323-PR1 Aerial Work Platforms* and *S3AM-304-PR1 Fall Protection/Working at Heights*.
  - Wear fall protection devices and be secured within the platform to the manufacturer's anchorage point.

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

- Provide technical guidance as to this procedure.
- Verify operators are trained and competent to operate the specific equipment by reviewing training documentation (i.e. certification, ticket, etc.) and ensuring a skill evaluation is conducted using *S3AM-324-FM2 Powered Industrial Truck Skill Evaluation* or equivalent.

4.2 Training

4.2.1 Training will be provided by a qualified instructor with the powered industrial truck knowledge, training, and experience to train and evaluate operator competence. Training is equipment specific.

4.2.2 All Operators shall successfully complete training according to the regulatory requirements before being allowed to operate a powered industrial truck.

4.2.3 Training shall consist of formal instruction and practical application, with documented evaluation of operator competency by the instructor.

4.2.4 Training will include the following topics:

- Operating instructions, warnings, and precautions for the types of powered industrial truck the Operator will be authorized to operate.
- General and specific legislation.
- Startup and shutdown procedures.
- Using a spotter and communication requirements (i.e. hand signals)
- Differences between the powered industrial truck and an automobile.
- Powered industrial truck controls and instrumentation, where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering with and without a load.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Powered industrial truck capacity.
- Powered industrial truck stability.
- Powered industrial truck inspection and maintenance.
- Refueling and/or charging and recharging of batteries.
- Operating limitations.
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of powered industrial truck that the Operator is being trained to operate.
- Surface conditions where the powered industrial truck will be operated.
- Composition of loads to be carried and load stability (e.g. center of gravity, load centers, etc.).
- Load manipulation, stacking, and unstacking.
- Pedestrian traffic in areas in which the powered industrial truck will be operated.
- Potential ground / floor conditions, narrow aisles and other restricted places where the powered industrial truck will be operated.

- Hazardous (classified) locations where the powered industrial truck will be operated.
- Ramps and other sloped surfaces that could affect the powered industrial truck's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a build-up of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

4.2.5 Operator's performance will be evaluated once every three years or more frequently if required by regulation. Refresher training will be provided in the following circumstances:

- Operator has been observed to operate the powered industrial truck in an unsafe manner.
- Operator has been involved in an incident.
- Operator has received an evaluation that reveals that the powered industrial truck is not being operated safely.
- Operator is assigned to drive a different type of powered industrial truck.
- A condition in the workplace changes in a manner that could affect safe operation of the powered industrial truck.
- As required by jurisdictional regulation.

4.3 Certification

4.3.1 Once training is completed, the appropriate Project Manager / Supervisor will verify the Operator is trained and competent to operate the powered industrial truck by reviewing training documentation (i.e. certification, ticket, etc.) and ensuring the applicable competency assessment / evaluation is conducted. The certification / ticket will include the name of the Operator, the date of the training, the date of the evaluation, and the identity of the person performing the training or evaluation.

4.4 Operations

There are many types of powered industrial trucks for various applications. Use a type suitable for the task. *S3AM-324-ATT1 Powered Industrial Truck Designations* provides additional information on the types of powered industrial trucks available.

4.4.1 The powered industrial truck will be inspected at the beginning of each shift prior to operation using the checklist. Refer to *S3AM-324-FM1 Pre-Operation Powered Industrial Truck Checklist* or equivalent.

4.4.2 Approved powered industrial trucks will carry labels, nameplates, or identifying marks indicating the following:

- Approval of the truck for fire safety purposes by a nationally recognized testing laboratory;
- Capacity of the truck and its attachments;
- Operation and maintenance instructions; and
- Designation of the truck, based on fuel type and fire safety features. The eleven standard truck designations are discussed in *S3AM-324-ATT1 Powered Industrial Truck Designations*.
- Confirm that all labels, nameplates, or identifying marks are maintained in legible condition.

4.4.3 If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck will be taken out of service until it has been restored to a safe operating condition.

- Report any damage or problems identified during the inspection to your immediate supervisor.
- Tag and remove equipment from service when defects are found that can affect the safe operation.
- Do not use equipment until the damage or problems have been corrected.

4.4.4 Review and follow truck operating instructions as provided in the machine's operator manual.

4.4.5 Powered industrial trucks will not be driven up to anyone standing in front of a bench or other fixed object to avoid a serious crushing injury.

4.4.6 Securely fasten seat belts and/or other restraining devices if the powered industrial truck is so equipped. Remain seated at all times while the truck is in operation.

4.4.7 Never engage in stunt driving or horseplay.

4.4.8 Use trucks only for the designed purpose. Do not use trucks to bump, push, or otherwise move materials or other trucks.

4.4.9 Restrict the use of trucks in areas where large numbers of pedestrians are present (e.g., break areas, primary exits, etc.).

- Separate truck traffic and ground personnel where possible.
- If possible, install physical barriers between workstations and truck travel paths.

4.4.10 Confirm clear vision of load, path of load and path of travel are unobstructed:

- If obstructed do not drive or attempt to lift or lower loads with without the assistance of a qualified spotter.
- If load obstructs forward view and it is safe to do so, operate the powered industrial truck in reverse with the assistance of a qualified spotter.

4.4.11 Be attentive to the swing radius of the forks or attachments when turning.

4.4.12 Slow down and sound the horn at intersections, cross aisles, building corners and other locations where vision is obstructed. Lightly tap the horn to warn pedestrians when approaching from behind.

4.4.13 Use extreme caution on or near ditches, holes, embankments, grades, ramps, or other slopes.

- Avoid turning on grades.
- Avoid use of the truck in areas where cracks and crumbling surface materials may be present.
- Never run over loose objects on the roadway surface.
- Do not make quick starts, jerky stops, or turns at excessive speeds.

4.4.14 Operate a powered industrial truck only at those speeds that will permit it to be stopped safely and do not negatively impact stability of equipment and/or load.

- Consult manufacturer's recommendations.
- Pay particular attention to wet or slippery surfaces.
- Forklifts operated indoors shall not be operated at a speed in excess of 5 miles (8 kilometers) per hour.

4.4.15 Observe all traffic regulations and signage. Maintain at least three truck lengths from other vehicles following the same travel path.

4.4.16 Cross railroad tracks or other bumps in the travel path diagonally provided doing so does not produce additional hazards.

4.4.17 Do not operate the powered industrial truck while carrying loose items, tools or other equipment in the cab.

4.4.18 Powered industrial trucks will not be driven up to anyone standing between the operated truck and another piece of equipment, a structure or any other object that could present a crushing hazard.

4.4.19 No person will be allowed to stand or pass under the elevated portion of any powered industrial truck, whether loaded or empty.

4.4.20 Passengers are not permitted on any part of a powered industrial truck unless the truck has been designed to accommodate a passenger, the appropriate safety restraining device is provided and authorization has been obtained.

4.4.21 Keep body parts within the truck while driving. Arms, legs or any other body part will not be placed between the uprights of the mast, outside the running lines of the truck or any other part of the truck where a shear or crushing hazard may exist.

4.4.22 In the event that a powered industrial truck overturns, do not attempt to jump from the machine. Stay in the truck, holding on firmly and leaning in the opposite direction of the overturn.

4.4.23 When a powered industrial truck is left unattended and before dismounting, load engaging means will be fully lowered, controls will be neutralized, power will be shut off, and brakes set. Wheel chocks will be used if the truck is parked on an incline.

4.4.24 A safe distance will be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car. Powered industrial trucks will not be used for opening or closing freight doors.

4.4.25 There will be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.

4.4.26 An overhead guard will be used as protection against falling objects. It should be noted that an overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.

4.4.27 A load backrest extension will be used whenever necessary to minimize the possibility of the load or part of it falling rearward.

4.4.28 Powered industrial trucks will not be parked so as to block fire aisles, access to stairways, or fire equipment.

4.4.29 If a powered industrial truck is used to lift a personnel platform, other requirements are necessary, including:

- Employees in a platform will utilize a full-body harness and fall arrest system that is secured to the manufacturer's anchorage point within the platform.
- The platform will have a full railing system, including toeboards, on all four sides.
- The lift equipment shall be designed by the manufacturer to lift personnel platforms and will be capable of supporting the weight of the platform, personnel and equipment to be used.
- The platform shall be certified, approved and compatible to the powered industrial truck to be used and will be designed for positioning personnel.
- The platform shall be installed according to manufacturer's specifications and secured to the lift equipment in addition to the support provided by the forks or other approved powered industrial truck attachment.
- Confirm the maximum number of workers permitted to occupy the platform is not exceeded.
- The personnel platform shall not be occupied while a powered lift truck is moving horizontally.
- Personnel in a platform shall have a means to shut the powered industrial truck off.
- Employees will be trained to use the platform and regarding fall protection, refer to *S3AM-323-PR1 Aerial Work Platforms* and *S3AM-304-PR1 Fall Protection*.
- If the powered industrial truck is operated by a separate Operator and not by employees within the platform, Operator of the powered industrial truck shall be trained and verified as competent to lift workers in a personnel platform.
- Coordination between the Operator and Employees in the platform will be established, refer to *S3AM-323-PR1 Aerial Work Platforms*.

4.5 Loading and Moving Material

4.5.1 Do not exceed the rated capacity of the powered industrial truck or of any attachments. Attachments shall have a load rating plate affixed indicating the weight that may safely be carried.

- Only stable or safely arranged loads will be handled.

- A load-engaging means will be placed under the load as far as possible.
- Confirm forks are spread correctly to support the load.
- Forks shall be engaged to at least two thirds the length of the load.
- The mast will be carefully tilted backward to stabilize the load.
- Confirm load being transported on the fork-lift does not project above the fork carrier or back rest a distance greater than half the height of the unit load.
- A loose load shall not project above the fork carrier or back rest.

- The long or high (including multiple-tiered) loads which may affect capacity will be adjusted.
- Carry load as low as possible.
- Caution will be exercised when handling off-center loads which cannot be centered.
- Place heavy objects with the weight as low as possible.
- Only lift the load vertically; never drag or tow a load horizontally

4.5.2 Block or tie objects as necessary to prevent tipping or rolling.

4.5.3 Ground personnel shall remain clear and out of the line of fire of material being loaded or moved by a power industrial truck to avoid struck by / struck against hazards.

4.5.4 Powered industrial trucks equipped with attachments will be operated as partially loaded trucks when not handling a load.

4.5.5 Do not load objects to a height that blocks the view of the Operator. If the load is obstructing the operator's view, then back the truck using a qualified spotter.

4.5.6 In a congested work area, use a qualified spotter to direct the Operator.

4.5.7 Be aware that freely suspended loads can exert additional dynamic forces which could affect the powered industrial truck's stability. Use tag lines when required.

4.5.8 Be cautious of overhead power lines when elevating a load. Maintain the applicable safe limit of approach distance and incorporate appropriate control methods to prevent contact.

4.5.9 Do not raise or lower a powered industrial truck's lifting devices while the truck is in motion.

- On grades, tilt the load back slightly and raise it only as far as is needed to clear the road surface.
- For grades in excess of 10 percent, keep the load pointed upslope when ascending or descending. Extreme care will be used when tilting the load forward or backward, particularly when high tiering.
- Tilting forward will only be permitted during load pick-up or when depositing on a rack or stack.
- Tilting backwards will only be permitted to stabilize a load.

4.5.10 If using a powered industrial truck to load or unload materials from a trailer or rail car, confirm that their brakes are set and that wheel blocks have been set prior to loading or unloading. Inspect the flooring of trailers and rail cars for breaks or weakness prior to driving onto them.

4.5.11 Confirm that dock boards and/or bridge plates are properly secured before being driven over. Drive over dock boards and bridge plates slowly. Never exceed the rated capacity of a dock board or bridge plate.

4.6 Service and Maintenance

4.6.1 Turn off engines before filling or replacing fuel tanks or recharging/replacing batteries. Confirm that "No Smoking" signs are posted in refueling and/or recharging areas. Immediately clean up any fuel, oil, or electrolyte leaks.

4.6.2 Provide appropriate personal protective equipment to personnel assigned to charging and changing batteries, including, but not limited to, eye protection, protective barrier creams, protective clothing, safety boots, gloves, and respiratory protection.

4.6.3 Battery charging locations shall be provided with facilities for:

- **An** eye wash station within the immediate area for emergency use if the charging station presents a risk of exposure to battery acid;
- Flushing and neutralizing spilled electrolyte;
- Fire protection;
- Protection of charging apparatus; and
- Adequate ventilation for dispersal of fumes.

4.6.4 Remove powered industrial trucks in need of repair from service until restored to a safe operating condition. Repairs may only be completed by qualified maintenance personnel or organizations.

4.6.5 Disconnect (lockout/tagout) power sources before repairs can be started. Refer to *S3AM-325-PR1 Lockout Tagout* for additional information.

4.6.6 Modifications, additions, or attachments that will affect the capacity and safe operation of the powered industrial truck are prohibited without the written approval and new capacity chart provided by the manufacturer.

4.6.7 Manufacturer approval is required if the powered industrial truck will be used as a work platform.

4.6.8 Powered industrial trucks shall be maintained in accordance with manufacturer's instructions and inspections conducted in accordance with any local regulatory requirements.

4.7 Hazardous Atmospheres

4.7.1 Classify the atmosphere of a work location as to whether it is hazardous or non-hazardous prior to considering which designation of powered industrial truck to use in the area.

4.7.2 Do not use powered industrial trucks in atmospheres containing hazardous concentrations of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene, or unsymmetrical dimethyl hydrazine (UDMH).

4.7.3 Do not use powered industrial trucks in atmospheres containing hazardous concentrations of aluminum (and its commercial alloys), magnesium (and its commercial alloys), or other metals of similarly hazardous characteristics.

4.7.4 A list describing the use of powered industrial trucks in hazardous atmospheres by truck designation is provided in *S3AM-324-ATT1 Powered Industrial Truck Designations.*

4.7.5 Evaluate carbon monoxide concentrations to confirm that they do not exceed published exposure limits when using fuel-powered trucks in an enclosed area.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-324-ATT1 Powered Industrial Truck Designations

6.2 S3AM-324-FM1 Pre-Operation Powered Industrial Truck Checklist

6.3 S3AM-324-FM2 Powered Industrial Truck Skill Evaluation

Americas

Respiratory Protection

S3AM-123-PR1

1.0 Purpose and Scope

1.1 This procedure establishes a written respiratory protection program with the required elements and work site-specific procedures for respirator selection, use, and maintenance for any workplace where respirators are necessary to protect the health of an Employee.

1.2 The primary objective shall be to prevent exposure to atmospheric contaminants as far as feasible by accepted engineering control measures (e.g. enclosure or confinement of the operation, general and local exhaust ventilation [LEV], and substitution of less toxic materials). If respiratory hazards remain, suitable administrative controls and respiratory protective equipment requirements shall be established.

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

2.0 Terms and Definitions

2.1 **Action Level (AL)** – An airborne concentration of a potentially toxic or hazardous substance, measured in parts per million by volume (ppm), microgram per cubic meter (µg/m3) milligram per cubic meter (mg/m3) or fibres per cubic centimetre (f/cc), that triggers certain provisions as required by the applicable jurisdictional legislation. In many cases the action level is 50% of the established exposure limit.

2.2 **Air-purifying respirator** – A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

2.3 **Approved** – Equipment tested and listed by the Bureau of Mines, jointly by the Mining Enforcement and Safety Administration (MESA), and the National Institute for Occupational Safety and Health (NIOSH), or jointly by the Mine Safety and Health Administration (MSHA) and NIOSH. Please note Canadian Standards Association (CSA) bases respirator selection on NIOSH criteria for the testing and certification of respirators.

2.4 **Assigned protection factor (APF)** – The ratio of the ambient concentration of an airborne substance (outside the respirator) to the concentration of the substance inside the respirator.

2.5 **Atmosphere-supplying respirator** – A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, including supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

2.6 **Breakthrough** – The first perception of an odor, taste or irritation experienced while wearing an air-purifying respirator. Breakthrough is generally an indication that the cartridges are saturated and are no longer filtering out the contaminant. Breakthrough can also be an indication of an improperly functioning respirator.

2.7 **Established Exposure Limit** – The maximum regulatory exposure concentration to which an individual may be exposed to for an 8- hour time weighted average (TWA).

- This limit is referred to by different terminology depending upon the given jurisdiction (e.g. Permissible Exposure Limit (PEL), Contamination Limit, Occupational Exposure Limit (OEL), Threshold Limit Value (TLV), etc.).
- Acceptable methods of adjusting this limit to correspond to a different exposure period (e.g. 10 hours) vary by jurisdiction and substance.

2.8 **Filtering facepiece (dust mask)** – A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

2.9 **Fit factor** – A quantitative estimate of the fit of a particular respirator to a specific individual, typically estimating the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

2.10 **Fit test** – The use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test [QLFT] and Quantitative fit test [QNFT].)

2.11 **Hazardous atmosphere** – Any atmosphere, either immediately or not immediately dangerous to life or health, that is oxygen-deficient or that contains a toxic or disease-producing contaminant exceeding the legally established permissible exposure limit or, where applicable, the Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists.

2.12 **Immediately dangerous to life or health (IDLH)** – An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

2.13 **Maximum use concentration (MUC)** – The maximum concentration of an airborne contaminant from which an employee is expected to be protected when wearing a respirator, determined by the assigned protection factor of the respirator or class of respirators and the occupational exposure limit for that contaminant. The MUC is usually determined mathematically by multiplying the assigned protection factor (APF) specified for a respirator by the established exposure limit, which can include a short-term exposure limit and a ceiling limit or any other exposure limit used for that chemical agent, as defined by the authority having jurisdiction.

MUC = APF x established exposure limit

2.14 **Negative pressure respirator (tight fitting)** – A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

2.15 **Oxygen-deficient atmosphere –** An atmosphere with oxygen content below 19.5 percent by volume.

2.16 **Physician or other licensed health care professional (PLHCP)** – An individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the health care services required by local or governmental respiratory protection standards.

2.17 **Positive pressure respirator** – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

2.18 **Powered air-purifying respirator (PAPR)** – An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

2.19 **Pressure demand respirator** – A positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

2.20 **Qualitative fit test (QLFT)** – A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

2.21 **Quantitative fit test (QNFT)** – An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

2.22 **Self-contained breathing apparatus (SCBA)** – An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

2.23 **Supplied-air respirator (SAR) or airline respirator** – An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

2.24 **Tight-fitting facepiece** – A respiratory inlet covering that forms a complete seal with the face.

2.25 **User seal check** – An action conducted by the respirator user to determine if the respirator is properly sealed to the face.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-114-PR1 Compressed Gases

3.3 S3AM-128-PR1 Medical Screening & Surveillance

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Respiratory Protection Program Administrator**

The Respiratory Protection Program Administrator will be established at each project/location where employees are required to wear respirators. The Respiratory Protection Program Administrator will:

- Verify full compliance with this procedure.
- Assist with the arranging of any required medical evaluations or any other additional medical attention related to the use of a respirator.
- Perform or arrange suitable providers to perform the program evaluations described in this procedure.
- Maintain required inspections and testing/certifications of SCBA units

4.1.2 **Manager /Supervisor**

- Verify compliance with the respiratory protection program set forth in this procedure.
- Verify that only those employees who are medically qualified, properly trained, and fit tested are assigned to respirator work.
- Verify that respirators are provided, repaired, or replaced as may be required due to wear and deterioration.
- Confirm that the emergency rescue service is available to respond prior to any employees entering the IDLH area.

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

- Monitor compliance with the various aspects of this program.
- Provide technical assistance regarding respirator selection and use, evaluate the effectiveness of this program, and support respirator training and fit testing (e.g. determine cartridge change out schedule for negative air respirators).
- Audit company compliance with this procedure.

4.1.4 **Employee**

- Use respiratory protection in accordance with instructions and training received.
- Maintain the respirator in accordance with this procedure and the manufacturer's instructions.
- Immediately report any malfunction of the respirator to the Supervisor or Manager or other responsible person.
- For employees who wish to wear respirators on a voluntary basis when not required to by AECOM or a regulatory agency, the employee shall complete *S3AM-123-FM2 – Voluntary Use of Respirators* or an equivalent form.

4.2 Training

4.2.1 Employees who wear respiratory protection shall receive training before they are assigned to a task that requires the use of respiratory protection.

4.2.2 Employees that may be exposed to a respiratory hazard will be instructed on the hazard and the controls prior to beginning work.

4.2.3 Atmospheric testing will be carried out by qualified personnel trained in the use, calibration, and interpretation of the test equipment.

4.2.4 Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the Employee's knowledge or use of the respirator indicate that the Employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to verify safe respirator use.

4.2.5 Basic Respirator Training Program

Respirator training classes will include, at a minimum, the following**:**

- Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used;
- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- The limitations and capabilities of the respirator;
- Proper fitting, including demonstrations and practice in wearing, adjusting, determining the fit of, and performing a user seal check each time respirator is donned. Refer to *S3AM-123-ATT1 Fit Testing Protocol*, *S3AM-123-FM1 Respiratory Equipment Fit Test* and *S3AM-123-ATT2 User Seal Check*;
- How to inspect, put on, use and remove the respirator;
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- The procedures for maintenance and storage of the respirator;
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- The general requirements of local or governmental Respiratory Protection Standards.

4.3 Medical Surveillance

4.3.1 No Employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator.

4.3.2 Prior to wearing a respirator and in accordance with the applicable jurisdictional requirements, Employees shall complete medical screening to identify any relevant psychological or physiological impediments to respiratory protection use. Screening may require an initial baseline medical surveillance examination, based on jurisdictional requirements or screening results, performed by a PLHCP in accordance with the requirements of *S3AM-128-PR1 Medical Screening & Surveillance Program.*

4.3.3 Additional medical examinations will be provided to employees who wear respirators when:

- An Employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, Supervisor, or the Respiratory Protection Program Administrator determines that an Employee needs to be reevaluated;
- Information from the Respiratory Protection Program, including observations made during fit testing and program evaluation, indicates a need for Employee reevaluation; or

- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature, etc.) that may result in a substantial increase in the physiological burden placed on an Employee.

4.3.4 All medical surveillance examinations shall be at no cost to the employee and occur during normal working hours; shall be convenient, understandable, and confidential; and the Employee will be given the chance to discuss results with examining physician.

4.4 Respirator Selection

4.4.1 The location or project specific SH&E Plan shall identify applicable respiratory hazards and develop appropriate controls, which may include respiratory protection. If respiratory protection is necessary the SH&E Plan shall detail the requirements.

4.4.2 SH&E Managers or his/her designated representative shall select and provide an appropriate respirator based on:

- The respiratory hazard(s) to which the employee may be exposed, including oxygen deficiency. Identify potential contaminants, concentrations, and the physical state of airborne contaminants:
  - Particulates (dust, fibers, micro-organisms, smoke, fumes).
    - Indicate the presence of any oil in particulate hazards. (may be produced by motor vehicles, air compressor systems using oil lubricators) If unknown, oil shall be assumed to be present.
  - Vapor and gases
    - Gases which may produce an oxygen deficiency (i.e. helium, argon, carbon monoxide and nitrogen).
    - Gases which are acids or produce acids when in contact with moisture (i.e. sulphur oxides, carbon dioxide, hydrogen chloride).
    - Gases which are alkaline or produce alkalis in reaction with moisture (i.e. ammonia, amines, phosphine).
    - True gases or vapors from evaporation of organic liquids (i.e. acetone, toluene, benzene).
    - Metal reacted with an organic compound (i.e. tetra-ethyl lead: was used in leaded fuel and still in aviation fuel, organic phosphates).
    - Mercury vapor.
    - Radon.
- The eye and face hazards to which the employee may be exposed (absorption, irritant, impact).
- Workplace or user factors that may affect respirator performance and reliability.

4.4.3 SH&E Managers or his/her designated representative shall identify and evaluate the respiratory hazard(s) in the workplace. Evaluations shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.

4.4.4 Respiratory protection is required for those operations in which engineering controls or work practice controls are not feasible to reduce toxic or hazardous substance exposure at or below the AL (or if applicable, established exposure limit).

4.4.5 Where the employee exposure cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH.

4.4.6 Only approved respirators shall be selected and they shall be used in compliance with the conditions of their certification.

4.4.7 Respirators shall be selected from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

4.5 Fit Testing Procedures

4.5.1 After the medical assessment is complete, employees using a tight-fitting respirator shall pass an appropriate QLFT or QNFT prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model or make) is used, and at least annually (or as required by the applicable jurisdiction) thereafter. Refer to *S3AM-123-ATT1 Fit Testing Protocol*.

4.5.2 Fit testing shall be performed using the same make, model, style and size of respirator the user would be expected to use.

4.5.3 Should the fit test fail, alternative makes, models, styles and sizes shall be tested to find a correct fit for the user.

4.5.4 Respiratory protective equipment shall not be used unless a satisfactory fit test has been achieved for that particular equipment.

4.5.5 Fit testing shall also verify user competency in donning, doffing, inspecting and performing of seal checks.

4.5.6 Additional fit tests will be performed:

- Whenever there is an indication that changes in the Employee's physical condition might have an effect on respirator fit (such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight);
- If the Employee notifies his/her Supervisor or SH&E Manager that the fit of his/her respirator is unacceptable.

4.6 Interference with Facepiece Seal

4.6.1 AECOM shall not permit respirators with tight-fitting facepieces to be worn by Employees who have:

- Facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or
- Any condition that interferes with the face-to-facepiece seal or valve function.

4.6.2 If an employee wears corrective glasses or goggles or other personal protective equipment, the Supervisor or Manager shall confirm that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

4.6.3 Employees shall perform a user seal check each time they don the respirator. Refer to *S3AM-123-ATT2 User Seal Check Procedures*.

4.7 Specification of Proper Level of Respiratory Protection

4.7.1 The SH&E Manager or his/her designated and qualified representative shall provide guidance on the proper selection and use of all respiratory protective devices, including half-face and full-face air purifying respirators, airline respirators, and self-contained breathing apparatus. This information is generally specified as part of the written site-specific SH&E plan and Task Hazard Assessment (THA).

4.7.2 Employees engaged in activities not covered by a THA or SH&E plan shall stop work and consult with the SH&E Manager or his/her designated representative to determine the proper equipment to use prior to resuming activities. Whenever appropriate, exposure levels will be measured to verify that the actual use conditions are within the limitations of the approvals specified by NIOSH/MSHA for the selected respirator.

4.8 Cartridges

4.8.1 NIOSH certifies three classes of filters*:

Three categories of resistance to filter efficiency degradation:	Three levels of filter efficiency:
N (**N**ot resistant to oil)	95% (called “95”)
R (**R**esistant to oil)	99% (called “99”)
P (oil **P**roof)	99.97% (called “100”)

*Filters are available in any combination of the above.

4.8.2 Generally cartridge color denotes the type of contaminant the cartridge was designed to filter:

Olive:	Multi-contaminant
White:	Acid gas
Black:	Organic vapors
Green:	Ammonia gas
Yellow:	Acid gas and organic vapors
Blue:	Carbon Monoxide
Purple (Magenta):	Radioactive material, except tritium & noble gases
Purple:	Any particulates - P100
Orange:	Any particulates - P95, P99, R95, R99, R100
Teal:	Any particulates free of oil - N95, N99, or N100

Please note; this is only a basic listing and should only be used as a reference. Combinations, deviations or additional types may be encountered. To ensure proper cartridge selection consult the cartridge supplier to ensure applicability to the contaminant(s) anticipated

4.8.3 Filter cartridges shall be changed out whenever an increase in breathing resistance is detected by the user.

4.8.4 When available, chemical cartridges that are equipped with end-of-service life indicators (ESLI) shall be utilized. In those cases, cartridges should be changed when indicated by the ESLI. A buddy system should be used so coworkers can monitor each other’s cartridge color condition.

4.8.5 In the absence of cartridges equipped with an ESLI, employees shall change chemical cartridges on the following schedule:

- Immediately if breakthrough is perceived or if resistance to breathing is detected by the user; and
- In accordance with the change out schedule based upon the anticipated contaminant concentration, environmental conditions, employee work rate, and the specific data provided by manufacturer.

4.8.6 When PAPRs are worn, the same rules apply with the exception that filter cartridges should be changed when airflow through the filter elements decreases to an unacceptable level, as indicated by the manufacturer’s test device.

4.9 Air-Supplying Respirator Use

4.9.1 Air-supplying respirators will be specified for use when it has been determined that any of the following conditions exist:

- The oxygen concentration is less than 19.5 percent;
- The contaminant is unknown or its concentration cannot be quantified;
- The airborne contaminant concentration is above its IDLH;
- An air-purifying respirator canister or cartridge that removes the contaminant is not available;
- The contaminant concentration is above the concentration for which an air-purifying canister or cartridge is approved; or
- The contaminant concentration is above the MUC of a full-face air-purifying respirator.

4.9.2 No Employee may engage in an operation requiring the use of an air-supplied respirator unless the SH&E Manager or his/her designated representative has reviewed the operation and approved its use.

4.9.3 The determination of the type of air-supplying respirator (i.e., SCBA, airline, demand, pressure demand, etc.) appropriate for the job, outside standby persons, communication, proper training and equipment, notification procedures, and necessary action should be part of the THA or SH&E Plan. Mandatory equipment including SCBA or SAR with auxiliary air supply and emergency appropriate retrieval equipment or equivalent rescue means shall be made by the SH&E Manager or his/her designated representative at the time of the THA or SH&E Plan review. The need for any additional precautions (i.e., equipment specific training, on-site health and safety support, etc.) shall also be determined by the SH&E Manager or his/her designated representative.

4.10 Minimum Procedures for IDLH Atmospheres

4.10.1 One Employee or, when needed, more than one Employee shall be located outside the IDLH atmosphere. This employee shall be responsible for communicating with the Employees in the IDLH atmosphere, alerting rescue services if needed, and restricting entrance to the IDLH area by untrained and unapproved persons.

4.10.2 Visual, voice, or signal line communication shall be maintained between the Employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

4.10.3 The Employee(s) located outside the IDLH atmosphere shall be trained and equipped to provide effective emergency rescue or to initiate on-site rescue services.

4.10.4 If on-site rescue services are to be used, the Manager or Supervisor shall confirm that the service is available to respond prior to any employees entering the IDLH area.

4.10.5 Employee(s) located outside the IDLH area and/or on-site rescue services shall be equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment would create a hazard to the Employees in the IDLH area.

4.11 Breathing Air

4.11.1 Compressed air used for respiration shall be of high purity and shall meet, as a minimum, the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1).

4.11.2 Oxygen shall NOT be used as a source of breathing air at any time in open-circuit SCBAs or airline respirators.

4.11.3 Compressor Supplied Breathing Air

- All compressors used for filling SCBA air cylinders or for supplying airline respirators shall be equipped with the following safety and standby devices:
    - The compressor intake shall be located to verify that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
    - Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
    - A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere shall be provided.
- If an oil-lubricated compressor is used to supply breathing air, it shall be equipped with both of the following devices:
    - A continuous reading carbon monoxide monitoring system set to alarm should the carbon monoxide concentration exceed 10 parts per million; and,
    - A high temperature alarm which will activate when the discharge air exceeds 110 percent of the normal operating temperature in degrees Fahrenheit.
- An in-line purifying filter assembly to remove oil, condensed water, particulates, odors, and organic vapors shall be used in conjunction with the air compressor.

4.11.4 Compressed Air Cylinder Systems for Airline Respirators

- Compressed air cylinders shall meet the requirements of *S3AM-114-PR1 Compressed Gases*.
- Compressed air cylinder systems used to supply airline respirators shall be equipped with low pressure warning bells (e.g., Scott Pak-Alarm) or similar warning devices to indicate air pressure in the manifold below 500 pounds per square inch (psi). When such systems are used, one employee shall be assigned as safety standby within audible range of the low pressure alarm.
- Airline hose couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying airline respirators with non-respirable gases or oxygen.
- The air pressure at the hose connection to airline respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.
- Routine inspection and maintenance of the air compressor shall be performed.

4.11.5 Compressed Air Cylinder Systems for Recharging SCBAs

- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi.

4.11.6 Escape/Egress Units

- Escape/egress unit respirators are intended for use in areas where escape with a short-term (minimum 5 minutes) air supply is necessary. It is important that escape bottle size be provided that will allow the employee to get to a safe location considering breathing rate and distance.
- Escape bottles are required on air-line respirators used in IDLH and high hazard work conditions.
- They may be used as adjuncts to airline pressure demand respirators as a backup air supply or as independent emergency devices in areas where respiratory protection is not normally required.

- Appropriate training shall be conducted and documented prior to assigning Employees to tasks or locations subject to the use of these respirators.
- Escape/egress units (minimum 5 minutes) shall never be used to enter a hazardous atmosphere or as primary standby respirators for confined space entry.

4.12 Respirator Inspection, Cleaning, Maintenance, and Storage

When respirator use is required, only properly cleaned and maintained NIOSH/MSHA approved respirators shall be used.

4.12.1 Inspection

- Respirators should be inspected before and after use using *S3AM-123-FM3 Respiratory Equipment Inspection*, or equivalent. The respirator should not be used and removed and marked out of service if any item on the checklist fails inspection.
- Respirators for emergency use should be inspected once per month.
- Defects shall be reported to their Supervisor or Manager. No defective respirator shall be issued or worn.

4.12.2 Cleaning and Maintenance

- Respirator facepiece assemblies shall be cleaned and sanitized minimally after each day of use in accordance with the requirements specified in *S3AM-123-ATT3 Respirator Cleaning*.
- The respirator should also be inspected for any damaged parts (repair should only be done by trained personnel with the proper tools).
- Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.
- Respiratory equipment shall be maintained according to manufacturer's instructions.
- In field situations, a pre-moistened towelette (e.g., baby wipes) can be used. The mask should then be rinsed with clean warm water and dried. Towelettes or wipes shall be compatible with the respirator materials.
- Alcohol should never be used to clean masks as it can damage the facepieces and rubber parts.
- Where respirators are assigned to individual employees, management shall verify compliance with cleaning and maintenance requirements by periodic inspection and field audits of respiratory equipment.

4.12.3 Storage

- Store clean respirators so that they are protected from dust, excessive moisture, damaging chemicals, temperature extremes and direct sunlight or UV light. They should be placed in a sealed plastic bag and stored in the original box or similar container which blocks light.

4.13 Hygiene

4.13.1 Employees shall leave the work area to wash, change cartridges, or if they detect breakthrough or resistance.

4.14 Costs

4.14.1 The costs for training, medical examinations, fit testing, respirators, spectacle kits, and cleaning materials should be considered as operational costs.

4.15 Program Evaluation

4.15.1 The SH&E Manager or his/her designated representative shall conduct evaluations of the workplace as necessary to verify that the provisions of the current written program are being effectively implemented and that it continues to be effective.

4.15.2 The SH&E Manager shall regularly (i.e., during annual training) consult Employees required to use respirators to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the Employee is exposed;
- Proper respirator use under the workplace conditions the Employee encounters; and
- Proper respirator maintenance.

5.0 Records

5.1 Medical records under this section shall be maintained at a minimum in accordance with *S3AM-128-PR1 Medical Screening & Surveillance.*

5.2 Fit Test Records shall be maintained in the Employee's health and safety records. *S3AM-123-FM1 Respiratory Equipment Fit Test*, or equivalent, will be used to document each fit test.

5.3 Training Records shall be maintained in accordance with *S3AM-003-PR1 SH&E Training***.**

6.0 Attachments

6.1 S3AM-123-ATT1 Fit Testing Protocol

6.2 S3AM-123-ATT2 User Seal Check

6.3 S3AM-123-ATT3 Respirator Cleaning

6.4 S3AM-123-FM1 Respiratory Equipment Fit Test

6.5 S3AM-123-FM2 Voluntary Use of Respirators

6.6 S3AM-123-FM3 Respiratory Equipment Inspection

Americas

Underground Utilities

S3AM-331-PR1

1.0 Purpose and Scope

1.1 Provides procedures designed to help prevent injuries to personnel working on the location and pedestrians, property damage, and adverse environmental impact as a result of potential hazards associated with encountering underground utilities, subsurface installations, and potential overhead hazards.

1.2 Provides the minimum requirements to be followed for underground work (e.g., excavations, drilling, boring, and probing work) to ensure that underground installations, and subsurface structures, are identified properly before work commences.

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

1.4 The Manager is responsible for meeting all the requirements in this procedure.

1.5 AECOM's clients may have specific procedures which shall be followed to identify and map utility and subsurface structures on their properties or facilities. Provided the client's procedures meet or exceed those of AECOM, approval shall be obtained from the Manager and the SH&E Manager to follow the client's procedures.

2.0 Terms and Definitions

2.1 **Underground Utilities –** All utility systems located beneath grade level, including, but not limited to, gas, electrical, water, compressed air, sewage, signaling and communications, etc.

2.2 **Clearance** – includes the following:

- The positive locating of underground utilities or subsurface installations in or near the work area.
- A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

2.3 **Ground Disturbance (GD) –** Any indentation, interruption, intrusion, excavation, construction, or other activity in the earth's surface as a result of work that results in the penetration of the ground.

2.4 **Hand Clearance Zone –** The area on either side of the locate marks of a utility that shall be maintained in order to expose the utility through the use of non-destructive ground disturbance techniques acceptable to the owner of the buried utility. Visual exposure is required before mechanical excavation equipment may be used.

2.5 **Intrusive Activities –** Examples: Excavation of soil borings, installations of monitoring wells, installation of soil gas sampling probes, excavation of test pits/trenches or other man-made cuts, cavity, trench or depression in an earth surface formed by earth removal.

2.6 **Non-Destructive Ground Disturbance Technique –** A safe and acceptable excavation method that is used to visually expose an underground utility without causing damage. Non-destructive ground disturbance techniques may include, but are not limited to:

- Hand digging.
- Use of non-conductive tools.
- Hydro-vacuum.

2.7 **Subsurface Installation –** Examples: Subterranean tunnels, underground parking garages and other structures beneath the surface.

2.8 **Utility Strikes –** Unplanned contact with utilities resulting in damage to the utility or its protective coating.

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-303-PR1 Excavation

3.3 S3AM-321-PR1 Drilling, Boring & Direct-Push Probing

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager**

- Administer this procedure and the development of the SH&E Plan.
- Confirm the appropriate equipment and materials are available to conduct the underground utility and/or subsurface installation clearance.
- Confirm all employees involved and affected by the task review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing
- Authorize work to proceed using the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist*.
- Confirm that employees conducting underground utilities and subsurface clearance processes possess all required training, registrations or certifications.
- Provide authorization (with the concurrence of the Site Supervisor and SH&E Manager) for work to resume if interrupted due to unexpected conditions or events.

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

- Assist AECOM management as needed by providing guidance and clarification as to issues that may arise.
- Review the SH&E Plan to confirm compliance with jurisdictional regulations. Provide technical guidance as needed when a variance is pursued related to this procedure.

4.1.3 **Employees**

- Maintain training as appropriate to the work to be completed (e.g. ground disturbance, lockout tagout, equipment operation, etc.). Refer to *S3AM-003-PR1 SH&E Training*.
- Review the SH&E Plan and Task Hazard Assessment (THA) prior to work commencing.
- As appropriate to the anticipated or encountered hazards and as addressed in the applicable planning documentation, utilize appropriate personal protective equipment (PPE) and applicable training, practices and operating procedures.
- Immediately notify the Manager of any unanticipated conditions or events. If assigned equipment, perform appropriate inspections and confirmations of maintenance and/or repairs.

4.2 Training

4.2.1 All on-site employees involved with the underground utility and subsurface identification and associated clearance process shall be trained, at a minimum, in these procedures.

4.2.2 Employees shall complete all required training associated with their tasks in accordance with the SH&E Training Matrix and any training assessments developed at the business group.

- Refer to *S3AM-003-PR1 SH&E Training.*
- This training may include, but is not limited to, Excavation / Trenching (Ground Disturbance), HAZWOPER, Petroleum Safety Training (or Construction Safety Training), and H2S Alive as appropriate.

4.2.3 As applicable, employees shall receive client-required training.

4.3 Planning

4.3.1 Health and Safety Plan – At a minimum, a SH&E Plan and task hazard assessments (THAs) shall be prepared prior to any underground utilities and subsurface installations clearance activities.

- The SH&E Plan will address any required environmental monitoring including gas monitoring, dust, noise, metals, radiation or other monitoring as may be appropriate for site conditions.
- Employees shall comply with all SH&E Plan requirements.
- The location specific emergency response plan shall be in place, contain procedures applicable to the potential emergencies presented by the operations, and be reviewed with all personnel potentially affected.

4.3.2 *S3AM-331-ATT2 Underground Utilities & Subsurface Installation Clearance Flow Chart* provides a summary of the key requirements addressed in this procedure.

4.3.3 Underground utilities and subsurface installations shall be investigated as being present, including the following, but not limited to:

- Steam, gas and electric.
- Sewer and water.
- Subterranean tunnels.
- Fibre optics (note: routine geophysical surveys will not identify fibre optic cables).
- Traffic control cables.

4.3.4 Location of underground utilities and subsurface installations will be confirmed by cross-referencing available information:

- Maps, as-built drawings and issued for construction (IFC) drawings.
- Plot plans, permits, crossing/encroachment agreements.
- One-Call information, locator and provided surveys.
- Private utility information, locator and provided surveys (e.g. ground penetrating radar (GPR), electromagnetic, etc.).
- Owner supplied documentation.
- Site walks.

4.3.5 As applicable, emergency shut-off locations of utilities shall be verified before work activities commence.

4.3.6 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the minimum search zone dimensions and appropriate clearance distances.

4.3.7 As necessary and if possible, adjust locations of excavations or intrusive subsurface work away from subsurface utilities and installations

4.3.8 Prior to any excavation or intrusive subsurface work, the *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* shall be completed. The form shall be reviewed and signed by the Manager.

- If the answer to any question in Part 1 of the checklist is “No” or “N/A”, no ground disturbance may take place without review by the Manager, in consultation with SH&E Manager, of the circumstances related to the particular item. The Manager shall initial beside each “No” or “N/A” item to indicate review and authorization.

4.4 Permits, Notifications and Access Agreements

4.4.1 Any required notifications shall be provided within the appropriate timeframe to the applicable organization (e.g. owner, utility company, agency, governing body, etc.).

4.4.2 All applicable permits (e.g. client, government, working near rail road, etc.) will be identified, obtained, and adhered to.

4.4.3 All access agreements will be obtained and adhered to.

4.5 Locating Underground Utilities and Subsurface Installations

4.5.1 Utilize the appropriate call/click-before-you-dig provider. Refer to *S3AM-331-ATT1 One-Call System*.

4.5.2 Federal/State/Provincial/Territorial and other "One Call" providers shall be contacted at least two working days and no more than ten working days prior to commencing the ground disturbance. Jurisdictional requirements shall be consulted to verify the appropriate advance notice. (e.g. 24 hours, two full working days, three to ten business days, etc.).

4.5.3 If the location of proposed excavation or intrusive subsurface work cannot be clearly and adequately identified, the route and/or area of the proposed ground disturbance shall be identified using white flags, paint or stakes prior to the arrival of the locator. Consult jurisdictional requirements as white-lining may be a mandatory requirement on all ground disturbances.

4.5.4 One Call providers shall appropriately identify and mark the subsurface utilities or installations, or otherwise provide written notification they do not have any facilities near the proposed subsurface/intrusive locations.

4.5.5 Confirm all circuits were on during subsurface checks if the checks were for identifying energized lines (e.g. circuits on timers or light sensing switches).

4.5.6 Areas that have a high density of sub-surface facilities may require a secondary locate by another independent locator to verify locations identified by the first locator.

4.6 Private Utility Locating

4.6.1 One Call services may not be available in various non-urban locations. Private utility locating companies shall be utilized to identify and located any underground utilities or subsurface installations.

4.6.2 Be aware urban areas (e.g. city or town) may have subsurface installations (e.g. underground garages) and utilities (e.g. public water, sewer, and gas pipelines) that are not covered by one-call systems.

- These subsurface installations and utilities require additional investigation and diligence beyond the one-call system.
- Additional investigation and diligence beyond the one-call system is also recommended for non-urban areas.

4.6.3 In urban areas, private utility locating companies shall be called to identify and locate, through geophysical surveys and other means, the presence of private utilities installed by the property owner (e.g. irrigation systems) and to verify the presence of public utilities on the properties.

- Hand clearing is required in urban areas.

4.6.4 Hand clearing is also recommended for non-urban areas and may be required by the given jurisdiction.

4.6.5 Warning tape, pea gravel, sand, non-indigenous material, bentonite, red concrete (indicative of electrical duct banks) and any departure from native soil or backfill may be evidence of the presence of subsurface installations and utilities.

4.7 Surface Markings

4.7.1 Once the underground installation has been identified, proper surface markings shall be made in accordance with the guidelines from the One-Call System (refer to S3AM-331-ATT1), guidance contained in this procedure or as contract-specified.

4.7.2 Color-coded surface marks (paints or similar coatings) shall be used to indicate the type, location, and route of buried installations. Additionally, to increase visibility, color-coded vertical markers (temporary stakes or flags) shall supplement surface marks.

4.7.3 All marks and markers shall indicate the name, initials, or logo of the company that owns or operates the installation and the width of the installation if it is greater than 2 inches.

4.7.4 If the surface over the buried installation is to be removed, supplemental offset marking shall be used. Offset markings shall be on a uniform alignment and shall clearly indicate that the actual installation is a specific distance away.

4.7.5 Locate marks shall be re-verified as per jurisdictional requirements or no later than 14 days after the previous locate was completed, whichever interval is shorter. These locate time intervals shall be maintained for the duration of the ground disturbance.

- If the work is interrupted during the determined lifespan or work does not commence during the applicable lifespan, a new locate shall be performed.
- Jurisdictional provisions may allow for an extension to the lifespan of the locate marks, however certain conditions may need to be met. (e.g. activities uninterrupted)
- If locate marks are moved or destroyed the location of the buried facilities shall be re-established.

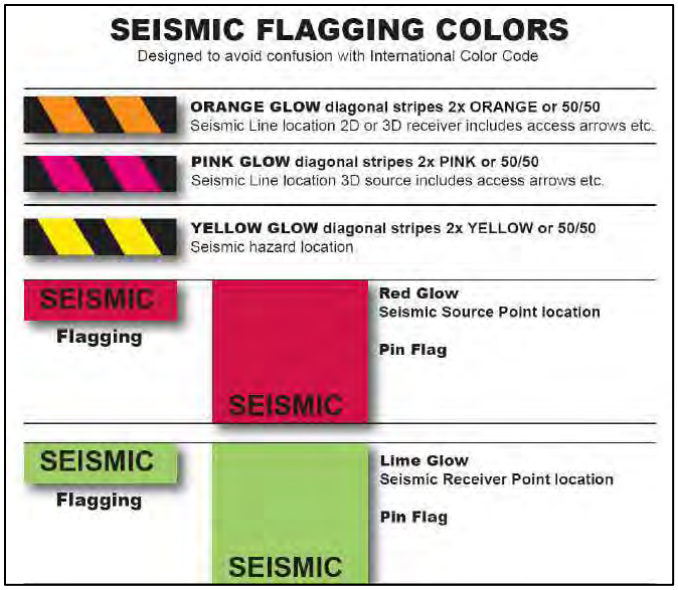
4.8 Uniform Color Coding

4.8.1 The colors and corresponding installation type are as follows unless otherwise contract-specified:

AMERICAN PUBLIC WORKS ASSOCIATION – APWA
Color Coding for Marking of Buried Facilities

White	Proposed Ground Disturbance Area
Pink	Temporary Survey Markings
Red	Electric Power Lines, Cables, Conduit and Lighting Cables
Yellow	Gas, Oil, Steam, Petroleum Lines or Gaseous Materials
Orange	Conduit, Cable, Communication, Alarm or Signal Lines
Blue	Potable Water
Green	Sewer, Storm Sewer and Drain Lines
Purple	Reclaimed Water, Irrigation and Slurry Lines (non-potable)

Canadian Association of Geophysical Contractors



4.9 Identification and Mapping of Utility and Subsurface Structures

4.9.1 The locations of subsurface utilities and subsurface installations shall be investigated, documented, and shown on a site plan (a scaled site plan shall be used when feasible). Refer to *S3AM-331-FM1 Underground Utilities & Subsurface Installation Clearance Checklist.*

4.9.2 Documentation of utility and subsurface installation identification (calling one call, responses from utilities) along with the scaled site plan shall be available on the worksite at all times of intrusive activities.

4.10 Site Walk

4.10.1 A site walk shall be conducted by the AECOM Manager and any other appropriate personnel with the objectives of reviewing all planned intrusive activity locations, the locations of subsurface and overhead utilities, overhead obstructions, and the potential for subsurface installations, to determine the appropriate utility clearance activities, and to observe other physical hazards.

- Walk the area at least 50 feet (15.2 meters) from perimeter of the site to observe physical hazards.
- Walk the area of at least 50 feet (15.2 meters) radius from each proposed subsurface intrusion location.
- If possible, particularly at urban and industrial sites, the client/property owner or an individual knowledgeable about the site and site utilities will attend the site walk.
- Add discovered items/issues to map for use in location confirmation.

4.10.2 The Site Walk further supplements the Identification and Mapping of Utility and Subsurface Structures procedure. Site Walks should be repeated as necessary following the Identification and Mapping of Utility and Subsurface Structures as visual verification of the hazards. Examples include:

- Proposed location(s) does not lie on a line connecting two similar manhole covers (e.g. sanitary sewer or storm drain).
- Proposed subsurface location(s) has not subsided, been excavated and patched, nor gives the appearance it may be covering a former trench (e.g. linear cracks, sagging curbs, linear re-pavements, etc.).
- Proposed subsurface location(s) does not lie on a line with any water, gas, electrical meters, utility cleanouts, or other utility boxes in the surrounding areas.

4.11 Proposed Subsurface Investigation Locations

4.11.1 All proposed subsurface locations will be reviewed in comparison to subsurface and overhead utilities and subsurface installations and adjustments made as necessary.

4.11.2 Minimum set back distances from subsurface and overhead utilities and subsurface installations will be established including 5 feet (1.5 meters) from any subsurface utility, 7 feet (2.1 meters) from the pad surrounding any underground storage tanks, and 10 feet (3 meters) from any overhead energized electrical line (or further depending on line voltage). These set back distances are a minimum; government regulations and utility requirements may dictate a greater set back distance.

4.12 Utility Clearance Investigation Location Confirmation

4.12.1 As applicable, all client on-site safety procedures shall be understood and adhered to.

4.12.2 Hand exposure or non-destructive ground disturbance techniques to expose an underground utility or subsurface installation are necessary to accurately determine size, location and alignment prior to mechanical excavation or intrusive subsurface work in the vicinity of that utility or installation.

4.12.3 Non-destructive ground disturbance techniques shall be acceptable to the owner of the buried utility (i.e. hydro-vacuum temperature or pressure).

4.12.4 Hydro-vacuum or air-knife require proper grounding equipment at sites where the subsurface may contain flammable gases, liquids, or vapors

4.12.5 Jurisdictional, land owner, client and utility owner requirements shall be consulted to determine the distance of the hand exposure zone, and what requirements, when met, may allow mechanical excavation within these zones.

4.12.6 At a minimum, all underground utilities and subsurface installations within a 5 feet (1.5 meter) radius of the work site shall be identified and physically located (seen) before use of mechanical excavation equipment is permitted. Jurisdictional, client, land owner and utility owner requirements shall be consulted as the required hand exposure radius may be larger.

4.12.7 In urban areas, proposed subsurface locations will be hand cleared to 5 feet (1.5 meters) (soil borings and wells) or 12 inches (30 centimeters) (soil gas sampling probes) using non-mechanical methods.

- In non-urban areas, hand clearing should be conducted if possible and shall be conducted as required by the given jurisdiction.
- Hand clearance should be extended if locations of deep utilities and structures are not known.
- Hand exposure or non-destructive ground disturbance techniques should extend a minimum of 24 inches (60 centimeters) below the intended ground disturbance depth to minimize the hazard of mechanical equipment contact with any utility or installation.

4.12.8 Mechanical equipment and attachment dimensions shall be considered when establishing the zone in which all underground utilities and subsurface installations are physically located (seen) prior to the use of that equipment. The radius may require expanding to maintain safe distances when using large equipment.

4.13 Utility Strikes

4.13.1 Utility strikes shall be reported in accordance with *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*.

4.13.2 All damaged utilities shall be repaired by a qualified and/or licensed professional.

5.0 Records

5.1 Retain completed *S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist* and documents related the clearance process (e.g. Utility Owner communication, etc.) in the site or project files.

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

6.0 Attachments

6.1 S3AM-331-ATT1 One-Call System

6.2 S3AM-331-ATT2 Underground Utilities & Subsurface Installation Flow Chart

6.3 S3AM-331-FM1 Underground Utility & Subsurface Installation Clearance Checklist

Americas

Wildlife, Plants & Insects

S3AM-313-PR1

1.0 Purpose and Scope

1.1 Communicates the requirements and precautions to be taken by AECOM employees to protect against the biological hazards associated with insects, arachnids, snakes, poisonous plants, and other animals referred to herein collectively as “biological hazards”.

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

2.0 Terms and Definitions

2.1 **Field Work –** Any activity conducted at a site that contains brush, overgrown grass, leaf litter, poisonous plants, or is located near mosquito breeding areas and includes work in structures where animals might exist that harbor fleas or ticks or where spiders and mites could be present. Field work includes, but is not limited to, Phase I, Phase II, Operations Monitoring & Maintenance, biological surveys, and other work that meets the definition of field work.

2.2 **Poisonous** – Capable of harming or killing by or as if by poison; toxic or venomous.

2.3 **Phase I Environmental Site Assessment –** Investigation of real property to determine the possibility of contamination, based on visual observation and property history, but no physical testing. Under new Environmental Protection Agency regulations that went into effect on November 1, 2006, a Phase I, as it is called for short, will be mandatory for all investors who wish to take advantage of Comprehensive Environmental Response, Compensation, and Liability Act defenses that will shield them from liability for future cleanup, should that prove necessary. The new Phase I rules, called “All Appropriate Inquiry” or AAI, also require more investigation than previously mandated. Investors can expect to see dramatic price increases over prior experiences.

2.4 **Phase II Environmental Site Assessment** – Investigation of real property through physical samplings and analyses to determine the nature and extent of contamination and, if indicated, a description of the recommended remediation method.

3.0 References

3.1 RS2-001-PR1 Firearms Standard

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

3.3 S3AM-008-PR1 Fitness for Duty

3.4 S3AM-113-PR1 Heat Stress

3.5 S3AM-208-PR1 Personal Protective Equipment

3.6 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers / Supervisors**

- Responsible for managing field work.

- Work with employees to see that a Task Hazard Analysis (THA) for the work to be conducted has been performed prior to the beginning of the field work and that it includes an assessment of potential biological hazards.
- Implement control measures at the location to reduce the potential for employees to be exposed to injuries and illnesses from biological hazards while working.
- If the exposures cannot be eliminated or managed with engineering controls, approve the use and cost of Personal Protective Equipment (PPE) and protective repellents and lotions and confirm that exposed employees have and use these products.

4.1.2 **SH&E Manager**

- Confirm training and guidance is provided to employees consistent with this procedure.
- During the performance of site visits, assess the precautions being taken against biological hazards for compliance with this procedure.
- Assist AECOM personnel in identifying hazards and selecting appropriate control measures.
- As applicable, review and approve relevant SH&E Plans for locations that have biological hazards.

4.1.3 **Employees**

- Participate in required training related this procedure.
- Participate in the development of THAs for the task, identify control measures to limit exposure and request PPE, repellents, and protective lotions identified by this procedure.
- Update the applicable THA when a new, unaccounted for biological hazard is identified. Employee shall stop work to identify appropriate elimination or control measures (and obtain any necessary guidance) before continuing work.
- Obtain approval from Managers and/or Supervisors to purchase selected PPE prior to purchasing.
- Implement the precautions appropriate to prevent exposure to the hazardous wildlife, insects and plants.
- Observe requirements for reporting (e.g. tick bites, skin irritations, etc.) as detailed within the procedure and attachments.

4.2 Training

4.2.1 Employees shall be trained to recognize organisms that represent a threat in the regions in which they work – experienced field staff shall provide on the job training to assist staff with hazard recognition.

4.2.2 Employees shall be properly trained to the anticipated tasks and the associated required PPE.

4.3 Overview

4.3.1 The procedures discussed below are detailed because these hazards have historically posed the most significant risk to AECOM employees. Note that this discussion is not a fully encompassing list of hazards. As part of the SH&E Plan and THA developed by the AECOM personnel, in accordance with *S3AM-209-PR1 Risk Assessment & Management*, additional consideration shall be given to other biological hazards.

4.3.2 Departments of Public Health local to the worksite, as well as the Centers for Disease Control (CDC) can serve as a resource for identifying biological hazards not discussed in this procedure.

4.3.3 If additional biological hazards are identified, employees should stop work and contact the SH&E Manager to discuss the hazards and identify effective control measures. Those control measures shall be implemented at the location prior to restarting work.

4.4 Employee Sensitivity

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

4.4.2 Employees also need to consider whether they are sensitive to the use of insect repellents.

4.5 Planning and Hazard Assessment

4.5.1 AECOM personnel shall confirm that the potential for exposure to specific biological hazards are assessed prior to the commencement of work and that the procedures specified by this procedure are integrated into the THA planning process and conveyed to employees conducting the field work. This information shall be communicated in the location-specific SH&E plan, the THA, pre-project kickoff meetings, and tailgate meetings at the location.

4.5.2 It is important to note that the precautions to be taken by employees to decrease the risk of exposure to biological hazards can directly increase the risk of heat-related illness due to thermal stresses. Therefore, heat stress monitoring and precautions shall be included as a critical component of the task-specific THA in accordance with *S3AM-511-PR1 Heat Stress.*

4.5.3 During the preparation of the location-specific SH&E plan and task specific THA, Managers, Supervisors, and employees shall determine what biological hazards might be encountered during the task or operations and shall prescribe the precautions to be taken to reduce the potential for exposure and the severity of resulting illnesses. Consideration will be given to conditions such as weather, proximity to breeding areas, host animals, and published information discussing the presence of the hazards.

4.5.4 It should be assumed that at least one of the biological hazards exists whenever working on undeveloped property. This can include insect activity any time that local temperatures exceed 40 degrees Fahrenheit (4.5 degrees Celsius) for a period of more than 24 hours. The stubble and roots of poisonous plants can be a hazard any time of year, including when some plants are dormant or mown.

4.5.5 The hazard assessments shall also consider the additional hazards posed by vegetative clearing such as the increased risk of coming in contact with poison ivy, oak or sumac and hazards associated with the use of tools and equipment to remove vegetation.

4.5.6 Employees in the field where biological hazards exist shall not enter the hazard areas unless they are wearing the appropriate protective clothing, repellents, and barrier creams specified below. If the hazard is recognized in the field but was not adequately assessed during the THA, the field staff shall stop work and not proceed until the THA has been amended and approved and protective measures implemented.

4.5.7 Employees who have severe allergic reactions are strongly recommended to notify their Manager, field Supervisor and co-workers of the potential for a reaction and demonstrate what medication they might need, where they keep it and how it is administered.

4.5.8 A decision flow chart and table for determining the potential for biological hazards in the Americas has been provided in *S3AM-313-ATT1 Biological Hazard Assessment Flow Chart.*

4.5.9 Restrictions:

- No firearms or weapons are allowed to be used without express permission by the Region Executive and Chief Resilience Officer, refer to the *RS2-001-PR1 Firearms Standard*.
- No weapons related work shall occur without an assessment that includes appropriate hazard control measures and training.

- Staff with life-threatening reactions shall not undertake work in areas infested with the allergen (e.g., wasps, poison ivy), unless precautions are met which satisfy a medical practitioner's requirements. Refer to *S3AM-008-PR1 Fitness for Duty*.

4.5.10 Precautions

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

4.6 Wildlife Hazards (Wild Animals, Reptiles and Birds)

4.6.1 Employees shall not work alone in areas where the risk of an encounter with dangerous wildlife is high. Wildlife handling shall only be completed under direct supervision of an experienced individual. Refer to the following work instructions for more specifics:

- *S3AM-313-ATT13 Alligators*
- *S3AM-313-ATT9 Large Carnivores & Ungulates*
- *S3AM-313-ATT10 Bear Safety*
- *S3AM-313-ATT11 Small Mammals*
- *S3AM-313-ATT12 Snakes & Scorpions*

4.7 Ticks, Spiders and other Insects

4.7.1 Insects for which precautionary measures should be taken include but are not limited to: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, fire ants and European fire ants.

4.7.2 Employees with known allergies to insect stings should consult their personal physician for advice on any immediate medications that they should carry with them. Epi-pens[1] shall be carried at all times in the field by employees who are aware that anaphylactic shock is a possibility for them AECOM highly recommends that employees with known allergies inform their co-workers of the allergy and the location of the medications they might carry for the allergy.

4.7.3 Habitat Avoidance, Elimination and/or Control

- The most effective method to manage worker safety and health is to eliminate, avoid and/or control hazards. Clearing the location of brush, high grass and foliage reduces the potential for exposure to biological hazards. Clearing will not eliminate the exposure to flying insects and there might be an increased exposure to ticks and spiders during the clearing process.
- Projects such as subsurface environmental assessment or remediation are often candidates for brush and overgrown grass to be cleared. In these instances, the Manager shall either request that the client eliminate vegetation, or request approval from the client to have vegetation clearing added to the scope of work.
    - o It should be noted that vegetation clearance may unintentionally serve to spread noxious and poisonous plant materials around the site.

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[1] Epi-pens must be prescribed by a personal physician. Renew epi-pens on a regular schedule to ensure effectiveness and make sure your field companions know where it is and how to use it if you cannot self-administer the dose.

- As applicable, measures should be taken to prevent spread, such as but not limited to, confirming equipment and materials are not placed on affected areas, and equipment is decontaminated after use and before removal from site.

- When work shall be conducted in areas that cannot or may not be cleared of foliage, personal precautions and protective measures shall be prescribed.
- Mosquitoes breed in stagnant water and typically only travel a quarter mile (less than half a kilometer) from their breeding site. Whenever possible, stagnant water should be drained to eliminate breeding areas. Managers and client site managers should be contacted to determine whether water can be drained and the most appropriate method for draining containers, containment areas, and other objects of standing water.
- If water cannot be drained, products similar to Mosquito Dunks® can be placed in the water to control mosquitoes. Once wet, the Mosquito Dunks® kill the immature, aquatic stage of the mosquito. The active ingredient is a beneficial organism that is lethal to mosquito larvae, but harmless to fish, humans, and other animals. Mosquito Dunks® provide long-term protection for 30 days or more.

4.7.4 Ticks

- Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will attach themselves. The most serious concern is a possibility of contracting a disease.
- Data from the CDC indicates that tick-borne diseases have become increasingly prevalent. At the same time, tick repellents have become both safe and effective so it is possible to prevent the vast majority of bites and, therefore, most related illnesses. The use of permethrin is strongly advised.
- The most common and severe tick-borne illnesses in the U.S. are Lyme disease, Ehrlichiosis, and Rocky Mountain spotted fever. A summary table listing CDC informational resources for these diseases is provided in *S3AM-313-ATT2 Ticks* along with a listing of CDC information resources and maps showing the distribution of common tick-borne diseases in the U.S.
- When working in areas where ticks may occur, it is recommended that clothes are turned inside out and shaken at the end of day; do not wear the same clothes two days in a row.
- Employees should conduct a thorough full body tick check upon exiting the field. Shower within two hours of coming indoors to help wash away loose ticks. Clothes should be laundered in hot water or tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks.
- To remove ticks that are embedded in skin, utilize a tick key. Alternatively use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Follow AECOM incident reporting guidelines to report the tick bite within 4 hours and notify the Manager or Supervisor.
- Familiarize yourself with the characteristic bulls-eye pattern of Lyme disease infection surrounding the bite. If you notice this type of pattern or rash resulting from a tick bite, immediately report the issue to your supervisor and follow the incident reporting requirements for your business group.
- If you experience symptoms such as fever, headache, fatigue, and a skin rash, you should immediately visit a medical practitioner as Lyme disease is treated easily with antibiotics in the early stages, but can spread to the heart, joints, and nervous system if left untreated.

4.7.5 Chiggers

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

4.7.6 Spiders

- Spiders can be found in derelict buildings, sheltered areas, basements, storage areas, well heads and even on open ground. Spiders can be found year round in sheltered areas and are often present in well heads and valve boxes.
- Most spider bites produce wounds with localized inflammation and swelling. The Black Widow and Brown Recluse spiders in the U.S. and others outside the U.S. inject a toxin that causes extensive tissue damage and intense pain.
- Additional information on spider identification can be found in attachment *S3AM-313-ATT3 Poisonous Spider Identification*.

4.7.7 Mosquitoes

- When a mosquito bites, it injects an enzyme that breaks down blood capillaries and acts as an anticoagulant. The enzymes induce an immune response in the host that results in itching and local inflammation. The tendency to scratch the bite sites can lead to secondary infections.
- CDC data indicates that mosquito-borne illnesses, including the strains of encephalitis, are a health risk. At least one of the Encephalitis strains listed below is known to exist in every area of the U.S. and in many other countries as well:
    - Eastern Equine encephalitis
    - Western Equine encephalitis
    - West Nile Virus
    - St. Louis encephalitis
    - La Crosse encephalitis
- Mosquitoes can transmit the West Nile Virus and other forms of encephalitis after becoming infected by feeding on the blood of birds which carry the virus.
- Most people infected with the virus experience no symptoms or they have flu-like symptoms. Sometimes though, the virus can cause severe illness, resulting in hospitalization and even death, so proper precautions should be taken. Consult a medical practitioner if you suspect you have West Nile Virus. Other diseases including Dengue Fever and Malaria are spread by mosquitoes in the sub-tropic and tropical parts of the world. See *S3AM-313-ATT4 Mosquito Borne Diseases* for information on the locations where mosquito borne diseases are known to be present.

4.7.8 Bees, Wasps and Hornets

- Wasps and bees will cause a painful sting to anyone if they are harassed. They are of most concern for individuals with allergic reactions who can go into anaphylactic shock. Also, instances where an individual is exposed to multiple stings can cause a serious health concern for anyone. These insects are most likely to sting when their hive or nest is threatened.
- Bees, hornets, and wasps may be found in derelict buildings, sheltered areas, behind covers or lids and even on open ground. Other protective measures are not normally effective against aggressive, flying insects. Be aware of the potential areas for these types of insects, approach these locations cautiously. Avoid reaching into areas where visibility is limited.
- If you see a nest in the area you are working in stop work. Contact the Manager or Site Supervisor for procedures to have the nest removed.

- If stung by a wasp, bee or hornet, notify a co-worker or someone who can help should you have an allergic reaction. Stay calm and treat the area with ice or cold water. Follow AECOM incident reporting guidelines to report the sting within 4 hours and notify the Manager or Supervisor immediately. Seek medical attention if you have any reactions to the sting such as developing a rash, excessive swelling or pain at the site of the bite or sting, or any swelling or numbness beyond the site of the bite or sting.

4.7.9 Fire Ants

- The fire ant (southern and western U.S.) and the European fire ant (northeastern U.S. and eastern Canada) is often very abundant where it is established. It is very aggressive and commonly climbs up clothing and stings unprovoked when it comes into contact with skin. Painful irritations will persist for an hour or more.

4.7.10 Personal Protective Equipment (PPE)

- Chemically-treated field clothing, full-length clothing, or Tyvek® coveralls.
- Gloves shall also be worn consistent with the recommendations of the site-specific SWP and/or THA to minimize hand exposure.
- Where ticks, chiggers, and spiders are presumed to exist, the Tyvek® or chemically treated clothing will be taped to the work boots.
- See *S3AM-313-ATT2 Ticks* for configuration of clothing for protection against ticks and insects.
- Application of insect repellent to clothing and/or exposed skin. Oil of lemon eucalyptus, DEET, and Permethrin have been recommended by the CDC for effective protection against mosquitoes that may carry the West Nile virus and related diseases.
- Note that DEET will reduce the effectiveness of Fire Resistance Clothing (FRC) and should not be applied to this clothing. If working in FRC, employees can use Permethrin as it has been shown not to reduce the effectiveness of FRC. Permethrin will need to be applied to FRC well in advance of the planned work. If permethrin is unavailable employees can apply DEET to their skin and let dry prior to putting FRC on.
    - Oil of Lemon Eucalyptus is a plant-based insect repellent on the market as Repel Lemon Eucalyptus. The products have been proven to be effective against mosquitoes, deer ticks, and no-see-ums for up to six hours. Derived from Oil of Lemon Eucalyptus, this non-greasy lotion or spray has a pleasant scent and is not known to be toxic to humans. The spray or lotions will be effective for approximately two to six hours and should be reapplied every two hours to sustain protection. Lemon Eucalyptus products cannot be applied to fire retardant clothing.
    - Permethrin is an insecticide with repellent properties registered with the Environmental Protection Agency and recommended by the CDC.
        - Permethrin is highly effective in preventing tick bites when applied to clothing, but is not effective when applied directly to the skin. Two options are available for Permethrin treatment of clothing worn during field work: 1) pre-treatment of fabric by the clothing manufacturer; or 2) manual treatment of their personal clothing using Permethrin spray in accordance with recommendations manufacturers recommendations. This will likely require treatment at home or the office prior to field mobilization. Caution should be used when applying Permethrin as it is highly toxic to fish and house cats. AECOM strongly recommends the first option (employees obtaining pre-treated clothing) to avoid the time required, potential risk, and housekeeping issues involved with manually treating the clothing with spray. Purchase pre-treated clothing in accordance with *S3AM-208-PR1 Personal Protective Equipment* and with the approval of your Supervisor or Manager.
        - The Permethrin pre-treatment is odorless and retains its effectiveness for approximately 25 washings. After 25 washings, the pre-treated clothing will be

considered no longer effective and removed from service. Clothing that has been manually treated by employees will be considered effective for five wash cycles.

- Also, use of clothing that has been pre-treated with Permethrin offers a reduction in the use and application of other insect repellents that shall be applied directly to the skin. Supervisor or Manager approval is required prior to purchase.
- If the employee opts not to utilize chemically pre-treated clothing while potentially exposed to insects, spiders and/or ticks, they shall either: 1) wear Tyvek® coveralls taped to the boots, or 2) wear full-length clothing consisting of long-legged pants and long-sleeved shirts treated with an insect repellent containing Permethrin, DEET, or an oil of lemon eucalyptus to their work clothing.

- Safety Data Sheets (SDS) for the repellents, lotions, and cleansers discussed in this Procedure are not required because the repellents, lotion, and clothing are consumer products used in the manner intended for the general public. Although not required, a SDS should be obtained for the products used and placed into the office SDS library and site-specific safety plan.

4.8 Poisonous Plants

4.8.1 Habitat Avoidance, Elimination and/or Control

- If poisonous plants are identified in the work area, employees will mark the plants using either flags or marking paint, and discuss what the specific indicator will be to signal to other employees to avoid the designated area. If employees decide to use ground-marking paint to identify poisonous plants, they should discuss this tactic with the Manager (and Client as appropriate) for approval.
- If removal of the plants is considered, it should be subcontracted to a professional landscaping service that is capable and experienced in removing the plant. If herbicides are considered for use, a discussion shall need to occur with the Manager (and Client as appropriate) to determine whether it is acceptable to apply herbicides at the work site. Application of herbicides may require a license.
- Employees shall not attempt to physically remove poisonous plants from the work area unless a clearing procedure, including PPE, is prepared in advance and approved by the SH&E Manager. The clearing procedure should be included in the SH&E Plan and THA and the required PPE specified.

4.8.2 Poisonous plants that employees should recognize and take precautions to avoid include: poison sumac, poison ivy (terrestrial and climbing), poison oak, giant hogweed[2] (or giant cow parsnip), wild parsnip, devil's club and stinging nettle. Many others are extremely poisonous to eat (e.g., poison hemlock; water parsnip) – do not eat anything that has not been identified. Refer to *S3AM-313-ATT5 Plants of Concern* for information on locations where some of these poisonous plants are found in the U.S.

- Of the toxic plants in the cashew family, poison ivy (*Rhus radicans*) is most widespread. It grows in a variety of forms such as a low sprawling shrub, dense ground cover, or a thick woody vine that grows high into the tree canopy. Poison oak (*Rhus diversiloba*) is typically a low shrub in drier soils. Both of these plants have leaves of three and white berries. Poison sumac (*Rhus vernix*) is a tall shrub that is less prolific in distribution. It grows in wet areas, has a compound leaf with a red leaf stem (rachis), and white berries. All of these plants possess urushiol oils in all parts of the plant. Touching the plant causes an itchy skin rash that can show up within 4-72 hours following contact. People have a wide range of reactions including swelling, itching, rash and bumps, patches or blisters.
- Uroshiol oil can also transfer onto clothing and equipment. The oil can remain active on surfaces for up to 5 years and can be transferred to your skin.

[2] Phytodermatisi producer: keep skin covered and wash well after exposure

- Wild parsnip is found throughout the U.S. and contains a poison that produces a rash similar to poison oak and ivy. Unlike poison oak and ivy, the active oil will not be present on unbroken leaves. See *S3AM-313-ATT6 Wild Parsnip Identification* for additional information and photos of wild parsnip.
- Several plants in the carrot family contain toxic sap that causes severe dermatitis if it comes into contact with skin that is then exposed to sunlight. The most serious reaction is caused by the giant hogweed (*Heracleum mantegazzianum*), a plant that is spreading in southern Ontario and is also present in southwestern British Columbia. The plant is enormous, attaining up to 16 feet (5 meters) in height, which it does in one growing season. Contact causes painful blistering that can cause permanent disfigurement. It is to be avoided. Similar but less serious reactions can be caused by meadow parsnip (*Pastinaca sativa*) and cow parsnip (*Heracleum lanatum*). Meadow parsnip can be very abundant on disturbed sites.
- Nettles, particularly stinging nettle (*Urtica dioica*) and wood nettle (*Laportea canadensis*) contain urticating hairs on the leaves and stems that cause sharp pain or itchiness on contact with skin. The irritation is immediate and normally lasts no more than an hour and there are no lasting consequences.
- Some plants contain abundant stiff spines that can present a safety hazard, particularly if one is to fall into them. These include the cactus (*Opuntia spp.*), devils club (*Oplopanax horridum*), and prickly-ash (*Zanthoxylon americanum*).

4.8.3 A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying to not eat any berries or plants if you are unsure of their identity.

- Remember that in the fall and winter the hazard still exists in the form of stubble and roots.

4.8.4 Personal Protective Equipment (PPE)

- Employees conducting clearing, grubbing, or similarly disturbing work activities in areas where poisonous plants exist shall wear long-sleeve clothing or Tyvek® coveralls, and disposable cotton, leather or synthetic gloves. Employees shall not touch exposed skin (neck and face) with potentially contaminated gloves. Tyvek® and gloves worn to protect from exposure to poisonous plants shall be treated as contaminated, removed from the body in a manner that the contamination is not spread, and placed in plastic bags for disposal.
- Personal clothing that has been exposed to poisonous plants shall be decontaminated with a poisonous plant cleanser such as Tecnu® or removed in a careful manner, bagged and washed separately from other clothing to remove urushiol.
- Work boots will be decontaminated with either soap and water or a cleansing agent such as Tecnu® cleanser.
- If foliage is being cleared and includes poisonous plants, exposed skin shall be treated with a dermal barrier cream such as Tecnu®'s Oak 'n Ivy Armor or Enviroderm's Ivy Block and either a full-face respirator or a half-face respirator (with goggles) fitted with a P-100 (HEPA) dust filter.

4.9 Bird Droppings and Biological Soil Hazards

4.9.1 Work in any area where pigeons or other flying animals (e.g. bats) may nest requires a written statement from the client which states the potential for, and extent of, accumulation of excrement on/in the structure from pigeons or other winged animals.

4.9.2 Substantial accumulations of droppings can pose physical and health risks as slippery surfaces (if wet) and if the material is disturbed and becomes airborne, it can be inhaled or ingested if personal hygiene practices are not implemented. Inhalation of airborne droppings can cause diseases such as histoplasmosis. Exposure to surfaces with bird droppings shall be safeguarded by implementing proper work practices, training employees for awareness and using PPE. See *S3AM-313-ATT8 Bird Droppings*.

4.9.3 Tularemia is a problem with contaminated soil in some locations. Tularemia is a disease of animals and humans caused by the bacterium *Francisella tularensis*. Rabbits, hares, and rodents are especially susceptible and often die in large numbers during outbreaks. Workers can contract Tularemia through tick and deer fly bites, but also through inhalation of contaminated aerosols or agricultural dusts. Check work areas for carcasses before disturbing the ground (e.g. mowing, brushing, grubbing, excavation, etc.).

4.10 Personal Hygiene and Body Checks

4.10.1 Tick-borne diseases typically require that the tick be imbedded for four hours to begin disease transfer. The oils from poisonous plants can take up to 4 hours after exposure to penetrate the skin and react with the live proteins under the skin.

4.10.2 It is recommended that exposed skin be checked frequently for the presence of ticks, insects, rashes, or discolorations. External clothing should also be checked for the presence of ticks and insects; these should be retained for identification and to determine if medical treatment is needed.

4.10.3 Employees shall shower as soon as practical after working in the field and examine their bodies for the presence of ticks, insect bites, rashes, or swollen areas. If imbedded ticks are found, they should be removed using the technique described in *S3AM-313-ATT2 Ticks*.

4.11 Employees shall immediately notify their Manager or Supervisor of the presence of an imbedded tick, bee, wasp or hornet sting, other insect bite, rash, or any abnormal reaction. Reporting shall occur within 4 hours for a significant incident and 24 hours for all other SH&E incidents, and in accordance with *S3AM-004-PR Incident Reporting, Notifications & Investigation*.

4.12 The Manager or Supervisor shall forward the report to the SH&E Manager for follow up.

5.0 Records

None

6.0 Attachments

6.1 S3AM-313-ATT1 Biological Hazard Assessment Flow Chart

6.2 S3AM-313-ATT2 Ticks

6.3 S3AM-313-ATT3 Poisonous Spider Identification

6.4 S3AM-313-ATT4 Mosquito Borne Diseases

6.5 S3AM-313-ATT5 Plants of Concern

6.6 S3AM-313-ATT6 Wild Parsnip Identification

6.7 S3AM-313-ATT7 Alligators

6.8 S3AM-313-ATT8 Bird Droppings

6.9 S3AM-313-ATT9 Large Carnivores & Ungulates

6.10 S3AM-313-ATT10 Bear Safety

6.11 S3AM-313-ATT11 Small Mammals

6.12 S3AM-313-ATT12 Snakes & Scorpions

Americas

Working Alone

S3AM-314-PR1

1.0 Purpose and Scope

1.1 This procedure establishes the requirements for communication and accountability between personnel at a work site to reduce the potential for incidents occurring to one employee without help readily available and to facilitate the rapid mustering of assistance to employees in the event of an emergency.

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

2.0 Terms and Definitions

2.1 **Buddy System** – A system of organizing employees at a work site in such a manner that each employee is accompanied by or in communication with at least one other employee or is escorted by a client or contractor representative during work site activities.

2.2 **Controlled Work Areas** – One or more designated work areas on a field project site where hazardous activities and/or strictly defined operations take place. Such controlled work areas include, but are not limited to, remediation or construction sites; a restricted radius where a critical lift operation will take place could be declared a controlled work area. On a HAZWOPER site, the controlled work area is divided into the exclusion zone, the contaminated reduction zone, and the support zone.

2.3 **Working Alone** – Performing work with no line of sight or direct voice communication with another person who is aware of your assignment and capable of initiating emergency response.

3.0 References

3.1 S3AM-005-PR1 Driving

3.2 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager or Supervisor**

- Establish if employee is permitted to work alone, through evaluation of employee's experience, training and any personal limitations (e.g. life-threatening allergic reactions).
- Provide the resources, communication devices, emergency response plans, and check-in procedures as listed in the Task Hazard Assessment (THA) or SH&E plan, etc. necessary so that employees are not working alone or have a buddy system in place.
- Act as point of contact if employees miss their check-in.

4.1.2 **Employees**

- Complete training as required to prepare for working alone.
- Confirm emergency contacts are provided to the Manager or supervisor in case of an emergency.
- Establish a buddy system and check in procedure in accordance with the THA or SH&E Plan provided by the Manager and Supervisor.

4.1.3 **SH&E Managers**

- Review and approve relevant planning documents entailing employees working alone and on remote travel.

4.2 General

4.2.1 All projects/programs shall conduct a review of all tasks performed by AECOM to establish specific work alone procedural requirements as defined here. They shall have at minimum a THA and SH&E Plan that has been reviewed by the SH&E Manager.

4.2.2 Employees are discouraged from working alone on any site due to the risk of delayed assistance in the event of an incident. If they will be out of contact with other employees, they shall establish a buddy system or check-in procedure with another employee or responsible person.

4.2.3 Employees working alone or in small crews in remote isolation shall have an effective means of communication including cell/radio/satellite phone as well as established check-in times.

4.2.4 When traveling alone, staff shall take appropriate precautions, including notifying someone of their travel plans as well as carrying a communication device and safety equipment, as appropriate. See *S3AM-005-FM1 Journey Management Plan*.

4.3 No employee shall work by themselves or without a buddy system established if they are conducting a hazardous job task.

4.3.1 The following tasks are considered hazardous:

- Working at heights.
- Working in a confined space.
- Working in a trench.
- Lock out/tag out tasks.
- Work on energized equipment.
- Working with electricity.
- Working with hazardous substances or materials.
- Working with material under pressure.
- Working where there is a possible threat of violence, including civil unrest.
- Working in avalanche areas.
- Working on water or ice.
- Working in remote or wilderness isolation.
- Working in a controlled area.
- Extreme heat or cold stress environments.
- Working with power tools/equipment.
- Working with/operating heavy equipment or machinery.
- Working in isolation from first aid services or immediate/emergency assistance.
- Working around mobile equipment.
- Highway and road work.

4.3.2 The following tasks (identified as hazardous) may permit working alone provided it can be demonstrated there is no substantial increased risk associated with working alone:

- Working with power tools/equipment (e.g. power drill versus chainsaw).

- Working with material under pressure (e.g. small air compressor versus compressed gasses).

4.4 Office Work

4.4.1 The supervisor shall have in place and shall communicate as part of location specific orientation, its procedures for the safety and security of an employee working alone in the office. Contact numbers to be used in case of emergency are posted at all common gathering areas or major exits.

4.4.2 Employees working in the office after regular working hours or in situations where they are working alone shall keep the entrance to the office locked.

4.4.3 If the building is monitored by a security service, employees working in the office after regular working hours or working alone shall notify the security guard of their presence and anticipated hours. If the building does not have a security service, the employee working alone shall notify their supervisor or a family member or friend if agreed to by their supervisor.

4.4.4 During all working hours, employees shall stay alert to unauthorized entries into the building and to other suspicious activities and shall report them to security or their supervisor immediately.

4.5 Field Work

4.5.1 Prior to work commencing, a THA shall be prepared for all assignments on which employees are to work alone (in accordance with *S3AM-209-PR1 Risk Assessment & Management*). The THA shall consider travel time, weather, available communications, and the impact of working alone when establishing risk ratings of the hazards associated with the task and work environment.

4.5.2 The THA should also consider whether the employee assigned to work alone has sufficient training and qualifications in the tasks to be performed to allow the employee to work safely alone. The employee's personal medical conditions may be considered if the employee has voluntarily made the medical condition known to the Manager or Supervisor.

4.5.3 The THA should identify the controls required for the safety of employees as applicable to the job task and location. Some controls associated with working alone or in remote isolation include a buddy system, standardized check-in times, what to do if a check-in is missed (e.g. worker in proximity attends site, utilizing secondary communication method, etc.), specialized communication devices, and enhanced emergency supply kits.

4.5.4 The THA is completed in addition to the SH&E plan which details the work activities and the procedures to manage the hazards and in accordance with *S3AM-209-PR1 Risk Assessment & Management*.

4.6 Buddy System

4.6.1 When conducting non-hazardous work, employees shall work with a buddy (another responsible individual) or follow check –in procedures listed in the THA or SH&E Plan.

4.6.2 When conducting hazardous work, employees shall work with a buddy (another responsible individual) at all times.

4.6.3 Once assigned as buddies, personnel shall remain in contact.

4.6.4 When electronic communication devices are used, prior to starting work, a protocol shall be established and agreed to by each buddy to confirm that periodic effective and faultless communications are maintained

4.6.5 When unanticipated conditions develop that do not permit line of sight and direct voice contact, and alternate communication was not established in the THA, Stop Work and notify the Supervisor. If permission from the Supervisor is obtained to continue the work, voice contact shall be achieved using reliable electronic communication devices such as, but not limited to, hand-held radio or cell phone. The THA shall be updated to reflect this change.

4.6.6 If crews will separate once they reach their work site, they shall then be considered to be "working alone". The buddy system or check-in procedures shall be established, as determined by the work being hazardous or non-hazardous and as identified in the THA.

4.6.7 Client or contractor personnel may be substituted for an AECOM employee's buddy only if they are designated by the client or contractor and the AECOM manager or supervisor, and are properly trained to the tasks and the site's emergency response procedures.

4.6.8 A missed communication event shall initiate the applicable missed check-in actions established in the THA (e.g. worker in proximity attends site, utilizing secondary communication method, etc.) and may trigger emergency response procedures. The results of each communication event shall be documented in the program or project files.

4.7 Check-In Procedures

4.7.1 All field crews shall establish check-in procedures as part of the THA or SH&E Plan prior to leaving the office. These procedures shall be reviewed daily as part of the Task Hazard Assessment review or more frequently if there is a change in work arrangements that could adversely affect a worker's well-being or a report that the system is not working effectively. These procedures shall be confirmed with the assigned Check-In Person daily.

4.7.2 The timing and frequency of those check-in procedures schedule shall be established prior to the initiation of field operations and shall vary depending on the task and location of the work.

4.7.3 If communication is lost between buddies or a check-in time is missed, it shall be assumed that an emergency situation exists, and the site's emergency response procedures shall be implemented. Site work shall cease until the emergency is resolved and the Supervisor directs personnel to restart work.

4.7.4 If crews will separate once they reach their field site, they will then be considered to be "working alone" and will establish a buddy system with the other members of the crew.

4.7.5 Employees working alone or in small crews in remote isolation will have an effective means of communication system including cell/radio/satellite phone as well as established check-in times.

4.7.6 The Check-In Procedure will be reviewed daily as part of the THA review or more frequently if there is a change in work arrangements that could adversely affect a worker's well-being or a report that the system is not working effectively.

4.8 Emergency Response Procedures

4.8.1 All field employees and the Check-In Person shall be provided with the location specific Emergency Response Plan (may be included in the THA or SH&E plan, or exist as a separate document).

4.8.2 The Check-In Person shall have access to a route map or understands their anticipated route of travel.

4.8.3 The established contact person shall follow the procedures below, with specifics established in the SWP Plan or THA, if a field employee has missed a check-in:

- First, they shall attempt to make contact with the field employee directly.
- If that fails to provide a response, they shall contact other persons who may have been on site, including client supervisors, or other locations where the field employee might be (e.g., hotel, home, office).
- If the field employee still cannot be located, the emergency contact person notifies the manager or supervisor responsible for the employee.
- Depending on the location and situation, they shall then dispatch another employee, another supervisor, or an appropriate emergency response agency (e.g., police) to travel to the last known location of the field employee.
- If the dispatched responder arrives at the site but cannot locate the field employee, the appropriate public emergency contacts (e.g., police, search and rescue) shall be made and the employee's personal contacts shall be notified by Human Resources.

- If the dispatched responder finds the crew in an emergency situation (medical, environmental, structural, etc.), the appropriate steps shall be taken to isolate the hazard, administer first aid, and contact emergency support services.

4.9 Training

4.9.1 All employees shall receive an initial orientation that includes the hazards and controls associated with working alone.

4.9.2 If working in wilderness, all field employees will be able to orienteer using a map and compass—if not, the basic skills of orienteering will be provided by an experienced employee before work commences. Refer to the *S3AM-314-ATT1 Wilderness Isolation* instruction for more specifics.

4.9.3 Employees working alone should be trained in First Aid. Consideration should be given to Wilderness First Aid training based on the anticipated work environment.

4.9.4 Employees regularly working in remote, isolated wilderness locations will either participate in a wilderness survival course from a qualified provider (one or two day) or will obtain management approval based on their level of experience/competence in wilderness situations.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-314-ATT1 Wilderness Isolation

Americas

Driving

S3AM-005-PR1

1.0 Purpose and Scope

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

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

2.0 Terms and Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.0 References

3.1 AECOM Global Travel Policy

3.2 RS2-001-PR Firearms Standard

3.3 S3AM-003-PR1 SH&E Training

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

3.5 S3AM-009-PR1 Fatigue Management

3.6 S3AM-010-PR1 Emergency Response Planning

3.7 S3AM-209-PR1 Risk Assessment & Management

3.8 S3AM-314-PR1 Working Alone

3.9 S3AM-319-PR1 All-Terrain Vehicles

3.10 S3AM-320-PR1 Commercial Motor Vehicles

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

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

4.1.2 **Employee**

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

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

4.1.3 **SH&E Manager**

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

4.2 General Procedures and Practices

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4.3 Distracted Driving

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

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

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

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

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

4.4 Impairment

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

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

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

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

4.5 Journey Management

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

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

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

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

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

4.6 Driver Safety Training

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

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

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

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

4.6.3 Vehicle / Driver Safety Training

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

4.6.4 Defensive Driver (online) Training

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

4.6.5 Defensive Driver (hands-on) Training

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

4.6.6 Driver Retraining

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

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

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

4.6.7 Special Vehicles and Driving Conditions

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

4.7 Personal Vehicles (additional requirements)

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

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

4.8 Rental Vehicles (additional requirements)

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

4.9 Requirements for Authorized Drivers

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

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

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

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

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

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

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

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

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

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

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

4.9.12 Secure the vehicle when left unattended.

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

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

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

4.10 Emergency Preparedness

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

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

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

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

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

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

4.11 Vehicle Incidents

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

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

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

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

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

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

4.12 Drug and Alcohol Testing

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

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

4.13 Driving Privileges, Citations and Violations

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

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

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

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

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

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

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

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

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

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

4.13.7 Disciplinary action may include the following:

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

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

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

5.0 Records

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

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

6.0 Attachments

6.1 S3AM-005-ATT1 Authorized Driver Safety

6.2 S3AM-005-FM1 Journey Management Plan

6.3 S3AM-005-FM2 Vehicle Inspection Checklist

Americas

SH&E Training

S3AM-003-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas-based employees and operations and any other entity and its personnel contractually required to comply with this document's content. These are the minimum safety, health and environment (SH&E)-related training requirements and tracking procedures. Additional training requirements may exist related to a specific task. Specific geographic entities, business units, and projects may have additional training requirements.

1.2 This procedure was developed to assist employees and managers in the identification of training requirements and to define the AECOM procedures for tracking and documenting SH&E training. The goals of this procedure are to ensure regulatory compliance and to provide employees with the information and training they need to accomplish their work assignments safely; prevent injuries to themselves, coworkers, surrounding communities, and customers; and protect company and/or customer property and the environment.

1.3 Major objectives of this procedure include:

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

2.0 Terms and Definitions

2.1 **Compliance Training –** Training meant to provide a safe and healthy workplace for AECOM employees and others through adherence to legislative and regulatory mandates (e.g., Federal, State, Provincial, Territorial, local/municipal governments and agencies thereof).

2.2 **Conformance Training –** Training developed by AECOM intended to further develop the AECOM SH&E culture, as specified in AECOM SH&E policy and procedure, or client requirements.

2.3 **Learning Management System (LMS) –** An electronic training delivery and data management system utilized for implementation of the SH&E training program.

3.0 References

3.1 S3AM-015-PR1 Newly Hired or Transferred Employees

3.2 S3AM-202-PR1 Competent Person Designation

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Executives**

- Establish adequate resources (budget, staffing, etc.) to implement this procedure.
- Assignment/support of Learning Management System administration duties.

4.1.2 **Supervisors/Managers**

- Confirm new employees complete the AECOM Safety Orientation.

- Assist employees in identifying training requirements.
- Confirm supplemental employee training courses are identified based on local/client requirements.
- Confirm additional employee SH&E training requirements are identified based upon prudent risk management considerations and local performance issues.
- Confirm employee's training requirements are re-evaluated whenever an employee's assigned duties change significantly.
- Provide time and resources to allow employee to complete required training.
- Verify corrective actions are implemented when employees fail to meet training requirements.
- Confirm that the appropriate level of training is being assigned to the employee with regard to their specific job and task assignments and client needs.
- Confirm employees have current and applicable training to the employee's assigned tasks associated with the program or project.
- Confirm their own supervisory or management training is complete and current as applicable to the scope of work and type or oversight (e.g., AECOM employees, subcontractors, etc.).

4.1.3 **Vice President SH&E**

- Establish and maintain this procedure.
- Provide the necessary tools, support, and staff for on-going development and support of the training program.
- Report/communicate training status to senior management.

4.1.4 **SH&E Managers**

- Confirm management understands the function of the LMS and provide training, access and resources.
- Work with management to develop schedules, develop skills of employees assigned with training and recordkeeping duties, and provide training classes as requested.
- Confirm qualifications of safety training providers are reviewed and approved.
- Confirm training lesson plans and course agendas for training courses are reviewed and approved to verify the course content meets compliance/conformance requirements.
- Offer training participants the opportunity to evaluate training events.
- Report compliance with training program requirements to line management.
- Develop a training calendar.

4.1.5 **Employees**

- Complete the AECOM Safety Orientation.
- Coordinate with their supervisor to complete required training within any specified timeframes.
- Monitor their training expiration dates and coordinate refresher training to prevent expiration of any required training certification.
- Maintain a personal record of all training certifications.
- Supply copies of training completion certificates for inclusion in the LMS, as requested.
- Provide feedback on training through the evaluation process.

4.2 Identifying Required Training

4.2.1 All new employees shall complete the AECOM Safety Orientation.

- The AECOM Safety Orientation communicates the responsibility of each employee for a safe working environment and establishes AECOM's commitment to safety.
- The orientation communicates AECOM's Safety, Health and Environment (SH&E) Policy and the fundamental principles of the SH&E Management System; Safety for Life and the Life

Preserving Principles. Employees are informed of various aspects of the program, including but not limited to:

- Monitoring and evaluation of the program by leadership on an ongoing basis.
- Availability of AECOM policies and procedures and reference to the AECOM intranet site.
- The importance and requirement of pre-planning, including hazard assessment basics.
- Responsibility to report unsafe actions and conditions and the authority to stop unsafe work.
- The availability and importance of task specific training, refresher training, and related initiatives.
- Basic requirements and importance of incident reporting, notifications and investigation.
- Substance abuse prevention program, fit for duty requirements and the availability of medical support.

- Employees shall also complete any applicable site specific field or office orientations.
  - Employees shall be oriented to the layout of the site and instructed on the recognition of unsafe conditions.
  - Employees shall be informed of the site specific field or office hazards, any applicable control measures and any site specific field or office requirements and restrictions (e.g. rules, required PPE, etc.) through the review of the applicable field or office SH&E Plan.
  - Site specific orientations shall include the location specific Emergency Response Plan, including any required actions and responsibilities.
  - As applicable, the site specific orientation may address any Short Service Employee requirements. Refer to *S3AM-015-PR1 Newly Hired or Transferred Employees*.
  - As applicable, any regulatory or client specific requirements and restrictions.

4.2.2 Employee training requirements are dictated by the work each employee performs (or is expected to perform) and the geographic area(s) where the employee performs these activities. Employees include all AECOM personnel (e.g. office/field personnel, supervisors, managers, etc.).

- The attached *SH&E Training Matrix (S3AM-003-FM1)* is a matrix of the most common courses that may be required, the frequency, and expected participants. The Attachment contains four tables. Table 1 is applicable to all Business Groups of AECOM. Table 2-4 are Business Group-specific requirements. Table 1 and the applicable Business Group-specific table should be used to evaluate an employee's training requirements.
- Additional tools such as a Training Assessment may be developed at the business group level if desired to further define training requirements.

4.2.3 Training requirements shall be evaluated upon hire. Employees shall not undertake a task for which they have not been adequately trained. SH&E training needs shall also be re-evaluated periodically and may also be identified through individual risk assessments, incident investigations, observed non-compliance, when procedures change, or through the annual staff appraisals process, and whenever an employee's assigned duties change significantly.

4.3 Training Competency Levels

4.3.1 Information Dissemination

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

4.3.2 Awareness Level

- Awareness-level training is applicable to training where the primary goal is to transfer knowledge from the organization to participants.
- Training will typically take the form of instructor-led discussions, presentation of related video content, and/or self-directed e-learning modules.
- In most cases comprehension assessment will be performed through discussion of the training topic with the participants and/or a simple quiz. When quizzes are provided employees will successfully complete at least 80% of the questions.

4.3.3 Performance Level

- Performance-level training will build upon the Awareness level. The goal of Performance Training is to have an employee successfully demonstrate that they can apply the knowledge discussed during training and perform the desired skills necessary to perform their job.
- Training materials are provided and discussed, and will incorporate a demonstration of the skills to be completed.
- The instructor will gauge the level of understanding through interactive discussion with participants and a pass/fail designation of demonstrated skills by the employee. A test or quiz of moderate difficulty will be provided, with participants scoring 80% or better, followed by the successful demonstration of the desired skill to receive certification.

4.3.4 Competent Person Level

- Competent Person-level certifications may be applicable to, and dictated by, specific regulatory standards. Refer to *S3AM-202-PR1 Competent Person Designation* for additional guidance.
- When Competent Person-level certifications are offered, comprehension assessments will build upon Performance-level certification.
- Competent Person certifications will incorporate classroom training along with on-the-job mentoring provided by employees previously certified to the Competent Person-level in the area of competency being sought. Candidates for Competent Person certification will be required to score 80% or better on administered written exams.
- Additionally, candidates shall be capable of repeatedly demonstrating the desired skills and regulatory knowledge, both in a classroom setting as well as in an actual work setting to the Instructor, Manager for the program or project the employee is seeking to gain and apply the certification to, and/or the mentoring Competent Person.
- Competent Person(s) will be designated on a program/project-by-program/project basis, in accordance with *S3AM-202-PR1 Competent Person Designation.* Forms to document certification and designation of a Competent Person are provided with the procedure and a record of the designation will be maintained within the project files and LMS.

4.4 Training Delivery

4.4.1 Internal Training

- Internal training is performed by AECOM's internal resources and may include intranet and classroom-based training.
- To ensure consistency in content and duration and in meeting regulatory and company requirements, AECOM training materials should be used as the basis for training whenever they are available. Trainers may always elect to supplement the base training materials for these courses with specifics for the program, project, customer, office, or geographic unit.
- AECOM instructors shall have the experience, education and competency and any required current licensing, registrations and/or certifications relevant to the course taught. Training format and material shall be appropriate to the topic and audience. Refer to *S3AM-003-FM4 SH&E Training Syllabus Template.*

- Course content of training provided on an annual basis will be updated as appropriate, or multiple versions of training may be developed for rotating use, to provide participants with new learning materials and avoid stagnation.
- Course content shall be periodically reviewed, with no greater than five years between reviews.

4.4.2 External Training

- External vendors conduct training that is not available through internal training sources. This training may be classroom or on-line training. External vendors should be pre-approved by the SH&E Department prior to any employee attending a training class.

4.5 Training Evaluation

4.5.1 At the conclusion of a training event, participants will be provided with the opportunity to anonymously evaluate the training session with through the use of *S3AM-003-FM3 Course & Instructor Evaluation* or an online survey.

4.5.2 Training instructors will review evaluations at the conclusion of training and request assistance addressing consistently noted issues if appropriate.

4.6 Training Expiration

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

5.0 Records

5.1 Courses denoted in *S3AM-003-FM1 SH&E Training Matrix* or commonly required training shall be tracked in the AECOM LMS when completed. Employee training tracked in the AECOM LMS shall be retained for the duration of the employee's employment.

5.2 Classroom training shall be documented using an attendance record and course agenda. Attachment *S3AM-003-FM2 SH&E Training Sign-In Sheet* may be used to document attendance. Attachment *S3AM-003-FM5 SH&E Training Certificate Template* may be used to document course completion. Course completion may also be documented by LMS-generated certificates when allowed by regulation.

5.3 For training provided by customers/vendors, training documentation shall be entered into a training database or LMS and documentation shall be maintained by the employee. Copies of certificates or other evidence of required project training may be included in program or project training files.

5.4 In some cases, objective evidence of comprehension is required (passing a test) and this information may be tracked in addition to the course information.

5.5 Attendance sheets, agendas, course evaluations, completed tests, and copies of certificates will be maintained. These should be filed in program or project training files by course then by date for easy access/auditing.

5.6 Locations/projects/programs will maintain records on any project, program, or location- or site-specific training requirements.

6.0 Attachments

6.1 S3AM-003-FM1 SH&E Training Matrix

6.2 S3AM-003-FM2 SH&E Training Sign-In Sheet

6.3 S3AM-003-FM3 Course and Instructor Evaluation

6.4 S3AM-003-FM4 SH&E Training Syllabus Template

6.5 S3AM-003-FM5 SH&E Training Certificate Template

6.6 S3AM-003-FM6 New Employee SH&E Orientation

Americas

Fitness for Duty

S3AM-008-PR1

1.0 Purpose and Scope

1.1 AECOM is committed to providing a safe workplace for its employees, clients and others. In order to provide a safe work environment, employees must be fit for work, be able to perform their job duties in a safe, secure, productive, and effective manner, and remain able to do so throughout the entire time they are working.

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

1.3 Fit for duty means an individual is in a state (physical, mental, and emotional) that enables them to perform assignments competently and in a manner that does not threaten the health and safety of themselves or others.

1.4 Fitness for duty expectations can vary with specific job tasks, location and regulatory requirements. Fitness for duty may be affected by significant fatigue, stress, emotional issues, illness, injury, or the effects of drugs and alcohol. Employees who are not fit for duty may present a safety hazard to themselves, to other employees, to the Company, or to the public.

1.5 The decision to request a fitness for duty examination (and repeat examinations as necessary) can be made by Operations, Safety, Health and Environment (SH&E) and Human Resources (HR). The decision will be based on the need to protect the employee and co-workers when there is concern about an employee's ability to perform his or her job safely, based on the observations of a supervisor, manager, or medical personnel.

1.6 Should AECOM require a fitness for duty examination, it shall be performed at no expense to the employee and will be performed by an occupational specialist, physician or other medical specialist designated by the Company or Employee Assistance Program (EAP). Employees awaiting a fitness for duty examination may be temporarily relieved of any work duties or may have their work duties modified.

1.7 The purpose of this policy is to establish consistent procedures by which AECOM will evaluate an employee's fitness for duty when an employee is:

1.7.1 Having observable difficulty performing work duties in a manner that is safe for the employee, for the employee's co-workers, for the Company, or for the public, as determined by the supervisor;

1.7.2 Posing an imminent and serious safety threat to self or others; or

1.7.3 Involved in the event of a workplace incident or accident.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 None

4.0 Procedure

4.1 It is the responsibility of all employees to:

4.1.1 Maintain a safe workplace;

4.1.2 Manage their health in a manner that allows them to safely perform their job responsibilities;

4.1.3 Arrive to work fit for duty and capable to perform their job responsibilities in a safe, secure, productive, and effective manner during the entire time they are working and refraining from behavior which could impair safety in the workplace;

4.1.4 Notify their supervisor or HR when they are not fit for duty and to declare any medication side effects and/or situations/concerns which may have an impact on their ability to perform work; and

4.1.5 Notify a supervisor when they observe a co-worker acting in a manner that indicates the co-worker may be unfit for duty. If the supervisor's behavior is the focus of concern, an employee may inform a senior manager and a HR representative.

4.2 The Company will not tolerate retaliation against any employee for filing a complaint or concern or for participating in any way in an investigation. It is the responsibility of AECOM management and supervisors to:

4.2.1 Communicate to all employees the content of this procedure and other applicable safety policies and procedures

4.2.2 Observe (and record when necessary) the attendance, performance, and behavior of the employees they supervise;

4.2.3 Fairly and consistently follow this procedure when presented with circumstances or knowledge that indicate that an employee may be unfit for duty by contacting SH&E and HR as appropriate;

4.2.4 Consider an employee's personal assessment of their own fitness for duty; and

4.2.5 Keep any information of medical conditions or records strictly confidential at all times.

4.3 HR and SH&E will assist in the administration of this program, ensuring that the requirements of the procedure are implemented by all responsible departments.

4.4 The supervisor who believes they have received reliable information that an employee may be unfit for duty, or through personal observation believes an employee may be unfit for duty, will validate and document the information or observations as soon as is practical and contact SH&E and HR immediately. While there is a great variety and range of acceptable behavior among employees, dramatic or sudden changes in any particular employee's customary behavior may be a cause for concern. Atypical behavior that may trigger the need to evaluate an employee's fitness for duty include, but is not limited to, problems with dexterity, coordination, concentration, memory, alertness, vision, speech, inappropriate interactions with co-workers or supervisors, inappropriate reactions to criticism, or suicidal or threatening statements. Though the mere presence of any one factor or sign of behavior may not be sufficient to require an evaluation, it should not be ignored and may lead to the ordering of an evaluation.

4.5 The supervisor will present the information or observations to the employee at the earliest possible time in order to validate them and will allow the employee to explain his or her actions, or to correct any mistakes of fact contained in the description of those actions. An employee is not required to disclose a disability to a supervisor; however, a supervisor may inquire regarding the conduct, behavior or circumstances that give rise to his or her concerns. The supervisor will then determine whether the employee should leave the workplace immediately for safety reasons. Where possible, discussion and meetings with any employee should occur with SH&E and/or HR staff present.

4.6 Depending on the severity of the situation or event and the type of behavior, possible actions may include the following:

- Documenting and noting the event or behaviour.
- Encouraging the employee to use the EAP (if applicable) or to seek medical treatment.
- Placing the employee on a paid leave of absence (Paid Time Off (PTO)) or paid administrative leave, depending on the situation).
- Arranging for the employee's safe transportation home.
- Making a management referral to the EAP or other local assistance agencies.

- Taking disciplinary action, if appropriate.
- Calling 911 or local emergency authorities.

4.7 If there is a basis for thinking that a crime may have been committed and/or the employee is making threats to harm himself or herself or others, or is acting in a manner that is immediately dangerous to himself or herself or others, contact 911 or local emergency authorities directly. HR and the EAP should be consulted regarding the fitness for duty procedure after the immediate safety issue has been addressed.

4.8 In all other circumstances, the supervisor shall take appropriate action, including contacting HR. If it is not immediately practicable to contact HR, managers have the authority and ability to contact the EAP when they receive reports and validate or personally observe an employee's unfit behavior. Depending on circumstances, such as when an employee's conduct immediately or directly threatens safety, a supervisor may immediately relieve the employee of duty pending further evaluation.

4.9 The Company will rely on the EAP or occupational specialist, physician or other medical specialist (which may include a registered psychologist or psychiatrist) to assist with the evaluation process. Each case will be evaluated on a case-by-case basis. In all instances, it is imperative that the EAP or medical professional be provided complete and accurate information on the employee's job duties, responsibilities and expectations in order to make a fully informed decision. Please refer to *S3AM-008-FM1 Description of Job Duties*.

4.10 The employee must comply and cooperate with all aspects of the fitness for duty and evaluation procedures, including furnishing necessary consent and release forms to the health service provider. Noncompliance (including delayed compliance) may be grounds for disciplinary action up to and including termination. Information will be requested from the health service provider regarding work restrictions and/or accommodations that may be required upon the employee's return to work.

4.11 If it is determined that a fitness for duty evaluation is necessary, the employee will be asked to leave the workplace until the evaluation is completed. A recommendation is provided by the occupational specialist, physician or other medical specialist to HR. When it is determined that the employee can return to work safely, a HR manager will contact that employee with the date and conditions of their return to work. If there are conditions that the employee will need to comply with in order to ensure continued safe working habits, they will be required to sign an acknowledgement that they will comply with those conditions.

4.12 This procedure is not intended as a substitute for other Company policies or procedures related to performance nor is intended as a substitute for discipline. Situations involving violations of Company policies or practices may result in disciplinary action being taken.

5.0 Records

5.1 None

6.0 Attachments

6.1 S3AM-008-FM1 Description of Job Duties

Americas

Fatigue Management

S3AM-009-PR1

1.0 Purpose and Scope

1.1 The purpose of this procedure is to reduce the potential for employee fatigue by providing criteria for recognition, treatment, and management.

1.2 This procedure applies to AECOM Americas-based employees and operations, and any other entity and its personnel contractually required to comply with this document's content, where fatigue can be a factor impacting an employee's fitness for duty. Fatigue is mental or physical exhaustion that stops a person from being able to function normally.

- Fatigue is mainly caused by a lack of sleep, but may also be associated with prolonged periods of physical and/or mental exertion without sufficient time to recover.
- Fatigue can be caused by work-related stresses, non–work-related stresses, or a combination of both. Work-related stress may be due to items such as pace of work schedule, location of work, environmental conditions of the work area (e.g., noise, lighting, tasks), and degree and duration of concentration required to perform a task.
- Non–work-related fatigue is influenced by personal lifestyle, health issues, and family and relationship responsibilities.
- Long-distance travel causes fatigue primarily by disruption of natural biological rhythms through both external factors and internal factors.
- Acute Mountain Sickness (AMS) is a group of symptoms including fatigue that jeopardizes the well-being and the work capacity of people who are not acclimated when exposing themselves to altitudes above 3,000 meters. It appears in the first hours after exposure, declining after 1 or 2 days because of acclimatization. Its prevalence is directly related to high-altitude work, ascent speed, and personal susceptibility.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 None

4.0 Procedure

4.1 Implementation of this procedure is the responsibility of the manager directing activities of the facility, site, or project location.

4.2 Fatigue, and the level to which it impacts an employee, is associated with a number of factors including:

4.2.1 The quantity and quality of rest obtained before and after a working day.

4.2.2 The time of day in which work takes place.

4.2.3 The length of time spent at work and on work-related activities (including travel time to and from work).

4.2.4 The type and duration of a work task and the environment in which it is performed.

4.2.5 The physical and mental demands of work.

4.2.6 Activities outside the workplace, such as sports, family commitments, or second jobs.

4.2.7 Disruption of normal circadian rhythms (human clock, bio-rhythms).

4.2.8 Individual factors, including existing medical conditions, illnesses, or sleep disorders.

4.2.9 Extreme alcohol intake or sleep deprivation.

4.2.10 Travel requirements, including daily commute distances and long- distance air travel.

4.3 Fatigue Recognition

4.3.1 Employees are expected to carry out their work activities in a manner that does not risk the health and safety of themselves, their fellow employees, or any other personnel on the site (e.g., contractors, clients, the public, etc.). If an employee feels that they are unable to perform their work activities safely due to the effects of fatigue, they are required to stop work immediately and notify their supervisor. If this occurs while an employee is driving a vehicle, the employee is required to stop driving and find a suitable location to rest.

4.3.2 Similarly, if an employee suspects a co-worker (including contractors or clients working with the employee) of suffering from the effects of fatigue, they are required to intervene on behalf of the affected person, stopping work and notifying their supervisor.

4.3.3 Characteristics that may assist in the identification of fatigue may include, but are not limited to:

- Physical Symptoms
  - Bloodshot eyes
  - Poor coordination
  - Slower movements
  - Slower-than-normal response time (e.g., response to commands or radio signals)
- Cognitive Function Symptoms
  - Distraction from task
  - Poor concentration or lapses in concentration
  - Inability to complete tasks
  - Short-term memory loss
  - Nodding off momentarily
  - Fixed gaze
  - Reports of blurred vision
- Emotional/Behavioral Symptoms
  - Appears depressed
  - Does not care about work
  - Easily frustrated with task/irritability
  - Increased or noticeable level of unexplained or unusual absenteeism

4.4 Fatigue Treatment

4.4.1 Where fatigue has been identified, employees are suggested to take action to treat the underlying causes of the fatigue. Suggestions include:

- Getting adequate, undisturbed, regular and consistent amounts of sleep each night. A minimum of 7 hours is recommended.
- Eating well-balanced and nutritious meals at regular intervals.
- Ensuring adequate consumption of water throughout the day.

- Exercising or stretching regularly.
- Maintaining a reasonable work and personal schedule.
- Avoiding alcohol, smoking, and drugs. Note that stimulants, including caffeine, may provide temporary relief from certain types of fatigue, but can increase the problem when the effect wears off.
- Changing stressful circumstances through vacation or personal leave.

4.5 Fatigue Management – Managers and Supervisors

4.5.1 Identify factors in the work place that may contribute to fatigue. Inform employees of potential fatigue-producing activities and how to manage them. Re-evaluate work tasks periodically to control fatigue.

4.5.2 Monitor employees for the signs and symptoms of fatigue.

4.5.3 Provide employees with sufficient breaks for food, water, and rest throughout the work day. Calling for unscheduled breaks/meals where fatigue factors are evident may be necessary.

4.5.4 Consult with employees regarding fatigue factors when extended work periods or shift work is anticipated.

- When possible and apart from shift work, minimize early morning starts before 6:00 AM local time, because early start times give employees less time to get adequate sleep.
- When possible and apart from shift work, minimize late-evening work after 9:00 PM local time (except where shift work is required), because employee alertness tends to decline after this time.
- Limit extended work days to a maximum of 14 hours, and extended work weeks to 60 hours. Where this is not feasible, develop project-specific fatigue management guidelines for inclusion in site-specific SH&E plans.
- For emergency work, a single shift should be limited to 16 hours, and an employee should be off work for at least 12 hours before the next shift start.
- Project-specific extended work schedules shall be reviewed and approved prior to implementation.
- Shift lengths longer than 12 hours should have two or more long breaks (at least 20 minutes) to allow time for meals.
- If shift work is required, employees should be given sufficient time to get a continuous 7- to 8-hour period of sleep in each 24 hours, and at least 50 hours every 7 days.
- At the end of extended night shifts, there should be a minimum of 36 hours or two sleep periods prior to transition to day shift.

4.5.5 Project industrial hygienists must consider extended work shifts in personal monitoring, and permissible exposure limits for acute chemical hazard exposures.

4.5.6 Review safety observations, near misses, injuries, and incidents that have occurred which may have resulted due to fatigue. Use the findings of these documents to revise project-specific fatigue management procedures, as necessary.

4.5.7 Supply adequate supervision for jobs that are physically or mentally demanding, repetitive, or require a high level of vigilance.

4.5.8 Develop job rotation and cross-training strategies for repetitive or monotonous work.

4.5.9 Consider providing ergonomic equipment such as anti- fatigue mats in areas of prolonged standing and lift assist devices for repetitive lifting tasks.

4.5.10 Remove obviously fatigued workers from activities where there is a risk to safety and health. These employees may be rotated to a task that creates a much lower immediate risk, or advised to go home. Where driving presents a further fatigue risk, provide transportation to ensure the employee reaches their destination safely.

4.5.11 Encourage employees to take adequate time away from work through vacations and personal leave. There should be at least one personal weekend in every 4 weeks of work.

4.5.12 Train employees on how to recognize fatigue, control fatigue through appropriate work and personal habits, and reporting of fatigue to a supervisor.

4.5.13 Where fatigue issues recur with an employee, consider referring the employee to the Employee Assistance Program (EAP) for help in the self-management of fatigue or other issues that may have a bearing on fatigue at work. Review working arrangements to assist employees in managing non–work-related fatigue causes.

4.5.14 Provide training to all employees as required by project- specific conditions or client-specific requirements (e.g., project startup training, onset of schedule changes, annual refresher training, etc.).

4.6 Fatigue Management – Employees

4.6.1 Employees are responsible for managing personal fatigue in the work place. This may include the following:

4.6.2 Report to work well-rested and mentally alert. Manage non– work-related choices that enable fitness for duty, including getting sufficient rest and sleep to recover from prior work duties, and managing personal, commuting, medical, and health issues.

4.6.3 Seek medical advice for any personal conditions affecting sleep, such as apnea or insomnia.

4.6.4 Advise your physician of any changes in your regular work schedule if you are taking daily prescriptions. Many medications exhibit important differences in the time course and effects depending on when the medication is administered.

4.6.5 Notify your manager or supervisor when you are feeling fatigued.

4.6.6 Take adequate rest and meal breaks for the working conditions.

4.6.7 Do not operate machinery or perform high-risk activities for at least 24 hours if you travel over 6 or more time zones or if you are required to work at elevations above 3,000 meters without adequate acclimatization.

4.6.8 Inform managers or supervisors when you suspect a co- worker of being fatigued or if you feel fatigued to a point of increased risk of an incident or error.

4.6.9 Consider seeking assistance from the Employee Assistance Program (EAP) for help in the self-management of fatigue or other issues that may have a bearing on fatigue at work.

5.0 Records

5.1 The following documentation will be maintained in the project file:

5.1.1 Safety observations, near misses, injuries, and incidents that have occurred as a possible result of fatigue.

5.1.2 Records of site-specific training in fatigue identification and management issues.

6.0 Attachments

6.1 None

Americas

Substance Abuse Prevention

S3AM-019-PR1

1.0 Purpose and Scope

1.1 This policy and procedure is consistent with the U.S. Drug-Free Workplace Act of 1988 and in accordance with federal, state / provincial / territorial, and local laws and regulations. It sets out practices for a drug-free, healthy, productive, safe and secure workplace and provides guidance for employees and supervisors with respect to their responsibilities. Drug and alcohol abuse pose a serious threat to the health and safety of employees, clients, and the general public as well as the security of our job sites, equipment and facilities. The Company is committed to the elimination of illegal drug use and alcohol abuse in its workplace and regards any misuse of drugs or alcohol by employees to be unacceptable.

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

1.3 AECOM prohibits the use, possession, presence in the body, distribution, manufacture, concealment, transportation, promotion or sale of the following items or substances on company premises:

- Illegal drugs (or their metabolites), designer and synthetic drugs, mood- or mind-altering substances and drug use related paraphernalia unless authorized for administering currently prescribed medication;
- Controlled substances that are not used in accordance with physician instructions or non-prescribed controlled substances;
- Alcoholic beverages while at work or while on any customer or AECOM controlled property. This prohibition on alcohol applies whenever an employee is on-duty, including during meal or break periods, while on Company premises, or while representing AECOM. AECOM may make exceptions and permit the consumption of alcohol beverages at work-related events, such as Company-sponsored or approved business meals, conferences, or holiday events. Employees who choose to consume alcohol on approved occasions are expected to exercise good judgment and to refrain from becoming intoxicated or impaired. If an employee has consumed alcohol and needs transportation home, the Company will reimburse the cost of a taxicab or other reasonable costs of transportation so that the employee may avoid driving.
- This policy does not prohibit lawful use and possession of current medication prescribed in the employee's name or over-the-counter medications. Employees shall consult with their health care provider about any prescribed medication's effect on their ability to perform work safely. An employee who has work restrictions due to his or her consumption of a prescribed medication shall disclose these restrictions to their supervisor.

1.4 Substance abuse testing procedures shall meet requirements of various U.S. regulatory agencies and / or those of the applicable jurisdiction, with regard to testing employees for the possession and use of illegal drugs (and their metabolites), mood- or mind-altering substances, synthetic and designer drugs, unauthorized use of prescription drugs and the unauthorized use of alcohol on AECOM or client premises or during working hours. The procedures will also comply with applicable laws and regulations by federal, state / provincial / territorial, and local law. If the law of a particular location differs from the practices expressed in this policy and procedure, AECOM will implement this policy and procedure in accordance with applicable law.

1.5 Although some states may pass laws legalizing medical or recreational marijuana use, the use, sale, distribution and possession of marijuana are violations of federal law. Similarly, the use sale, distribution, presence in the body and possession of marijuana or the presence of marijuana on company premises or while on duty including during lunch and breaks violates the *S3AM-019-ATT1 Substance Abuse Policy Statement* (policy) and will subject an employee to disciplinary action up to and including termination in accordance with controlling law.

1.6 This policy and procedure have been developed to provide employees, managers, supervisors and administrative support personnel with guidelines and procedures for the implementation, administration, and enforcement of this policy and procedure. The company policy statement for substance abuse prevention is included as Attachment 1 of this document and a copy of the included policy statement shall be posted on employee information boards. New employees shall receive and sign *S3AM-019-FM1 Acknowledgement and Consent Form* upon hire or transfer between sites or clients as acknowledgement of the program requirements. A signed or electronic copy of this form should be kept as part of the employee personnel file.

1.7 This policy and procedure do not prohibit employees from the lawful use and possession of current legally prescribed or over-the-counter medications. Employees shall consult with their health care providers about any prescribed medication's effect on their ability to perform work safely. Employees shall disclose any relevant work duty restrictions to their supervisor. Employees are required only to provide information necessary for the Company to make an informed decision regarding the ability to perform required work safely, and to evaluate whether the employee may be entitled to a reasonable accommodation. Employees who shall bring current prescribed medications to work shall carry the medication in the original packaging bearing a current label from a licensed pharmacist for the person in possession of the drugs.

1.8 Compliance with this policy is a condition of initial and continued employment. Failure to comply with these requirements will be grounds for disciplinary action, up to and including termination of employment.

1.9 This procedure will be administered by the Business Group Substance Abuse Prevention (SAP) Program Administrator in conjunction with Safety, Health & Environment (SH&E) and Human Resources (HR).

1.10 This procedure may be further supplemented by Business Group specific and/or client specific Substance Abuse Prevention procedures. These supplementary programs shall either meet or exceed the requirements contained in this document.

2.0 Terms and Definitions

2.1 **Adulterated Sample** – A urine sample provided by an applicant, employee or contractor that has been intentionally altered to mask the analysis for illegal substance use. Any applicant or employee who knowingly provides a false sample or attempts to adulterate a sample will be terminated or disqualified from employment.

2.2 **Confidentiality** – The principle that the information associated with an individual's participation in the AECOM Substance Abuse Prevention program is private and has limits on how and when it can be disclosed.

2.3 **Designated Employer Representative (DER)** – Another name for the drug and alcohol program administrator. The DER provides oversight and manages the applicable Business Group's Substance Abuse Prevention Program(s) in coordination with the requirements of this document.

2.4 **Employees/Applicants** – The SAP program will apply to all individuals who may be: regular full-time, part-time, probationary, temporary, craft (direct hires), casual, contract or leased employees, and applicants of employment as permitted by applicable laws

2.5 **Employee Assistance Program (EAP)** – All AECOM employees, eligible dependents and family members living in the same household are eligible to utilize the EAP in accordance with Human Resources policy. Check with your HR manager for eligibility for EAP.

2.6 **Illegal Drugs, Controlled Substances and Unauthorized Items** – Illegal drugs, designer and synthetic drugs, substances that impair job performance or safety and drug-related paraphernalia: Controlled substances such as medications when usage is abused; Unauthorized alcoholic beverages

2.7 **Medical Review Officer (MRO)** – The MRO is a designated Medical Doctor (MD) with experience and certification in the interpretation of urinalysis test results for drug testing. The MRO examines the positive test results with consideration of whether there is a legitimate medical reason for the result. This is accomplished by telephone interviews with the donor and also with their prescribing physician or pharmacist when prescription or over the counter medications are possibly involved.

2.8 **Negative Test** – A personal sample (urine, blood, hair, breath, saliva or other permitted by law) that indicates a concentration(s) of any drug on the panel which is below the cut-off limit and also meets all quality control requirements (e.g., temperature, pH) and no evidence of adulterants.

2.9 **Positive Test Result** – A personal sample (urine, blood, hair, breath, saliva or other permitted by law) that indicates a concentration(s) of any drug on the panel which is above the cut-off limit and/or the gas chromatography – mass spectrometry (GCMS) confirmation level of that applicable regulation or requirement.

2.10 **Prohibited Substances** – Illegal or unprescribed drugs (or their metabolites), controlled substances and mood or mind-altering substances (i.e. any synthetic derivative/product that produces a marijuana-type high and any herbal products not intended for human consumption); or any prescribed drugs used in a manner inconsistent with the prescription, and alcoholic beverages.

2.11 **Reasonable Suspicion** – Suspicion based upon the observation of objective facts or specific and articulable behavior. Supervisor should complete a Reasonable Suspicion training course and be able to document the process and observations.

2.12 **Refusal to Test** – Refusing to provide a sample, refusing to cooperate, leaving the testing area, or refusing to accept and sign the testing consent form, is considered a breach of company policy and subject to disciplinary action up to termination of employment.

2.13 **Safety Sensitive** – A task or position is designated as safety sensitive when the task or position is such that an action would endanger the life of the employee and/or the lives of others. AECOM Business Groups may further define safety sensitive as it applies to their applicable line of work or to a specific project. When identifying safety-sensitive tasks or positions, consideration shall be given to applicable factors such as, but not limited to, the relevant industry (e.g., transportation, railroad, pipeline, etc.), regulatory requirements (e.g., covered tasks) of the given jurisdiction, an employee's direct involvement in the task or position's responsibilities, level of supervision, etc. Examples, but not a complete list, of positions that may be determined to be "safety-sensitive" based upon the applicable factors include:

- Drivers of Commercial Motor Vehicles (CMV)
- Workers on pipelines carrying fuels or toxic or corrosive substances
    - Example – US requirements: *S4AM(US)-019-ATT1 PHMSA Covered Tasks Flowchart* provides additional guidance for tasks related to pipeline or liquified natural gas (LNG) facilities.
- Workers at nuclear power plants
- Employees that operate -regulated devices (e.g., nuclear density gauges)
- Operators of industrial mobile equipment
- Workers handling hazardous substances.

2.14 **Substance Abuse Prevention Program Administrator (SAP Administrator)** – a person that administers policies for the company and acts as the Designated Employer Representative (DER).

3.0 References

3.1 None

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **SAP Administrator**

- Engage and coordinate appropriate parties as necessary to execute the SAP Program.
- Receive test results and other Substance Abuse Prevention related communications for AECOM.
- Function as DER

- The DER is authorized by AECOM to take immediate action(s) to remove employees from safety sensitive duties, or cause employees to be removed from these covered duties, and to make decisions required in the testing and evaluation process, such as in the case of a shy bladder or shy lung situation.
- The DER will also refer employees to the Substance Abuse Professional and facilitate the return to duty process of employees who have successfully completed the Substance Abuse Professional's recommendations or identified program, as permitted by AECOM, and as applicable, the client.
- All Service Agents (TPAs, MRO's Labs and Collection Agencies) shall know who the DER is so that they may speak to them if problems arise and/or to include the DER name on the testing forms. A Service Agent may not be a DER for a company.
- The DER is the person that will work with directly with auditors during an inspection, including providing all the information about the program and any compliance issues. Therefore, the DER shall be someone who carries some authority and has access to needed resources and is familiar with the company's operation.

- Provide SAP Program related guidance concerning AECOM requirements and report as appropriate on SAP Program status to the applicable party. Refer to *S3AM-019-ATT2 Substance Abuse Prevention Communication Guidelines*.

4.1.2 **Supervisors and Managers**

- Obtain any client - specific SAP Program related requirements associated with the project as early in the project lifecycle as possible (e.g., contract negotiations).
- Provide SAP Program related guidance and requirements applicable to the respective client and/or project(s) to the SAP administrator as soon as received. Refer to *S3AM-019-ATT2 Substance Abuse Prevention Communication Guidelines*.
- Has received the required and approved Supervisor Reasonable Suspicion training and: knows the signs and symptoms of abuse, knows the required documentation, understands procedures regarding confrontation of the individual, and the importance of confidentiality and has authority to refer an employee for drug and alcohol testing as required.
- Observe and document employee behavior which appears to violate this policy and procedure and refer employees for drug and alcohol testing as required.
- Ensure all employees have been orientated to this procedure and are knowledgeable about, and in compliance with this procedure, associated policy and applicable programs.
- Make appropriate referrals for a drug and/or alcohol test as per this procedure as well as any client contractual agreements or governmental regulation.
- Be current with the Employee and Supervisor Training and education programs so as to be knowledgeable about the use of alcohol and drugs and be able to recognize the signs and effects of alcohol and drug uses.
- Alert and involve Human Resources (HR), the Corporate Safety, Health and Environment (SH&E) Occupational Health Director and the Substance Abuse Program Administrator when an employee is believed to be unfit for duty due to drugs or alcohol use in violation of this policy and/or if an employee is tested for a reasonable suspicion use of drugs or alcohol.
- If any illegal drugs or drug paraphernalia are located on company premises, do not handle the items and immediately notify the following as necessary: HR, Resilience Group, the police department and the applicable Substance Abuse Program Administrator.
- Guide employees who voluntarily seek assistance for a personal substance abuse problem to appropriate resources such as the EAP or other local resource.

4.1.3 **Employees**

- Commit to a safe and drug-free workplace by complying with this policy and procedure and understanding their responsibilities.
- Read and understand the *S3AM-019-ATT1 Substance Abuse Policy Statement* detailing the Company's commitment to a drug free workplace. The signed *S3AM-019-FM1 Acknowledgement and Consent Form* attests that they have reviewed and are familiar with this procedure and understand that compliance is a condition of employment. Any questions should be directed to the Substance Abuse Administrator.
- Follow the instructions of their supervisor or Substance Abuse Administrator when informed that they have been chosen for a random or client drug test as allowed by federal, state / provincial / territorial, or local law and regulations. Failure to do so may result in discipline up to and including termination.
- Participate in substance abuse training programs as directed.
- Report for work Fit for Duty and remain Fit for Duty while on Company premises and worksites and adhere to the standards set out in this procedure and any applicable program.
- Notify your supervisor, HR or SH&E representative if you believe another employee or subcontractor is not Fit for Duty or exhibits conduct suggesting substance abuse.
- If having a valid driver's license is a condition of employment, report any loss of license related to drug or alcohol use immediately (no later than 24 hours after losing the license) to your supervisor.
- Consult with health care provider about any prescribed medication's effect on the ability to perform work safely and disclose work restrictions due to consumption of prescribed medications to their supervisor to determine if reasonable accommodation is needed.
- Bring legally prescribed medicine in the original packaging bearing a current label in the employee's name from a licensed pharmacist if the employee carries more than a single day of prescribed medications to work.
- An employee who has been convicted of a felony under a criminal drug statue for a violation occurring on Company property or during the employee's working hours shall notify Human Resources no later than five (5) calendar days after the felony conviction becomes final under the law.

4.2 Confidentiality

4.2.1 Information and records relating to drug screen test results, drug and alcohol dependencies and medical information shared with the Company in the course of administering this Policy and Procedure shall be treated as confidential and shared with HR and managers on a need-to-know basis. Information will not be released to third parties except with the consent of the individual or where relevant to a grievance, charge, claim, or other legal proceeding initiated by or on behalf of an employee or applicant, or as may be required by law or legal process.

4.3 Types of Testing

4.3.1 Employees undertaking Safety-Sensitive tasks or in a Safety Sensitive position may be required to undergo drug and alcohol testing.

4.3.2 Pre-employment Testing - Applicants extended a conditional offer of employment may be required to take, and pass, a pre-hire drug test before beginning work. Individuals who test positive or refuse the test will not be hired and will be ineligible to reapply for a minimum period of six months or longer as defined by the applicable Business Group. Employees who transfer from one company Business Group or project to another are not required to take a pre-employment drug test if their employment is without interruption, they are not subject to client testing or safety sensitive testing requirements, and they would have been expected to have taken a pre-hire or client mandated drug test.

4.3.3 Random and Annual Testing - Employees may be subject to random drug and/or alcohol testing in accordance with federal, state / provincial / territorial, and local laws. In addition, employees may be subject to random or annual drug tests to meet contract requirements.

- Selections for random testing will be made by the Substance Abuse Program Administer or a Certified Third Party Administrator using employee identification numbers and a random selection process. They will be unannounced and once selected for testing, an individual may not be waived from the testing process unless approved by the Substance Abuse Prevention program administrator.
- Employees will be notified to report for random tests at a time when they should be able to stop working and report immediately to the collection site. Failure to report for a test promptly when instructed to do so may be considered a refusal to test.
- Employees who may be required to submit to random or annual tests will be so notified at the time that they are hired into an applicable position, when they transfer into such a position, or when random or scheduled testing becomes applicable to their position.

4.3.4 Reasonable Suspicion Testing - Employees are subject to drug and/or alcohol testing whenever AECOM supervision has reason to believe that the employee may have violated this policy and procedure. Requests for tests will be based upon contemporaneous, articulable observations from supervisors suggesting that the employee may be under the influence of illegal drugs, controlled substances, or alcohol.

- Examples of observations that may lead or further substantiate reasonable suspicion testing can include the employee's appearance, behavior, speech, body odors, absenteeism, job performance, tardiness, etc. The SAP administrator should be consulted when guidance is required, who will engage HR as necessary. Observations shall be documented before the individual is asked to submit to a test.
- An employee asked to take a drug and/or alcohol test will be suspended without pay until test results are received. They may use Paid Time Off (PTO) time during this period. An employee who has negative test results will be returned to work status and the employee will then be paid or have their PTO restored for any lost time during that period.

4.3.5 Post Incident/Accident Testing - Employees may be subject to drug and alcohol testing in accordance with federal, state / provincial / territorial, and local law whenever:

- An employee is subject to post-incident testing in accordance with applicable client requirements and/or regulations or laws that contain specific requirements for testing (e.g., Department of Transportation, state / provincial / territorial, workers' compensation laws);
- An employee sustained or potentially caused or contributed to an injury or illness requiring off-site medical treatment beyond first aid, and there is a reasonable possibility the employees' drug or alcohol use may have contributed to the incident. Employees will not be tested post-incident if management determines that potential drug and/or alcohol use likely did not contribute to the incident such as in the cases or animal or insect bites, repetitive strain injury, poison ivy, etc;
- An employee may have caused or contributed to property damage estimated (including to Company vehicles or equipment) of $2,500 or more (a lower cost of damage requiring testing may be identified in Business Group specific programs); and
- An employee may have caused or contributed to an incident or serious near miss, whether or not they sustained an injury or illness, or whether property damage resulted. Testing may be appropriate in these circumstances if there is a reasonable possibility the employees' drug or alcohol use may have contributed to the incident and results may provide insight to the root causes of the incident.

In either of these instances, the investigation and substance abuse testing shall take place immediately following the incident and at a minimum within 8 hours for alcohol and 36 for drug testing, except that no investigation or request for test will delay the provision of urgent medical

care to any person in need of assistance. Employees will not be allowed to return to work until a negative drug/alcohol test result is received.

4.3.6 Return-to-Work and Follow-up Testing - Employees who test positive for drugs or alcohol or who have otherwise violated this Policy and Procedure are subject to discipline, up to and including discharge. Depending on the eligibility, the Company may offer an employee who violates this Policy and Procedure the opportunity to seek assistance in lieu of termination through an approved counseling program as per Business Group policy. Employees offered this opportunity will be required to be evaluated by a substance abuse professional, and to complete any course of education or treatment prescribed before returning to work. In addition, employees shall have a negative drug/alcohol test prior to their return to work and follow-up drug and/or alcohol testing may be required as a condition of continued employment, for a period of up to two years following the return to work. If subject to a client-specific substance abuse policy, employees who have had a positive test result will not be permitted to return to work on the client site or facility. Return-to-Work Agreements will be tailored to the individual's circumstances and job responsibilities.

4.4 Collection and Testing

4.4.1 Consent and Refusals to Test: No sample will be collected, or test conducted on any sample, without the consent of the person being tested. AECOM will pay the costs of all drug and/or alcohol tests it requires. A refusal to submit to a test will be treated as an admission of a policy violation and will usually result in termination of employment. Job applicants who refuse a test will have their job offers withdrawn.

- Attempts to tamper with, substitute, adulterate, dilute or otherwise falsify a test sample are considered refusals to submit to a test, as is a refusal to accept transportation to the testing facility, failure to appear at the testing location promptly after being asked to submit to a test, or other conduct that has the effect of hindering the testing process.

4.4.2 Test Methods: Drug test samples may include urine, hair, swab or saliva (oral fluids). All drug test samples will be screened and all presumptive positive drug tests will be confirmed using gas chromatography/ mass spectrometry (GC/MS) (or an equally accurate methodology). Drug tests will be performed by a laboratory certified by the U.S. Substance Abuse and Mental Health Services Administration for federal workplace testing, or as required by the applicable jurisdiction. Breath, blood, swab or urine tests may be used to detect the presence of alcohol. An alcohol test will be considered positive if it shows the presence of .04 percent or more alcohol in a person's system.

- Dilute or invalid results may require a recollection, and the Company may require the individual to provide an alternative test specimen as may be available and consistent with the underlying purpose of the test.

4.4.3 Collection and Chain-of-Custody: Persons being tested will be asked to provide a test sample to a trained collector. Procedures for the collection of specimens will allow for reasonable individual privacy. Urine specimens will be tested for temperature and may be subject to other validation procedures as appropriate. The collector and the person being tested will follow chain-of-custody procedures for specimens at all times. Tests will seek only information about the presence of drugs and alcohol in an individual's specimen and will not test for any medical condition.

4.4.4 Notification and Medical Review: Any individual whose test sample is confirmed positive for a drug or drugs will be contacted by a Medical Review Officer ("MRO") (a medical professional with an expertise in toxicology) and offered an opportunity to explain in confidence any legitimate reasons he or she may have that would explain the positive test (such as, for example, evidence that the individual holds a valid prescription for the substance detected). The MRO may also review suspected adulterated, substituted, and dilute specimens and make determinations about their validity.

- If the individual provides an explanation acceptable to the MRO that a drug test result is due to factors other than the consumption of illegal drugs, the MRO will order the positive test result

to be disregarded and will report the test as negative to AECOM. Otherwise, the MRO will verify the test as positive and report that test result.

4.4.5 Right to Explain and Retest: Within three working days after notice of a verified positive drug or alcohol test result on a confirmatory test conducted under this Policy, the tested individual may submit information to the MRO to explain the positive result. An individual who tests positive for drugs also may ask to have his or her remaining or split test sample sent to an independent certified laboratory for a second confirmatory test, at the individual's expense, and provided that a written request is made within five business days of the date the individual of the positive test result. the MRO will notify the original testing laboratory that the employee or applicant has requested that the laboratory conduct a confirmatory retest or arrange for transfer of the sample to the laboratory selected by the individual to perform the confirmatory retest. Tested individuals will be required to pay the testing laboratory for any confirmatory retest they request. AECOM may suspend, transfer, or take other appropriate employment action against an employee pending the results of any such re-test. However, if the re-test fails to confirm as positive the individual will be reimbursed for the cost of the re-test and the prior test results disregarded.

4.4.6 The Company will provide drug and alcohol tests results to candidates and employees automatically, where applicable law so requires, and otherwise upon written request as may be required by law or as approved by legal counsel.

4.5 Workplace Searches and Inspections

4.5.1 The Company reserves the right to inspect and search all portions of its premises for drugs and other contraband. All employees, contract workers, and visitors may be asked to cooperate in inspections of their persons, work areas, and property brought on site in connection with an inspection. Testing may be warranted based on search or disclosure of evidence obtained on a work site or company controlled property. Employees who refuse to cooperate in any such inspections are subject to discipline, up to and including discharge.

4.6 Employee Assistance Program and Drug Free Awareness

4.6.1 Illegal drug use and alcohol misuse result in a number of adverse health and safety consequences. Information about those consequences and source of help for drug/alcohol problems is available from HR representatives who can also refer employees to the EAP for assistance with drug/alcohol related problems. Information about the EAP program is available on the Company intranet.

4.6.2 The Company will provide support to employees who voluntarily seek help for drug or alcohol problems. Depending upon the eligibility, the employee may be referred for evaluation and allowed to use accrued paid time off or be placed on leave as may be necessary to complete any prescribed education and/or treatment. Employees also may be required to document that they are successfully following a prescribed education and/or treatment plan and pass return to duty and follow-up drug and/or alcohol testing. A request for assistance will be considered voluntary only if made before the employee becomes subject to disciplinary action for violating this or another Company policy, and cannot excuse substandard performance, so AECOM encourages employees who may need assistance to seek it promptly:

4.6.3 In conjunction with the EAP, the Company will promote a drug-free workplace and provide awareness concerning the AECOM SAP program to inform employees about:

- The dangers of substance abuse in the workplace.
- Available counseling, rehabilitation, and EAPs (both for self-referral or supervisory referral).
- The penalties that may be imposed for violations of this procedure.
- The Company's commitment to promoting a drug-free workplace.

5.0 Records

5.1 None.

6.0 Attachments

6.1 S3AM-019-ATT1 Substance Abuse Policy Statement

6.2 S3AM-019-ATT2 Substance Abuse Prevention Communication Guidelines

6.3 S3AM-019-FM1 Acknowledgement & Consent Form

6.4 S4AM(US)-019-ATT1 Pipeline & Hazardous Materials Safety Administration (PHMSA) Covered Tasks Flowchart

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas based employees and operations and any other entity and its personnel contractually required to comply with this document's content where the potential for hand injuries is present.

1.2 This procedure is intended to protect employees from activities that may expose them to hand injury. This procedure provides information on recognizing those conditions that require personal protective equipment (PPE) or specific work practices to reduce the risk of hand injury.

1.3 All personnel shall have gloves in their immediate possession 100% of the time when in a shop or on a work site. Appropriate gloves shall be worn when employees work with or near any materials or equipment that present the potential for hand injury due to sharp edges, corrosives, flammable and irritating materials, extreme temperatures, splinters, etc.

2.0 Terms and Definitions

2.1 None

3.0 References

3.1 S3AM-003-PR1 SH&E Training

3.2 S3AM-208-PR1 – Personal Protective Equipment

3.3 S3AM-209-PR1 – Risk Assessment & Management

3.4 S3AM-325-PR1 – Lockout Tagout

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Manager / Supervisor**

- Implementation of this standard for the applicable facility, site, or project location.
- Confirm employees are familiar with this procedure and have appropriate training.
- Confirm the appropriate hand protection is available on site as necessary.

4.1.2 **Employees**

- Recognize hazards to hands.
- Comply with this procedure as well as client or work location requirements.

4.1.3 **SH&E Manager**

- Advise supervisors and site personnel on matters relating to hand safety.
- Work with the manager / supervisor to confirm that sufficient PPE and equipment are available.
- Maintain contact with manager / supervisor to regularly evaluate site conditions and new information that might require modifications to this procedure.
- Conduct training or briefings, when necessary, and to explain the content of this procedure and site hazards to employees.

- Assist in investigation of incidents that resulted or could have resulted in an injury.

4.2 Hazard Assessment

4.2.1 Perform hazard assessments for those work activities likely to require Personal Protective Equipment (PPE).

- Use the Task Hazard Assessment (THA) to perform the hazard assessment (in accordance with *S3AM-209-PR1 Risk Assessment & Management*). The THA will accompany AECOM personnel at jobsites for use in the event of a job or task change, or
- Use the *Gloves Needs Assessment – S3AM-317-FM1* or equivalent to perform the assessment.
- Re-evaluate completed hazard assessments when the job or task changes.

4.2.2 The hierarchy of controls should be considered during the THA process to minimize or eliminate the need for hand protection PPE or material handling tools. Examples of controls are chemical substitution, machine guarding, and use of different tools.

4.2.3 Select PPE that will protect employees if hazards cannot be eliminated.

- Review Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with a SH&E Manager for assistance.
- Review glove manufacturer recommendations for both physical and chemical protection.
- Obtain gloves of the correct size for the employees.
- When both chemical and physical protection is of concern, wear the chemical protection gloves (e.g., nitrile) inside the physical protection gloves (e.g., leather, Kevlar®).
- Nitrile gloves or equivalent chemical resistant shall always be used for protection from hazardous fluids or non-corrosive chemicals.
- Do not wear metal or metal-reinforced gloves when working with electrical equipment or on electrical services. Proper leather and/or rubber gloves designed and tested for this purpose shall be used.
- Refer to *S3AM-208-PR1 – Personal Protective Equipment* for additional information.

4.2.4 Follow glove requirements in the applicable SH&E plan.

4.3 Guidelines for Working With and Around Equipment (Hand Tools, Portable Powered Equipment)

4.3.1 General

- As applicable, employees shall be trained in the use of all tools. Refer to *S3AM-003-PR1 SH&E Training*.
- Keep hand and power tools in good repair and use them only for the task for which they were designed.
- Inspect tools before use and remove damaged or defective tools from service.
- Operate tools in accordance with manufacturer's instructions.
- Do not remove or bypass a guarding device for any reason.
- Keep surfaces and handles clean and free of excess oil to prevent slipping.
- Do not carry sharp tools in pockets.
- Clean tools and return to the toolbox or storage area upon completion of a job.

- Confirm that the wrench is in full contact (fully seated, "flat", not tilted) with the nut or bolt before applying pressure.
    - Place the body in the proper position for optimal balance and bracing to prevent falls if the tool slips.
    - Make sure hands and fingers have sufficient clearance in the event the tool slips.
    - Whenever possible, pull on a wrench and avoid pushing.
- When working with tools overhead, place tools in a holding receptacle when not in use.
- Do not throw tools from place to place or from person to person, or drop tools from heights.
- Inspect all tools prior to start-up or use to identify any defects.
- Powered hand tools shall not be capable of being locked in the ON position.
- Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
- Do not allow loose clothing, long hair, loose jewelry, rings, and chains to be worn while working with power tools or rotating equipment.
- Do not increase the leverage by adding sleeved additions (e.g. a pipe or snipe) to increase tool handle length.
- Make provisions to prevent machines from restarting through proper lockout/tagout (refer to *S3AM-325-PR1 – Lockout Tagout*).

4.3.2 Cutting Tools

- Always use the specific tool designed for the task. Tubing cutters, snips, self-retracting knives, concealed blade cutters, and related tools are task specific and minimize the risk of hand injury. For more information about cutting tools, see *S3AM-317-ATT1 Safe Alternative Tools.*
- Fixed open-blade knives (FOBK) are prohibited from use during the course of AECOM work.
    - Examples of fixed open-blade knives include pocket knives, multi-tools, hunting knives, and standard utility knives.
    - Any exception to this requirement shall require approval of the Manager / Supervisor and SH&E Manager.
- When utilizing cutting tools, personnel will observe the following precautions to the fullest extent possible:
    - Use the correct tool and correct size tool for the job.
    - Cut in a direction away from yourself and not toward other workers in the area.
    - Maintain the noncutting hand and arm toward the body and out of the direction of the cutting tool if it were to slip out of the material being cut.
    - Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp, clean cutting tool.
    - Store these tools correctly with covers in place or blades retracted, as provided by the manufacturer.
    - On tasks where cutting may be very frequent or last all day (e.g., liner samples), consider Kevlar® gloves in the PPE evaluation for the project.
    - Do not remove guards on paper cutters.
    - In office locations, paper cutters must always be kept in a locked position when not in use.

4.3.3 Moving/Rotating Equipment

- General Requirements for Rotating Equipment (feed augers, chippers, conveyors, etc.)

- Never place hands, fingers, or extremities near hoppers and operational areas of machinery.
- When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.
- Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, locked out, and the moving parts of the equipment have stopped rotating. Refer to *S3AM-325-PR1 – Lockout Tagout*.

4.3.4 Other Physical Hazards

- Activities such as drum handling, fencing, work near razor wire, manhole cover removal, and demolition also pose hazards to hands. Use tools instead of hands for high hazard tasks whenever possible.
- Plan work to avoid pinch points for hands when moving drums, moving manhole covers into position, and handling other heavy objects.
- Work handling scrap metal, glass or other sharp edges requires proper hand PPE (Kevlar® or leather gloves).
- Activities involving hoisting, lifting and landing of a load shall be done “hands-free” when possible. Refer to *S3AM-317-ATT2 – Safe Hands-Free Lifting Guidelines*.

4.4 Ergonomics – Hand and Wrist Care

4.4.1 Keep your wrist in neutral. Avoid using your wrist in a bent (flexed), extended, or twisted position for long periods of time. Instead try to maintain a neutral (straight) wrist position. Ergonomic tools may be needed for long-term work.

4.4.2 Watch your grip. Gripping, grasping, or lifting with the thumb and index finger can put stress on your wrist. When practical, use the whole hand and all the fingers to grasp an object.

4.4.3 Minimize repetition. Even simple, light tasks may eventually cause injury. If possible, avoid repetitive movements or holding an object in the same way for extended periods of time.

4.4.4 Reduce speed and force. Reducing the speed with which you do a forceful, repetitive movement gives your wrist time to recover from the effort. Using power tools helps reduce the force.

4.4.5 Rest your hands. Periodically give your hands a break by letting them rest briefly. Or you may be able to alternate easy and hard tasks, switch hands, or rotate work activities.

4.4.6 Consider low vibration or anti- vibration hand power tools when possible.

4.5 Cleaning Hands

4.5.1 Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.

4.5.2 Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.

4.5.3 If the hands contact a corrosive (e.g., nitric acid), wash the area with water for fifteen minutes and then seek medical attention.

4.5.4 Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.

4.5.5 In some cases barrier creams may be used to provide limited protection for hands exposed to greases and oils.

4.6 Safe Hands Observation Tool

4.6.1 The *Safe Hand Task Review Card S3AM-317-FM2* may be used to supplement and reinforce safe work practices and the requirements of this procedure.

4.6.2 The observer's responsibilities include:

- Two-way conversation with the employees being observed.
- Completing the card and mark the applicable fields on the back of the card.
- Submitting the completed cards to the supervisor.

4.6.3 The supervisor's responsibilities include:

- Reviewing the completed cards.
- Identifying best work practices and any improvements.
- Communicating any changes back the employee(s).

5.0 Records

The following documentation will be maintained:

5.1 Hand tool training records, as applicable.

6.0 Attachments

6.1 S3AM-317-FM1 Glove Needs Assessment

6.2 S3AM-317-FM2 Safe Hands Task Review Card

6.3 S3AM-317-ATT1 Safe Alternative Tools

6.4 S3AM-317-ATT2 Safe Hands-Free Lifting Guidelines

Americas

Glove Needs Assessment

S3AM-317-FM1

Mgr. / Supervisor Name: Work Area Name:

Task/Operation Being Evaluated: Date:

1.0 Using the Protection and Performance Needs Assessment Table Below

1.1 Function and performance needs must be evaluated thoroughly. If employees have a strong need for dexterity, tactility, and/or grip this should be identified as a priority. Rank properties in the table below with 1 being the highest priority. Do not assign the same priority more than once. It is only necessary to rank the applicable properties. If all properties are ranked, the lowest priority would be ranked 12.

Protection and Performance Needs Assessment			
Category	**Properties**	**Protection and Performance Needs**	**Priority** (1=Top Priority)
Mechanical	Cut Resistance	Protection from sharp edges, blades, and other cutting hazards	
	Puncture Resistance	Protection from sharp objects like nails, pins, needles, wire	
	Abrasion Resistance	Durability and resistance to abrasive objects or materials	
	Shielding	Protection from impact, ricochet, small projectiles.	
Chemical	Degradation & Absorption Resistance	Durability and resistance to breaking down and/or permeating the glove from exposure to chemicals. Refer to the chemical's Safety Data Sheet for the appropriate glove choice.	
Thermal	Heat Resistance	Thermal protection from hot objects or materials	
	Cold Resistance	Thermal protection from cold weather, objects, or materials	
Vibration	Anti-Vibration	Vibration reduction from operating certain tools and equipment	
Electrical	Insulation	If performing work on electrical equipment, this must be the top priority	
Function	Dexterity	Ability to manipulate objects and control hands in the desired manner	
	Tactility	Ability to sense objects by touch	
	Grip	Ability to exert pressure on an object when holding it	

1.2 Identify a glove that meets the top protection and performance priorities.

In most cases there are trade-offs between hazard protection and functional performance of a glove. These factors are equally important. The higher the severity of the hazard, the more important hazard protection is. The table below offers additional guidance on key considerations when selecting a glove for certain protection and performance properties.

<table>
<tr><th>Category</th><th>Properties</th><th>Key Considerations and Selection Criteria</th></tr>
<tr><td rowspan="4">Mechanical</td><td>Cut Resistance</td><td>Testing Standard: ASTM F1790 and ASTM F1970-05
There are 5 levels of cut resistance. 5 is the highest.</td></tr>
<tr><td>Puncture Resistance</td><td>Testing Standard: EN 388:2003
This testing measures the force required to pierce the sample with a standard sized point.</td></tr>
<tr><td>Abrasion Resistance</td><td>Testing Standard: ASTM D3389-05 and ASTM D3884-09
Abrasion resistance testing measures how well the glove material resists loss of material from rubbing on rough surfaces.</td></tr>
<tr><td>Shielding</td><td>Some gloves offer thick padding or hard guards around the back of the hand or knuckles. These can offer good protection against impact.</td></tr>
<tr><td>Chemical</td><td>Degradation & Absorption Resistance</td><td>Identify products / chemicals that present potential exposures. Refer to the chemical’s Safety Data Sheet and glove manufacturer’s specifications for the appropriate glove choice.</td></tr>
<tr><td rowspan="2">Thermal</td><td>Heat Resistance</td><td>Testing Standard: ASTM F1060-08
This testing measures the insulation provided by the glove when contacting a hot surface. Higher temperatures reported indicate a glove with greater insulation.</td></tr>
<tr><td>Cold Resistance</td><td>Testing Standard: EN 511:1994 (for ambient temperature)
Testing Standard: ISO 5085:1989-1 (for cold surfaces)
Choosing the right glove depends on whether protection is needed from cold weather or cold surfaces.</td></tr>
<tr><td>Vibration</td><td>Anti-Vibration</td><td>Testing Standard: ANSI S2.73-2002 (R2007)
This testing method measures the vibration transmission of the glove.</td></tr>
<tr><td>Electrical</td><td>Insulation</td><td>Testing Standard: ASTM D120-09
Glove protection depends on the maximum voltage of energized components.
<table>
<tr><td>50 – 480V</td><td>Class 00 with Leather Protectors</td></tr>
<tr><td>480 – 600V</td><td>Class 0 with Leather Protectors</td></tr>
<tr><td>600V and above</td><td>Class 0 or higher (depending on maximum voltage) with Leather Protectors</td></tr>
</table></td></tr>
<tr><td rowspan="3">Function</td><td>Dexterity</td><td>Testing Method: EN 420:2003
Ability to manipulate objects and control hands in the desired manner. This testing method assesses the wearer’s ability to pick up small diameter pins lying on a flat surface with their thumb and forefinger.
If high dexterity is needed, and the hazards are relatively low to the forefinger and thumb, consider a glove that is tip less for those two digits.</td></tr>
<tr><td>Tactility</td><td>Ability to sense objects by touch. There is no standard test. However, a common field test is to determine if the wearer can feel a pulse while wearing the glove. This is affected by the thickness of the glove, presence of liners, glove surface characteristics, and properties of the coating material.</td></tr>
<tr><td>Grip</td><td>Testing Standard: NFPA 1971 (Grip)
Ability to exert pressure on an object when holding it.</td></tr>
</table>

1.0 Types of Safety Knives or Alternative Cutting Tools

1.1 Self-retracting utility knives (brands – OLFA, Martor, Allway Tools)

1.2 Guarded utility knives (brands – The Safety Knife Co., Martor)

1.3 Shears, snips, scissors (brands – Ridgid, Craftsman, Wolfcraft)

1.4 Concealed blade cutters (brands – The Safety Knife Co., Martor)

1.5 Pipe cutters (brands – Ridgid, Empire)

1.6 Specialty cutter (brand – Geoprobe)

Americas

Hazardous Materials Communication

S3AM-115-PR1

1.0 Purpose and Scope

1.1 Provides a Hazard Communication Program so that AECOM employees are informed of the hazards of the chemicals to which they may be exposed in the course of their work by way of container labeling and other forms of warning, safety data sheets (SDS), and employee training.

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

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.

1.4 The program does not apply to general consumer products, for example, cleaners, printer toner, white out, etc.

2.0 Terms and Definitions

2.1 **Acute Effect** – An adverse effect on the human body with immediate onset of symptoms.

2.2 **Article** – A manufactured item: (1) which is formed to a specific shape or design during manufacture; (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and, (3) which does not release or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.

2.3 **Carcinogen –** Those chemicals appearing in any of the following reference sources are established as carcinogens for hazard communication purposes:

- National Toxicology Program (NTP) Annual Report on Carcinogens.
- International Agency for Research on Cancer (IARC) Monographs, Volumes 1-34. Note: The Registry of Toxic Effects of Chemical Substances published by NIOSH indicates whether a substance has been found by NTP or IARC to be a potential carcinogen.

2.4 **Chemical Name –** The scientific designation of a substance in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry or the system developed by the Chemical Abstracts Service.

2.5 **Chronic Effect –** An adverse effect on the human body with symptoms which develop slowly over a long period of time or which frequently recur.

2.6 **Combustible Liquid –** Any liquid having a flash point at or above 100°F (37.8°C) but below 200°F (93.3°C), except any mixture having components with flash points of 200°F (93.3°C), or higher, the total volume of which makes up 99% or more of the total volume of the mixture.

2.7 **Common Name –** Any designation or identification such as code name, code number, trade name or brand name used to identify a substance other than by its chemical name.

2.8 **Container –** Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains a hazardous chemical. For purposes of this procedure, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle are not considered to be containers.

2.9 **Location –** Any separate and distinct AECOM office, laboratory or other company facility.

2.10 **Exposure –** Any situation arising from work operations where an employee may ingest, inhale, absorb through the skin or eyes or otherwise come into contact with a hazardous substance.

2.11 **Flammable –** A substance that falls into one of the following categories:

2.11.1 **Flammable Aerosol** – An aerosol that when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening or flashback (a flame extending back to the valve) at any degree of valve opening.

2.11.2 **Flammable Gas** – A gas that at ambient temperature and pressure:

- Forms a flammable mixture with air at a concentration of 13% of volume or less; or
- Forms a range of flammable mixtures with air wider than 12% by volume, regardless of the lower limit.

2.11.3 **Flammable Liquid** – Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flash points of 100°F (37.8°C) or higher, the total of which make up 99% or more of the total volume of the mixture**.**

2.11.4 **Flammable Solid** – A solid, including a powdered, granular or pasty mixture of a substance 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**.**

Flammable Solids do not include blasting agents or explosives as defined in 8 CCR 5237(a).

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 **GHS** – The Globally Harmonized System of Classification and Labelling of Chemicals developed by the United Nations with the goal of an international system to define and classify the hazards of chemical products, and communicate health and safety information on labels and safety data sheets.

2.14 **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).

2.15 **Hazardous Substance –**A hazardous chemical or carcinogen, or a product or mixture containing a hazardous chemical or carcinogen provided that:

2.15.1 The hazardous chemical is 1% or more of the mixture or product or 2% if the hazardous chemical exists as an impurity in the mixture; or

2.15.2 The carcinogen is 0.1% or more of the mixture or product;

2.15.3 Manufacturers, importers and distributors will be relied upon to perform the appropriate hazard determination for the substances they produce or sell.

2.15.4 The following materials are not covered by the Hazard Communication Standard:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 USC 6901 et seq.) when subject to regulations issued under that act by the Environmental Protection Agency.
- Tobacco or tobacco products;
- Wood or wood products. Note: Wood dust is not exempt since the hazards of wood dust are not “self-evident” as are the hazards of wood or wood products;
- Consumer products (including pens, pencils, adhesive tape) used in the work place under typical consumer usage;
- Articles (i.e. plastic chairs);

- Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place;
- Foods, drugs, cosmetics in retail store packaged for retail sale; and
- Any drug in solid form used for direct administration to the patient (i.e., tablets or pills).

Hazardous substance shall be considered the equivalent term to 'controlled substance'.

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 **National Fire Protection Association (NFPA)** – The NFPA is a trade association that issues standards and codes concerning risks associated with fire. A system of categories has been established by NFPA standard 704; colors and numbers, to provide basic hazard information concerning hazardous materials. 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. Refer to *S3AM-115-ATT1 Pictograms &Sample Labels* for an example.

2.19 **Mixture –** Any solution or intimate admixture of two or more substances which do not react chemically with each other.

2.20 **Reactivity** – A measure of the tendency of a substance to undergo chemical reaction with the release of energy.

2.21 **SDS –** A Safety Data Sheet prepared pursuant to state and federal regulations, OSHA Form 174 and Canada regulations (Hazardous Products Act & Regulation).

2.22 **SDS Administrator –** The individual or group designated by the Office Manager (Operations) or Project Manager to maintain the location-specific inventory list or log and the SDS binder required if that location uses or stores hazardous substances.

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 safety data sheets (SDSs) and worker education and training programs.

3.0 References

3.1 Additional definitions can be found in the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Hazardous Material Regulations (HMR), the Transportation of Dangerous Goods (TDG) Regulations, and the International Air Transport Association (IATA) Dangerous Goods Regulation (DGR).

3.2 S3AM-003-PR1 SH&E Training

3.3 S3AM-117-PR1 Hazardous Waste Operations

3.4 S3AM-208-PR1 Personal Protective Equipment

3.5 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **SH&E Manager / SH&E Department**

- Audit their regional offices to confirm that they maintain a location-specific Hazardous Substance Inventory (HSI).
- Audit their regional offices to confirm that if a location-specific HSI is required, that current SDSs are available for each substance listed on the HSI.
- Provide interpretation of SDSs and hazard information for GHS labels/WHMIS labels/NFPA labels and other information to assist in training employees.
- Provide hazard communication training to AECOM employees and file documentation related to this training (e.g. trainer name, date trained, brief description of training, etc.).
- Review SDS for adequacy of completion to meet the OSHA and Canadian standard and returning them to supplier, if necessary.

4.1.2 **Manager / Site Safety Officer (SSO) / Supervisor**

- 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, safety data sheets, and employee information and training will be met.
- Appoint an SDS administrator for their location if they store or use hazardous substances.
- Confirm, if required, that the SDS Administrator maintains an HSI for their location.
- Confirm that a copy of this Procedure and the site-specific SDS are available to all employees (and/or their designated representative). Employees shall be instructed in the location of this Procedure and the SDSs.
- Confirm that all employees (including new employees) under their supervision have received the appropriate training required by this procedure prior to assigning employees to tasks involving the use of, or potential exposure to, hazardous substances.
- Notify employees of hazardous substances covered by this procedure 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 a current SDS (is replaced as new versions are issued) is available for each hazardous substance used, or potentially encountered, in the work areas or on the projects that are under their supervision.
- Confirm hazardous substances are properly labelled.
- Notify subcontractors (working for AECOM) of any hazardous substances that are used or stored by AECOM to which the subcontractor’s employees may be exposed.
- Notify clients or property owner/operators of chemicals brought onto their property by AECOM or AECOM’s subcontractors.
- Request SDSs from all subcontractor organization for the relevant chemicals they bring onto an AECOM controlled site.
- Access or obtain, and maintain copies of SDS from:

- The product manufacturer or supplier;
- All AECOM subcontractors bringing chemicals onto the project site; and
- The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.

4.1.3 **Employee**

- Confirm that they have received appropriate hazard communication training prior to working with materials that fall under the procedure.
- Only work with materials for which they have been instructed on how to find an SDS and how to work with that material safely.
- Utilize the appropriate Personal Protective Equipment (PPE) and spill containment materials as per the SDS.
- Provide a copy of all SDSs received to the SDS Administrator at their facility.
- Verify that an SDS is available in their work area for each hazardous substance that they use.

4.2 General Procedure

4.2.1 Confirm that containers of hazardous substances that they use are properly labelled. All employees have a right to, and should, know the properties and potential hazards of substances to which they may be exposed.

4.2.2 Should AECOM assign employees that do not read and speak English to tasks with chemical exposures, communications will be provided in the language understood by that employee.

4.3 Employee Information and Training

4.3.1 Training of employees on hazardous substances in their work area shall be conducted:

- At the time of their initial assignment;
- Whenever a new hazardous substance is introduced into their work area; and
- According to jurisdictional requirements (e.g., GHS, WHMIS, etc.).

4.3.2 As a minimum, the training requirements apply to employees in the following job categories:

- All employees who perform field work that involves the use of, shipping / receiving of, or potential exposure to, hazardous substances covered under the OSHA Hazard Communication Standard and WHMIS; and
- Laboratory Employees.

4.3.3 The Initial Training will provide instruction in the following:

- Methods and observations that may be used to detect the presence or release of a hazardous substance in the work area (such as personal monitoring, visual appearance or odor of hazardous substances being released, etc.);
- The physical and health hazards of substances in the work area and measures and procedures AECOM has implemented to protect employees; and
- The details of this hazard communication program, including an explanation of the labelling system and the SDS, and how he/she can obtain and use appropriate hazard information;
- Any operations in their work area in which hazardous substances are present;
- Location and availability of this written hazard communications program (this procedure);
- Their right to personally receive information regarding hazardous substances to which they may be exposed;

- Their right to have their physician receive information regarding hazardous substances to which they may be exposed; and
- Any relevant jurisdictional regulation, such as an employee's right against discharge or other discrimination (in California) due to the employee's exercise of rights afforded pursuant to provisions of the California Hazardous Substances Information and Training Act.

4.3.4 Periodic Training and Training for Non-Routine Tasks

Additional training will be provided to employees who have received initial training whenever:

- A new hazardous substance is introduced into their work area;
- A new or significantly increased risk has been identified related to an existing hazardous substance (e.g. as identified in an updated SDS); and
- Non-routine tasks are performed, which will potentially result in exposure to hazardous substances, or exposure under circumstances, which were not addressed during initial training.

Supervisors, in coordination with their SH&E Manager, shall provide such training through an explanation of the information on the contents of the SDS for that substance.

When training their employees, supervisors shall explain:

- Any health hazards associated with use of the substance or mixture;
- Proper precautions for handling;
- Necessary personal protective equipment or other safety precautions to prevent or minimize exposure; and
- Emergency procedures for spills, fire, disposal, and first aid.

For most projects involving field work, this periodic training requirement will be facilitated through the implementation of the site specific SH&E Plan that has been developed for the project.

4.3.5 Documentation of Initial and Periodic Training

- All training required shall be documented at the time it is performed by having the employee sign a copy of a training attendance sheet.

4.4 Hazardous Waste Exemption

4.4.1 In the U.S., hazardous wastes are excluded from the state and federal Hazard Communication standards. AECOM employees who handle or are otherwise exposed to hazardous wastes are covered by the requirements of the Resource Conservation and Recovery Act (RCRA) and other local waste related laws and regulations and the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and *S3AM-117-PR1 Hazardous Waste Operations.*

4.5 Hazardous Substance Inventory and Chemical Usage

Establishment of a Specific Hazardous Substance Inventory (HSI) or WHMIS Log, as referenced or contained within the safe to work plan, refer *S3AM-209-PR1 Risk Assessment & Management*, shall include:

4.5.1 If an AECOM location uses or stores additional hazardous substances, a location-specific HSI or WHMIS Log shall be maintained at that location.

4.5.2 If it is determined that an office-specific HSI is needed, the Manager shall confirm that one is developed and maintained by someone appointed as the location's SDS Administrator.

4.5.3 The HSI or WHMIS Log may be hard copy or managed through an electronic SDS management system.

4.5.4 The content of the HSI or WHMIS Log shall be updated as new hazardous substances are procured for, or removed from the location, and shall be verified by the SH&E Manager through regular inspections of the location.

4.5.5 In order to meet the 30-years-after-employment-termination record retention requirement, the office or project specific HSIs shall be managed as a permanent record.

Prior to using any chemical, a Task Hazard Analysis (THA) shall be completed by the employees assigned to use the chemical. The analysis will identify the hazards associated with the chemical (e.g. review the SDS to identify carcinogens or extremely hazardous chemicals), the tasks to be performed, and prescribe the Personal Protective Equipment (PPE) to be used, refer to *S3AM-208-PR1 Personal Protective Equipment.*

4.6 Safety Data Sheets (SDS)

4.6.1 Location-Specific SDS Inventory

- If it is determined that an AECOM location is required to maintain a location-specific inventory SDSs for the specific hazardous substances shall be maintained on file at that location.
- The SH&E Manager shall audit the local office or project for SDS request and maintenance and report deficiencies to the appropriate management level, as necessary, to confirm compliance with this procedure.

4.6.2 Field Project Sites and Client Facilities

- The Project Manager and/or the Site Safety Officer shall access or obtain, and maintain copies of SDS from:
  - The product manufacturer or supplier;
  - All AECOM subcontractors bringing chemicals onto the project site; and
  - The client, for all of the client's chemicals to which AECOM or AECOM subcontract employees are potentially exposed.

4.6.3 Employee Access to SDSs

SDSs should be maintained at the local location that uses that hazardous substance. Copies of this program and the SDS should be made available to the employee upon request to the office's SDS Administrator.

4.6.4 Field Access to SDSs

When hazardous substances are brought into the field, the user shall confirm that a copy of the SDS for that substance accompanies it and is available at the field location where it is to be used.

4.6.5 SDSs for AECOM Products

It is unlikely that AECOM activities would create a chemical for which a new SDS were needed. If such a chemical were created, the SH&E Department shall work with the appropriate operations groups to draft, review, and publish the new SDS.

4.6.6 Content of the SDS:

- Safety Data Sheets, previously referred to as Material Safety Data Sheets, will now require a 16-section format that is essentially the same as the ANSI standard for Hazardous Workplace Chemicals-Hazard Evaluation and Safety Data Sheets and Precautionary Labeling Preparation (ANSI Z400.1 & Z129.1 – 2010).
- Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- Section 2, Hazard(s) identification includes all information regarding the hazards of the chemical and the appropriate warning information associated with the hazards including classification, signal word, hazard statement, pictograms, and precautionary statement.

- Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.
- Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.
- Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.
- Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.
- Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).
- Section 9, lists the physical and chemical properties of the hazardous substance.
- Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
- Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.
- Section 12, Ecological information
- Section 13, Disposal considerations
- Section 14, Transport information
- Section 15, Regulatory information
- Section 16, Other information, includes the date of preparation or last revision.

SDSs that do not contain this information shall be returned to the distributor or manufacturer to be updated.

4.6.7 Trade Secrets

Some hazardous substance suppliers may claim the information requested on SDSs is proprietary and not provide the information to AECOM.

When SDSs supplied to the SH&E Manager indicate that proprietary information has been withheld, the SH&E Manager will either obtain the necessary information to make a hazard assessment or reject the material for use within AECOM.

4.6.8 For Canadian operations, all relevant SDS shall be current (no more than 3 years old) and readily available (in French and English) for all hazardous materials.

4.7 Labeling

4.7.1 Containers of hazardous substances used or stored in each AECOM location shall be labeled, tagged or marked with the following information:

- Product name or Identifier;
- Hazard Pictogram;
- Signal Word;
- Physical, Health, Environmental Statements;
- Supplemental Information;
- Precautionary Measures and Pictograms;

- First Aid Statements;
- Name and Address of Company; and
- Telephone Number.

4.7.2 Refer to *S3AM-115-ATT1 Pictograms & Sample Labels*.

4.7.3 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.

4.7.4 Formal and informal inspections shall include observing that hazardous materials are properly labeled.

4.7.5 Immediately replace lost or illegible labels provided the product can be conclusively identified. Any failure to have the appropriate labeling information on a container at any time, or illegible or missing labels will be cause to suspend use of the product until the product is conclusively identified and is properly labeled.

4.7.6 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.

4.7.7 Stationary Process Containers

If there is stationary process equipment within a work area (e.g., vessels, piping systems, etc.), signs, placards, pictograms, 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.

4.7.8 Portable Containers

Portable containers of hazardous substances need not be labelled when the substance is transferred from labelled containers and will be used immediately by the employee who performs the transfer, however the container shall still contain the product identifier (name). Immediate use means the container will remain in the employee's immediate possession and direct oversight until the container is fully emptied or contents are returned to a labelled container.

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 meeting workplace label requirements in accordance with the OSHA Hazard Communication Standard or WHMIS (as applicable to the given jurisdiction).

4.8 Chemical Storage

4.8.1 Hazardous chemicals are to be stored in labeled containers with the lids securely closed using appropriate undamaged caps or lids. Confirm liners are in place if used.

4.8.2 Flammable and combustible materials shall be stored in fire impervious cabinets in designated stockroom areas. Chemicals shall be stored in compliance with instructions provided on their labels, SDS, or the manufacturer's specifications (e.g. compatibility with other substances, environmental conditions, etc.).

NOTE: Flammable gases or other compressed gases should not be stored in flammable material cabinets as these cabinets are not designed for containment of pressurized gases.

4.8.3 All hazardous chemicals shall be stored in a manner that prevents spillage and leakage from exposing people or the environment to the chemical.

4.8.4 Hazardous chemicals shall not be stored with foods or beverages. Food and beverages shall not be consumed in areas where hazardous chemicals are used or stored.

4.9 Chemical Use in Offices

4.9.1 In general, hazardous substances should not be taken into office areas, conference rooms, or break areas, contact the SH&E Manager for guidance if this general requirement is infeasible.

4.9.2 General exceptions to this rule are the following:

- Liquid paper;
- Toner;
- Cleaners;
- Isobutylene calibration gas; and
- pH calibration solutions for instruments.

4.9.3 Each office or location using or storing hazardous materials will develop a written office/ location-specific Hazard Communication/WHMIS Program.

4.9.4 If the local office decides to implement the requirements of the standard in any way that differs from this procedure, they shall verify the changes with the SH&E Manager, document the changes, and communicate the differences to all affected employees.

4.10 Canada-specific

4.10.1 Consumer products are exempt from supplier labels and SDS requirements. Some cleaning solvents may be packaged as consumer products and these shall be labeled in accordance with the Consumer Product Act requirements.

4.10.2 In addition to the labelling of storage containers in the workplace, the contents of process piping (including valves), process vessels and reaction vessels are required to be identified through the use of colour coding, labels, placards or other modes of identifications that shall be communicated to workers through training programs. It is important for employees to be aware of and understand Client labelling requirements for these types of process systems.

5.0 Records

5.1 HSI or WHMIS Logs shall be retained in project or office files for a minimum of 30 years or according to jurisdictional requirements.

5.2 Training documentation shall be retained in accordance with *S3AM-003-PR SH&E Training*.

6.0 Attachments

6.1 S3AM-115-ATT1 Pictograms & Sample Labels

Americas

Stop Work Authority

S3AM-002-PR1

1.0 Purpose and Scope

1.1 This procedure establishes the requirements for AECOM personnel to stop any task or company operation if they believe there is an imminent safety, health, or environmental risk as described within this document.

1.2 The AECOM Safety Red Card is a key component in the Stop Work Authority for Unsafe Work procedure. The Safety Red Card is derived from its use in football (soccer), where circumstances are such that a referee has to stop the play, similar to an imminently dangerous situation on a project site. The Safety Red Card is a physical tool that reinforces the Stop Work Authority Procedure.

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

2.0 Terms and Definitions

2.1 **Contractor** – For the purposes of this procedure, a person or business whose contract to provide work or services is not with AECOM. AECOM may have the responsibility of safety oversight for Contractor-controlled work on a particular project or construction site if specified in the associated contract.

2.2 **Direct Subcontractor** – For the purposes of this procedure, a person or business which has a contract directly with AECOM to provide work or services.

2.3 **Imminent Danger –** For the purposes of this procedure, an immediately dangerous situation that, if left uncorrected, is likely to result in serious injury, loss of life, or environmental impairment.

2.4 **Project Management / Construction Management (PM-CM)** – AECOM has contractually agreed with the client to the specified roles and responsibilities of oversight of Contractor-controlled work for the given project.

2.5 **Safety Red Card** - A tangible reminder of stop work authority for all AECOM employees that can be presented when stopping work. The intent is for every employee to have or have access to their own Safety Red Card.

2.6 **Stop Work Order – AECOM and Direct Subcontractors -** A directive to cease AECOM-directed work, issued for failure to follow procedures, Imminent Danger situations/conditions, accumulation of safety violations, etc. The Stop Work Order will also be completed when there is disagreement between those affected or involved regarding the validity of the stop work issue or adequacy of the resolution actions. The Stop Work Order will apply to AECOM employees and AECOM Direct Subcontractors placed at risk by the identified situations or conditions. Refer to *S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors*.

2.7 **Stop Work Order – Project Management / Construction Management** – Applies to Contractor-controlled work for which AECOM Project Management / Construction Management (PM-CM) has contractually agreed to the responsibility of safety oversight of Contractors for the given project. A directive served to the Contractor to cease Contractor-controlled work, issued for failure to follow procedures, Imminent Danger situations / conditions, accumulation of safety violations, etc. Refer to *S3AM-002-FM2 Stop Work Order-Project Management / Construction Management.* Note: If PM-CM has not contractually agreed specifically to oversight of safety, this form does not apply.

3.0 References

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

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees**

- Any time an employee identifies a condition or act that is likely to cause an Imminent Danger situation:
- Responsible for stopping associated AECOM-directed work and that of Direct Subcontractors, and for bringing it to the attention of the appropriate supervisor, manager, SH&E Representative, and/or Contractor representative.
- Where Employees are working alongside Contractors for which AECOM has contractual Project Management / Construction Management (PM-CM) safety oversight of the Contractor, employees shall be responsible for stopping associated Contractor-controlled work and for bringing it to the attention of the appropriate supervisor, manager, SH&E representative, and/or Contractor representative.
- Where employees are working alongside Contractors for which AECOM PM-CM has not contractually agreed to the responsibility of safety oversight of Contractors for the given project, employees can, as applicable, report unsafe conditions/acts to the Contractor's site representative (supervisor, foreman, etc.) for resolution. Employees shall promptly report the situation to AECOM management.
- Where no contract exists between AECOM and the party presenting the situation, employees can, as applicable, and report unsafe conditions/acts to the parties' site representative (supervisor, foreman, etc.) for resolution. Employees shall promptly report the situation to AECOM management.
- Where Employees are working under the direction of client / customer supervisors and/or working on a task with a client / customer employee, Employees shall be trained, as is applicable, to communicate directly with the worker involved, report the unsafe conditions/acts to their client / customer supervisor and/or point-of-contact for resolution and subsequently report it to AECOM management.
- Decline to participate in client / customer-directed work under unsafe conditions or acts and immediately report the situation to AECOM management.
- Employees shall retain their individual Safety Red Card. An Employee may or may not physically present a Safety Red Card when stopping work.

4.1.2 **SH&E Manager**

- Review all Stop Work Orders applicable to their scope.
- Provide technical guidance for the development and implementation of corrective actions.
- Training of AECOM Employees should include how to exercise stop work authority and the measures AECOM management will take as a result of the work stoppage.
- Honor any worker refusals of unsafe work. Assist in resolving issues before operations resume, and that all stop work actions are properly resolved with required follow-up completed.

4.1.3 **Manager**

- Establish a safety culture where the stop work authority is embraced by the workforce as a tool so that all AECOM employees share the responsibility for safe working conditions.
- Training of AECOM Employees should include how to exercise stop work authority and the measures AECOM management will take as a result of the work stoppage.
- AECOM Employees have or have access to their own Safety Red Card and understand its meaning.

- Contractors for which AECOM PM-CM has contractual safety oversight, and Direct Subcontractors are informed of the stop work authority of AECOM and its Employees as a regulatory and Company requirement, as well as the intent of the program, which is to empower employees to work safe and prevent injuries.
- Clients / customers understand stop work authority of Employees is a regulatory and Company requirement, as well as the intent of the program, which is to empower Employees to work safe and prevent injuries.
- Honor any worker refusals of unsafe work, Resolve issues before operations resume, and that all stop work actions are properly resolved with required follow-up completed.
- Confirm reporting is completed any time an Employee exercises stop work authority
- Review so that Reporting is appropriate to the stop work situation, using inspection and observations programs (e.g. LifeGuard, Office Inspections, etc.) and IndustrySafe. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation* for additional direction.
- Maintain and track reports associated with the stop work situation until resolved/closed.
- Stop work interventions that include a near miss or incident shall be reported as such.
- Review for Stop Work Orders completed when AECOM Employees or Direct Subcontractors completing AECOM-directed work fail to provide resolution to the stop work situation, or if at any time the actions or failure to act of those involved in the Stop Work Order cause Imminent Danger to the health and safety of Employees, any other person at the place of employment, or the environment. Refer to *S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors*.
- Review Stop Work Orders – Project Management / Construction Management are completed when Contractors performing Contractor-controlled work, subject to AECOM contractual safety oversight, fail to provide resolution to the stop work situation, or if at any time the actions or failure to act of those involved in the Stop Work Order cause Imminent Danger to the health and safety of Employees, any other person at the place of employment, or the environment. Refer to *S3AM-002-FM2 Stop Work Order – Project Management / Construction Management*.
- When an unsafe condition or act has been reported by an AECOM Employee of a Contractor for which AECOM does not have specific contractual safety oversight, communicate promptly with client representative(s).
- Review corrective actions have appropriately addressed the conditions leading to the stoppage of work or the Stop Work Order.
- If AECOM has control over the circumstance that led to the condition, initiate additional corrective actions necessary to correct the conditions leading to the Stop Work Order. Otherwise, remain in communication with the persons or entities that are taking the corrective measures.
- Communicate such corrective actions and the effects of such corrective actions on the project / location / office to the client and/or next level of AECOM Management.
- Work activities of AECOM-directed work should not resume until the stop work situation has been resolved to the satisfaction of all involved and/or the appropriate approvals received to resume work.
- Monitor that work activities of Contractors subject to AECOM contractual safety oversight do not resume work until the unsafe situation has been resolved.
- Documentation related to the Stop Work Order and corrective actions is placed in the project / location / office file.

4.2 Requirements

4.2.1 Employees shall be trained in how to exercise stop work authority, the use of the Safety Red Card and in the measures AECOM management will take as a result of the work stoppage.

4.2.2 Employees will each be provided a Safety Red Card for their own use.

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

- "Stopping work" for AECOM-directed work may include stabilizing an Imminent Danger situation, as is safely possible, to the extent that it can be left unattended for a prolonged period of time until the issue is resolved.
- Stop work interventions to correct some unsafe situations that do not present an Imminent Danger (e.g., to remind workers to put on their hard hats, safety glasses, etc.) may not require formal stop work notification but should be appropriately reported (e.g. LifeGuard, Inspection Report).

4.2.4 There will be no retribution or any form of intimidation directed against an employee for good faith reporting of SH&E issues or the good faith stopping of work due to unsafe conditions.

4.2.5 Where Employees identify an unsafe act or condition related to a Contractor or worker for which AECOM does not have specific contractual safety oversight , as applicable, Employees should report the situation to the Contractor or worker's site representative (supervisor, foreman). Employees shall immediately report the situation to AECOM management who, in turn, shall promptly communicate with the client representative(s).

- While Employees may not be authorized to stop client / customer-directed work, Employees shall decline to participate in work under the Imminently Dangerous situation and immediately report the situation to the client / customer representative and AECOM management.

4.2.6 AECOM's stop work authority applies to all work AECOM-directed work and to Contractor-controlled work for which AECOM PM-CM has contractually agreed to the responsibility of safety oversight of Contractors for the given project.

- When an Employee identifies an Imminent Danger situation, the Employee shall immediately stop work and notify the affected co-worker(s) and supervisor, manager, SH&E representative and/or Contractor representative.
- If the supervisor / manager / representative is not readily available and/or the affected person(s) are in an Imminent Danger situation, the stop work intervention should be initiated directly with the Employee(s) at risk. The supervisor / manager / representative shall be informed as soon as possible.
- The supervisor / manager / representative shall communicate the stop work situation with any other affected personnel and the applicable client / customer representative(s).
- Managers, and/or SH&E Managers may issue a formal Stop Work Order for AECOM-directed work in the following situations:
    - Imminent Danger exists involving an employee's safety and health, that of any other person at the place of employment or damage to the environment, facilities, or property.
    - A project, or any segment of the project, is executed improperly or is out of compliance with applicable regulations or standards.

4.2.7 Stop Work Order – Project Management / Construction Management

Applies to Contractor-controlled work for which AECOM Project Management / Construction Management (PM-CM) has contractually agreed to the responsibility of safety oversight of Contractors for the given project. Refer to *S3AM-002-FM2 Stop Work Order- Project Management / Construction Management.*

- With a stop work situation related to Contractor- controlled work for which AECOM has contractually specified safety oversight, the Contractor is expected to immediately resolve the stop work situation. A Stop Work Order – Project Management / Construction Management form must be completed if:

- Imminent Danger exists involving the Employees' safety & health, the environment, facilities, or property.
- There is a discrepancy, deficiency, or potentially dangerous condition or act that is likely to cause an unsafe or unhealthy situation or an Imminent Danger situation.

- When a Stop Work Order – Project Management / Construction Management is issued by AECOM, the Contractor is expected to establish and document corrective actions and provide items (e.g. pictures, documents, etc.) related to the stop work situation and related corrective actions. AECOM will monitor the Contractor's corrective actions.

4.2.8 Stop Work Order – AECOM Employees and Direct Subcontractors

With a stop work situation related to AECOM-directed work, the appropriate parties (e.g. affected personnel, supervision, SH&E representative, management, client / customer representative, etc.) shall discuss and gain agreement on the stop work issue.

- If determined and agreed by all involved that the task or operation is cleared to safely proceed, the affected persons shall immediately resume work.
- If determined and agreed that the stop work issue is valid, then every attempt must be made to resolve the issue for the safety of Employees, Contractors, any other person at the place of employment, and the environment.
- If the stop work issue cannot be resolved immediately, work shall be suspended until proper resolution can be achieved to the satisfaction of all involved.
- If all affected by the stop work issue cannot agree that work can be resumed safely (opinions differ regarding the validity of the stop work issue or adequacy of the resolution actions), a Stop Work Order must be completed. Refer to *S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors*.
    - In order for work to resume, the completed Stop Work Order must be reviewed by the Manager, the applicable SH&E Manager and any other parties necessary (this may include the Employee who initiated the stoppage of work) to determine whether work can be resumed safely.
- If it is determined work can be resumed safely but the disagreement remains, work will only commence with the written approval to return to work by the Vice President of the applicable business group and, as applicable, the client representative. Refer to *S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors.*
- If the responsible organization fails to provide resolution, or if at any time the responsible organization's acts or failure to act cause Imminent Danger to the health and safety of **Employees**, that of any other person at the place of employment, or the environment, AECOM may issue a Stop Work Order. Refer to *S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors*.

4.2.9 In most cases, a Stop Work Order affects only those areas immediately involved in the hazardous situation. The Stop Work Order will apply to AECOM – directed work, its **Employees** and its Direct Subcontractors placed at risk by the situations or conditions. The Stop Work Order – Project Management / Construction Management will apply to Contractor-controlled work and its employees for which AECOM PM-CM has contractually agreed to the responsibility of safety monitoring of Contractors for the given project.

4.2.10 AECOM may issue a Stop Work Order for a portion of the work area(s) or for an entire work area when unacceptable risks exist.

4.2.11 The Stop Work Order will remain in effect until the responsible organization resolves the problem(s) and brings the work area(s) to satisfactory conformance with established AECOM SH&E requirements. Corrective actions taken and preventative measures put in place must be communicated to all affected by the Stop Work Order.

4.2.12 Work will not resume until appropriate corrective actions have been completed. The “Return to Work” portion of the Stop Work Order must be completed.

4.2.13 An AECOM Employee’s failure to comply with any Stop Work Order in whole or in part may result in disciplinary action, and/or termination of employment. An AECOM Direct Subcontractor Employee’s failure to comply with any Stop Work Order may result in immediate removal from the project, location and/or office.

5.0 Records

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

6.0 Attachments

6.1 S3AM-002-FM1 Stop Work Order – AECOM Employees and Direct Subcontractors

6.2 S3AM-002-FM2 Stop Work Order – Project Management / Construction Management

6.3 S3AM-002 ATT1 Stop Work Order – Authority Table

Americas

Subcontractor Management

S3AM-213-PR1

1.0 Purpose and Scope

1.1 This procedure applies to all AECOM Americas based employees and operations and to subcontractors of any tier. A subcontractor is a person or business which has a contract (and is not an employee) with AECOM to provide some portion of the work or services on a project which AECOM has agreed to perform for the client.

1.2 This procedure does not apply to vendors. For the purposes of this procedure, a vendor is a service provider and, is a person or business which performs services. Examples of a vendor could be a food machine vendor supplier for a site canteen; a portable toilet delivery company; an office equipment repair service; etc.

1.3 This procedure does not apply to third-party contractor operations where there is no subcontract relationship between the contractor and AECOM. Safety issues regarding third-party contractor operations are governed by project-specific contracts, and are not covered by this procedure.

1.4 This procedure provides requirements on the evaluation of subcontractor safety, health, and environmental programs; contractual risk management; subcontractor safety performance on the job site; and the responsibilities of the Manager with respect to subcontractor jobsite performance.

1.5 Each AECOM subcontractor must be evaluated at least annually using *S3AM-213-FM1 Subcontractor SH&E Evaluation Form*, or equivalent process (e.g., third-party qualification vendor, internal pre-qualification databases), in order to perform work on any AECOM projects.

2.0 Terms and Definitions

2.1 Subcontractor - For the purposes of this procedure, a person or business which has a contract directly with AECOM to provide work or services related to AECOM or client work scopes beyond delivery or basic repairs. Examples of a subcontractor could be an engineer; a sign installer; a welding company; an office renovation company; etc. A person or business with a contract directly with AECOM that does not fall clearly within this definition may also be required by the applicable business group to comply with this procedure.

3.0 References

3.1 S3AM-015-PR1 Newly Hired or Transferred Employees

3.2 S3AM-209-PR1 Risk Assessment & Management

4.0 Procedure

4.1 Implementation of this procedure is the responsibility of the AECOM manager (Manager) directing activities of the facility, site, or project location.

4.2 The AECOM manager shall ensure appropriate training of AECOM personnel responsible for overseeing subcontractor work.

4.3 Subcontractors shall be appropriately trained, competent, and capable to perform their activities in a safe, healthful, and environmentally responsible manner.

- As applicable, verification of subcontractor training or competency, or medical clearance may be required.

4.4 AECOM direction shall be provided to the subcontractor's management (foreman, supervisor, Site Safety Representative, etc.). Direction of subcontractor employees shall be the responsibility of the subcontractor's management.

4.5 Pre-qualification of Subcontractor – The Manager shall complete the following procedures for all subcontractors proposed for projects covered by this procedure unless an equivalent process (e.g., third-party prequalification vendor, internal pre-qualification databases and procurement processes, etc.) is used. The Manager shall also require subcontractors to follow these procedures with respect to pre-qualification of sub-subcontractors of any tier.

4.5.1 Request all subcontractor candidates to complete the attached *S3AM-213-FM1 Subcontractor SH&E Evaluation Form* or equivalent (e.g., third-party prequalification vendors, internal pre-qualification databases).

4.5.2 Conduct an assessment of each subcontractor's qualifications with respect to the Subcontractor Evaluation Criteria contained in *S3AM-213-ATT1 Subcontractor Evaluation Criteria.*

4.5.3 If the subcontractor does not meet criteria outlined in *S3AM-213-ATT1 Subcontractor Evaluation Criteria*, the decision shall be that the subcontractor shall not be used. However, if a unique business need exists (e.g., subcontractor is a specialty subcontractor, only bid, client required, small business/minority set asides), the Manager shall initiate *S3AM-213-FM2 Subcontractor Variance Form* (or equivalent vendor/database approval).

- Subcontractor Variance documentation shall clearly identify how the risk of the unmet criteria will be managed, including expectations and requirements of the subcontractor in managing the risk. Examples may include, but are not limited to requiring the subcontractor to:
  - Submit a detailed safety mitigation plan associated with the unmet criteria.
  - Utilize the AECOM Safety Management System in place of the subcontractor system.
  - Utilize specific programs associated with the AECOM Safety Management system.
  - Provide disclosures of specific criteria or engage in inspections at greater frequency.
- Potential risk and liability impact of variance content can vary considerably based on contract, type of subcontractor, and workplace activities. Legal counsel should be consulted to ensure that the proposed variance for the subcontractor does not impose undue risk and liability for AECOM.
- Variance requirements shall be acknowledged and agreed to by the subcontractor prior to work commencing and compliance with the variance requirements shall be monitored by the Manager.
- Failure to comply with the variance requirements shall be grounds for termination (this shall be specified in the subcontract).

4.5.4 If the subcontractor has been successfully evaluated within the last 12 months, the successful evaluation may be substituted for the pre-qualification evaluation.

4.5.5 For long-term operations, update this evaluation within 12 months of the previous evaluation.

4.6 Contractual and Risk Management Requirements of Subcontractors

4.6.1 Ensure that the subcontractor is contractually bound to comply with applicable client and AECOM SH&E Program requirements (e.g. alcohol and drug policies, procedures, insurance, licenses, registrations, etc.).

4.6.2 The AECOM SH&E Plan does not, nor is it intended to, address procedures of subcontractors during their site activities.

4.6.3 The subcontractor shall maintain appropriate SH&E procedures, that at a minimum comply with client and AECOM requirements and those procedures applicable to work that is exclusive to their activities on the site, and for which they may have superior knowledge.

- Depending upon the contractual agreement between AECOM and the subcontractor, the subcontractor may be required to develop a project SH&E Plan. Subcontractors' SH&E Plans shall, at a minimum, conform to the requirements of the AECOM SH&E Plan
- AECOM's scope of work under the client contract and the contract with the subcontractor can determine to what extent AECOM is required to review subcontractor plans and procedures. If in doubt consult legal counsel. In general, concerning subcontractors contracted to AECOM:
  - AECOM can be expected to review subcontractor plans and/or procedures in which AECOM can reasonably be expected to have adequate knowledge (e.g., Fitness for Duty, Hazard Assessment & Risk Management, Stop Work Authority, etc.).
  - AECOM can be expected to verify documentation and general adequacy of relevant subcontractor SH&E plans and/or procedures for which the subcontractor has superior knowledge.

4.6.4 Ensure that AECOM has the right in its subcontract, without liability to AECOM, to stop the subcontractor's work in the event of any violations of the applicable safety requirements.

4.6.5 Managers shall require subcontractors to follow pre-qualification procedures for lower-tiered subcontractors.

4.7 Subcontractor Safety Representative

4.7.1 Require each subcontractor to appoint a Subcontractor Safety Representative (SSR) who:

- Is knowledgeable of the subcontractor's activities.
- Understands the safety requirements of the subcontractor's activities.
- Has the ability to recognize and the authority to correct safety deficiencies and execute a stop work order should an imminent danger arise.
- Has the responsibility for the administration of the subcontractor safety program.
- Will serve as the direct contact with AECOM regarding resolution of SH&E issues
- Will report work-related injuries/illnesses/incidents, environmental incidents and regulatory inspections/violations to AECOM according to AECOM procedures and/or client requirements.

4.8 Communication

4.8.1 Provide the SSR with information regarding site safety program including but not limited to:

- Client Requirements
- Project SH&E Plan
- AECOM SH&E Program
- Site Hazard Communication Program
- Site Emergency Plan
- Any additional safety information from other contractors or subcontractors working on the site.

4.8.2 Subcontractors and their employees shall engage in a hazard assessment and risk management process equivalent to or exceeding that of AECOM. Refer to *S3AM-209-PR1 Risk Assessment & Management*.

- If the subcontractor process is deficient, the subcontractor management shall utilize AECOM's process to supplement for the deficiency and train their employees appropriately.

4.8.3 Subcontractors shall participate in site safety briefings including, and as applicable, orientations, project kick-off meetings, hazard assessments, inspections, tailgate / toolbox meetings, and post-job meetings.

4.8.4 Subcontractors shall comply with all safety directives and/or stop work orders issued by the AECOM representatives.

4.8.5 Subcontractors shall notify the AECOM manager when they will utilize short service employees (SSE) to perform on-site activities. The AECOM manager approval of any SSE shall be obtained by the subcontractor prior to mobilization. Subcontractor site management will interact with the short service employee to verify their level of competency and manage the subcontractor SSE in accordance with *S3AM-015-PR1 Newly Hired or Transferred Employees* or an equivalent process.

4.8.6 Prior to the start of work, roles, responsibilities, communication chain-of-command, and emergency preparedness procedures shall be established.

4.9 Subcontractor Performance

4.9.1 To the extent reasonable in light of AECOM's scope of work under the client contract, the AECOM Manager (or designee) should visit the site and periodically observe subcontractor's operations (e.g., conduct spot checks) to assess whether subcontractor appears to be conducting their operations in accordance with applicable safety requirements. Periodically review any required subcontractor health and safety performance and written documentation for compliance with applicable requirements. *S3AM-213-FM4 Subcontractor SH&E Data Submission* may be used to obtain monthly SH&E metrics from the subcontractor.

4.9.2 Information shall be compiled and subcontractor performance assessment should be documented using *S3AM-FM3 Subcontractor SH&E Performance Assessment* or equivalent.

4.9.3 In the event that unsafe acts or unsafe conditions are observed, immediately stop work, and bring them to the attention of the SSR for resolution.

4.9.4 The AECOM Manager shall ensure incidents and significant near misses related to subcontractor operations are investigated to identify causes and corrective actions.

4.9.5 In the event of serious and/or continuing subcontractor breaches of applicable requirements, contact legal counsel to assess whether formal contractual action is appropriate under the subcontract.

4.9.6 Once a job is completed, a subcontractor's performance should be reviewed and feedback provided to subcontractor management. This should be documented using *S3AM-FM3 Subcontractor SH&E Performance Assessment* or equivalent.

5.0 Records

The following documentation will be maintained in the project file:

5.1 S3AM-213-FM1 Subcontractor SH&E Evaluation Form or equivalent.

5.2 S3AM-213-FM2 Subcontractor Variance Form or equivalent, if applicable.

5.3 S3AM-213-FM3 Subcontractor SH&E Performance Assessment or equivalent.

5.4 S3AM-213-FM4 Subcontractor SH&E Data Submission, if applicable.

5.5 Identified safety deficiencies as applicable for subcontractors and verification of correction of conditions.

5.6 All other safety-related subcontractor documentation (e.g., training certifications, incident reports, etc.

6.0 Attachments

6.1 S3AM-213-ATT1 Subcontractor Evaluation Criteria

6.2 S3AM-213-FM1 Subcontractor SH&E Evaluation Form

6.3 S3AM-213-FM2 Subcontractor Variance Form

6.4 S3AM-213-FM3 Subcontractor SH&E Performance Assessment

6.5 S3AM-213-FM4 Subcontractor SH&E Data Submission

Americas

Medical Screening & Surveillance

S3AM-128-PR1

1.0 Purpose and Scope

1.1 Provides a streamlined process to determine if employees meet the physical requirements to perform assigned duties as defined by applicable regulations.

1.2 Designed to provide a means to collect data relevant to exposure to chemical and physical agents for the protection of the workers and to confirm the effectiveness of health and safety programs.

1.3 Applies to all AECOM Americas employees and operations and any other entity and its personnel contractually required to comply with this document's content.

2.0 Terms and Definitions

2.1 **Employee Exposure Record** - A record containing any of the following kinds of information:

- Environmental (workplace) monitoring or measuring of a toxic substance or harmful physical agent, including personal, area, grab, wipe or other form of sampling, as well as related collection and analytical methodologies, calculations and other background data relevant to interpretation of the results obtained.
- Biological monitoring results which directly assess the absorption of a toxic substance or harmful physical agent by body systems (e.g., the level of a chemical in the blood, urine, breath, etc.), but not including results which assess the biological effect of a substance or agent or which assess an employee's use of alcohol or drugs.
- Safety data sheets indicating that the material may pose a hazard to human health.
- In the absence of the above, a chemical inventory or any other record which reveals where and when used and the identity (e.g., chemical, common, or trade name) of a toxic substance of harmful physical agent

2.2 **Medical Director –** A physician, board-certified in occupational medicine, employed by the Medical Services Provider (MSP). The Medical Director manages the services provided by the MSP and provides to AECOM guidance on medical matters.

2.3 **Medical Services Provider (MSP) –** Manages all occupational medical services, including medical surveillance programs, travel medicine, documentation, and injury intervention for first aid support for employees with occupational injuries or illnesses.

2.4 **Participating Employee** – Those employees required to participate in the medical screening and surveillance program will be identified by the Supervisor, Operations and SH&E Manager. Medical surveillance is required for employees who are or may be:

- o Exposed to substances at or above the occupational exposure limits.
- o Required to participate by regulatory provisions (e.g., asbestos, lead OSHA standards, designated substances).
- o Fit-tested for or wearing a respirator in the field.
- o Working on sites/projects with specific state, provincial/territorial or federal medical surveillance requirements.
- o Driving a commercial motor vehicle.
- o Performing safety sensitive tasks.

2.5 **Physical Activity Restriction –** To prevent aggravation of an existing condition, the Medical Doctor recommends a physical activity restriction to limit exposure to a chemical or class of chemicals (e.g., benzene, lead), a physical agent (e.g., noise), or an activity (e.g., heavy lifting).

3.0 References

3.1 S3AM-214-PR1 International Travel

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Employees**

- Ensuring that he/she maintains a current work clearance as required for the performance of assigned work duties.
- All employees designated to participate, called Participating Employees, in the medical surveillance program as a condition of employment or participate voluntarily and will be notified in advance if they will be assigned to a location, project or client which requires a Medical Surveillance and Surveillance program.
- If employee knows or suspects that he/she may have an adverse reaction to completing elements of the physical, (such as blood draws, physical limitation, etc.) then the employee should notify the MSP at the time they schedule the physical so that appropriate safeguards may be taken to protect the health of the employee.
- Communicate any change in medical condition (e.g. medications, pregnancy), to MSP to allow for evaluation of the need for additional precautions.

4.1.2 **Supervisors and Operations Managers**

- Evaluates the duties of each employee and prospective employee reporting to him or her for potential participation in the medical screening and surveillance program.
- Responsible for ensuring that the employee is enrolled in the medical screening and surveillance program if the employee's position requires participation. Consult with a SH&E Manager if assistance is needed in determining if an employee is required to participate in the program.
- Assures employees in positions that require medical surveillance in order to meet their job description may not be on site until they have satisfactorily completed the baseline or pre-employment medical examination.

4.1.3 **Safety, Health, & Environment (SH&E) Department**

- Serves as the primary point of contact between the employee, employee's supervisor, the MSP and the SH&E Department.
- Provides information regarding medical surveillance documentation, forms, and scheduling of services.
- Maintains a medical surveillance database and other associated documents (medical records are maintained by the MSP).
- Assists employees with scheduling of exams with the MSP.
- Participates in initial SH&E training and subsequent reviews and updates that will provide guidance on exam protocols.

4.1.4 **SH&E Manager**

- Reviews employee assignments with managers to ensure that all employees who should be participating in the medical surveillance program have been enrolled.
- Provides all assistance necessary to ensure all required information is provided to the Medical

Director.

- Report any change in requirements, protocols or concerns with the MSP to the Occupational Health Manager.

4.1.5 **Occupational Health Manager**

- Provide the MSP with appropriate references (e.g., a copy of this procedure, regulations).
- Designate other employees to participate in certain parameters of the medical screening and surveillance program after consultation with the Medical Director.

4.1.6 **Medical Director**

- Requires an exposure-specific examination when he/she has reason.
- Determine the frequency of the exposure-specific medical examinations.
- Consults with the Occupational Health Manager.

4.2 General Requirements

4.2.1 All AECOM employees whose work assignments involve potential exposure to harmful chemical and/or physical agents should participate in the medical surveillance program. Guidance as to harmful potential exposures is presented in *S3AM-128-FM1 Medical Surveillance Evaluation (MSE).* The form provides the primary guidance for determining whether medical screening is required for an employee and the frequency of periodic exams. The MSE is to be completed by the employee and his/her supervisor at the time of hire for any employee who may work outside an office environment. At each annual performance review, the MSE is to be reviewed for accuracy. Other reviews are required whenever there is a change in job tasks.

4.2.2 In addition, employees may be requested to participate in the medical surveillance program if they perform a task that requires an assessment for fitness for duty (e.g., lifting, climbing, etc.). The Supervisor, Operations Manager and SH&E Manager will identify activities/tasks that will require fit-for-duty assessments.

4.2.3 Medical screening and surveillance will only be performed were required by regulatory requirements or this procedure. Screening and surveillance provided at no cost to employees.

4.2.4 For medical screening and surveillance related to international travel, refer to *S3AM-214-PR1 International Travel*.

4.3 Types of Medical Examinations

The medical surveillance program consists of the following types of examinations:

- Baseline (initial)
  - The baseline medical examination is used to identify physical capabilities and medical limitations that may have an impact on the candidate's ability to perform in the position for which he/she is being considered and to provide a baseline against which periodic or project-specific monitoring can be compared. The baseline medical examination is used to determine the suitability of an existing employee for a new assignment (pre-placement) or a candidate's suitability to be hired (pre-employment) for a particular position.
- Periodic (annual or biennial)
  - The periodic medical examination is used to evaluate an employee's continued fitness for duty and to assess any impact occupational exposures may have on his/her health status. The periodic examination includes an update to the medical and work history, results of any occupational exposure assessments and a detailed medical examination tailored to the job description.
  - The SH&E Manager will assist in determining the frequency of the periodic medical examinations based on regulatory requirements, the position held by the employee, and the level of exposure to physical, chemical, and biological agents.

- Employees performing work activities on HAZWOPER sites will receive exams based on the following schedule:

Annual	Working in an exclusion zone and the regulatory required exposure limit is exceeded for 30 or more days a year.
Biennial	Working in an exclusion zone more than 30 days a year and the regulatory required exposure limit is not exceeded.

- Exposure-specific
  - The exposure-specific examination consists of medical tests to assess the impact of occupational exposures associated with a particular activity or project. The Medical Director or SH&E Manager will require an exposure-specific examination when he/she has reason to believe occupational exposures are impacting or may be impacting the health of an employee.
- Exit/termination
  - Employees currently participating in an examination program will receive exit exams when they leave their work assignment as identified in *S3AM-128-ATT1 Exit Exam Determination.* In the event an employee declines the exit exam, the employee will be requested to sign *S3AM-128-FM2 Waiver of Exit Medical Surveillance Exam*.
  - An exit medical examination is offered when an employee leaves the medical surveillance program, either because of termination of employment with AECOM or because of reassignment to a position not designated to participate in the medical surveillance program or if conditions in the workplace no longer constitutes the need for the medical surveillance (e.g., change in product).
  - The exit examination assesses any impact occupational exposures may have had on the employee's health status.

4.4 Exam Protocols

4.4.1 *S3AM-128-ATT2 Exam Protocol* identifies the medical exam components of exam.

4.4.2 The evaluation will be confidential and provided during normal business hours. Employees will be offered the opportunity to discuss the results of the evaluation with the MSP. All exam results are considered personal and confidential information, and will not be stored in any unsecured records not transmitted without the employee's permission.

4.5 Participating Employee Guidance and Documentation

4.5.1 When necessary, based on the position being filled, the hiring Supervisor and Human Resources Representative informs the candidate that the offer of employment is contingent on the candidate being physically and medically qualified to perform the duties of the position for which he/she is being hired. The hiring Supervisor and Human Resources Representative may not allow the candidate to begin employment until the conditions of the offer letter have been satisfied.

4.5.2 When designated to participate in the medical surveillance program, the Employee completes and signs the following documents:

- Medical and Work History Questionnaire (provided by the MSP).
- Medical Records Release authorizing MSP to receive the work clearance certificate.

4.5.3 Any Employee that has not completed the required medical evaluation after 30 days of an expiration date will be issued a non-qualified statement. The Employee is not permitted to perform the associated task and/or work until the required medical evaluation is completed and a qualified statement is issued by the Medical Director.

4.5.4 If an exam becomes due during an employee's pregnancy, it is advised to defer the exam until after delivery and the employee returns to work from family/medical leave status.

4.5.5 Human Resources Representative

- Notifies the SH&E Manager or designee to arrange for exit medical examination, upon notification of termination or impending termination from the Supervisor. In the event an employee declines the exit exam, the employee will be requested to sign *S3AM-128-FM2 Waiver of Exit Medical Surveillance Exam*.
- Place the original waiver in the employee's Human Resources personnel file and send a copy the MSP.

4.5.6 Medical Services Provider (MSP)

- Provides notification approximately 30 days before subsequent periodic or exposure-specific medical examination is due.
- Notify the employee 30 days before the periodic or exposure-specific medical examination is due.
- Provides notification of delinquent medical examinations.

4.5.7 Operations Manager

- Facilitate the management and exchange of documentation regarding the medical screening and surveillance program between AECOM (typically employee's supervisor) and MSP using the *S3AM-128-FM3 Scheduling Request Form*. If exams for multiple employees is required, the information from page 1 of the Scheduling Request Form and the requested exams can be placed in a spreadsheet and sent to the MSP.
- Schedule the initial exam for newly hired or re-assigned employees as needed. Special requests should be coordinated with the SH&E Manager, prior to contacting MSP to schedule.
- Assist employees with scheduling examinations as necessary.
- Coordinate medical surveillance program information exchange between Human Resources Representative and the MSP as necessary.
- Notify the candidate's manager and Human Resources upon receipt of the work clearance.
- Provide information from previous examinations that may not be readily available.

4.5.8 SH&E Manager

- Provides such assistance as is requested by the hiring Supervisor to ensure the job description for the position being filled adequately describes the physical, chemical, and biological stresses of the position, and the PPE used or which may be used, including respiratory protection.
- Provides all necessary assistance to ensure that required and appropriate information is provided with the request and authorization for medical examination.
- Provides assistance to the hiring Supervisor to interpret physical activity restrictions if such restrictions are noted on the work clearance certificate.
- Confirms that all relevant exposure assessments have been appropriately annotated to show the applicability to the employee and forwarded to the MSP.
- Confirms that employees on the delinquent medical examination list have been removed from designated assignments.
- Provides assistance to ensure that terminating and reassigned employees are offered the opportunity to take an exit medical examination.

4.5.9 Supervisor

- Arranges work assignments so that the employee is available to take the medical examination before the work clearance certificate expires.

- Removes the employee from the work assignment before the work clearance certificate expires until the medical evaluation is completed and a qualified statement is issued by the Medical Director.
- Contacts the Human Resources Representative, upon notification of termination or reassignment and requests they arrange for the MSP to perform an exit medical examination.
- Releases the terminating or reassigned employee from duties as necessary to complete the exit medical examination.

4.6 Reports

4.6.1 Report of Examination

- The MSP provides AECOM and the employee with a copy of the work clearance certificate, which will include any medical restrictions and address the employee's ability to use personal protective equipment. AECOM requires the employee to preserve the work clearance certificate in a safe place and provide copies to AECOM managers and clients when requested.
- The MSP will mail a confidential letter detailing the results of the exam to the employee's home address within 30 days of the exam date.

4.6.2 Examinations Due Report

- The MSP produces a list by organization code of employees due to be examined 30 days before the expiration of their work clearance certificate. This list is provided to SH&E Department, who ensures each Supervisor is notified of the employees in his/her charge who are due examinations so they may be scheduled appropriately.
- The MSP notifies each employee via email or phone to the office of record 30 days before the periodic or exposure-specific medical examination is due.

4.6.3 Delinquent Examinations Report

- The MSP distributes a report of delinquent medical examinations to the SH&E Department.
- When an employee's name appears on the delinquent examination report for two consecutive months, the SH&E Department must notify the SH&E Manager, who will bring this to the attention of the employee's Supervisor for resolution. If the delinquency issue is not resolved, the employee's regional management will be notified for final resolution.

4.6.4 Physical Activity Restriction Report

- The Supervisor maintains a list of employees who have physical activity restrictions.
- The SH&E Manager shall evaluate locations and projects periodically to ensure employees with physical activity restrictions are not exceeding their limitations. Concerns of an employee exceeding his/her physical activity restriction is brought to the attention of the employee's Supervisor for resolution.

4.6.5 Annual Reports

- The MSP provides annual reports of utilization, medical trends, and statistical analyses. These reports are prepared to improve the service, manage trends, and reduce the cost of the medical screening and surveillance program.

5.0 Records

5.1 Employees who participate in a medical surveillance or physical examination program or had exposure monitoring conducted will have access to all employee exposure and medical records maintained for that employee by AECOM and the MSP.

5.2 Upon an employee entering into a medical surveillance or physical examination program, the employee shall be informed of the following:

- The existence, location and availability of any records covered by this procedure
- The MSP responsible for maintaining and providing access to records and
- The employee's right of access to these confidential records.

5.3 Employees in medical monitoring programs are notified initially and annually thereafter, of the existence, location and ability to access medical records maintained by the MSP. Upon request, each employee (or designated representative) will have access to the employee's medical records. Prior to the release of health information to the employee (or designated representative), a specific written consent must be signed by the employee. Records will be provided in a reasonable time and manner at no cost to the employee.

5.4 Medical records must be preserved and protected in accordance with applicable legislative requirements for the duration of employment plus 30 years, verify local, state of federal regulations to confirm time period. Medical records contain information that is protected by the Privacy Act. To meet the obligations of preserving the medical records and protecting the information they contain, AECOM has arranged for the MSP to manage the medical records.

5.5 An employee or designated representative may request to review his/her medical. Such a request must be in writing and be signed and dated. The SH&E Manager or the SH&E Department will forward the request to the MSP, who will provide the employee with a copy of the medical records.

The MSP provides employees with a copy of their results after each physical. If employee would like a copy of their historical records, the MSP will supply the copy within 15 days after the request has been submitted by the employee or designated representative.

5.6 MSP performs quality control checks on all medical records to ensure examining physicians appropriately record the findings of the examination and tests.

The MSP has access to all medical records to perform quality assurance checks to ensure proper recording and preservation

5.7 Projects that use local clinics or employer/client clinics may store records at that site, but at the termination of the project, all employee medical records must be transferred to long-term record retention.

5.8 If in the event AECOM ceases operations, medical records will be transferred to the successor employer. If no successor employer is available, records will be transferred to the National Institute for Occupational Safety and Health.

6.0 Attachments

6.1 S3AM-128-ATT1 Exit Exam Determination

6.2 S3AM-128-ATT2 Exam Protocols

6.3 S3AM-128-FM1 Medical Surveillance Evaluation

6.4 S3AM-128-FM2 Waiver of Exit Medical Surveillance Exam

6.5 S3AM-128-FM3 Scheduling Request Form

6.6 S3AM-128-FM4 Waiver of Medical Screening & Surveillance Program

Americas

Competent Person Designation

S3AM-202-PR1

1.0 Purpose and Scope

1.1 Outlines the process and minimum requirements necessary for classifying an AECOM employee as a "Competent Person" to oversee and/or self-perform activities involved with tasks listed in this procedure. Employee competency to perform work activities is addressed elsewhere.

1.2 This procedure applies to all AECOM Americas-based employees and operations where AECOM is self-performing the identified activities and where AECOM controls projects performing activities requiring a Competent Person. This procedure also applies to any other entity and its personnel contractually required to comply with this document's content. Client-mandated requirements may apply on a project-specific basis and shall be addressed in supplemental documents (e.g. Task Hazard Assessment, SH&E Plan, etc.).

1.3 It is recognized that local regulations and legislation may contain alternate definitions for Competent Person and it will be the responsibility of the manager responsible for the work (e.g. Manager, Superintendent) in conjunction with the local SH&E Manager to determine if conflicts exist between AECOM and applicable regulatory/legislative definitions and resolve the conflict.

1.4 When a qualified employee within AECOM is not available to be designated as the AECOM Competent Person, the Manager in coordination with their SH&E Manager may designate an appropriately qualified and trained Contractor employee as the Competent Person for the AECOM operations.

2.0 Terms and Definitions

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

3.0 References

3.1 S3AM--213-PR1 Subcontractor Management

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 M**anager**

- Confirm that all assigned personnel, including personnel utilized from other offices to support their operations, comply with the requirements of this procedure. The manager responsible for the work shall:
  - Identify the need for a designated Competent Person or persons based on anticipated work activities.
  - Communicate competent person training/experience requirements with the employee and documenting completion of these requirements using *S3AM-202-FM-1 Competent Person Designation* or equivalent.
  - Identify supplemental employee training needs based on local/client requirements.
- For projects controlled by AECOM, when these activities are contracted to another party:
  - Confirm and secure the identity of the Contractor's Competent Person(s) for its activities. Refer to *S3AM-213-PR1 Subcontractor Management*.

- *S3AM-202-FM1 Competent Person Designation* or equivalent may be used for this purpose.
- Provide the Contractor with a copy of this SH&E Procedure to verify the Contractor's capability to comply with the requirements within, and obtain documentation to support the designation of the Contractor employee as a Competent Person for AECOM.

- Verify the designation of the Competent Person for a specific activity is documented and effectively communicated to field personnel on site during daily tailgate safety meetings.

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

- Assist the Manager responsible for the work in assessing the competency of all designated persons based on specific requirements outlined in this procedure.
- Assist the Manager in:
  - Establishing competent person training/experience requirements and communicating these requirements to the supervisor.
  - Monitoring the overall implementation of this SH&E Procedure.
  - Monitoring field compliance of this procedure.
  - Providing technical assistance/support as requested.
  - Coordinating internal safety training classes as requested.
- Support the Manager in establishing minimum competent person requirements for regulated job activities based on individual job descriptions, applicable regulatory requirements, operational considerations, and management directives.
- Review as requested by designated operations representatives the Competent Person's qualifications for AECOM employees.

4.1.3 **Competent Person**

- Predict, identify, and control hazards when either AECOM self-performs associated field work or oversees and directs the work of subcontractors.
  - For operations where AECOM is providing oversight of subcontractors (e.g. drilling services), it is the subcontractor's employee who shall be designated as the Competent Person.
- Contractor Competent Persons - Unless AECOM is self-performing, the Contractor shall:
  - Determine the safe means and methods of its work activities.
  - Designate its Competent Person(s) for each category of work the Contractor undertakes and/or controls as required by this procedure.
  - If the contractor is unable to designate a Competent Person, AECOM may designate an appropriate AECOM employee as the contractor's Competent Person only if AECOM is contractually responsible for safety oversight of the contractor's activities.
- The Contractor's Competent Person shall:
  - Technically support the Contractor's site operations for the safe execution of its activities. Identify and remove any field hazards
  - Maintain appropriate knowledge about the work activities, the Contractor's work practices and procedures and compliance with the associated safety and health regulations.

4.2 General Requirements

4.2.1 The AECOM Competent Person project or worksite functions are dependent on the project activities and AECOM's project or worksite function.

4.2.2 Refer to each SH&E Procedure for the activities listed below and the associated legislative standards to determine the details of responsibility.

4.2.3 The following activities require an individual to be designated as a Competent Person:

- Asbestos
- Assured Equipment Grounding Conductor
- Blasting & Explosives
- Concrete & Masonry Construction
- Confined Spaces
- Control of Hazardous Energy (Lockout-Tagout)
- Cranes & Derricks
- Crane Assembly / Disassembly
- Demolition
- Electrical Wiring Design & Protections
- Elevated Work Platforms & Aerial Lifts
- Fall Protection
- Hearing Protection
- Heavy Equipment
- Ionizing Radiation
- Lead
- Material Hoists & Personnel Hoists
- Stairways & Ladders
- Respiratory Protection
- Rigging Equipment
- Scaffolds
- Steel Erection
- Trench & Excavations
- Underground Construction
- Welding & Cutting

4.2.4 Generally, it is the responsibility of the Competent Person(s) to be on site at all times when respective staff (AECOM, subcontractor) are performing work governed by this procedure, make daily inspections of the conditions and work activities, and take actions to control any hazards associated with those activities.

4.2.5 The *S3AM-202-FM1 Competent Person Designation* or equivalent shall be used for all programs or on all projects for documenting Competent Person designations. Documentation shall be filled out completely and updated as necessary.

4.2.6 *S3AM-202-ATT1 Competent Persons in General Industry (29 CFR 1910)* and *S3AM-202-ATT2 Competent Persons in Construction (29 CFR 1926)* include descriptions of various U.S. Occupational Safety and Health Administration requirements for competent persons. The list is not comprehensive and as such 29 CFR 1910 and 1926 shall be consulted for any additional competent person requirements.

5.0 Records

5.1 AECOM Competent Person Designation forms shall be maintained in the program / project file.

5.2 Documentation as to daily inspections and corrective measures by the AECOM Competent Person shall be maintained in the program / project file.

6.0 Attachments

6.1 S3AM-202-FM1 Competent Person Designation

6.2 S3AM-202-ATT1 Competent Persons in General Industry (29 CFR 1910)

6.3 S3AM-202-ATT2 Competent Persons in Construction (29 CFR 1926)

Americas

Exposure Monitoring

S3AM-127-PR1

1.0 Purpose and Scope

1.1 This procedure applies to the operations of AECOM and its subsidiary companies, and any other entity and its personnel contractually required to comply with this document's content, where employees may be exposed to airborne concentrations of hazardous air contaminants potentially exceeding permissible limits. Note that this standard does not cover monitoring for asbestos operations (S3AM-109-PR1), toxic and hazardous substances (S3AM-110-PR1), radiation (S3AM-120-PR1), non-ionizing radiation (S3AM-121-PR1), confined spaces (S3AM-301-PR1), heat stress (S3AM-113-PR1), or noise (S3AM-118-PR1).

1.2 The purpose of this procedure is to assist and provide guidance to AECOM personnel who need to conduct personal industrial hygiene monitoring and to control employee exposures to toxic or hazardous substances to the lowest level practicable, including those specified under applicable jurisdictional legislation. Monitoring will be conducted to evaluate the potential exposure of AECOM employees to airborne concentrations of hazardous particulates, fibers, gases, vapors, mists, pathogens, hazardous biological agents, or to oxygen-deficient atmospheres.

1.3 Personal monitoring shall be conducted under the following conditions:

1.3.1 Where directed by a facility or site-specific health and safety plan.

1.3.2 Where employees are exposed to known or suspected human carcinogens (e.g., beryllium, vinyl chloride, etc.).

1.3.3 Where regulations require "initial exposure assessments" (e.g., lead, asbestos, methylene chloride, hexavalent chromium). Certain regulations allow for an exemption to initial exposure assessments when exposure monitoring of similar exposure groups has been conducted under the same site conditions and for equivalent tasks within 1 year prior to the start of work on the current project or site.

1.3.4 When directed by a client or required by contract.

1.3.5 At the direction of a Safety Manager in response to employee concerns or incidents involving chemical exposure.

1.3.6 Co-sampling during regulatory inspections.

1.3.7 Routine monitoring in compliance with regulatory requirements.

2.0 Terms and Definitions

2.1 **Action Level (AL)** – An airborne concentration of a potentially toxic or hazardous substance, measured in parts per million by volume (ppm), microgram per cubic meter ($\mu g/m^3$) milligram per cubic meter (mg/m^3) or fibres per cubic centimetre (f/cc), that triggers certain provisions as required by the applicable jurisdictional legislation. In many cases the action level is 50% of the established exposure limit.

2.2 **Established Exposure Limit** – The maximum regulatory exposure concentration to which an individual may be exposed to for an 8- hour time weighted average (TWA).

- This limit is referred to by different terminology depending upon the given jurisdiction (e.g. Permissible Exposure Limit (PEL), Contamination Limit, Occupational Exposure Limit (OEL), Threshold Limit Value (TLV), etc.).

Acceptable methods of adjusting this limit to correspond to a different exposure period (e.g. 10 hours) vary by jurisdiction and substance.

3.0 References

3.1 S3AM-109-PR1 Asbestos

3.2 S3AM-301-PR1 Confined Spaces

3.3 S3AM-113-PR1 Heat Stress

3.4 S3AM-118-PR1 Hearing Conservation

3.5 S3AM-123-PR1 Respiratory Protection

3.6 S3AM-110-PR1 Toxic & Hazardous Substances

4.0 Procedure

4.1 Implementation of this standard is the responsibility of the AECOM manager directing activities of the facility, site, or project location.

4.2 Hazard assessments shall be completed to identify potential employee exposure to toxic or hazardous substances. Industrial hygiene monitoring conducted and prioritized as appropriate to the potential risk and in accordance with regulatory requirements.

4.3 Procedures for Personal Industrial Hygiene Monitoring

4.3.1 Personal industrial hygiene monitoring documentation shall include accurate and detailed descriptions of the work environment and of the work activities of each employee being monitored to evidence monitoring results are tied to the work operations conducted. This permits demonstration that suggested corrective actions are appropriate or adequate to control the exposure.

4.3.2 Individuals responsible for equipment maintenance and collection shall be appropriately trained. Engage applicable subject matter experts as necessary (e.g., industrial hygienists / technicians).

4.3.3 Maintain, service, and calibrate sampling equipment in accordance with the manufacturer's recommendations and, as applicable, the approved sampling methodology (may include both pre- and post-calibration to confirm consistent flow rates).

4.3.4 Collect samples using current applicable methodologies established by the National Institute for Occupational Safety and Health (NIOSH) *Manual of Analytical Methods*, U.S. Department of Labor – Occupational Safety and Health Administration (OSHA) *Sampling and Analytical Methods*, American Society for Testing Materials (ASTM), the Environmental Protection Agency (EPA), or applicable guidelines for the host country.

4.3.5 Select an analytical laboratory accredited by the American Industrial Hygiene Association (AIHA), or equivalent host country certification, licensing, or accreditation, to analyze the personal air samples.
Note: There are several programs under which a laboratory may receive AIHA accreditation. The laboratory shall be currently accredited for the specific program, scope category, and field of testing for the analysis that will be performed, not merely hold AIHA accreditation.

4.3.6 Confirm samples are submitted to the laboratory for analysis in a timely manner to confirm sample viability.

4.3.7 Require the selected laboratory to use the applicable analytical methodologies and document quality control procedures.

4.3.8 Confirm equipment is maintained, serviced, and calibrated in accordance with manufacturer's recommendations.

4.3.9 Document personal monitoring activities and work operations using the appropriate AECOM Industrial Hygiene Monitoring Form; require that all laboratory chain-of-custody forms be properly completed; and confirm samples are sealed and secured according to Quality Assurance procedures.

4.3.10 Confirm workers are being protected (e.g., engineering controls, administrative controls, and PPE, including respiratory protection) during the monitoring phase. Refer to *S3AM-123-PR1 Respiratory Protection* and *S3AM-208-PR1 Personal Protective Equipment*.

4.3.11 Reassessment of exposure hazards shall be conducted as appropriate when there are changes in conditions or work processes, and at suitable intervals based on potential risk and regulatory requirements.

4.3.12 Determine whether medical surveillance is required. Refer to jurisdictional requirements and *S3AM-128-PR1 Medical Screening & Surveillance*.

4.4 Evaluation of Personal Monitoring Results

4.4.1 Samples sent out for independent laboratory analysis will follow chain of custody requirements.

4.4.2 An AECOM Certified Industrial Hygienist (CIH) approved by a Safety Manager should evaluate the analytical results when feasible.

4.4.3 Obtain a written evaluation report from the SH&E manager. If exposures exceed the Action Level and/or Established Exposure Limit for the air contaminant(s) of concern, a verbal report is to be made to the senior facility, project, or site manager immediately, and follow up with the written report within any established timeframe. The evaluation report will include required corrective actions.

4.4.4 Complete evaluation reports within 5 working days of the receipt of the analytical results.

4.4.5 Results of all personal exposure monitoring will be provided to the SH&E department for inclusion in the employee medical records, refer to *S3AM-017-PR1 Injury & Illness Recordkeeping.*

4.5 Procedures for Direct-Read Air Monitoring

4.5.1 Direct-read air monitoring instruments are used primarily as screening tools to provide real-time evaluations of hazardous airborne contaminants at a project site.

4.5.2 Select an appropriate air monitor for the air contaminant to be measured.

4.5.3 Calibrate monitor in accordance with manufacturer's recommendations. Dates of full instrument calibration will be recorded on the direct-read instrument and on any associated calibration data sheets. If instrument calibrations are not performed daily, then daily bump tests (exposure to a known concentration of contaminant) will be performed to verify calibration and confirm alarms are working appropriately.

4.5.4 Conduct air monitoring using techniques identified by the instrument manufacturer and according to any identified methods (e.g. NIOSH, EPA, etc.).

4.5.5 Confirm equipment is maintained, serviced, and calibrated in accordance with manufacturer's recommendations.

4.5.6 Document personal monitoring activities using the appropriate AECOM Industrial Hygiene Monitoring Form.

4.5.7 Confirm workers are being protected (e.g., engineering controls, administrative controls, and PPE, including respiratory protection) during the monitoring phase. Determine whether medical surveillance is required.

4.5.8 Where required by client request or by unique or high hazard areas, individual portable direct-read monitors shall be used.

4.6 Evaluation of Personal Monitoring Results

4.6.1 Compare measured results with project-specific Action Levels and/or published Established Exposure Limits. If exposures exceed the Action Level and/or Established Exposure Limit for the air contaminant(s) of concern, take corrective actions as identified in the site-specific SH&E plan. If the SH&E Plan did not account for the identified hazard, or where questions exist about the results, contact the SH&E Manager to evaluate the analytical results for appropriate corrective action (this may involve consultation with a Certified Industrial Hygienist). The SH&E Plan should be updated accordingly.

4.7 Communication of Sample Results and Evaluation

4.7.1 Provide copies of the evaluation report to the employee(s) monitored and to employees working in the area for which the exposures could be representative, within 5 days of receipt of lab results.

4.7.2 Exposure results will be posted on site and explained in a safety briefing.

4.7.3 Provide a copy of the evaluation report and monitoring data to the client, owner, or manager directing activities of the facility or site for filing purposes.

4.7.4 Personal identifiers (e.g., name, address, employee number) or information which could reasonably be used to identify specific employees (e.g., exact age, height, weight, race, sex, date of initial employment, job title), shall be removed from analysis reports before access to the exposure data is provided.

4.8 Corrective Actions

4.8.1 Implement required corrective actions immediately.

4.8.2 If the exposure hazard cannot be eliminated or otherwise controlled through the use of engineering controls, the reason shall be documented and suitable administrative controls and personal protective equipment requirements developed.

4.8.3 Workers who may be exposed above the Established Exposure Limit or Action Limit, shall be appropriately trained and wear respiratory protection in accordance with *S3AM-123-PR1 – Respiratory Protection Program*.

4.9 Exposure Records

4.9.1 Exposure records include work activities / process descriptions, workplace monitoring, biological monitoring, material safety data sheets and chemical inventories. Sampling results, the collection methodology (sampling plan), a description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results obtained, shall retained for at least thirty (30) years.

5.0 Records

The following documents will be maintained in the project profile:

5.1 Calibration data.

5.2 Completed IH Monitoring Form(s).

5.3 Evaluation Report with sample results (provide copy to affected employee as well).

5.4 Corrective actions, including engineering controls.

5.5 Relevant prior initial exposure assessments.

6.0 Attachments

6.1 S3AM-127-FM1 General Industrial Hygiene Survey

6.2 S3AM-127-FM2 Industrial Hygiene Sample Field Sheet

6.3 S3AM-127-FM3 Total Dust Industrial Hygiene Sample Field Sheet

6.4 S3AM-127-FM4 Respirable Dust Industrial Hygiene Sample Summary

6.5 S3AM-127-FM5 Detector Tube Industrial Hygiene Sample Summary

6.6 S3AM-127-FM6 Gas/Vapor/Fume/Mist Industrial Hygiene Sample Summary

6.7 S3AM-127-FM7 Toxic Gas Monitor Industrial Hygiene Sample Summary

6.8 S3AM-127-FM8 PID/FID Monitoring Report

6.9 S3AM-127-FM9 Industrial Hygiene Evaluation Form

6.10 S3AM-127-FM10 Instrument Calibration Log

Americas

Environmental Compliance

S3AM-204-PR1

1.0 Purpose and Scope

1.1 This procedure establishes a process for assuring compliance with applicable environmental laws and regulations.

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

2.0 Terms and Definitions

The terms and definitions relating to environmental compliance and hazardous waste management are included in the respective laws and regulations in Canada, Latin America and the United States.

2.1 **Applicable Environmental and Hazardous Waste Management Laws and Regulations** – The specific legal requirements that apply to an AECOM office or project. Laws and regulations vary considerably throughout the Americas.

2.2 **Compliance Map** – a document defining and detailing the actions necessary to assure compliance with applicable environmental legal requirements.

2.3 **Reportable Quantity (RQ)** – quantities of hazardous substances, which when released to the environment require notification to the appropriate authorities / agencies (e.g., National Response Center, local police, coast guard, state / provincial / territorial reporting agency, etc.). Multiple agencies and regulations have established RQs; RQs may differ by agency.

2.4 **Subject Matter Expert** – a person who is an expert in a particular topic or area based on experience, technical/regulatory knowledge, and/or training.

2.5 **Hazardous Wastes** – Hazardous waste laws and regulations are complex and vary considerably throughout the Americas. For example, based on the Canadian Environmental Protect Act of 1999, in Canada hazardous wastes and hazardous recyclable materials are defined as those with properties such as flammability, corrosiveness or inherent toxicity. According to EPA regulations, a hazardous waste is a waste with properties that make it dangerous or potentially harmful to human health or the environment. Hazardous waste can take many physical forms and may be solid, semi-solid, liquid, or even contained gases. Hazardous wastes fall into the categories of listed wastes and characteristic wastes. The characteristic wastes exhibit one of more of the following characteristics: ignitability, corrosivity, reactivity and toxicity.

2.6 **Generator of Hazardous Wastes** – For example, based on the Resource Conservation and Recovery Act (RCRA) and Environmental Protection Agency (EPA) regulations in the United States, a hazardous waste generator is any person or site whose processes and actions create hazardous waste. Generators are divided into three categories based on the quantity of waste they produce. Large quantity generators generate 1,000 kilograms per month or more of hazardous waste, more than 1 kilogram per month of acutely hazardous waste, or more than 100 kilograms per month of acute spill residue or soil. Small quantity generators generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month. Very Small Quantity Generators generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste, or less than 100 kilograms per month of acute spill residue or contaminated soil, water, or other debris.

2.7 **Storage** – Per EPA regulations, storage is defined as the temporary holding of waste before the waste is treated, disposed of or stored somewhere else.

2.8 **Treatment and Disposal** – Per EPA regulations, treatment and disposal is any process that changes the physical, chemical or biological characteristics of a waste to minimize its threat to the environment.

3.0 References

3.1 AECOM Safety, Health and Environment Policy Statement

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

3.3 S3AM-017-PR1 Injury & Illness Recordkeeping

3.4 S3AM-109-PR1 Asbestos

3.5 S3AM-116-PR1 Hazardous Materials Shipping

3.6 S3AM-119-PR1 Laboratories

3.7 S3AM-209-PR1 Risk Assessment & Management

3.8 S3AM-216-PR1 Compliance Assurance

4.0 Procedure

Subject matter experts knowledgeable in Canada, Latin Americas and the United States environmental and hazardous waste laws and regulations should be consulted for clarification of the requirements. Hazardous waste laws and regulation may vary by provinces in Canada, countries in Latin Americas and states in the United States. It is critical to understand the specific requirements in the various offices and project locations in the Americas.

4.1 Roles and Responsibilities

4.1.1 Managers (Operations) directing activities of the facility, site, or project location

- Ensure the areas they manage are in compliance with applicable environmental and hazardous waste laws and regulations. The SH&E Plan shall identify all applicable SH&E requirements the particular project/location is responsible for meeting.
- Participate in assessing the applicable activities, products or services for associated environmental impacts. Refer to *S3AM-204-ATT2 Aspects and Environmental Impacts Assessment* as a guideline.
- Ensure the necessary resources exist to comply with these requirements and is responsible for working with the SH&E team to audit compliance.
- Consult subject matter experts on an ongoing basis to ensure up-to-date specific requirements of applicable legislation and regulation are met.
- Ensure relevant information and compliance requirements are communicated to all affected personnel. As applicable, refer to *S3AM-204-ATT3 Environmental Management Plan (Sample)*.

4.1.2 Project / Location Manager

- Identifying and implementing the actions necessary to ensure compliance with the project / location's applicable environmental and hazardous waste requirements. As applicable, this may include:
  - Participating in the assessment of applicable activities, products or services for associated environmental impacts. Refer to *S3AM-204-ATT2 Aspects and Environmental Impacts Assessment* as a guideline.
  - Ensuring procedures for conducting any activities that could have a significant environmental impact are established.
  - Ensuring procedures for identification of significant environmental aspects of goods and services used by AECOM are established.
  - Identifying and understanding the applicable legal requirements that apply to the project / location's activities.

- Verifying that staff have the appropriate environmental and hazardous waste management training prior to performing assigned activities.
- Budgeting the necessary resources into each project / location to achieve compliance with applicable legal requirements.
- As applicable, verifying that Legal Counsel and Office of Risk Management (ORM) have reviewed and approved the signed client's Agency Agreement authorizing AECOM to sign a waste manifest or sign shipping papers "as an agent of that client." NOTE: It is AECOM's policy that AECOM personnel will not sign client waste manifests or shipping papers unless authorized to do so by AECOM Legal Counsel and ORM.
- Obtaining all applicable environmental permits prior to the start of any regulatory permitted activity, including those permits held by the client which may impact AECOM's activities.
- Assessing the compliance status of AECOM's activities.
- Implementing any identified corrective actions relative to noted potential environmental compliance deficiencies.
- Identifying environmental regulatory noncompliance or near misses to AECOM's incident report system

- Ensuring project / location-specific environmental compliance plan is developed and documented in the form of Environmental Management Plans (EMP) or equivalent (refer to *S3AM-204-ATT3 Environmental Management Plan (Sample)* as a guideline and to *S3AM-204-ATT1 Environmental Compliance Maps* for examples of Compliance Maps).
- Consult subject matter experts on an ongoing basis to ensure up-to-date specific requirements of environmental legislation and regulation are met.
- Ensure relevant information and compliance requirements are communicated to all affected staff.

4.1.3 SH&E Manager

- Assisting operations personnel in assuring that activities undertaken by Operations are in compliance with environmental legal requirements, including but not limited to:
  - Assisting operations in identifying applicable environmental and hazardous waste laws and regulations and Subject Matter Experts.
  - Supporting compliance assessments of operations activities as needed. Refer to *S3AM-204-ATT2 Aspects and Environmental Impacts Assessment* as a guideline.
  - Reporting regulatory potential noncompliance events that result in a notice of violation, notice of noncompliance, or other indication of noncompliance to both management and region counsel.
  - Reporting to management and legal counsel, as applicable, on the status of identified corrective actions.

4.1.4 Legal Counsel

- Reviewing, commenting on, and approving a client's signed Agency Agreement letter authorizing AECOM to sign a waste manifest or shipping papers "as an agent of the client."
- Taking appropriate action upon notification that AECOM received a notice of violation or any other written notice of noncompliance, or becoming aware of a noncompliance situation.
- Supporting operation's response to notices of violation or any other written notice of noncompliance issued to AECOM from a regulatory agency.

4.1.5 America's Office of Risk Management

- Reviewing, commenting on, and approving a client's signed Agency Agreement letter

authorizing AECOM to sign a waste manifest or shipping papers “as an agent of the client.”

4.1.6 Employees

- Reporting all environmental releases or permit exceedances immediately as per *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*.
- Performing all project-related tasks in compliance with applicable environmental legal requirements.
- Signing waste manifests only if authorized by the Project Manager and Region Counsel. Refer to *S3AM-116-PR1 Hazardous Materials Shipping*.

4.2 Office Compliance

4.2.1 Overall – AECOM offices must comply with the applicable environmental and hazardous waste laws and regulations. This section describes some potential office related activities that can be subject to environmental laws and regulations.

4.2.2 Shipping Materials – The shipping and manifesting of hazardous materials from an AECOM office is subject to *S3AM-116-PR1 Hazardous Materials Shipping* procedure. Employees associated with shipping (such as with Federal Express, UPS and others) must be trained in their responsibilities and ensure they comply with the applicable shipping and manifesting requirements.

4.2.3 Storage of Chemicals and Wastes - Some AECOM offices may store chemicals and wastes. If so, these offices must comply with the applicable laws and regulations governing these activities.

4.2.4 Applicable Permits – Most AECOM offices will not require an air or water permit for discharges. If hazardous wastes are present in AECOM offices, they should be properly managed, stored, and disposed of in compliance with the applicable regulation and permitting requirements (e.g., United States EPA – storage permit required if hazardous waste is to be stored in excess of 90 days without having obtained regulator extension). The off-site disposal of hazardous waste from AECOM offices shall be properly manifested and both the waste hauler and the disposal facility shall be certified / permitted by the applicable environmental agencies.

4.3 Project Compliance

4.3.1 Obtaining Necessary Permits

4.3.1.1 Air Permits – If a project will result in emissions to the air, the project may require an air permit. It is important to work closely with the client as the permit may need to be applied for by the client.

4.3.1.2 Water Permits – For projects that involve discharges to receiving bodies of water (rivers, streams, etc.), storm sewers and sanitary sewers, AECOM needs to work closely with our clients to ensure all water related permits are obtained prior to start-up of the projects.

4.3.1.3 Waste Management and Waste Storage Permits – Federal, state, provincial and local environmental agencies have many regulations related to proper waste management (i.e. approval of spill containment plans, wastes placed in drums and containers must be properly labeled, etc.). Ensure appropriate approvals and permits are in place where required (i.e. British Columbia – approval of Operational Plan; United States – permit required for hazardous wastes stored on sites longer than generator status allowances). This may require working closely with the client to obtain required approvals and/or permits.

4.3.1.4 For projects where a client is authorizing AECOM to manage their waste, AECOM Employees must never sign a waste manifest indicating AECOM is the generator of the waste unless approved to do so by AECOM Legal Counsel and Americas Office of Risk Management.

4.3.2 Incident Reporting – Employees must promptly report to the client and work closely with the client in reporting to regulatory agencies any spills or releases into the environment. This includes: discharges of contaminated groundwater to a sanitary sewer or storm water sewer system unless authorized by the regulatory agencies involved to do so; spills of oil, petroleum products, or other chemicals to the ground or water bodies; and any release of hazardous substances in amounts greater than their "reportable quantities" –as defined by regulations. Employees must also report these incidents into AECOM's incident reporting system.

4.3.3 Laboratory Operations – Where AECOM has laboratory operations, the disposal of laboratory chemicals into laboratory drains is not allowed. Water discharges from laboratory operations must meet applicable environmental legal requirements.

4.3.4 Asbestos Management – There are many regulations governing asbestos management. Regulations may include implementing an Asbestos Management Plan; providing notice to air and other regulatory agencies relating to demolition or asbestos abatement plans within the specified timelines prior to the start of any abatement operations; and the abatement and disposal of asbestos. Refer to *S3AM-109-PR1 Asbestos*.

4.3.5 Environmental Management Plan (EMP) or equivalent – Documented at the site/office and project level, to ensure proper planning of operations with respect to the environment (as determined by the aspects and impacts assessment). Refer to *S3AM-204-ATT3 Environmental Management Plan (Sample).*

- Initial steps in developing the EMP include assessing environmental impacts of the activities, products or services to be undertaken. Refer to *S3AM-204-ATT2 Aspects and Environmental Impacts Assessment* as a guideline. This completed assessment may be included in the EMP.
- As required, each office / project must identify and document applicable environmental regulatory requirements in their EMP, or equivalent.
    - It is advisable to develop a Compliance Map for those projects where AECOM is a permit holder or where AECOM is operating under a client's permit. Compliance maps can indicate the applicable actions, limits, records retention requirements, and applicable submittals to ensure compliance with applicable environmental legal requirements.
    - Refer *to S3AM-204-ATT1 Environmental Compliance Maps* for examples of Compliance Maps.
- EMP (or equivalent) shall include documented procedures for conducting any activities that could have a significant environmental impact (e.g., requirements to maintain segregation of hazardous wastes from other wastes, disposal requirements, remodeling activities, laboratory operations, etc.).
    - If AECOM is responsible for selecting the waste disposal site/facility, the identified disposal site/facility shall meet regulatory requirements of the applicable jurisdiction.
- EMP shall identify required records management with respect to any environmental-related monitoring equipment (e.g., tank monitoring equipment, pH meters used prior to discharge to sanitary sewers, etc.).
- As applicable, the EMP, or equivalent, shall include procedures for identification of significant environmental aspects of goods and services used by AECOM (e.g., office supplies, utilities, subcontractors, commuting, and project- and overhead-related travel).
- If customer, client, or facility owner EMP fully encompasses AECOM operations, it is not necessary to create an AECOM - specific EMP.
- If not already included in SH&E Plans and Emergency Response plans, the EMP or equivalent shall include procedures to identify the potential for and response to upsets, incidents, and emergency situations. These plans also include procedures for preventing and mitigating the negative impacts of any emergencies.
- EMP (or equivalent) shall include provisions for a commitment to conduct (at least annually) an

evaluation of compliance with relevant environmental legislation, as well as opportunities for improvements.

- As applicable, EMP (or equivalent) shall identify opportunities and procedures to prevent and reduce the generation of waste, as well as recycle or reuse waste, both in the execution of activities or services and in the procurement of goods and services used by AECOM.
- *S3AM-204-ATT3 Environmental Management Plan* may be used as a template to prepare an EMP.

4.3.6 Releases/Spills – Where the possibility of an environmental release exists due to AECOM activities, the Reportable Quantity for regulated substances must be identified prior to the start of work. Any release or spill must be immediately reported to the client and depending on the material and quantity of material released or spilled, reported to regulatory agencies.

4.3.7 Subject Matter Experts – When necessary, project teams will consult with Subject Matter Experts to identify the necessary permitting/licensing and/or applicable regulations governing the planned scope of work. Example guiding questions that project teams may use to initially assess their project's environmental compliance needs include, but are not limited to:

- Will AECOM's activities have the potential to discharge any hazardous or other regulated chemicals/materials to the air?
- Is there any equipment on site that has an air permit or similar regulatory requirement governing air discharges to the environment? Note: This should include client-owned equipment that AECOM will operate and have contractual regulatory liability for during the planned scope of work.
- Will AECOM manage characteristic or listed hazardous waste for the client?
- Will AECOM activities generate nonhazardous, universal, or hazardous waste subject to requirements?
- Is this a site or facility where AECOM will perform activities under the Resource Conservation and Recovery Act (RCRA – United States), Canadian Environmental Protection Act (CEPA – Canada), a Consent Order or any other applicable jurisdictional regulatory body?
- Is the site or facility a hazardous waste generator (e.g., large quantity, small quantity, or very small quantity)?
- Will AECOM be required to select a waste disposal facility?
- What oil storage capacity does the site or facility have (count containers/equipment with capacities of 55 gal or greater)?
- Will AECOM's activities create a discharge into a surface water body?
- Will AECOM's activities disturb ≥ 1 acre of land surface area?
- Will AECOM's activities physically disturb or impact a wetland?

4.4 Environmental Compliance Assessments

4.4.1 AECOM will periodically assess its operations (offices and project sites) and activities to verify ongoing activities comply with applicable environmental legal requirements. Assessments shall be conducted, as a minimum, on an annual basis. The frequency of these documented environmental compliance assessments should be based on the complexity of the project/size of the office and the associated environmental compliance risks to AECOM.

4.4.2 The Managers (Operations) or Project/Location Managers will conduct the assessment or designate a qualified individual to conduct the assessment.

4.4.3 The environmental compliance assessment, refer to *S3AM-204-FM1 Office/Project Environmental Compliance Assessment Checklist,* will provide information to AECOM management on the

environmental compliance performance of specific operations.

4.4.4 The assessment can be combined into a periodic, comprehensive audit; typically, a business systems audit incorporating quality assurance, health and safety, and environmental components.

4.5 Environmental Incident or Non-Compliance

4.5.1 Should an assessment identify non-compliance issues or an environmental incident occurs, the severity level must be assessed for appropriate response. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation*. Ensure the parties appropriate to the severity are contacted and involved with issue resolution (e.g., Legal Counsel).

4.5.2 If a regulatory Notice of Violation (NOV) is received by an AECOM facility or project, Legal Counsel shall be contacted and involved with issue resolution.

4.5.3 The issue or incident must be investigated and will be documented and tracked. Refer to *S3AM-004-PR1 Incident Reporting, Notifications & Investigation.* The documented investigation must:

- Identify the cause (root cause).
- Identify corrective actions.
- Assign responsibility to implement or modify controls to prevent reoccurrences and establish scheduled date of completion.
- Identify methods to inform impacted staff of any revisions to written procedures.

4.5.4 The documentation must be reviewed for actual completion and effectiveness of controls.

4.5.5 Document, review, and communicate appropriate lessons learned for incidents and near misses (including environmental).

5.0 Records

5.1 Comply with *S3AM-017-PR1 Injury & Illness Recordkeeping* requirements.

5.2 Maintain or keep accessible the following additional records/documentation:

5.2.1 Relevant laws and regulations (may be accessed via the web).

5.2.2 Facility and project non-compliance records.

5.2.3 Training records (maintained at the facility level, with the exception of modules tracked in computer-based training).

5.2.4 Required equipment inspections, waste storage area inspections, maintenance, and calibration information (in accordance with site EMP).

5.2.5 Relevant contractor/supplier information (in accordance with the site EMP or project-specific waste management plans) with respect to waste disposal vendors, transportation companies, etc.

5.2.6 Agency citations/Notice of Violations and any supporting information.

5.2.7 Information on emergency preparation and response.

5.2.8 Copies of Environmental Aspect and Impact Assessments (maintained by the safety representative for office locations or in the project files for project-related assessments). Refer to *S3AM-204-ATT2 Aspects and Environmental Impacts Assessment*.

5.2.9 Completed Compliance Assessment checklists and audit results.

6.0 Attachments

6.1 S3AM-204-FM1 Office/Project Environmental Compliance Assessment Checklist

6.2 S3AM-204-ATT1 Environmental Compliance Maps

6.3 S3AM-204-ATT2 Aspects and Environmental Impacts Assessment

6.4 S3AM-204-ATT3 Environmental Management Plan (Sample)

Americas

Personal Protective Equipment

S3AM-208-PR1

1.0 Purpose and Scope

1.1 Provide an effective Personal Protective Equipment (PPE) Program to protect AECOM employees from potential workplace safety and health hazards.

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

1.3 The proper use of appropriate PPE, in combination with effective engineering and administrative controls, can provide AECOM employees with protection against potential workplace hazards and can reduce the potential for workplace injury and illness.

2.0 Terms and Definitions

2.1 **ANSI** – American National Standards Institute

2.2 **CSA** – Canadian Standards Association

2.3 **PPE** – Personal Protective Equipment

2.4 **SDS** – Safety Data Sheets

2.5 **THA –** Task Hazard Assessment

3.0 References

3.1 S3AM-123-PR1 Respiratory Protection

3.2 S3AM-209-PR1 Risk Assessment & Management

3.3 S3AM-301-PR1 Confined Spaces

3.4 S3AM-304-PR1 Fall Protection

3.5 S3AM-315-PR1 Working On & Near Water

3.6 S3AM-317-PR1 Hand Safety

4.0 Procedure

4.1 Roles and Responsibilities

4.1.1 **Managers** or **Supervisors**

- Confirm the location specific SH&E Plan documents required hazard controls.
- Confirm Task Hazard Assessments (THAs) are conducted and hazards identified are eliminated through substitution, engineering, or administrative controls first before assigning PPE for hazard mitigation.
- Confirm appropriate subject matter experts, manufacturer's specifications, and regulatory requirements are consulted as necessary to assist with proper PPE selection.
- Match the appropriate PPE to those hazards that cannot be eliminated; support employees in exercising Stop Work Authority if the task is too hazardous to be mitigated
- Provide and document employee training on use and care of PPE.
- Determine which staff requires employee-issued PPE.

- Determine PPE requirements for visitors.
- If applicable, manage medical monitoring of employees using PPE (e.g. respirators, hearing protection, radiation, etc.).
- Approve the purchase of company-issued PPE.
- Confirm that appropriate PPE is utilized by employees when required or necessary. This may periodically be documented using *S3AM-208-FM2 Personal Protective Equipment Inspection*.
- Exercise Stop Work Authority if PPE is inadequate to address hazards.

4.1.2 **SH&E Managers**

- Provide guidance to Managers, Supervisors, and staff on the assessment of hazards and the selection of PPE.
- Provide training materials to Managers and Supervisors for employee training

4.1.3 **Employee**

- Review all relevant SH&E Plans, THAs and applicable SDS prior to commencing work.
- Exercise Stop Work Authority if the task is too hazardous.
- In accordance with training and instructions, utilize appropriate PPE that has been issued when required or necessary.
- Inspect PPE prior to and after use to confirm that it is functional, and maintain PPE in a clean and functional condition.
- Follow instructions and manufacturers' guidance on the care, use, and storage of PPE.
- Replace PPE when worn out, expired or damaged.
- Refrain from wearing PPE outside of the work area for which it is required if doing so would constitute a hazard.

4.2 Hazard Assessment

4.2.1 The location specific SH&E plan and THA shall assess the hazards and identify the necessary control measures. Refer to *S3AM-209-PR1Risk Assessment & Management.*

4.2.2 These control measures shall include direction and guidance concerning the appropriate PPE required as the last line of defense to the anticipated hazards of the specific operations and tasks. A PPE specific assessment may assist in identifying PPE requirements. *S3AM-208-FM1 Personal Protective Equipment Assessment* may be completed and included in the SH&E Plan.

4.2.3 Various tasks and operations, including but not limited to, demolition, remediation, spill response, asbestos abatement, and lead removal, may require additional direction concerning selection, use, care, and disposal of PPE from a subject matter expert (e.g. protector manufacturer, industrial hygienist, asbestos professional, etc.).

- Obtained direction shall be included in the SH&E Plan.
- Consultation with subject matters may be limited to the planning phase or they may be retained to provide technical assistance for a portion of or duration of the project.

4.3 Training

4.3.1 All employees shall be informed of their right to Stop Work if the task is too hazardous to mitigate through use of elimination, substitution, engineering controls, administrative controls, and PPE.

4.3.2 Staff will receive adequate instruction on the correct use, limitations, and assigned maintenance duties for the equipment to be used. The following information, at a minimum, will be covered during PPE training:

- What PPE is required.
- When it is required.
- Why it is required.
- How to properly don, doff, adjust, and wear the PPE described.
- The limitations of the PPE, including its expected useful life.
- How to properly care for, maintain, and dispose of the PPE.

4.3.3 Retraining may be required as applicable (e.g., observed non-compliance, changes in procedure, etc.).

4.3.4 Staff are responsible for confirming that they have reviewed the operation manual/instructions for the PPE before work commences.

4.3.5 All staff will receive a location specific orientation to the hazards on the job site as well as appropriate PPE requirements.

4.4 Determining the Need for PPE

4.4.1 Prior to beginning work, the SH&E plan shall be consulted and THAs developed to identify the PPE requirements.

4.4.2 After the hazard assessments have been completed, the manager and/or employee shall select the appropriate PPE for each job category or task, as necessary. PPE will be provided to each employee appropriate for the hazards present.

- All PPE selected, purchased and used by AECOM will meet or exceed the appropriate ANSI/CSA standards or other standards as determined by federal, provincial, territorial, or state legislation.

4.4.3 If the hazard can be mitigated through using appropriate PPE shall:

- Properly fit the employee's body. Reasonable attempts shall be made to procure gender-specific gear / sizing.
- Be selected and used in accordance with recognized standards and provide effective protection.
- Not in itself create a hazard to the wearer (e.g., scratched safety glasses which could cause impaired vision should be replaced with clear safety glasses).
- Be compatible so that one item of PPE does not interfere with other PPE.
- Be maintained in good working order and in a sanitary condition.
- Not be altered in any way.

4.4.4 Prior to entering any controlled or restricted work area, employees shall review the SH&E plan and corresponding THA(s) to confirm that they are equipped with the applicable ANSI/CSA-approved PPE, appropriate to the specific work area's hazards.

4.5 Eye and Face Protection

4.5.1 AECOM employees shall use appropriate eye and face protection when eye or face hazards are present or potential from flying particles, molten metal, liquid chemicals, acid and caustic liquids, chemical gases or vapors, or injurious light radiation.

4.5.2 Safety glasses with side protection is the minimum eye protection requirement. Additional eye protection shall be suitable to the anticipated hazards (e.g. goggles, safety glasses with a face-shield, welder's helmet, etc.). Refer to *S3AM-208-ATT1 Eye & Face Protection*.

4.6 Head Protection

4.6.1 Appropriate protective hardhats are required when employees are working in areas where there is any potential for injury to the head.

4.6.2 Head protection shall be suitable to the anticipated hazards (e.g. working near exposed electrical conductors requires hardhats designed to reduce electrical shock). Refer to *S3AM-208-ATT2 Head Protection.*

4.7 Foot Protection

4.7.1 AECOM employees shall use appropriate foot protection when hazards to feet are present or potential; including impact, puncture, cut, electrical, thermal or chemical hazards.

4.7.2 Refer to *S3AM-208-ATT3 Foot Protection.*

4.8 Hand Protection

4.8.1 Appropriate hand protection is required when employee's hands are exposed to hazards such as those from skin absorption of harmful substances, cuts and lacerations, abrasions, punctures, chemical burns, thermal burns, electricity, or harmful temperature extremes.

4.8.2 Refer to *S3AM-208-ATT4 Hand Protection* and *S3AM-317-PR1 Hand Safety*.

4.9 Chemically Resistant Clothing

4.9.1 Chemically resistant clothing is required when there is significant potential for the employee to come in direct contact with the chemicals being handled. Tasks that involve chemical handling will be evaluated for potential splashing or spilling. Refer to *S3AM-208-ATT5 Limb & Body Protection*.

4.9.2 The process for selecting chemical resistant clothing will be similar for the selection of chemical resistant gloves (refer to *S3AM-208-ATT4-Hand Protection* and *S3AM-317-PR1 Hand Safety*).

4.10 High-Visibility Apparel

4.10.1 “High visibility safety apparel” means personal protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage and that meets the Performance Class II or III requirements of ANSI/CSA standards. Refer to *S3AM-208-ATT6 High Visibility Safety Apparel.*

4.10.2 Color of apparel (orange or lime) may be client/project-specific. If there is a specific need to be visible to the passing public, to machine operators, or to other crew members, high visibility vests shall be worn (and retro-reflective striping on arms and legs at night).

4.10.3 Work conducted at night may require that the minimum level of apparel worn be, at minimum, ANSI/CSA Class III, and in accordance with the governing legislation.

4.11 Personal Clothing

4.11.1 Employees on a project site shall wear full length trousers and shirts that cover shoulders.

4.11.2 For personal safety on the job site, do not wear

- Loose or unsecured clothing or loose fitting cuffs;
- Greasy or oily clothing, gloves, or boots; or
- Torn or ragged clothing.
- Jewelry (e.g. rings, bracelets, neck chains) when working with moving parts or there is a risk or entanglement.

4.11.3 Long hair shall be tied back or otherwise confined when working with moving parts or there is a risk of entanglement.

4.11.4 Clothing made of synthetic fibers can be readily ignited and melted by electric flash or extreme heat sources. Cotton or wool fabrics are recommended for general use.

4.11.5 Footwear shall be suitable for the site conditions and task requirements. No athletic shoes, sandals, flip flops, permitted on active job sites.

4.11.6 It is recommended to use clothing with sun protection properties when working in high sun UV exposure

4.12 Specialized PPE

4.12.1 In addition to basic PPE, additional specialized PPE may be required to provide appropriate protection to the employee. Refer to applicable legislation and related SH&E procedures for additional information on PPE requirements.

- Fall Protection – Only full-body harnesses with shock-absorbing lanyards will be used for personal fall arrest. Refer to *S3AM-304-PR1 Fall Protection*.
- Respiratory Protection – Respiratory protection shall be selected based on the contaminant and concentration to which the employee will be exposed. Refer to *S3AM-123-PR1 Respiratory Protection*, the task- or project-specific hazard assessments and the applicable SDSs for specific requirements.
- Fire Resistant Clothing (FRC) – Approved fire-resistant outer clothing may be required at work locations with flammable or explosive materials or environments. Refer to *S3AM-208-ATT5 Limb & Body Protection.*
- Other Head Protection – Operators and passengers (if trained and permitted) of all-terrain vehicles and snowmobiles will wear approved helmets. Refer to *S3AM-208-ATT2 Head Protection.*
- Protection from Drowning – Appropriate personal floatation devices shall be worn when work working over and near water. Refer to *S3AM-315 Working On & Near Water*.
- Temperature Extremes – Work in cold environments may require additional layers and insulated clothing, gloves, boots and accessories such as balaclavas, hardhat liners. Confirm these items are approved and do not introduce additional unacceptable hazards (e.g. insufficient visibility, conductivity, etc.).
- Hearing Protection – Noise levels in the work environment that cannot be eliminated or reduced to acceptable levels requires worker be protected from exposure. Refer to *S3AM-118-PR1 Hearing Conservation.*
- Traction Devices – Traction devices applied to the base of work boots may be necessary if the employee may be walking on icy surfaces. Refer to *S3AM-208-ATT3 Foot Protection*.
- Rescue – Confined spaces hazards may necessitate the use of specific harnesses attached to retrieval lines to facilitate rescue. Refer to *S3AM-301-PR1 Confined Spaces*.

4.13 Maintaining PPE Supplies

4.13.1 Employees shall inspect their required PPE prior to use. Defective equipment shall be removed from service and replaced.

4.13.2 Each AECOM location will maintain a supply of safety equipment of appropriate types and sizes, including hard hats, high visibility vests, safety glasses, gloves, hearing protection and chemically resistant clothing based on the nature of their field activities. The Manager or designee will be responsible for maintaining this inventory.

4.13.3 Use of PPE by employees and adequacy of protection should be evaluated on a routine basis. This may periodically be documented using *S3AM-208-FM2 Personal Protective Equipment Inspection.*

4.13.4 At a minimum, locations will review their PPE program annually.

4.14 Obtaining Personalized Safety Gear

4.14.1 Employees are not expected to provide their own general PPE. Most basic PPE will be provided to the employee at no charge (e.g. safety glasses, hard hat, gloves, hearing protection, etc.) with the

exception of the below personalized safety equipment (prescription safety glasses, safety-toed boots, any washable coveralls).

4.14.2 Certain personalized safety gear such as prescription safety glasses, safety-toed (capped) boots, and any washable coveralls will be ordered and sized specifically by the user. A partial cost reimbursement to the employee may be made if their location provides a specialized PPE purchase program.

4.14.3 All specialized PPE (e.g. fall protection equipment, respirators, helmets, etc.) will be provided by AECOM for employee use at no charge to the employee, with the exception of the above personalized safety equipment (prescription safety glasses, safety-toed boots, any washable coveralls).

5.0 Records

5.1 Completed SH&E plans, THAs documenting PPE requirements, and as applicable, PPE assessments and PPE inspections, will be maintained in the location's safety files.

6.0 Attachments

6.1 S3AM-208-ATT1 Eye & Face Protection

6.2 S3AM-208-ATT2 Head Protection

6.3 S3AM-208-ATT3 Foot Protection

6.4 S3AM-208-ATT4 Hand Protection

6.5 S3AM-208-ATT5 Limb & Body Protection

6.6 S3AM-208-ATT6 High Visibility Safety Apparel

6.7 S3AM-208-FM1 Personal Protective Equipment Assessment

6.8 S3AM-208-FM2 Personal Protective Equipment Inspection

Americas

Personal Protective Equipment Assessment

S3AM-208-FM1

Location: _____ **Job No.:** _____

Date: _____ **Assessment conducted by:** _____

Specific tasks performed at this location: _____

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE. Include any additional guidance in the available section below each item.

Overhead Hazards

1.	Suspended/elevated loads, beams, or objects that could fall or strike head	☐ **Yes**	☐ **No**	Hard hat, ANSI Z89, Class G, E or C
2.	Flying objects that could strike head	☐ **Yes**	☐ **No**	Hard hat, ANSI Z89, Class G, E or C
3.	Energized wires or equipment that could strike head	☐ **Yes**	☐ **No**	Hard hat, ANZI Z89, Class G or E (dependent on potential voltage)
4.	Sharp objects or corners at head level	☐ **Yes**	☐ **No**	Hard hat, ANSI Z89, Class G, E or C

Eye Hazards

5.	Chemical splashes or irritating mists	☐ **Yes**	☐ **No**	Safety goggles
6.	Excessive dust	☐ **Yes**	☐ **No**	Safety glasses or goggles
7.	Smoke and/or fumes	☐ **Yes**	☐ **No**	Safety goggles
8.	Welding operations	☐ **Yes**	☐ **No**	Welding goggles
9.	Lasers/optical radiation	☐ **Yes**	☐ **No**	Consult subject matter expert for proper selection
10.	Projectiles	☐ **Yes**	☐ **No**	Dual eye protection
11.	Sawing, cutting, chipping, and/or grinding	☐ **Yes**	☐ **No**	Dual eye protection

Face Hazards

12.	Chemical splashes or irritating mists	☐ **Yes**	☐ **No**	Safety goggles
13.	Welding operations	☐ **Yes**	☐ **No**	Welding goggles or welding helmet
14.	Projectiles	☐ **Yes**	☐ **No**	Dual eye protection

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE. Include any additional guidance in the available section below each item.

Hand Hazards

15.	Chemical exposure	☐ **Yes** ☐ **No**	Use chemical-resistant gloves specific to hazard; consult SDS, subject matter expert, and/or Safety Representative
16.	Sharp edges, splinters, sharp tools, machine parts, etc.	☐ **Yes** ☐ **No**	Leather or Kevlar gloves
17.	Impact or crush hazards	☐ **Yes** ☐ **No**	Impact resistant gloves
18.	Temperature extremes – heat	☐ **Yes** ☐ **No**	Leather gloves, welder's gloves, hot mill gloves
19.	Temperature extremes – cold	☐ **Yes** ☐ **No**	Insulated gloves
20.	Blood, fungus, biological agents	☐ **Yes** ☐ **No**	Nitrile gloves
21.	Exposure to live electrical currents	☐ **Yes** ☐ **No**	Electrical gloves; consult Safety representative
22.	Vibrating tool operation	☐ **Yes** ☐ **No**	Anti-Vibration gloves
23.	Material handling	☐ **Yes** ☐ **No**	Leather, cotton, synthetic gloves

Foot Hazards

24.	Heavy materials (greater than 50 pounds) handled by employees	☐ **Yes** ☐ **No**	Safety shoes or boots
25.	Potential to crush or cut whole foot	☐ **Yes** ☐ **No**	Safety shoes or boots with metatarsal guard
26.	Sharp edges or points (puncture risk)	☐ **Yes** ☐ **No**	Safety shoes or boots
27.	Exposure to electrical hazards	☐ **Yes** ☐ **No**	Safety shoes or boots with: Conductive - Protects the wearer in an environment where the accumulation of static electricity on the body is a hazard. Static dissipative - Reduces accumulation of excess static electricity by conducting body charge to ground while maintaining a sufficiently high level of resistance. Electrical hazard - Provides a secondary source of protection against accidental contact with live electrical circuits, electrically energized conductors, parts or apparatus, and is manufactured with non-conductive electrical shock resistant soles and heels.

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE. Include any additional guidance in the available section below each item.

28.	Slippery conditions	☐ **Yes**	☐ **No**	Rubber-soled boots or grips
29.	Chemical contamination	☐ **Yes**	☐ **No**	Rubber, PVC, or polyurethane boots or boot covers with puncture and protective toe if task required
30.	Wet conditions	☐ **Yes**	☐ **No**	Rubber boots or boot covers
31.	Construction/demolition	☐ **Yes**	☐ **No**	Safety boots with metatarsal guard if foot-crushing hazard exists

Fall Hazards

32.	Elevations above 4 feet (general industry) or 6 feet (construction) without guardrails	☐ **Yes**	☐ **No**	ANSI A-10.14 Type 1 full-body harness
33.	Suspended scaffolds, boatswain's chairs, float scaffolds, or suspended staging	☐ **Yes**	☐ **No**	ANSI A-10.14 Type 1 full-body harness
34.	Working in trees	☐ **Yes**	☐ **No**	ANSI A-10.14 Type 1 full-body harness
35.	Working in vehicle-mounted elevating work platforms (e.g., bucket trucks, aerial lifts)	☐ **Yes**	☐ **No**	ANSI A-10.14 Type 1 full-body harness

Water Hazards

36.	Working on or above water where a risk of drowning exist	☐ **Yes**	☐ **No**	U.S. Coast Guard approved personal floatation device; Type I, II, or III

Excessive Heat or Flame

37.	Full body chemical protective clothing in temperatures greater than 80 °F	☐ **Yes**	☐ **No**	Cooling vest
38.	Work around molten metal or flame	☐ **Yes**	☐ **No**	Nomex or heat reflective clothing
39.	Welding activities	☐ **Yes**	☐ **No**	Welding leathers for those areas that are exposed to flame, spark, or molten metal

Respiratory Hazards

40.	Airborne particulates, gases, vapors, or mists in excess of established exposure limits	☐ **Yes**	☐ **No**	Refer to *S3AM-123-PR1 Respiratory Protection* for respirator selection guidance

Excessive Noise

41.	Exposure to noise	☐ **Yes**	☐ **No**	Ear plugs, muffs or both

If any of the indicated hazards are present, eliminate the hazard or use the indicated PPE. Include any additional guidance in the available section below each item.

Body and Leg Protection

42.	Chemical exposure	☐ **Yes** ☐ **No**	Contact SH&E Representative and/or subject matter expert for assistance in proper selection
43.	Using chainsaw, cutting brush	☐ **Yes** ☐ **No**	Chainsaw chaps
44.	Exposure to snakes	☐ **Yes** ☐ **No**	Snake chaps
45.	Exposure to vehicle traffic or heavy equipment	☐ **Yes** ☐ **No**	High visibility apparel

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on: _____

Name _____ Signature _____

This document should be included in the location specific SH&E Plan.

Attachment C

Stretch/Flex Manual and Poster

AECOM

Stretch & Flex Program

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Introduction

Why do we stretch?

- Prepares the body for physical work activities—it's a wake-up call for your muscles.
- —not just at work but all of the time.
- Promotes circulation—your muscles need oxygen from the blood to operate at peak performance.
- Decreases muscle tension—a static position locks the tendons
- Increases relaxation—gives your brain something else to concentrate on instead of work activities.
- Improves your range of motion—progressively strengthens muscles and lengthens your tendons, which means greater range of motion.
- Increases body awareness—keeps those muscles from sleeping on the job.
- Delays muscle fatigue—removes lactic acid from the muscles which contributes to fatigue.
- Reduces frequency and severity of injury—there are proven results from numerous studies.
- Increases team morale—it is not a competition, it'

Guidelines & Limitations

Before you start stretching, begin with your body in a neutral position by:

- Rythmic movements should proceed stretching for 2–3 minutes: Step forward left, step back.
- Standing relaxed with your feet shoulder-width apart, bend your knees slightly and contract your abdomen. This will keep your back straight. Your shoulders should be relaxed and your chest lifted.
- Hold each stretch for a count of 10–15 seconds.
- ***Do not bounce*** while you are stretching. Bouncing may cause injury.
- Breathe in a relaxed manner; don't hold your breath.
- Do the stretches at your own rate—don't compete.
- Stretch just beyond the point of natural tension. ***No pain!***
- Stretch at your own pace and ability. Make sure you stretch within your own limits.
- Stretch to the point of comfortable tension, then relax before you do the next stretch.
- Avoid any straining while you are performing stretches.
- None of these stretches should be painful. If it hurts, leave it out!
- Release the stretch slightly if your muscles begin to shake.
- If you experience any pain in the joint area, back off the stretch and make sure you are doing it correctly. If necessary, you should try another position or a different stretch for the target muscles.

Make stretching a daily habit, and stretch before you start work, after lunch, and immediately after work.

Always begin the Stretch & Flex Program with low impact rhythmic movements. Stretching a cold muscle may cause injury and may decrease This is not a strenuous aerobic workout, it prepares the body for stretching. This simple warm up will improve , reduce stretching-induced injuries, and will improve stretching

- Decreased likelihood of injury.
- .
- Gradual muscle warming.
- Reduced chance of soreness before stretching.

Shoulder Shrug with High Reach

Time Required:

50–60 seconds

Here's How:

1. Lift (shrug) shoulders as high as possible while slowly raising your arms to a fully extended position above head.

2. At the same time, stand on your tiptoes (for as long as comfortable). While reaching high, extend and spread ***only*** if you're able to balance.

3. Hold this position for 10 seconds and then slowly lower arms to the side into a neutral body position. Relax while breathing slowly and rhythmically. Concentrate on your breathing rate for at

Do's & Don'ts:

Do…

- align arms with ears
- keep back straight

Don't…

- lift onto your toes if you're unable to balance.
- continue if it's painful

Target Muscles:

Biceps, lats, forearms, and muscles that support the spine

Neck Stretch

Time Required:

30 seconds

Here's How:

1. Keep your neck as straight as possible while relaxing your shoulders. Tilt your head to the right. Slowly lower head toward right shoulder.

2. Repeat in four positions: right, left, front, and back, each time returning to the upright position.

3. Do this slowly and do not hold your breath. ***There should be a complete breath cycle with each position of the head!***

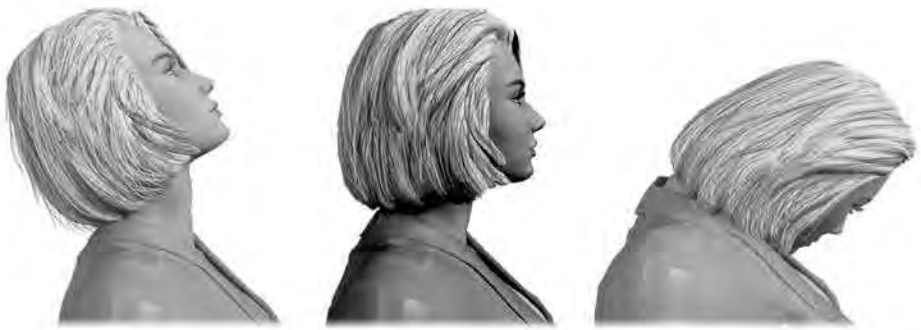
Do's & Don'ts:

Do…

- limit backward motion range (very slight movement)
- keep back straight

Don't…

- shrug shoulders
- impinge neck
- continue if painful



Target Muscles:

Neck muscles and stress reducer

Tricep Stretch

Time Required:

20 seconds

Here's How:

1. Bring right hand to upper back between shoulder blades from above shoulder.
2. Place left hand on the tricep (muscle on the underside of the arm) near the elbow.
3. Gently pull right elbow up and back with left hand, moving the right hand down center of upper back as far as comfortable. This should not cause pinching in the neck. Repeat on opposite side.

Do's & Don'ts:

Do…

- keep head straight forward
- keep back straight

Don't…

- bend head forward
- continue if painful

Target Muscles:

Triceps and shoulders

Upper Trunk Stretch

Time Required:

30 seconds

Here's How:

1. Place hands on back of hips.

2. Slowly arch upper body backward to a comfortable position. Hold while continuing to breath.

3. Return to neutral position and repeat two more times.

Do's & Don'ts:

Do…

- breath continously
- keep head straight

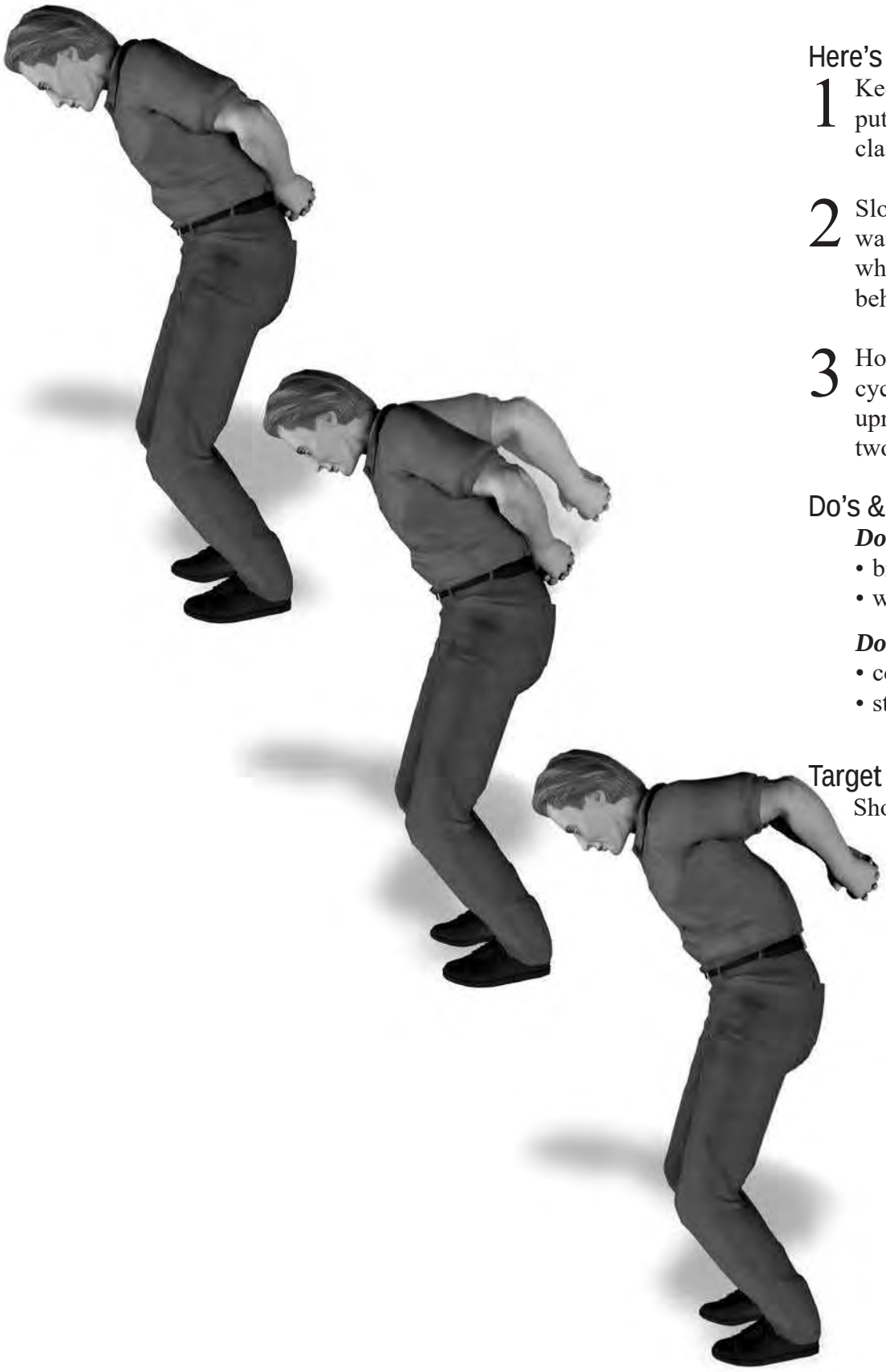
Don't…

- bend head back
- lock knees
- continue if painful

Target Muscles:

Lower back, abdominals

Shoulder Rotation Stretch



Time Required:

30 seconds

Here's How:

1. Keeping knees slightly bent, put hands behind back, clasping them if you can.

2. Slowly bend forward from the waist to a ***comfortable*** angle while lifting arms upward and behind your back.

3. Hold position for one breath cycle and slowly return to upright position. Repeat two more times.

Do's & Don'ts:

Do…

- breath continually
- with a comfortable angle

Don't…

- continue if painful
- straighten legs or lock knees

Target Muscles:

Shoulders and upper back

Trunk Rotation

Time Required:

20 seconds

Here's How:

1. Extend left arm out to side and grasp left hip with right hand.
2. Rotate upper body to the left while pulling on hip with right hand.
3. Release tension and change to other side. Repeat on opposite side.

Do's & Don'ts:

Do…

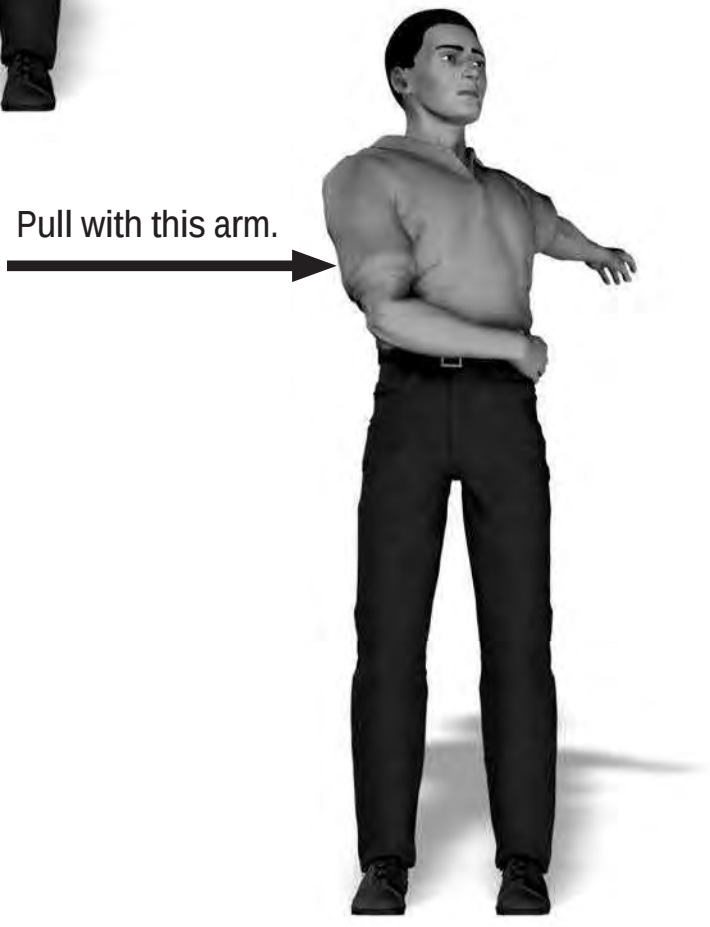
- breath continually
- have minimal head rotation
- keep back straight

Don't…

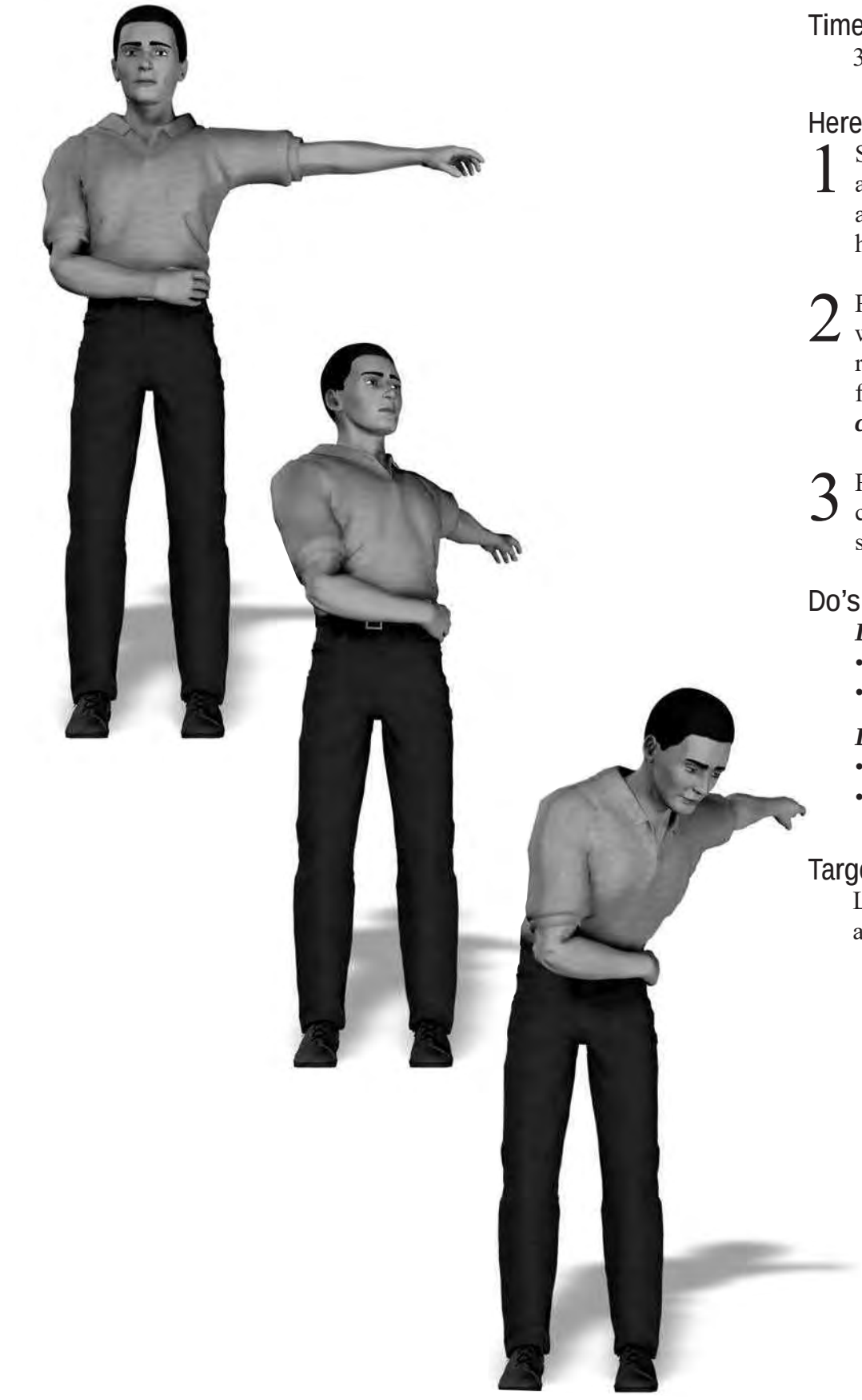
- continue if painful

Target Muscles:

Lower back and trunk support muscles



Lateral Rotation Stretch



Time Required:

30 seconds

Here's How:

1. Stand upright, feet slightly apart for balance. Extend left arm out to side and grasp left hip with right hand.

2. Rotate upper body to left while pulling on hip with right hand, then bend slowly from waist to left side to a ***comfortable*** angle.

3. Return to upright position and change hand locations to other side. Repeat on opposite side.

Do's & Don'ts:

Do…

- breath continually
- keep head aligned

Don't…

- continue if painful
- rotate back/spine

Target Muscles:

Lats, lower back muscles, abdominals, upper leg muscles

Lateral Stretch

Time Required:

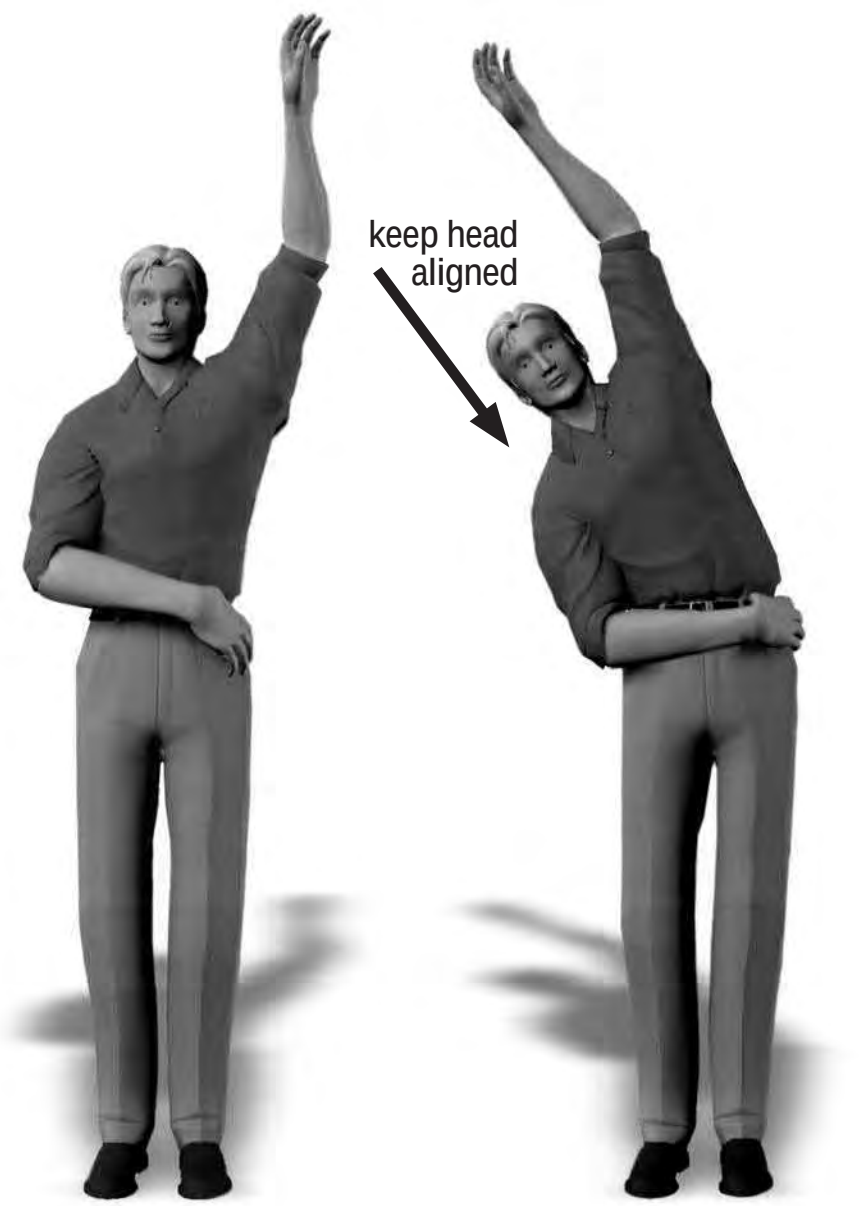
30 seconds

Here's How:

1. Place right hand on waist, extend left arm over head and bend upper body sideways to the right.

2. Hold position for one breath cycle and return to upright position.

3. Repeat two more times and change hand position to other side. Repeat on opposite side.



Do's & Don'ts:

Do…

- breath continually
- keep back straight
- keep head aligned

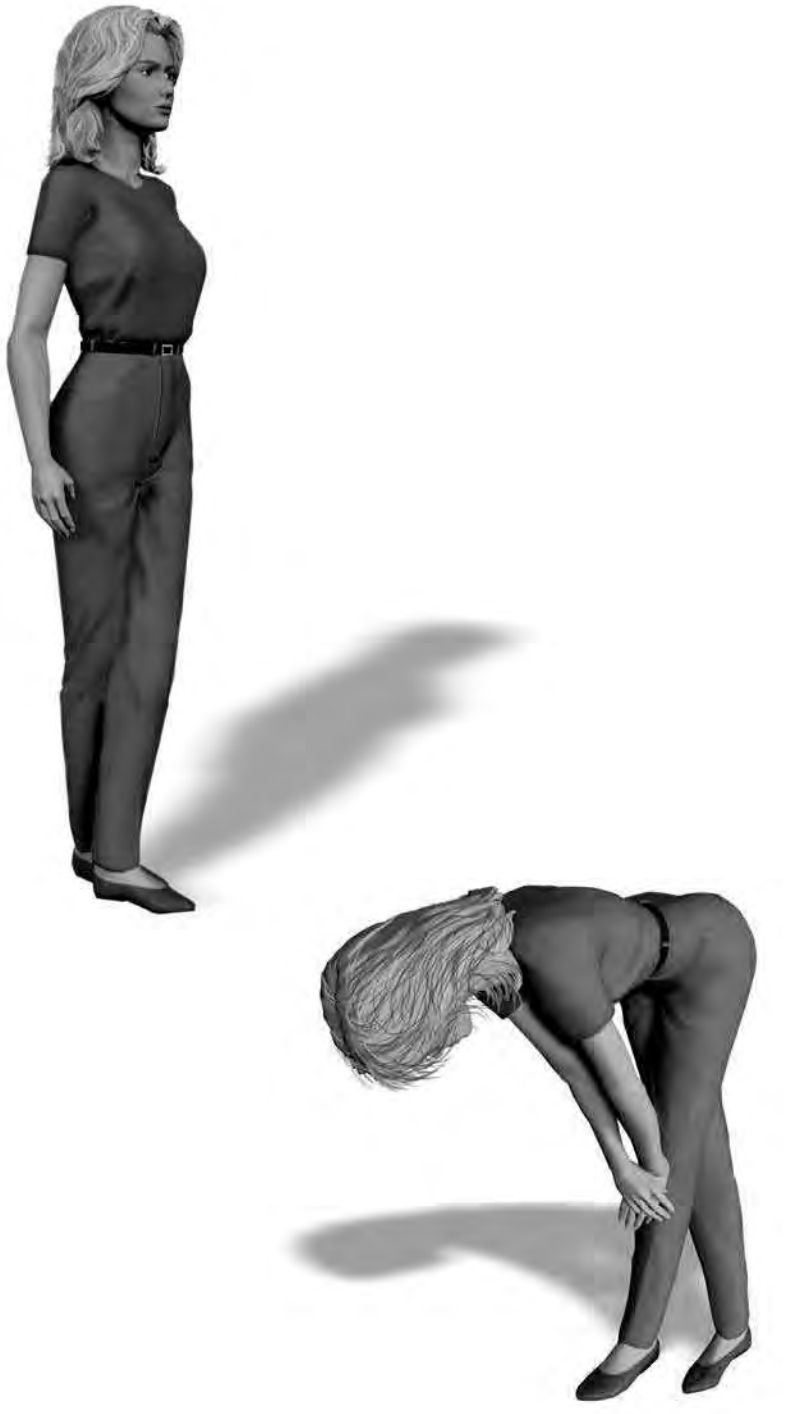
Don't…

- continue if painful
- continue if dizzy

Target Muscles:

Lats and triceps plus shoulder mobility

Single Leg Stretch



Time Required:

20 seconds

Here's How:

1. Cross legs, keeping both

2. Bend forward slowly from the waist and place both hands on the forward knee. Continue bending forward as far as possible.

3. Hold position for one breath cycle. Change leg position and repeat.

Warning—discontinue this exercise if you become dizzy or lose your balance. If you have problems, limit forward motion to comfortable angles, without pain.

Do's & Don'ts:

Do…

- breath continually

Don't…

- continue if painful
- lock knees

Target Muscles:

Hamstrings, lower back muscles, and stability

Single Quadriceps Stretch

Time Required:

20 seconds

this is a great quad stretch, but it is the most difficult

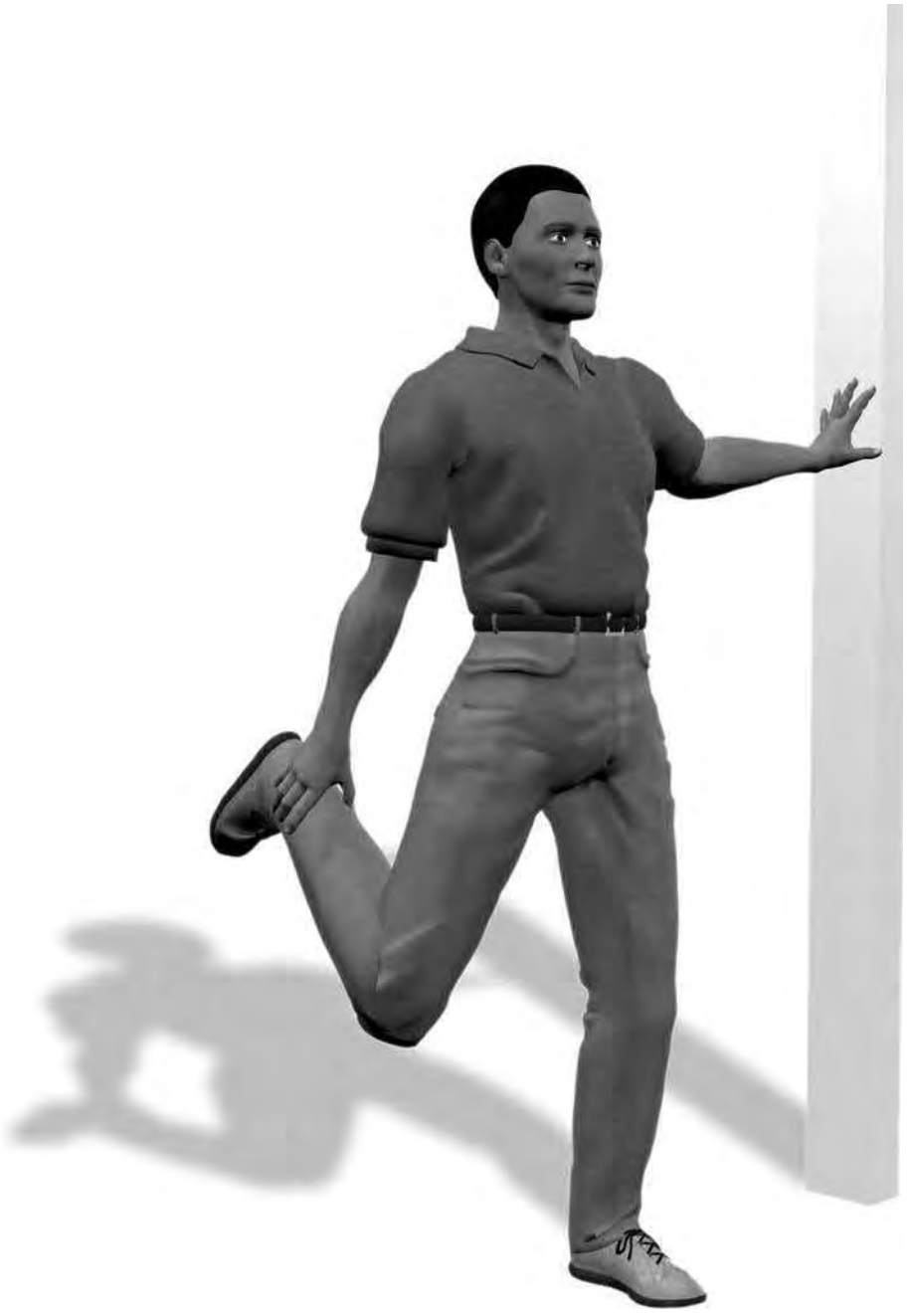
Here's How:

1 With your left hand, hold onto a stationary object for support, grasp your right ankle behind hips with right hand. Support may be critical for some individuals.

2 Pull ankle upward to stretch the quadriceps muscle.

Alternate—If you have knee injuries, you may elect to lift the lower leg behind you without a handhold and hold the position for 10 seconds. Repeat on opposite side.

Warning—do not attempt this exercise if you have problems with balance or severe knee injuries.



Do's & Don'ts:

Do…

- breath continually
- keep back straight

Don't…

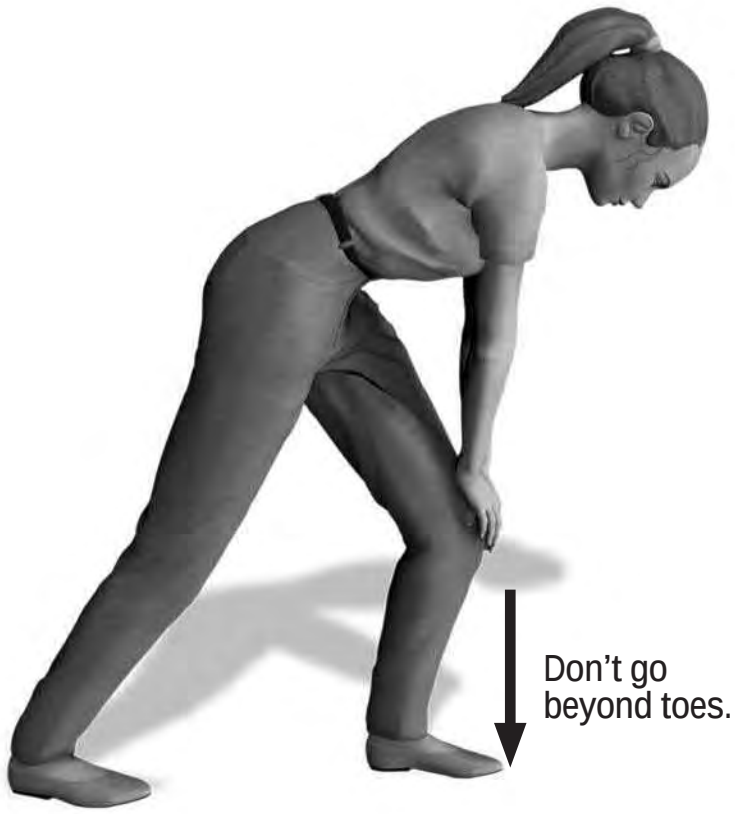
- allow leg to angle away from body.
- pull lower leg against hamstrings, it puts stress on the knees

Target Muscles:

Quadriceps and also helps balance and ankle strength

Taget Goal is to do this without support

Calf Stretch



Time Required:

20 seconds

Here's How:

1 Stand in upright stride position, left leg forward.

2 Flex the upper trunk forward and place both hands on left knee.

3

slowly push hips and body forward as far as possible, as though you are leaning into something. The stress should be on the calf muscles in the back of the right leg if you

on opposite side.

Do's & Don'ts:

Do…

- breath continually
- keep head forward

Don't…

- let knees stretch beyond toes
- bend head back

Target Muscles:

Calves, lower back muscles

Time Required:

10–20 seconds

Here's How:

1 apart, press momentarily together and release.

2 Stretch arms out forward

Hold 5 seconds and open hands wide.

3 Force your thumbs down while keeping pointing up towards the sky, wrists are bent back, and elbows should be locked. You should feel a slight burn in the upper arm muscles (extensor muscles) of the forearm. These muscles are frequently less used and

muscles in the forearm, which leads to unbalance and potential wrist injuries.

4 Hold 5 seconds and release. Return your arms to the neutral arm position at your side and shake out your hands gently.

Do's & Don'ts:

Do…

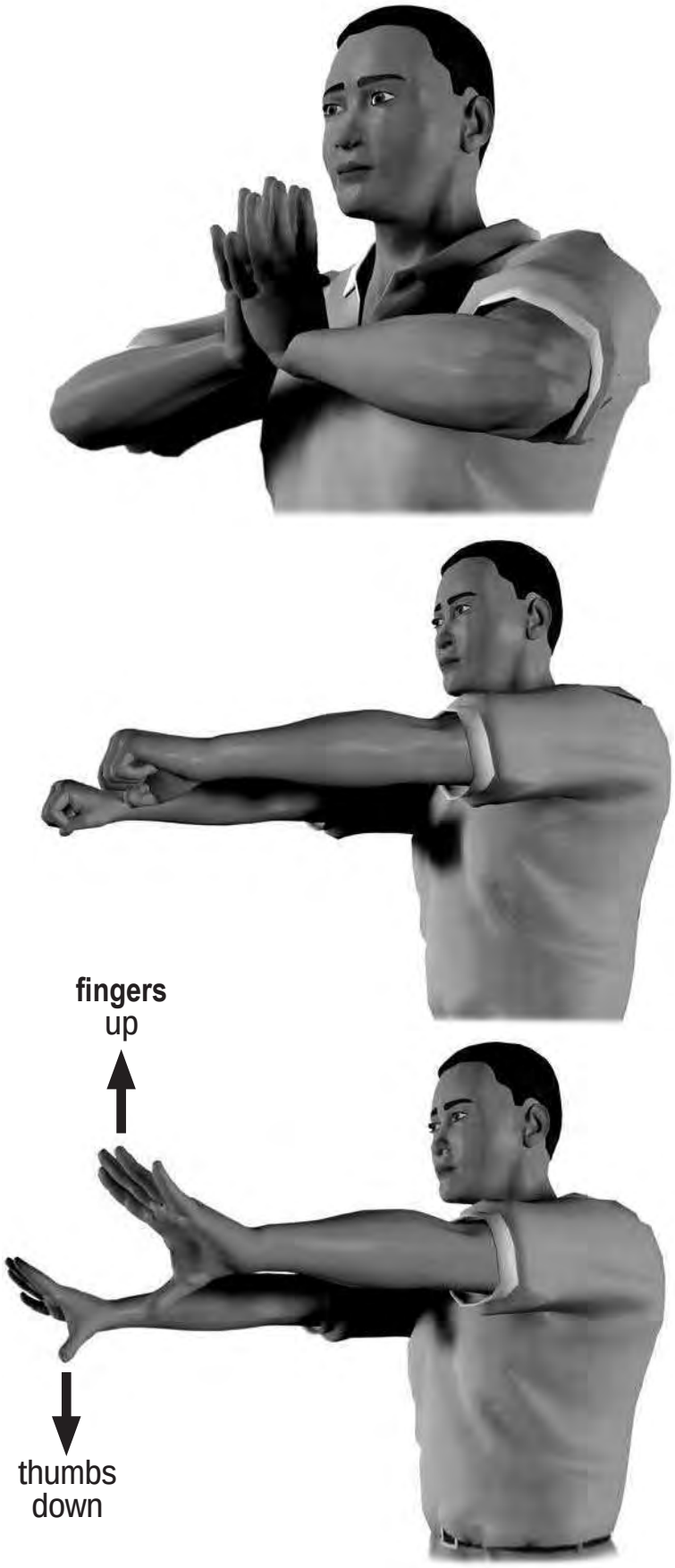
- breath continually
- keep back straight

Don't…

- continue if it's painful

Target Muscles:

Arm extensor muscles



Notes

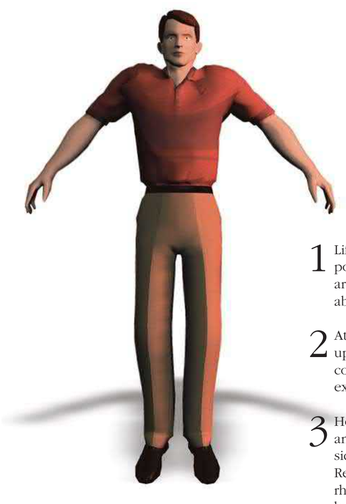
URS

Stretch & Flex Program

WARM-UP BEFORE STRETCHING

Run in place for 30 seconds, 10 jumping jacks, chicken dance, hokie pokie, Macarena, etc. to warm your muscles up.

SHOULDER SHRUG WITH HIGH REACH *Reach High*



1 Lift (shrug) shoulders as high as possible while slowly raising your arms to fully extended position above head.

2 At the same time, lift the body up onto your toes (for as long as comfortable). While reaching high, extend and spread fingers.

3 Hold this position for 10 seconds and then slowly lower arms to the side into a neutral body position. Relax while breathing slowly and rhythmically. Concentrate on your breathing rate for at least five breath cycles.

TARGET: Biceps, lats, forearms, and muscles that support the spine. Particularly good for using hand tools and light lifting tasks.

NECK STRETCH *Bobblehead*

1 Keep your neck as straight as possible while relaxing your shoulders. Tilt your head to the right. Slowly lower head toward right shoulder.

2 Repeat in four positions: right; left; front, and back each time returning to the upright position.

3 Be sure to do this slowly and do not hold your breath. There should be a complete breath cycle with each position of the head!

TARGET: Neck muscles and stress reducer. Particularly good for equipment operators, office personnel, drafters, CAD operators, and engineers.

TRICEP STRETCH *Backscratch*

1 Bring right hand to upper back between shoulder blades from above shoulder.

2 Place left hand on the tricep (muscle on the underside of the arm) near the elbow.

3 Gently pull right elbow up and back with left hand, moving the right hand down center of upper back as far as comfortable. This should not cause pinching in the neck. Repeat on opposite side.

TARGET: Triceps and shoulders. Particularly good for light lifting, carrying or pushing such as laborers, and mail clerks.

UPPER TRUNK STRETCH *Back Bend*

1 Place hands on back of hips.

2 Slowly arch upper body backward to a comfortable position. Hold while continuing to breath.

3 Return to neutral position and repeat two more times.

TARGET: Lower back, abdominals. Particularly good for truck drivers, equipment operators, laborers.

SHOULDER ROTATION STRETCH *Can Opener*

1 Keeping knees slightly bent, clasp hands behind back.

2 Slowly bend forward from the waist to a comfortable angle while lifting arms upward and behind your back.

3 Hold position for one breath cycle and slowly return to upright position. Repeat two more times.

TARGET: Shoulders and upper back. Particularly good for carpenters, office workers.

TRUNK ROTATION *Sprinkler*

1 Extend left arm out to side and grasp left hip with right hand.

2 Rotate upper body to the left while pulling on hip with right hand.

3 Release tension and change to other side. Repeat on opposite side.

TARGET: Lower back and trunk support muscles. Particularly good for laborers, mechanics, iron workers.

LATERAL ROTATION STRETCH *Take a Bow*

1 Stand upright, feet slightly apart for balance. Extend left arm out to side and grasp left hip with right hand.

2 Rotate upper body to left while pulling on hip with right hand, then bend slowly from waist to left side to a comfortable angle.

3 Return to upright position and change hand locations to other side. Repeat on opposite side.

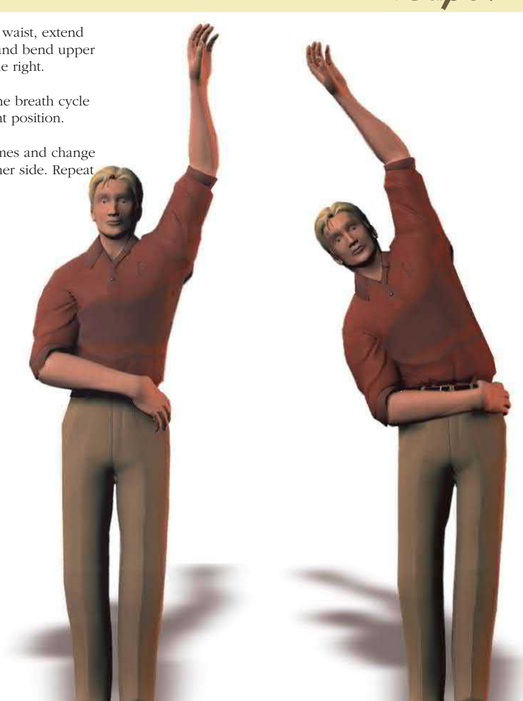
TARGET: Lats, lower back muscles, abdominals, upper leg muscles. Particularly good for laborers, iron workers.

LATERAL STRETCH *Teapot*

1 Place right hand on waist, extend left arm over head and bend upper body sideways to the right.

2 Hold position for one breath cycle and return to upright position.

3 Repeat two more times and change hand position to other side. Repeat on opposite side.



TARGET: Lats, and triceps plus shoulder mobility. Particularly good for masons, riggers, machinists.

SINGLE LEG STRETCH *Touch Your Toes*

1 Cross legs, keeping both knees slightly flexed.

2 Bend forward slowly from the waist and place both hands on the forward knee. Continue bending forward as far as possible.

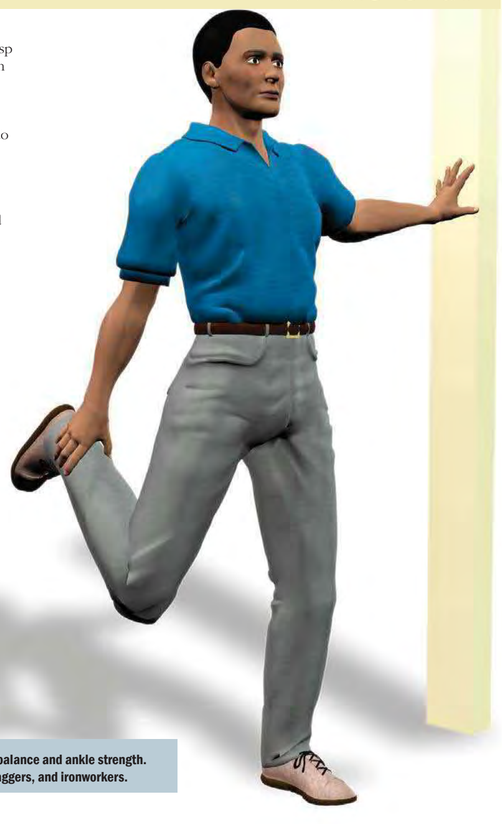
3 Hold position for one breath cycle. WARNING: discontinue this exercise if you become dizzy or lose your balance. Change leg position and repeat.

TARGET: Hamstrings, lower back muscles and stability. Particularly good for laborers, masons, mechanics.

SINGLE QUADRICEPS STRETCH *Ankle Grab*

1 With your left hand hold onto a stationary object for support, grasp your right ankle behind hips with right hand.

2 Pull ankle upward to stretch the quadriceps muscle. WARNING: do not attempt this exercise if you have problems with balance or severe knee injuries. If you have knee injuries, you may elect to lift the lower leg behind you and hold the position for 10 seconds. Repeat on opposite side.



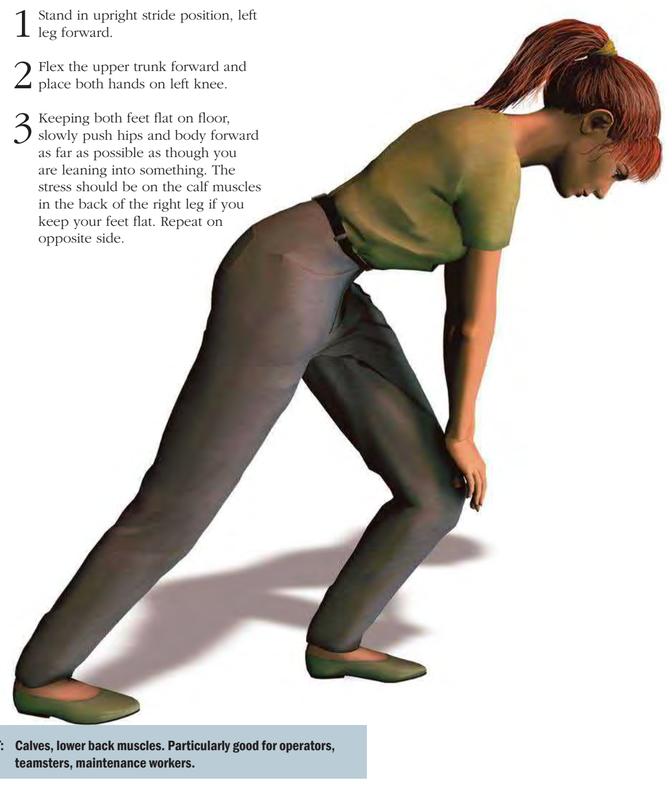
TARGET: Quadriceps and also helps body balance and ankle strength. Particularly good for laborers, flaggers, and ironworkers.

CALF STRETCH *Starting Line*

1 Stand in upright stride position, left leg forward.

2 Flex the upper trunk forward and place both hands on left knee.

3 Keeping both feet flat on floor, slowly push hips and body forward as far as possible as though you are leaning into something. The stress should be on the calf muscles in the back of the right leg if you keep your feet flat. Repeat on opposite side.



TARGET: Calves, lower back muscles. Particularly good for operators, teamsters, maintenance workers.

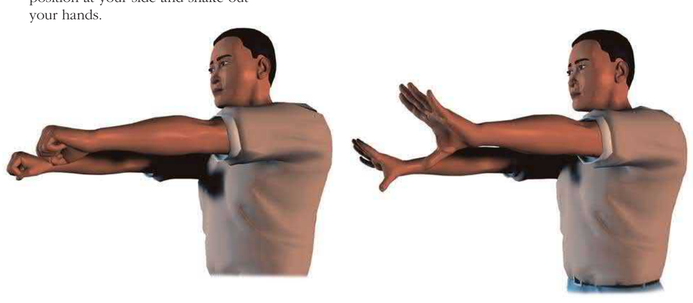
WRIST EXTENSION *Magic Hands*

1 Palms together with fingers apart, press momentarily together and release.

2 Stretch arms out forward and make a fist in each hand. Hold 5 seconds and open hand wide.

3 Force your thumbs down while keeping fingers pointing up towards the sky, wrists are bent back and elbows should be locked. You should feel a slight burn in the upper arm muscles (extensor muscles) of the forearm. These muscles are frequently less used and developed than the flexor muscles in the forearm which leads to unbalance and potential wrist injuries.

4 Hold 10 seconds and release. Return your arms to the neutral arm position at your side and shake out your hands.

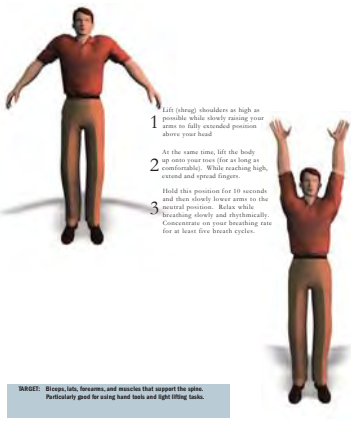


TARGET: Extensor muscles. Particularly good for carpenters, administrative professionals, CAD operators, machinists, and maintenance workers.

AECOM

Stretch & Flex Program

SHOULDER SHRUG WITH HIGH REACH



1 Lift (shrug) shoulders as high as possible while slowly raising your arms to fully extended position above your head

2 At the same time, lift the body up onto your toes (for as long as comfortable). While reaching high, extend and spread fingers.

3 Hold this position for 10 seconds and then slowly lower arms to the neutral position. Relax while breathing slowly and rhythmically. Concentrate on your breathing rate for at least five breath cycles.

TARGET: Biceps, lats, forearms, and muscles that support the spine. Particularly good for using hand tools and light lifting tasks.

NECK STRETCH

1 Keep your neck as straight as possible while relaxing your shoulders. Tilt your head to the right. Slowly lower head toward right shoulder.

2 Repeat in four positions: right; left front and back each time returning to the upright position.

3 Be sure to do this slowly and do not hold your breath. There should be a complete breath cycle with each position of the head!

TARGET: Neck muscles and stress reducer. Particularly good for equipment operators, office personnel, drafters, CAD operators, and engineers.

TRICEP STRETCH

1 Bring right hand to upper back between shoulder blades from above shoulder

2 Place left hand on the tricep (muscle on the underside of the arm) near the elbow

3 Gently pull right elbow up and back with left hand, moving the right hand down center of upper back as far as comfortable. This should not cause punching in the neck. Repeat on opposite side.

TARGET: Triceps and shoulders. Particularly good for light lifting, carrying or pushing such as laborers, and mail clerks.

UPPER TRUNK STRETCH

1 Place hands on back of hips.

2 Slowly arch upper body backward to a comfortable position. Hold while continuing to breath.

3 Return to neutral position and repeat two more times.

TARGET: Lower back, abdominals. Particularly good for truck drivers, equipment operators, laborers.

SHOULDER ROTATION STRETCH

1 Keeping knees slightly bent, clasp hands behind back.

2 Slowly bend forward from the waist to a comfortable angle while lifting arms upward and behind your back.

3 Hold position for one breath cycle and slowly return to upright position. Repeart two more times.

TARGET: Shoulders and upper back. Particularly good for carpenters, office workers.

TRUNK ROTATION

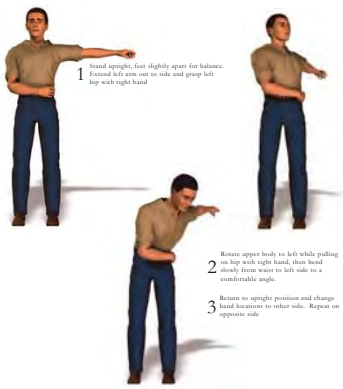
1 Extend left arm out to side and grasp left hip with right hand

2 Rotate upper body to the left while pulling on hip with right hand

3 Release tension and change to other side. Repeat on opposite side.

TARGET: Lower back and trunk support muscles. Particularly good for laborers, mechanics, iron workers.

LATERAL ROTATION STRETCH



1 Stand upright, feet slightly apart for balance. Extend left arm out to side and grasp left hip with right hand

2 Rotate upper body to left while pulling on hip with right hand, then bend slowly from waist to left side to a comfortable angle.

3 Return to upright position and change hand locations to other side. Repeat on opposite side.

TARGET: Lats, lower back muscles, abdominals, upper leg muscles. Particularly good for laborers, iron workers.

LATERAL STRETCH

1 Place right hand on waist, extend left arm over head and bend upper body sideways to the right

2 Hold position for one breath cycle and return to upright position

3 Repeat two more times and change hand position to other side. Repeat on opposite side.

TARGET: Lats, and triceps plus shoulder mobility. Particularly good for masons, riggers, machinists.

SINGLE LEG STRETCH

1 Cross legs, keeping both knees slightly flexed.

2 Bend forward slowly from the waist and place both hands on the forward knee. Continue bending forward as far as possible.

3 Hold position for one breath cycle. WARNING: Discontinue this exercise if you become dizzy or lose your balance. Change leg position and repeat

TARGET: Hamstrings, lower back muscles and stability. Particularly good for laborers, masons, mechanics.

SINGLE QUADRICEPS STRETCH

1 With your left hand hold onto a stationary object for support, grasp your right ankle behind hips with right hand.

2 Pull ankle upward to stretch the quadriceps muscle. Warning: Do not attempt this exercise if you have problems with balance or severe knee injuries. If you have knee injuries, you may elect to lift lower leg behind you and hold the position for 10 seconds. Repeat on opposite side.

TARGET: Quadriceps and also helps body balance and ankle strength. Particularly good for laborers, flaggers, and ironworkers.

CALF STRETCH

1 Stand in upright stride position, left leg forward

2 Flex the upper trunk forward and place both hands on left knee

3 Keeping both feet flat on floor, slowly push hips and body forward as far as possible as though you are leaning into something. The stress should be on the calf muscle in the back of the right leg if you keep you feet flat. Repeat on opposite side.

TARGET: Calves, lower back muscles. Particularly good for operators, teamsters, maintenance workers.

WRIST EXTENSION

1 Palms together with fingers apart, press momentarily together and release.

2 Stretch arms out forward and make a fist in each hand. Hold 5 seconds and open hand wide.

3 Force your thumbs down while keeping fingers pointing up towards the sky, wrists are bent back and elbows should be locked. You should feel a slight burn in the upper arm muscles (extensor muscles) of the forearm. These muscles are frequently less used and developed than flexor muscles in the forearm which leads to unbalance and potential wrist injuries.

4 Hold 10 seconds and release. Return your arms to the neutral arm position at your side and shake out your hands.

TARGET: Extensor muscles. Particularly good for carpenters, administrative professionals, CAD operators, machinists, and maintenance workers.

Attachment D

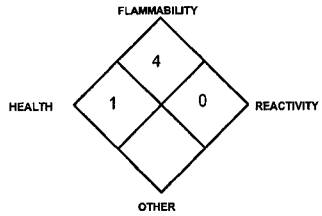
Safety Data Sheets (SDSs)

APPENDIX C

SAFETY DATA SHEETS

Airgas

NFPA RATING



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:	**ISOBUTYLENE - C_4H_8**
	Document Number: 001031
PRODUCT USE:	For general analytical/synthetic chemical uses.
SUPPLIER/MANUFACTURER'S NAME:	AIRGAS INC.
ADDRESS:	259 N. Radnor-Chester Road Suite 100 Radnor, PA 19087-5283
BUSINESS PHONE:	1-610-687-5253
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300 International: 703-527-3887 (Call Collect)
DATE OF PREPARATION:	May 12, 1996
SECOND REVISION:	January 16, 1998

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	OTHER
Isobutylene	115-11-7	> 99.0%	There are no specific exposure limits for Isobutylene. Isobutylene is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Maximum Impurities		< 1.0%	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established C = Ceiling Limit See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Isobutylene is a colorless, liquefied, flammable gas with an unpleasant odor similar to burning coal. The liquefied gas rapidly turns into a gas at standard atmospheric temperatures and pressures. Isobutylene is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Rapid evaporation of liquid from the cylinder may cause frostbite. Both the liquid and gas pose a serious fire hazard when accidentally released. The gas is heavier than air and may travel to a source of ignition and flash back to a leak or open container. Flame or high temperature impinging on a localized area of a cylinder of Isobutylene can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant route of overexposure for this gas is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of overexposure, death may occur. Isobutylene also has some degree of anesthetic action and can be mildly irritating to the mucous membranes. The effects associated with various levels of oxygen are as follows:

CONCENTRATION	SYMPTOMS OF EXPOSURE
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or 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 such contact can quickly subside.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	4
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications

See Section 16 for Definition of Ratings

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Overexposure to Isobutylene may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, headache, dizziness, and nausea. At high concentrations, unconsciousness or death may occur. Contact with liquefied gas or rapidly expanding gases may cause frostbite.

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

TARGET ORGANS: Respiratory system.

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 ISOBUTYLENE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

4. FIRST-AID MEASURES (Continued)

Remove victim(s) to fresh air as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. 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.

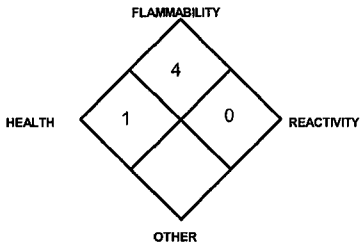
Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT (Closed Cup): -10°C (< 14°F)
AUTOIGNITION TEMPERATURE: 465°C (869°F)
FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 1.8%
Upper (UEL): 9.6%

NFPA RATING



See Section 16 for Definition of Ratings

FIRE EXTINGUISHING MATERIALS: Extinguish Isobutylene fires by shutting off the source of the gas. Use water spray or a foam agent to cool fire-exposed containers, structures, and equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may ignite and produce toxic gases, including carbon monoxide and carbon dioxide.

DANGER! Fires impinging (direct flame) on the outside surface of unprotected pressure storage vessels of Isobutylene can be very dangerous. Direct flame exposure on the cylinder wall can cause an explosion either by BLEVE (Boiling Liquid Expanding Vapor Explosion), or by exothermic decomposition. This is a catastrophic failure of the vessel releasing the contents into a massive fireball and explosion. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the vessel. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Static discharge may cause Isobutylene to ignite explosively if released.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipeline. Stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the leaking gas could explosively re-ignite without warning and cause extensive damage, injury, or fatality. In this case, increase ventilation (in enclosed areas) to prevent flammable or explosive mixture formation. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of vessel exposures, evacuate the area. Refer to the North American Emergency Response Guidebook for additional information. Other information for pre-planning can be found in the American Petroleum Institute Publications 2510 and 2510A.

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. Adequate fire protection must be provided. Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, gloves resistant to tears, and Self-Contained Breathing Apparatus.**

Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut off with water spray. Allow the gas to dissipate. Monitor the surrounding area for combustible gas levels and oxygen. Combustible gas concentration must be below 10% of the LEL (LEL = 1.8%) prior to entry. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. 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.

THIS IS AN EXTREMELY FLAMMABLE GAS. Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Isobutylene IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Isobutylene could occur without any significant warning symptoms.

STORAGE AND HANDLING PRACTICES: 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. Post "No Smoking or Open Flames" signs in storage or use areas.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Isolate from oxidizers such as oxygen, chlorine, or fluorine. Use a check valve or trap in the discharge line to prevent hazardous backflow. Post "No Smoking or Open Flame" signs in storage and use areas. 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. Electrical equipment should be non-sparking or explosion proof. 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, if provided, in place 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 gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Isobutylene. 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*".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., nitrogen) before attempting repairs.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Isobutylene dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the presence of potentially explosive air-gas mixtures and level of oxygen.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Maintain level of gas below the level listed in Section 2 (Composition and Information on Ingredients). Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Isobutylene. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding gases and splashes of liquid Isobutylene.

HAND PROTECTION: Wear gloves resistant to tears when handling cylinders of Isobutylene. Use low-temperature protective gloves (e.g., Kevlar) when working with containers of liquid Isobutylene.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product, as well as fire retardant items.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY @ 21.1°C (70°F): 2.396 kg/m^3 (0.1496 lb/ft^3)
SPECIFIC GRAVITY (air = 1): 1.997
SOLUBILITY IN WATER: Insoluble.
EVAPORATION RATE (nBuAc = 1): Not applicable.
ODOR THRESHOLD: Not established.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.
pH: Not applicable.
FREEZING POINT: -140°C (-220.6°F)
BOILING POINT @ 1 atm: -6.9°C (19.6°F)
EXPANSION RATIO: Not applicable
VAPOR PRESSURE (psia): 39
SPECIFIC VOLUME (ft^3/lb): 6.7

APPEARANCE AND COLOR: Colorless gas with the unpleasant odor of burning coal. The liquid is also colorless and has the same unpleasant odor of burning coal.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties. 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: Stable.

DECOMPOSITION PRODUCTS: When ignited in the presence of oxygen, this gas will burn to produce carbon monoxide and carbon dioxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: 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 IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is for pure Isobutylene.

ISOBUTYLENE:
LC_{50} (rat, inhalation) = 620 g/m^3/4 hours
LC_{50} (mouse, inhalation) = 415 g/m^3/2 hours

SUSPECTED CANCER AGENT: Isobutylene is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Isobutylene may be mildly irritating to the mucous membranes. In addition, contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Isobutylene is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Isobutylene on the human reproductive system.

Mutagenicity: No mutagenic effects have been described for Isobutylene.
Embryotoxicity: No embryotoxic effects have been described for Isobutylene.
Teratogenicity: No teratogenic effects have been described for Isobutylene.
Reproductive Toxicity: No reproductive toxicity effects have been described for Isobutylene.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational 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.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by overexposure to Isobutylene.

11. TOXICOLOGICAL INFORMATION (Continued)

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Isobutylene.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen-deficient environments. No adverse effect is anticipated to occur to plant life, except for frost produced in the presence of rapidly expanding gases. See Section 11, Toxicological Information, for additional information on effects on animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of Isobutylene on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Airgas Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

For Isobutylene Gas:

PROPER SHIPPING NAME:	Isobutylene
HAZARD CLASS NUMBER and DESCRIPTION:	2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1055
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

Alternate Description:

PROPER SHIPPING NAME:	Petroleum gases, liquefied
HAZARD CLASS NUMBER and DESCRIPTION:	2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1075
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

MARINE POLLUTANT: Isobutylene is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Isobutylene is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

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

CANADIAN DSL/NDSL INVENTORY STATUS: Isobutylene is on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Isobutylene is listed on the TSCA Inventory.

15. REGULATORY INFORMATION (Continued)

OTHER U.S. FEDERAL REGULATIONS: Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 lb. Depending on specific operations involving the use of Isobutylene, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Isobutylene is not listed in Appendix A; however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lb (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Isobutylene is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Liquefied Petroleum Gas.
California - Permissible Exposure Limits for Chemical Contaminants: Liquefied Petroleum Gas.
Florida - Substance List: Isobutylene.
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Isobutylene.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: Liquefied Petroleum Gas.
Missouri - Employer Information/Toxic Substance List: No.
New Jersey - Right to Know Hazardous Substance List: Isobutylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Isobutylene.
Rhode Island - Hazardous Substance List: Liquefied Petroleum Gas.
Texas - Hazardous Substance List: Liquefied Petroleum Gas.
West Virginia - Hazardous Substance List: Liquefied Petroleum Gas.
Wisconsin - Toxic and Hazardous Substances: Liquefied Petroleum Gas.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Isobutylene is not on the California Proposition 65 lists.

LABELING:

DANGER:

FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
MAY CAUSE FROSTBITE.

Keep away from heat, flames, and sparks.
Store and use with adequate ventilation.
Cylinder temperature should not exceed 52°C (125°F).
Do not get liquid in eyes, on skin, or clothing.
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

FIRST AID:

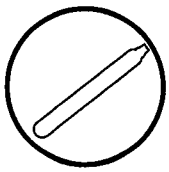
IF INHALED, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gas
Class B1: Flammable Gas



16. OTHER INFORMATION

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

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. It is used for computer-related searching.

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. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**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°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); 1 (material 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).
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 causes death or major residual injury).

NATIONAL FIRE PROTECTION ASSOCIATION (Continued): 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: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** 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.

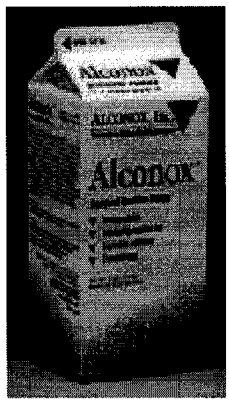
REGULATORY INFORMATION:
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the 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.

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..... May 25, 2000
(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)-242-9300 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.

NFPA Rating: 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 aggrivated by exposure:
Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggrivated 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 re-administer 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 CO_2 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. Copyright Policy. 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.

ON-LINE To Ask a Question or Make a Comment

ON-LINE To Place an Order or Request a Quote

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MATERIAL SAFETY DATA SHEET: SIMPLE GREEN®

SG-13008

I. PRODUCT & COMPANY INFORMATION

PRODUCT NAME: **SIMPLE GREEN® CLEANER / DEGREASER / DEODORIZER**

COMPANY NAME: **SUNSHINE MAKERS, INC.**

15922 Pacific Coast Highway
Huntington Harbour, CA 92649 USA
Telephone: 800-228-0709 • 562-795-6000
Fax: 562-592-3034
Website: www.simplegreen.com

Version No. 1007
Issue Date: January, 2002

For 24-hour emergency, call Chem-Tel, Inc.: 800-255-3924

USE OF PRODUCT: An all purpose cleaner and degreaser used undiluted or diluted in water for direct, spray, and dip tank procedures.

II. INGREDIENT INFORMATION

The only ingredient of Simple Green® with established exposure limits is undiluted 2-butoxyethanol (<6%) (Butyl Cellosolve; CAS No. 111-76-2): the OSHA PEL and ACGIH TLV is 25 ppm (skin). Note, however, that Butyl Cellosolve is only one of the raw material ingredients that undergo processing and dilution during the manufacture of Simple Green®. Upon completion of the manufacturing process, Simple Green® does not possess the occupational health risks associated with exposure to undiluted Butyl Cellosolve. Verification of this is contained in the independent test results detailed under "Toxicological Information" on Page 3 of this MSDS.

The Butyl Cellosolve in Simple Green® is part of a chemical category (glycol ethers) regulated by the Emergency Planning and Community Right-to-Know Act (SARA, Title III, section 313); therefore, a reporting requirement exists. Based upon chemical analysis, Simple Green® contains no known EPA priority pollutants, heavy metals, or chemicals listed under RCRA, CERCLA, or CWA. Analysis by TCLP (Toxicity Characteristic Leaching Procedure) according to RCRA revealed no toxic organic or inorganic constituents.

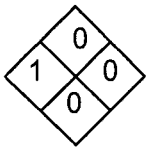
All components of Simple Green® are listed on the TSCA Chemical Substance Inventory.

III. HAZARDS IDENTIFICATION

UN Number: Not required
Dangerous Goods Class: Nonhazardous

Hazard Rating (NFPA/HMIS)

Health = 1* Reactivity = 0
Fire = 0 Special = 0



Rating Scale

0 = minimal 1 = slight
2 = moderate 3 = serious
4 = severe

*Mild eye irritant, non-mutagenic and non-carcinogenic. **None of the ingredients in Simple Green® are regulated or listed as potential cancer agents by Federal OSHA, NTP, or IARC.**

IV. FIRST AID MEASURES

SYMPTOMS OF OVEREXPOSURE AND FIRST AID TREATMENT

Eye contact: Reddening may develop. Immediately rinse the eye with large quantities of cool water; continue 10-15 minutes or until the material has been removed; be sure to remove contact lenses, if present, and to lift upper and lower lids during rinsing. Get medical attention if irritation persists.

Skin contact: Minimal effects, if any; rinse skin with water, rinse shoes and launder clothing before reuse. Reversible reddening may occur in some dermal-sensitive users; thoroughly rinse area and get medical attention if reaction persists.

Swallowing: Essentially non-toxic. Give several glasses of water to dilute; do not induce vomiting. If stomach upset occurs, consult physician.

Inhalation: Non-toxic. Exposures to concentrate-mist may cause mild irritation of nasal passages or throat; remove to fresh air. Get medical attention if irritation persists.

V. FIRE FIGHTING MEASURES

Simple Green® is stable, not flammable, and will not burn.

Flash Point/Auto-Ignition:	Not flammable.
Flammability Limits:	Not flammable.
Extinguishing Media:	Not flammable/nonexplosive. No special procedures required.
Special Fire Fighting Procedures:	None required.

VI. ACCIDENTAL RELEASE MEASURES

Recover usable material by convenient method; residual may be removed by wipe or wet mop. If necessary, unrecoverable material may be washed to drain with large quantities of water.

VII. HANDLING, STORAGE & TRANSPORT INFORMATION

No special precautions are required. **This product is non-hazardous for storage and transport according to the U.S. Department of Transportation Regulations.** Simple Green® requires no special labeling or placarding to meet U.S. Department of Transportation requirements.

UN Number: Not required Dangerous Goods Class: Non-hazardous

VIII. EXPOSURE CONTROLS

Exposure Limits: The Simple Green® formulation presents no health hazards to the user when used according to label directions for its intended purposes. Mild skin and eye irritation is possible (please see Eye contact and Skin contact in Section IV.).

Ventilation: No special ventilation is required during use.

Human Health Effects or Risks from Exposure: Adverse effects on human health are not expected from Simple Green®, based upon twenty years of use without reported adverse health incidence in diverse population groups, including extensive use by inmates of U.S. Federal prisons in cleaning operations.

Simple Green® is a mild eye irritant; mucous membranes may become irritated by concentrate-mist.

Simple Green® is not likely to irritate the skin in the majority of users. Repeated daily application to the skin without rinsing, or continuous contact of Simple Green® on the skin may lead to temporary, but reversible, irritation.

Medical Conditions Aggravated by Exposure: No aggravation of existing medical conditions is expected; dermal sensitive users may react to dermal contact by Simple Green®.

IX. PERSONAL PROTECTION

Precautionary Measures:	No special requirements under normal use conditions.
Eye Protection:	**Caution, including reasonable eye protection, should always be used to avoid eye contact where splashing may occur.**
Skin Protection:	No special precautions required; rinse completely from skin after contact.
Respiratory Protection:	No special precautions required.
Work and Hygienic Practices:	No special requirements. Wash or rinse hands before touching eyes or contact lenses.

X. PHYSICAL AND CHEMICAL PROPERTIES

Appearance/odor: Translucent green liquid with characteristic sassafras odor.
Specific Gravity: 1.0257 **Vapor Pressure:** 17 mm Hg @ 20 °C; 22 mm Hg @ 25 °C
pH of concentrate: 9.5 **Vapor Density:** 1.3 (air = 1)
Evaporation: >1 (butyl acetate = 1) **Density:** 8.5 lbs./gallon
Boiling Point: 110 °C (231 °F)
Freezing Point: -9 °C (16 °F) If product freezes, it will reconstitute without loss of efficacy when brought back to room temperature and agitated.
VOC Composite Partial Pressure: 0.006 mm Hg @ 20 °C
Volatile Organic Compounds (VOCs): 7.96 g/L per ASTM Method 3960-90. Per California AQMD's VOC test method, product must be diluted at least 2 parts of water to 1 part Simple Green® in order to meet SCAQMD Rule 1171 & Rule 1122 and BAAQMD Regulation 8-16 VOC requirements for solvent cleaning operations.
Water Solubility: Completely soluble in water. The higher salt concentrations in marine ecosystems will lead to complexes with Simple Green® that may become visible at ratios above one part Simple Green® to 99 parts seawater.
Ash Content: At 600 °F: 1.86% by weight.
Nutrient Content: Nitrogen: <1.0% by weight (fusion and qualitative test for ammonia).
Phosphorus: 0.3% by formula.
Sulfur: 0.6% by weight (barium chloride precipitation method).

Detection: Simple Green® has a characteristic sassafras odor that is not indicative of any hazardous situation.

XI. STABILITY AND REACTIVITY INFORMATION

Nonreactive. Simple Green® is stable, even under fire conditions, and will not react with water or oxidizers. Hazardous polymerization will not occur.

XII. TOXICOLOGICAL INFORMATION

Nonhuman Toxicity

Acute Mortality Studies:
Oral LD_{50} (rat): >5.0 g/kg body weight // Dermal LD_{50} (rabbit): >2.0 g/kg body weight

Dermal Irritation: Only mild, but reversible, irritation was found in a standard 72-hr test on rabbits. A value of 0.2 (non-irritating) was found on a scale of 8.

Eye Irritation: With or without rinsing with water, the irritation scores in rabbits at 24 hours did not exceed 15 (mild irritant) on a scale of 110.

Subchronic dermal effects: No adverse effects, except reversible dermal irritation, were found in rabbits exposed to Simple Green® (up to 2.0 g/kg/day for 13 weeks) applied to the skin of 25 males and 25 females. Only female body weight gain was affected. Detailed microscopic examination of all major tissues showed no adverse changes.

Fertility Assessment by Continuous Breeding: The Simple Green® formulation had no adverse effect on fertility and reproduction in CD-1 mice with continuous administration for 18 weeks, and had no adverse effect on the reproductive performance of their offspring.

XIII. BIODEGRADABILITY AND ENVIRONMENTAL TOXICITY INFORMATION

Biodegradability:
Simple Green® is readily decomposed by naturally occurring microorganisms. The biological oxygen demand (BOD), as a percentage of the chemical oxygen demand (COD), after 4, 7, and 11 days was 56%, 60%, and 70%, respectively. Per OECD Closed Bottle Test, Simple Green® meets OECD and EPA recommendations for ready biodegradability.
In a standard biodegradation test with soils from three different countries, Butyl Cellosolve reached 50% degradation in 6 to 23 days, depending upon soil type, and exceeded the rate of degradation for glucose which was used as a control for comparison.

Environmental Toxicity Information:
Simple Green® is considered practically non-toxic per EPA's aquatic toxicity scale. Simple Green® is non-lethal to any of the marine and estuarine test animals listed in the following table at concentrations below 200 mg/L (0.02%). This table shows the Simple Green® concentrations that are likely to be lethal to 50% of the exposed organisms.

	LC_{50} in mg/L (ppm)	
	48-hour	96-hour
Marine Fish:		
Mud minnow *(Fundulus heteroclitus)*	1690	1574
Whitebait *(Galaxias maculatus)*	210	210
Marine/Estuarine Invertebrates:		
Brine Shrimp *(Artemia salina)*	610	399
Grass Shrimp *(Palaemonetes pugio)*	270	220
Green-lipped Mussel *(Perna canaliculus)*	220	220
Mud Snail *(Potamopyrgus estuarinus)*	410	350

XIV. DISPOSAL CONSIDERATIONS

Simple Green® is fully water soluble and biodegradable and will not harm sewage-treatment microorganisms if disposal by sewer or drain is necessary. Dispose of in accordance with all applicable local, state, and federal laws.

XV. OTHER INFORMATION

Containers:	Simple Green® residues can be completely removed by rinsing with water; the container may be recycled or applied to other uses.
Electrical Wiring Compatibility:	Polyimide insulated wiring is not affected by exposure to Simple Green®. After immersion in Simple Green® for 14 days at 74°F, the 61 cm piece of polyimide insulated wire passed a one minute dielectric proof test at 2500 volts (ASTM D-149).
Contact Point:	Sunshine Makers, Inc., Research and Development Division: 562-795-6000.

***** NOTICE *****

All information appearing herein is based upon data obtained by the manufacturer and recognized technical sources. Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of this information, Sunshine Makers, Inc. or its distributors extends no warranties, makes no representations and assumes no responsibility as to the suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Attachment E

Site Orientation

Attachment E Site Orientation

AECOM will conduct a site safety briefing for a person's initial visit to the site. The briefing will be conducted:

- Prior to the start of work;
- For any new AECOM or subconsultant personnel; and
- At each mobilization, or whenever there is a change in task or significant change in task location.

All personnel working on the project who have received the site briefing (including the HASP review) will sign the Personal Acknowledgement located at the end of the HASP. Visitors may receive a shortened version to address the hazards specific to their visit.

The following items, at minimum, will be discussed during the site safety briefing:

- Contents of this HASP;
- The Emergency Response Plan;
- Contractor SH&E Management expectations;
- Injury management, including notification and hospital and occupational clinic locations;
- The AECOM 4-Sight program;
- Stop Work authority;
- Completion of a THA each day (Attachment F);
- Types of hazards at the site and means for minimizing exposure to them;
- Instructions for new operations to be conducted, and safe work practices;
- PPE that must be used;
- Lone worker check-in procedures;
- Emergency evacuation routes, muster points, and tornado/storm shelters; and
- Location and use of emergency equipment.

These meetings must be documented and maintained in the project files.

Attachment F

Risk Register/Hazard Assessment, Daily Tailgate Meeting Form and Task Hazard Assessment Forms

AECOM

Americas

Daily Tailgate Meeting

S3AM-209-FM5

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

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

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

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

1. Required Topics

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

2. Discuss if Applicable to Today's Work

☑	■	**Check ☑ as reviewed or mark ■ as not applicable**
☐	☐	Biological/ Chemical / Electrical Hazards
☐	☐	Ergonomics - Lifting, Body Position
☐	☐	Lock Out/ Tag Out
		Short Service Employees - visual identifier and mentor/ oversight assignment
☐	☐	Simultaneous/ Neighbouring Operations
☐	☐	Slip/ Trip/ Fall Hazards
☐	☐	Specialized PPE Needs
☐	☐	Traffic Control
☐	☐	Waste Management/ Decontamination
☐	☐	Weather Hazards / Heat Stress / Cold Stress
☐	☐	Subcontractor Requirements (e.g., JHAs, THAs, procedures, reporting, etc.)
☐	☐	Work Permits / Plans required (e.g., Fall Protection, Confined Space, Hot Work, Critical Lifts, etc.); in place, understood (identify/attach):
☐	☐	Other Topics (describe/attach):
☐	☐	Client specific requirements (describe):

3. Daily Check Out by Site Supervisor

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

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

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

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

All employees:

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

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

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

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

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

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

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

SITE VISITOR / SITE REPRESENTATIVE

Name	Company Name	Arrival Time	Departure Time	Signature

Americas

Pre-Job Hazard Assessment

S3AM-209-FM4

Location: Click here to enter text. **Date:** Click here to enter text.

Prepared By: Click here to enter text. **Approved By:** Click here to enter text.

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
List principal activities involved in the scope of work	Identify each safety or health hazard		Identify elimination, substitution, engineering & administrative controls & any specific required PPE	
ACTIVITY 1 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
ACTIVITY 2 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
ACTIVITY 3 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
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ACTIVITY 4 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
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	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
ACTIVITY 5 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
ACTIVITY 6 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
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ACTIVITY 7 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
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	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
ACTIVITY 8 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
ACTIVITY 9 – Click here to enter text.	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
	Click here to enter text.	#	Click here to enter text.	#
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SPECIAL REQUIREMENTS

Step #	Equipment to be Used	Inspection requirements	Training Requirements
	List equipment to be used in work activity	List inspection/permit requirements for work activity	List training requirements including hazard communication
1.	Click here to enter text.	Click here to enter text.	Click here to enter text.
2.	Click here to enter text.	Click here to enter text.	Click here to enter text.
3.	Click here to enter text.	Click here to enter text.	Click here to enter text.
4.	Click here to enter text.	Click here to enter text.	Click here to enter text.
5.	Click here to enter text.	Click here to enter text.	Click here to enter text.
6.	Click here to enter text.	Click here to enter text.	Click here to enter text.
7.	Click here to enter text.	Click here to enter text.	Click here to enter text.
8.	Click here to enter text.	Click here to enter text.	Click here to enter text.
9.	Click here to enter text.	Click here to enter text.	Click here to enter text.

AECOM

INSTRUCTIONS AND RISK MATRIX

Hazard Evaluation – Identify principal steps of the task. Identify potential safety/health hazards for each step and determine initial risk rating using the matrix provided below. Identify control measures including PPE for each hazard. Re-evaluate hazard potential and assign a final risk rating. If the final risk rating is a 5-9 (medium risk) or 10-25 (high risk), additional hazard controls shall be identified and applied until the final risk rating is reduced to 4 or below. The final risk rating cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin. Add additional rows as required to cover all major steps/aspects of the activity.

Special Requirements – Identify equipment to be used including specific PPE required. Identify inspection requirements such as competent person, permit issue, documented task hazard analysis, etc. Identify training requirements such as hazard communication, scaffold user, fall protection, etc.

High ← → Low (Severity)

High ↕ Low (Probability)

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

10-25 (red) are high risk, 5-9 (yellow) are medium risk, and 1-4 (green) are low risk

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

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

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

Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:		**Control #:**	

Project Name:	National Grid Williamsburg	**Client:**	National Grid	**Date:**	
Permits Required? (list):		**Work Location:**	50 Kent Ave, Williamsburg, Brooklyn		

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

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☒ Gloves: _____ ☐ Hearing Protection ☐ Other: _____
Tools & Equipment:	

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

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1.	1a.		1a.	
On-Site Edits:				
2.	2a.		2a.	
On-Site Edits:				
3.	3a.		3a.	
On-Site Edits:				

Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:		Control #:	

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

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions To Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
4.	4a.		4a.	
On-Site Edits:				
5.	5a.		5a.	
On-Site Edits:				
6.	6a.		6a.	
On-Site Edits:				
7.	7a.		7a.	
On-Site Edits:				

Additional Notes:

Task Hazard Assessment – DCSA

AECOM Imagine it. Delivered.

Task Name:		Control #:	

All Employees:

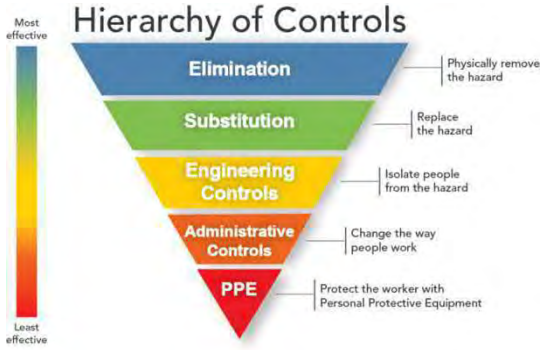
STOP WORK if uncertain about safety or if a hazard or additional precaution is not recorded on the THA.

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

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

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

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



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

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

Visitor Acknowledgement
Visitors review task hazards and acknowledge understanding
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

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

Attachment G

Competent Person Designation Forms

AECOM

Americas

Competent Person Designation

S3AM-202-FM1

Company:	AECOM	**AECOM Manager:**	Kevin Connare
Project Location:	National Grid Front Street	**Program/ Project No:**	60412543
Designated Competent Person:		**Employee No:**	

Check the technical activity for which the Designation will apply:

- ☐ Asbestos
- ☐ Assured Equipment Grounding Conductor
- ☐ Blasting & Explosives
- ☐ Concrete & Masonry Construction
- ☐ Confined Space Entry
- ☐ Control of Hazardous Energy (Lockout/Tagout)
- ☐ Crane Assembly / Dissassembly
- ☐ Cranes & Derricks
- ☐ Demolition
- ☐ Electrical Wiring Design & Protections
- ☐ Elevated work platforms & aerial lifts
- ☐ Fall Protection
- ☒ Hearing Protection
- ☒ Heavy Equipment
- ☐ Ionizing Radiation
- ☐ Lead
- ☐ Material Hoists & Personnel Hoists
- ☒ Respiratory Protection
- ☐ Rigging Equipment
- ☐ Scaffolds
- ☐ Silica
- ☐ Stairways & Ladders
- ☐ Steel Erection
- ☒ Trench & Excavations
- ☐ Underground Construction
- ☐ Welding & Cutting

Other (Explain):

The AECOM employee identified has been designated as the Competent Person in the technical area specified by the responsible manager (e.g. Project Manager, Operations Manager, Superintendent) identified. This designation is based on the following:

1. The responsible manager is authorizing the Competent Person to allocate whatever resources that are necessary to perform tasks associated with the area of competency to provide a safe work environment and comply with applicable regulatory and legislative requirements, and AECOM SH&E procedures and policies.
2. The Responsible Manager has confirmed that the individual is competent to perform the required tasks by way of:
   a. Documented training
   b. Practical experience (hands-on)
   c. Documented professional experience
   d. Legislative knowledge

Print name and sign below

Designated by: Kevin Connare (AECOM Manager) **Date:**

Designated by: (AECOM SH&E Manager) **Date:**

Comments:

Attach any related documentation of training, certifications, insurance coverages, or other related information that supports the designation of the person as Competent.

Attachment H

2019/2020 Certificates of Liability Insurance for Rental Car Companies

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 08/01/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Marsh USA Inc.
701 Market Street, Suite 1100
St. Louis, MO 63101
Attn: stlouis.certrequest@marsh.com

CN101321765-EHI-BT135-19-20 EHI

CONTACT NAME:
PHONE (A/C, No, Ext): **FAX (A/C, No):**
E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : ACE American Insurance Company	22667
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Enterprise Holdings, Inc.
and its subsidiaries
600 Corporate Park Drive
St. Louis, MO 63105

COVERAGES **CERTIFICATE NUMBER:** CHI-007882389-13 **REVISION NUMBER:** 4

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	[ ] CLAIMS-MADE [ ] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	[ ] POLICY [ ] PRO-JECT [ ] LOC						PRODUCTS - COMP/OP AGG	$
	[ ] OTHER:							$
A	**AUTOMOBILE LIABILITY**			SCA H08241223	08/01/2019	08/01/2020	COMBINED SINGLE LIMIT (Ea accident)	$
	[X] ANY AUTO						BODILY INJURY (Per person)	$ 100,000
	[ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS						BODILY INJURY (Per accident)	$ 300,000
	[ ] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$ 50,000
	[X] SELF INSRD [X] MFR							$
	UMBRELLA LIAB [ ] OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB [ ] CLAIMS-MADE						AGGREGATE	$
	[ ] DED [ ] RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						[ ] PER STATUTE [ ] OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [N] **(Mandatory in NH)**	N / A					E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
XZ32001.

CERTIFICATE HOLDER

Tiana Vazquez
AECOM
One California Plaza
300 S. Grand Avenue, 2nd Floor
Los Angeles, CA 90071

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE of Marsh USA Inc.

Manashi Mukherjee Manashi Mukherjee

ADDITIONAL REMARKS SCHEDULE

AGENCY	NAMED INSURED
Marsh USA Inc.	Enterprise Holdings, Inc. and its subsidiaries 600 Corporate Park Drive St. Louis, MO 63105
POLICY NUMBER	
CARRIER / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,
FORM NUMBER: 25 FORM TITLE: Certificate of Liability Insurance

Coverage provided by this policy is subject to the terms of the Corporate Rental Agreement between the certificate holder and Enterprise Holdings, Inc. and its subsidiaries. The certificate holder is an additional insured under the policy in accordance with the terms of the policy and of their Corporate Rental Agreement with Enterprise Holdings, Inc. and its subsidiaries.

The coverage provided hereunder is excess automobile liability only and is excess over the State Minimum Financial Responsibility limits (MFR) which vary by State of accident or rental; however the coverage provided hereunder is primary to all other insurance coverage.

6/22/2018

AON RISK SERVICES CENTRAL, INC.
5600 WEST 83RD STREET, 8200 TOWER, SUITE 1100
MINNEAPOLIS, MN 55437-1027

(866) 283-7122 (847) 953-5390

CONTINENTAL CASUALTY COMPANY	20443
PV HOLDING CORP. / BUDGET TRUCK RENTAL, LLC.	90029
AMERICAN CASUALTY COMPANY OF READING, PA	20427
TRANSPORTATION INSURANCE COMPANY	20494
ACE PROPERTY & CASUALTY INSURANCE COMPANY	20699

AVIS BUDGET GROUP, INC.; AVIS BUDGET CAR RENTAL, LLC, ITS SUBSIDIARIES INCLUDING AVIS RENT A CAR SYSTEM, LLC, BUDGET RENT A CAR SYSTEM, INC. AND BUDGET TRUCK RENTAL, LLC.
6 SYLVAN WAY; PARSIPPANY, NJ 07054

1764

A	x		x		GL9001603190	7/1/2019	7/1/2020		$2,000,000 $1,000,000
	x	GARAGE LIABILITY							$0 $2,000,000
	x								$25,000,000 $2,000,000
A	x				BUA 7001700830	7/1/2019	7/1/2020		$1,000,000
B					SELF INSURED	7/1/2019	7/1/2020		
E	x		X		G28130168004	7/1/2019	7/1/2020		$4,000,000 $4,000,000
		X	10,000						
C					WC4014106301 - DED.	7/1/2019	7/1/2020	x	
C				N	WC4014106346 - CA				$1,000,000
D					WC4014106265 - RETRO				$1,000,000 $1,000,000
								EACH OCCURRENCE / AGGREGATE	

See Attached

INSURANCE CERTIFICATE ENCLOSED

Evidence of Coverage

USA C/O PROPERTY / AIRPORT MANAGER

Aon Risk Services Central, Inc.

Certificate Holder:

Cert Number:

123

THIS CERTIFICATE OF INSURANCE (COI) RELATES TO A POLICY (POLICIES) ISSUED TO THE INCLUDED INSURED AND IS INTENDED TO DEMONSTRATE COVERAGE AS PROVIDED SOLELY TO THE INCLUDED INSURED AND IS FOR INFORMATIONAL PURPOSES ONLY. THE CERTIFICATE HOLDER LISTED ON THIS COI MAY BE INCLUDED AS AN ADDITIONAL INSURED UNDER SUCH POLICY (POLICIES) ONLY TO THE LIMIT THAT SUCH CERTIFICATE HOLDER'S INTEREST APPEARS ONLY IF SUCH INCLUSION IS REQUIRED IN WRITING SPECIFICALLY AND EXPRESSLY STATING THAT SUCH CERTIFICATE HOLDER BE INCLUDED AS AN ADDITIONAL INSURED UNDER SUCH POLICY (POLICIES).

Attachment I

Pandemic Procedures

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Field and Field Office – Precautions for Coronavirus	**Control #:**	Rev # 6 (6/17/2020)

Project Name:	Various	Client:	Various	**Date:**	
Permits Required? (list):	Essential Services Letter required for travel if required by ocal ordinance	**Work Location:**			

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☒ Hard Hat ☒ Safety Glasses ☒ HiVis Vest ☒ Safety Toe Boots ☐ Gloves: ☐ Hearing Protection ☐ Other: _____
	For certain tasks (see THA below) the following are required: Potable water and soap (preferable) or hand sanitizer w/ 60% alcohol Disinfectant wipes Tissues Nitrile gloves Safety goggles Coveralls Disinfectant spray List of Cleaning Products to Kill Coronavirus Face covering when you are not able to maintain 6' social distance or where required by client or government order. Face coverings can be made from household materials by using needles, thread, cloth, tee-shirts, bandanas, etc. KN95, N95, dust/face masks are also acceptable. Local requirements may vary. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html PPE Note: Consider checking sources such as gas stations and specialty markets, as these may have equipment or materials not available at general grocery stores.
Tools & Equipment:	

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

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions to Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Fitness for Duty check (performed at home prior to work)	1a. Being unfit for duty – impacted by illness including coronavirus	12	1a. Ensure you are fit for duty Are you or have you been in any of these situations? ➢ I have had close contact with a confirmed case or a symptomatic person under investigation for coronavirus in the last 14 days. ➢ A doctor requested me to be tested for coronavirus or instructed me to self-quarantine? ➢ A member of my household or someone I was in close contact within the last 14 days experienced some of the following symptoms: fever, cough, shortness of breath, fatigue, sore throat, chills, gastro-intestinal disease or diarrhea, loss of taste/smell. ➢ I have or previously had some of the following symptoms in the last 7 days: fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body ache, headache, new loss of taste/smell, sore throat, congestion or runny nose, nausea or vomiting, or diarrhea..	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	General Field Work and Office Work	Control #:	Rev # 6 (6/17/2020)

			➢ Where required, my temperature check today shows a fever, without the use of fever reducing medications in the last 24 hours? (100.4 F [37.8C] or above or exceeding criteria required by local order or client requirements). **If response is a YES, then do not access the workplace**. If AECOM employee, contact your Supervisor and the AECOM Nurse at **512-419-5016** for advice. **If response is a NO or Yes, but released by AECOM nurse, you can proceed to work**. You may be asked to check your temperature again when you arrive to your workplace.	
On-Site Edits:				
2. Travel by vehicle or air required	2a. Being in an enclosed space with poor air circulation in close contact with other people.	12	2a. For Vehicle travel, review the "Preparations for Travel when Driving (fleet, rental and personal vehicles) to Minimize Coronavirus Exposure" THA for driving and the "Preparations for Travel when flying to Minimize Coronavirus Exposure" for flying.	4
On-Site Edits:				
3. General Field Work	3a. Working Around Others	12	3a. **Personnel must maintain at least 6-foot distance from each other** (see note below if this seems to be unachievable)**.** Practice social distancing at tailgate meetings, in break rooms and job trailers. Completely avoid (if possible) or limit the number of people in job trailers and other confined areas at any one time so that this distance can be maintained. If possible, hold meetings outside. If indoors, open window(s) for circulation. Wipe down window handles prior to opening. Even when practicing social distancing, we must limit the amount of people in any one group to less than 10 people. Clean all surfaces of your hands often with soap and water for at least 20 seconds. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands, including around and under fingernails and rub them together until they feel dry. When using hand sanitizer, be sure your hands are completely dry prior to touching any objects or surfaces. Wear safety glasses or goggles and avoid contact/touching of face, eyes, nose, and mouth. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash or sanitize your hands. **NOTE**: . Face coverings will also be worn where clients, states or municipalities require them. If you feel your task cannot be performed by maintaining social distancing, face coverings will be worn in combination with additional behavioral or PPE controls. If additional guidance is required, contact your SH&E manager to discuss the use of additional controlsPlease keep in mind, face coverings alone will not protect you from Coronavirus, so additional controls must be added. If the need arises to enter a personal residence, **prepare a separate task specific THA** for this task.	4
	3b. Handling Shared Equipment and Tools	12	3b. Wipe down and disinfect equipment before use with soap/water or disinfectant wipes. Wear disposable gloves when wiping surfaces down with disinfectant. Regularly wash hands when handling tools or equipment. Wash hands before eating or drinking.	

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	General Field Work and Office Work	Control #:	Rev # 6 (6/17/2020)

	3c. Exposure during Lunch and Bathroom Breaks	12	3c. Be sure to wash hands with soap/water whenever a bathroom is nearby. At minimum, do so during bathroom and lunch breaks. Use a paper towel to open door handle when exiting bathroom. If using outside toilet facilities (i.e. Porta Johns), wash hands with soap and water or hand sanitizer both before and after opening/closing the door. Where possible, employees are encouraged to pack meals and snacks as needed for the project duration and avoid visiting stores and restaurants. If necessary, modify your schedule to avoid restaurants and public restrooms during peak, i.e., crowded, periods to minimize contact with the public. Use drive-through service for food pick-up if available. Avoid eating lunch as a group, if you must, do so outside or in a space with windows open (wipe down windows prior to opening). Maintain 6 feet or more and do not share dishes (e.g., bag of chips, communal salad bowl, etc.) Refrain from sharing a field office coffee pot.	4
	3d. Lack of food/water/supplies	4	Many locations may have shortages of food, water, or supplies or closed restaurants. Bring food, water, and supplies to allow you to work a full shift without additional provisions.	1
On-Site Edits:				
4. Office Work	4a. Working around others	12	4a. Work from home when possible. Clean hands often with soap and water for at least 20 seconds after using the restroom, after you have been in a public place, before and after eating or after blowing your nose, coughing, or sneezing. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands, including around and under fingernails, and rub them together until they feel dry. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash or sanitize your hands. Sit at least six feet apart from others. Change workstations and meeting room setup to accommodate this social distancing. Even if you are practicing social distancing, we must still limit groups of people to less that 10. Do not eat or hang out in common areas. Maintain social distancing during tailgate meetings and/or THA reviews, supervisor should seek verbal agreement from all and note this rather than passing pen and clipboard around for signature. Avoid passing round other items such as sign-in sheets as well. Make hand-sanitizers, sanitizing wipes, and other hygienic supplies readily available.	4
	4b. Encountering frequent "touch points" and handling shared equipment	12	4b. Wipe down keyboards, mouse, phone, headset/headphones, any other "touch points". Limit contact of shared items. Wipe down surfaces before contacting them. Wash hands after handling or wear disposable gloves. In reception areas, use your own pen to sign in and out of offices. Remove unnecessary items such as business card holders, communal candy jars, etc.	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	General Field Work and Office Work	Control #:	Rev # 6 (6/17/2020)

				Work with facilities to assign someone to clean AND disinfect frequently touched surfaces daily. Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time.	
On-Site Edits:					

Additional Notes:

Where required, supplies (i.e., disinfectant spray/wipes, soap/hand sanitizer, nitrile gloves) should be made available prior to starting work. Request re-supply if stock runs low.

Use disinfectant products that contain at least 70% alcohol. Use alcohol-based hand sanitizer that contains at least 60% alcohol. Wash hands with soap and water whenever available. Remember that soap (including bar soap) is generally available and is considered superior to hand sanitizer or disinfectant wipes/spray.

Common touch points and surfaces include but are not limited to:

- Arms on chairs
- Tabletops
- Doorknobs and handles
- Countertops
- Elevator Buttons
- Coffee Pots
- Refrigerator / microwave / dishwasher / toaster handles
- Water Dispensers
- Cabinet and file drawer knobs / handles
- Shared office supplies such as staplers, paper cutters, scissors, packaging tape dispensers, writing utensils
- Phone receivers, keypads
- Copier / printer / fax control buttons
- Sink faucets
- Light switches

If any staff are showing any possible symptoms of or have been in recent direct contact with others showing symptoms of CORONAVIRUS, **STOP WORK**. Notify the site supervisor and the project manager and go home and/or stay home. Contact the AECOM Incident Reporting Hotline (1-800-348-5046) and/or the AECOM Nurse Line (1-512-419-5016), and notify the Area SH&E Manager. A list of common symptoms to look out for can be found here: AECOM Guidance for Coronaviruses

Visit the CDC webpage on cleaning and disinfecting procedures: CDC Guidance for Community and Residential Cleaning-Disinfection for Coronavirus.

A list of approved disinfectants for use against SARS-CoV-2, the cause of CORONAVIRUS, is available here: US EPA List of Disinfectants Effective Against Coronaviruses

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	General Field Work and Office Work	Control #:	Rev # 6 (6/17/2020)

Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
0	Amanda Lanning & Kelly Dwyer	March 23, 2020	Original version
1	Patrick Walz	March 26, 2020	Added new Step 1, Fitness for Duty Check. Modified language related to stopping work when PPE supplies are unavailable. Added instructions for making diluted bleach solution. Modified vehicle use instructions to allow long-term rental and fleet vehicle use.
2	Scott Dietz	April 2, 2020	Added new Step 5, Traveling/Out of Town Work
3	Patrick Walz & Joan Root	April 13, 2020	Modified language related to hotel stays. Moved instructions for making diluted bleach solution from PPE section to Step 6 and added hazards and mitigations. Added note regarding requirements for face coverings to PPE section, and added tips for obtaining sources of PPE.
4	Scott Dietz, Kelly Dwyer, Patrick Walz, & Devon Molitor	May 1, 2020	Added revision log. Modified language related to office cleaning to clarify that facilities should be contacted to arrange office cleaning. Modified Step 3 to clarify social distancing requirements and added “note” with steps to take when not possible.
5	Walz, Dietz, Dwyer, Indorato, Gregory, Molitor, Cooter	May 5, 2020	Modified the Fit for Duty language, removed requirement to wear nitrile gloves when driving and opening/closing doors and windows, modified language if AECOM personnel must enter a personal residence.
6	Walz, Dietz, & Shelley Brown	June 17, 2020	Modified the symptoms of coronavirus, removed language regarding travel and hotel stays and provided link to new travel THAs which cover those topics in greater detail. Various additional minor modifications to text and formatting. Modified initial risk ratings.
Project-Specific Revisions			

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	General Field Work and Office Work	Control #:	Rev # 6 (6/17/2020)

All Employees:

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

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

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

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

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

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

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Printed Name	**Signature**
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Visitors review task hazards and acknowledge understanding
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Include a copy of the new THA or a photo of the THA modifications as appropriate.

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Preparations for Travel when Driving (fleet, rental and personal vehicles) to Minimize Coronavirus Exposure	Control #:	Rev # 0 (6/1/2020)

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

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☐ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☒ Gloves: ☐ Hearing Protection ☐ Other: _____
	Additional materials and supplies required: Potable water and soap (preferable) or hand sanitizer w/ 70% alcohol Disinfectant wipes Tissues Disposable gloves Face coverings/face masks One Gallon Zip Lock Bags Safety goggles Disinfectant spray List of Cleaning Products to Kill Coronavirus
Tools & Equipment:	

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

Job Steps *List all steps required to perform a task in the sequence they are performed*	Potential Hazards *How could you be hurt? What would the injury be?*	Risk *(initial)*	Critical Actions to Mitigate Hazards *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	Risk *(final)*
1. Planning the trip	1a. Potential exposure to Coronavirus	4	1a. Map route in advance to minimize the potential for exposure and utilize the least populated route of travel where feasible. Avoid entering public places. If traveling more than 250 miles in one direction, develop a Journey Management Plan and be sure to add controls for protection against Coronavirus.	2
On-Site Edits:				
2. Preparing vehicle for driving	2a. Possible exposure from touching contaminated surfaces, tools, equipment and materials in vehicle.	8	2a. If feasible, use your personal vehicle or procure a fleet vehicle or a rental car (contact rental car company in advance) that hasn't been driven in the past 72 hours. Clean and disinfect the vehicle in accordance with the V**ehicle Cleaning THA** prior to driving. If possible, park the vehicle with the windows closed facing the sun (on sunny days), to allow the vehicle to heat up for 2-3 hours.	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	**Preparations for Travel When Driving**	**Control #:**	**Rev # 0 (6/1/2020)**

On-Site Edits:					
3. Driving to and from destination	3a. Possible exposure from passengers	8	3a. Limit to one person per vehicle whenever possible. If a passenger must ride with you, limit to one passenger and have them sit in the rear passenger side seat. Crack and/or open windows and use fan to recirculate air.	4
On-Site Edits:					
4. Stopping for restroom breaks and food	4a. Possible exposure due to contact with members of the general public at gas stations, convenience stores, restrooms, etc.	**12**	4a. Plan trip to eliminate the need to stop for food or restroom breaks. Bring your own food/water/snacks if possible If you must stop, try avoid entering public places (use drive through services if possible). If you must enter public places, practice social distancing and wear a face covering. If you must use public restrooms, don disposable gloves prior to entering, doff and dispose of in trash receptacle when exiting. Wash hands with soap and water for at least 20 seconds or use a hand sanitizer before and after entering public places and restrooms. Have soap and water, antibacterial hand wipes or spray, 70% + alcohol hand sanitizer available.	4
On-Site Edits:					
5. Fueling	5a. Possible exposure due to contact with members of the general public at gas stations, convenience stores, restrooms, etc.	**12**	4a. Plan trip to eliminate the need to stop for fuel. When fueling, wear gloves and dispose of after use. Do not reenter the vehicle with gloves worn during fueling. If gloves are not available, wipe down the fuel pump handle and keypad prior using. If you don't have wipes, then consider using a paper towel or tissue to grab the fuel dispenser handle. Where possible, use contactless payment methods to avoid touching keypads or pens. Consider using your knuckles rather than fingertips to touch common use contact areas like keypads. When finished, doff disposable gloves, dispose of in trash receptacle and wash hands with soap and water or hand sanitizer with at least 70% alcohol.	4

Task Hazard Assessment

Task Name:	Preparations for Travel When Driving	Control #:	Rev # 0 (6/1/2020)

Additional Notes:

Where required, supplies (i.e., disinfectant spray/wipes, soap/hand sanitizer, nitrile gloves) should be made available prior to starting work. Request re-supply if stock runs low.

Use disinfectant products that contain at least 70% alcohol. Use alcohol-based hand sanitizer that contains at least 60% alcohol. Wash hands with soap and water whenever available. Remember that soap (including bar soap) is generally available and is considered superior to hand sanitizer or disinfectant wipes/spray. If disinfectants are unavailable, prepare diluted bleach solution as described in Step 6 and use in their place.

If any staff are showing any possible symptoms of or have been in recent direct contact with others showing symptoms of CORONAVIRUS, **STOP WORK**. Notify the site supervisor and the project manager and go home and/or stay home. Contact the AECOM Incident Reporting Hotline (1-800-348-5046) and/or the AECOM Nurse Line (1-512-419-5016).

A list of common symptoms to look out for can be found here:
AECOM Guidance for Coronaviruses

Visit the CDC webpage on cleaning and disinfecting procedures: CDC Guidance for Community and Residential Cleaning-Disinfection for Coronavirus

A list of approved disinfectants for use against SARS-CoV-2, the cause of CORONAVIRUS, is available here: US EPA List of Disinfectants Effective Against Coronaviruses

Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
1	Scott Dietz	June 1, 2020	Original version
Project-Specific Revisions			

Task Hazard Assessment

Task Name:	Preparations for Travel When Driving	Control #:	Rev # 0 (6/1/2020)

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Preparations for Travel When Driving	Control #:	Rev # 0 (6/1/2020)

All Employees:

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

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

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

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

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

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

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Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Coronavirus Vehicle Cleaning THA	**Control #:**	Rev # 1 (6/1/2020)

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

THIS THA MUST BE FULLY REVIEWED AND ACKNOWLEDGED DAILY BY ALL AECOM STAFF and AECOM SUBS ON-SITE

All job steps, hazards, work practices & PPE are to be clearly understood and implemented. All necessary revisions have been written on the THA.

Required PPE:	☐ Hard Hat ☒ Safety Glasses ☐ HiVis Vest ☐ Safety Toe Boots ☒ Nitrile Gloves: ☐ Hearing Protection ☐ Other: See list below _____ Disposable gloves, in proper size for operator(avoid latex due to allergy concerns) Face coverings or mask Safety Glasses
Tools & Equipment:	Paper towels Trash container/bags Safety glasses Small bucket of water Dish soap Disinfectant spray or wipes List of Cleaning Products to Kill Coronavirus Note: Many of the same household cleaners (such as non-bleach, unscented, non-chlorinated disinfectant cleaners and wipes) that kill coronaviruses on hard surfaces at home can also clean most car interiors without causing damage. Alcohol solutions that contain at least 70 percent alcohol are effective against coronavirus, according to the CDC. Nearly every interior surface of a vehicle can be cleaned with isopropyl alcohol. Vigorous washing with soap and water can also destroy the coronavirus. Soap and water are safe for most car interiors. **Warning!** • Don't use bleach or hydrogen peroxide on the inside of the vehicle. • Don't use scented wipes or wipes containing bleach. • Don't use ammonia-based cleaners on car touch screens or dashboards, as they can damage anti-glare and anti-fingerprint coatings. • Never combine cleaning chemicals as doing so may lead to toxicity. • If using alcohol, avoid any potential source of sparks/ignition. **DO NOT SMOKE!**

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Coronavirus Vehicle Cleaning THA	**Control #:**	Rev # 1 (6/1/2020)

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

Job Steps *List all steps required to perform a task in the sequence they are performed*	**Potential Hazards** *How could you be hurt? What would the injury be?*	**Risk** *(initial)*	**Critical Actions to Mitigate Hazards** *List control measures required to eliminate, control or protect against the potential hazards associated with each job step to minimize the risk of injury or environmental impact.* ***Identify any 'Stop Work' triggers.***	**Risk** *(final)*
1. Plan for cleaning/disinfecting	1a. Exposure to harsh disinfectants	**8**	1a. Read the Safety Data Sheet or warnings/precautions on the label. Wear the PPE specified. At a minimum, gloves and safety glasses shall be worn.	4
	1b. Not having the supplies necessary to perform the task (inadequate cleaning	**8**	1b. Confirm that you have the necessary supplies and equipment before proceeding. If possible, prepare a supply kit with all necessary cleaning/disinfecting prior to travel.	4
	1c. Damaging vehicle interior surfaces	**8**	1c. Consult the owners manual to verify how to clean the various surfaces. Some surfaces may be adversely impacted by certain cleaners and by an excess application of water.	4
On-Site Edits:				
2. Prepare the vehicle for cleaning	2a. Inadequate cleaning because of obstructed surfaces	**6**	2a. Don gloves and safety glasses. Open all vehicle doors and remove all trash, water bottles, tools, equipment, etc., that are not part of the vehicle. Clean or discard as appropriate.	4
On-Site Edits:				
3. Inspect the vehicle and clean if necessary	3a. Insufficient cleaning due to excessively soiled surfaces	**8**	3a. Inspect the vehicle interior for any visibly soiled surfaces. If these are identified, clean those surfaces with a few drops of dish detergent in a bucket of water using a clean cloth.	4
	3b. Damaging electronics	**6**	3b. Avoid using excess water onto the surfaces	4
On-Site Edits:				
4. Disinfect frequent touch points **(see Additional Notes section for list)**	4a. Accidental transfer of coronavirus to others.	**8**	4a. Disinfect all frequently touched surfaces using the disinfectant identified. Consult the Additional Notes section for a list of surfaces to be considered.	4
	4b. Improperly applying disinfectant and ruining vehicle surfaces	**10**	4b. Test on small, inconspicuous surface first. Apply disinfectant in accordance with the instructions. Avoid excessive application.	4

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Rev # 1 (6/1/2020)

		4c. Eye, skin, or inhalation exposure to disinfectant	10	4c. Apply disinfectant in accordance with the directions. Wear PPE as required.	4
On-Site Edits:					
5. Hold time		6a. Eye, skin or lung irritation from residual disinfectant	8	6a. Keep the vehicle doors open for 10-15 minutes after disinfecting to allow the vehicle to air out. If possible, park the vehicle with the windows closed facing the sun (on sunny days), to allow the vehicle to heat up for 2-3 hours.	2
		6b. Frequent changeover of vehicles	8	6b. To the extent feasible, all vehicles should have a 72-hour wait/hold time between different drivers. Currently, the Coronavirus is believed to survive up to 72 hours on certain hard surfaces. Waiting 72-hours further minimizes the risk of exposure.	4
On-Site Edits:					

Additional Notes:

Surfaces can be a source of COVID-19 exposure and sharing vehicles can result in different people touching the surfaces of the vehicle.
Vehicles should be cleaned and disinfected **before use, after use, and when changing drivers**.
The cleaning should be conducted by the **vehicle operator**.
Cleaning supplies shall be stored in each vehicle to allow for periodic cleaning before and after use and during the day, as needed.

Common touch points and surfaces on vehicles include but are not limited to the following:

- Center console
- Dashboard surface
- Glove box,
- Inside door handles
- Keys/key fob
- Outside door handles
- Overhead console
- Parking brake handle
- Rear view mirror
- Seat belts buckles
- Seat control

Task Hazard Assessment

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Rev # 1 (6/1/2020)

- Shift lever
- Steering wheel
- Sun visors
- Radio controls
- Touch screens

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Revision Log

Version	Issued / Revised By	Date	Revision Summary
THA Revisions			
1	Lisa Rygiel	June 1, 2020	Original version
Project-Specific Revisions			

Task Hazard Assessment

AECOM Imagine it. Delivered.

Task Name:	Coronavirus Vehicle Cleaning THA	Control #:	Rev # 1 (6/1/2020)

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March 18, 2020

Dear Business Partner,

National Grid US continues to be acutely aware of the ongoing Coronavirus situation. We have received many inquiries from -our suppliers regarding -our response to Coronavirus (COVID-19).

As the World Health Organization has declared COVID-19 a pandemic, National Grid has begun to implement its business continuity plans, and as conditions evolve, we are taking actions to mitigate exposure and reduce the impact of the coronavirus to our customers, communities, and employees.

We have a comprehensive US pandemic strategy plan in place to ensure business continuity. Our Pandemic Plan contains specific actions and activities for different stages of the event. Examples can include such measures as facility cleaning, PPE requirements, distancing policies, work from home directives, visitor policies, exposure tracking, and return to work protocols.

As we have a commitment to our customers for safe and reliable delivery of gas and electricity, we also have a commitment of providing a safe working environment to our employees. As your organization has been identified as one which provides key services as part of our operations, we would ask that you do the same and work with us in helping to limit the spread of the virus. Most importantly, please be sure that your employees stay home if sick.

In the event that one of your employees has a potential of, or an actual case of COVID-19 and has had close contact with our employees, it is imperative that your Field Supervisor reports the incident to National Grid immediately, so we are able to assess associated risks and provide direction to all parties affected. All cases should be called into our Employee Services department at (888) 483-2123 which is staffed Monday – Friday 7:00 AM – 5:00 PM.

As a reference, we've also provided guidance to our employees to avoid being exposed to the virus as guided by the CDC which we'd encourage your organization to leverage as appropriate:

- Stay home when you are sick
    - Employees who have symptoms of respiratory illness should stay home until they are free of fever (<100.4° F using an oral thermometer) or other symptoms for at least 24 hours, without use of fever/symptom reducing medicines (e.g. cough suppressants).
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Practice social distancing (keeping 6 feet from others) and avoid large groups and gatherings.
- Avoid close contact with people who are sick.
- When greeting people, do not engage in handshaking or any other physical contact.
- Avoid touching your eyes, nose, and mouth.
- Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe.
- Wash your hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.
    - If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.
- Follow CDC's recommendations for using a face mask.

- To prevent spread of the disease, face masks should be used by people with symptoms of COVID-19, healthcare workers, and those caring for someone in close setting.
- CDC does NOT recommend that healthy people wear a face mask to protect themselves.

We are also asking contractor employees who interact with customers in their homes to consider the following:

- Ask before you enter - Employees should ask if anyone in the house is feeling sick, is on quarantine, or if there is any chance that a customer may have been exposed to an individual with the coronavirus.
- Keep your distance - The best way to prevent illness is to avoid being exposed to this virus. The CDC advises the public to avoid close contact with people who are sick.
- Ill or quarantined customers should be asked to isolate themselves in a different room with the door closed while our employee is there.
- If they must open the front door, they must step back and maintain a minimum distance of 6 feet from our employee before moving to a separate room.
- If the customer has a respirator mask, they should be asked to use it.
- If you feel it would be unsafe to enter the home, we ask that you contact your supervisor to report the incident and to await further guidance.

We all have an obligation to protect each other and to not put any individual in a position where they become exposed or a conduit for the virus. Thank you for reviewing this communication and taking this requirement seriously.

Please provide a confirmation of receipt of this request, and that you have communicated this to your teams by COB, March 20th, 2020 to SupplyChainFAQ@nationalgrid.com .

Sincerely,

Simon Harnett
Vice President, U.S. Procurement
National Grid

Attachment J

National Grid COVID-19 Health & Safety Plan

FORWARD

National Grid's vision is to be a world-class safety organization, with zero injuries every day. A critical component of achieving this vision is the careful development, implementation and maintenance of safety procedures. This guidance document, COVID-19 Health and Safety Plan, describes pandemic response measures, taken by National Grid, to help prevent the spread of COVID-19.

Questions regarding this guidance should be referred to National Grid's Safety Department.

Record of Change

Revision	Date	Description
Initial	04/28/2020	Initial creation

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4.0 COVID-19 REPORTING PROCESS 6
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1.0 SCOPE OF HEALTH & SAFETY PLAN

National Grid has developed this Health & Safety Plan (HASP) to uniformly apply pandemic response measures to help prevent the spread of the COVID-19 virus. National Grid field personnel and crews have been provided this information and communications.

2.0 PROJECT PERSONNEL

2.1 Roles and Responsibilities

National Grid shall be responsible for the safety of all its employees and shall ensure COVID-19 pandemic measures are in place. Key National Grid personnel are as follows:

Incident Command Structure

The National Grid Incident Command Structure (ICS) has been activated within all Business Units of National Grid's US Operations to respond to the COVID-19 pandemic. Members of the ICS review and approve all operational decisions, with the Incident Commander ultimately responsible for these decisions. The Incident Commander relies upon subject matter experts within the ICS, including the Operations Officer, the Safety and Health Officer, to help set standards and guidance for protective measures to be used to limit the spread of the COVID-19 virus. These Officers, in turn, utilize the expertise of other members of the organization within Operations, Safety, and Health, to assess risks associated with the work being performed and provide guidance on the most effective measures to be used by employees to protect themselves, their coworkers, our customers, and members of the public.

Field Supervisor

The Field Supervisor shall have the responsibility for monitoring and enforcing National Grid COVID-19 pandemic measures and shall ensure that all employees have received and reviewed this Health & Safety plan.

- Serve as the appointed supervisor to oversee field personnel and ensure pandemic measures are being followed
- Ensure field personnel have the appropriate pandemic supplies
- Disseminate all new National Grid COVID-19 communications to all field employees
- Where non-compliance is observed, take prompt corrective action; and
- Have the authority to order a safety stop in the event of a serious safety issue.

Crew Leader

The National Grid crew leader shall be in charge of the day-to-day details of the work to be performed. They shall ensure that work is performed in accordance with National Grid COVID-19 pandemic measures. They will:

- Walk the job site at the start of each day to ensure a safe work environment;
- Where non-compliance is observed, take prompt corrective action; and
- Have the authority to order a safety stop in the event of a serious safety issue.
- Perform the daily job safety briefing before commencing work, whenever a visitor arrives to the job site, and if there is a significant change in the work or when an extended break occurs. As part of the COVID-19 pandemic response, the COVID-19 job brief checklist (Appendix A) shall be used in addition to the applicable departmental job brief form.

Employees

National Grid employees are responsible for following all COVID-19 pandemic measures;

- Each employee is responsible for reporting to supervision any symptoms of COVID-19, of any direct contact with an individual confirmed to have COVID-19, or in contact with a person in quarantine.
- Each employee is obligated to call a safety stop when a hazardous condition is observed.
- All lone workers shall conduct a self-assessment utilizing the COVID-19 job brief checklist (Appendix A) and adhere to the guidance outlined in this plan.

National Grid Field Safety Representative

National Grid Field Safety Representatives conduct routine and random crew visits to National Grid job sites. The National Grid Field Safety Department shall act as a resource for National Grid field personnel to effectively implement this COVID-19 Health & Safety Plan and will be available on an as-needed basis for inquiries related to this HASP.

3.0 COVID-19 PANDEMIC RESPONSE MEASURES

3.1 COVID-19 Symptoms

COVID-19 Symptoms may include the following:

- Fever
- Cough

- Shortness of Breath
- Chills
- Repeated shaking with chills
- Muscle Pain
- Headache
- Sore Throat
- New loss of taste or smell

3.2 Hygiene and Social Distancing

- Wash your hands often with soap and water for at least 20 seconds, especially after using the restroom, before eating, and after blowing your nose, coughing, or sneezing. Hand washing is the best way to prevent the spread of viruses.
- If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.
- **Proper hand washing/sanitizing products will be provided to all employees**
- Maintain a minimum of 6' social distance from other employees on site while performing work and during routine breaks. When work tasks prevent this, ensure proper face coverings are continued to be worn and proper hygiene
- Avoid touching your eyes, nose, and mouth.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces using a disinfecting cleaning spray or wipe; if not available, use a soap and water solution.
- All cleaning product trash and potentially contaminated PPE will be stored in a trash bag and immediately disposed of at a National Grid facility at the end of each shift. Trash should not accumulate in any National Grid vehicle. Immediately wash hands upon disposing of trash bag.

3.3 COVID-19 PPE and Face Coverings

- Face coverings are a requirement for all National Grid employees. Face coverings must be worn by all employees:
    - When working in public places
    - When working in a customer's premises
    - When social distancing is not able to be maintained with a co-worker, customer or member of the public in a National Grid facility, barn/yard, work location or company vehicle.
- Non-Fire-Retardant/Arc Rated Face Covering– use when there is no potential for a gas ignition or electric arc flash. This can be National Grid supplied or a personal face covering. Fire Retardant Face Covering – must be used when there is potential for a gas ignition or electric arc flash.
- **Additional COVID-19 PPE guidance is provided in the attached Premise**

Entry Guidelines

3.4 COVID-19 Virus Risk Assessment and Adopted Measures

National Grid's prescribed measures (work practices, PPE, hygiene) were selected based upon the risk assessments completed by subject matter experts and reported up through the ICS for approval. They are based upon the Centers for Disease Control & Prevention (CDC) and OSHA guidance, as well as input from Operations, Safety, and Health team members. They are believed to address all risks posed to our workforce, as well as to our customers and members of the public, when jobs are conducted in public places. These measures are reviewed on a continuous basis, for both effectiveness and to ensure the latest guidance is incorporated, with changes made, as necessary, after these reviews.

4.0 COVID-19 REPORTING PROCESS

4.1 COVID-19 Job Brief Checklist

In addition to the applicable departmental job brief form, all crew leaders shall utilize the COVID-19 job brief checklist to facilitate crew discussion regarding symptoms of COVID-19 and allow for discussion to help facilitate the reporting of a COVID-19 incident. All visitors to the job site will be required to have the job brief and COVID-19 checklist reviewed with them by the crew leader prior to entry on the job site.

Remember to maintain social distancing while conducting the job brief

4.2 COVID-19 Incident Reporting

To ensure the safety of all employees and the public, any employee shall immediately contact their Supervisor and National Grid Employee Services if one of the following conditions occur:

- Employee is exhibiting symptoms of COVID-19
- Employee has been in close contact of another individual with COVID-19
- Employee has been in close contact of another individual who is currently being quarantine for a suspected case of COVID-19

Close contact is defined as being within 6' of a sick/quarantined individual for more than 15 minutes.

Please refer to the COVID-19 Suspected/Confirmed Positive Process guidance document in Appendix A.

Appendix A – National Grid COVID-19 Communications

A Message from John Bruckner

National Grid US Coronavirus Incident Commander

Updated Guidance on Face Coverings

April 16, 2020

The state of New York and the state of Rhode Island recently issued executive orders requiring all essential employees who are working in public places to wear face coverings when distance from the public or co-workers cannot be maintained. As a result, we are updating our company policy to align safety standards for all employees.

We had previously communicated that wearing a face covering was voluntary based on CDC recommendations. We are now **requiring** National Grid employees to wear face coverings in the situations below. Please note that this applies to both **office** and **field-based** employees, and applies across **all jurisdictions**.

Face coverings must be worn:

- ✓ When working in public places
- ✓ When working in a customer's premises
- ✓ When social distancing is not able to be maintained with a co-worker, customer or member of the public in a National Grid facility, barn/yard, work location or company vehicle.

- This directive is effective at 8:00 pm this evening for all New York employees.
- It is effective starting this Saturday for all Rhode Island and Massachusetts employees.
- If you are working from home, our company guidance remains: If you can work from home, you should.

What qualifies as a face covering?

Employees may use either a company-issued or a personal face covering, depending on preference and availability. These include:

- Disposable masks, which need to be changed daily or if significantly dirty.
- Reusable FR Balaclavas, which need to be laundered daily, according to CDC cleaning guidance.
- Reusable FR neck warmers, which need to be laundered daily, according to CDC cleaning guidance.
  - Please note: Face pieces must be made from Flame Resistant (FR) material if they are worn when working in an energized zone or there is potential for a gas ignition.

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How to get a face covering:

Our procurement and warehouse teams are working directly with teams to ensure a steady supply of face coverings.

It is our intention to provide company-supplied face coverings widely, but in instances where one is not available or preferred, a personal covering may still be used.

Operations teams should work through their normal channels to order face coverings. We will be providing further guidance to office-based colleagues on where they can access face coverings.

CDC guidance on personal face coverings can be found here:

- https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html
- https://www.cdc.gov/coronavirus/2019-ncov/downloads/DIY-cloth-face-covering-instructions.pdf

Face coverings should:

- Fit snugly but comfortably against the side of the face
- Be secured with ties or ear loops, if provided
- Include multiple layers of fabric
- Allow for breathing without restriction
- Be removed from behind head or ears to minimize hand contact with face
- Be laundered and machine dried if reusable

Cleaned, dried coverings can be kept in a clean plastic bag until needed for use

It is important to note that face coverings, whether company-issued or personal, are not a substitute for taking measures that are known to be effective in stopping the spread.

Handwashing, and maintaining a social distance of 6 feet apart from others remains the most critical guidance that we can follow.

Sincerely,

John Bruckner

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COVID-19 Job Brief Checklist

Please Distribute

Revised 5/7/2020

During this trying time it is important that we maintain our same level of focus at work locations conducting hazard assessments and identifying risks prior to the start of each task. Prior to beginning work at every location, when conditions, job focus or crew members change, after each meal period and after any prolonged interruption to the work, a **Job Briefing** shall be held.

The work to be performed shall be discussed and assigned, and the safety aspects of the job shall be reviewed. The National Grid protocol to screen all individuals to determine who may have been exposed to COVID-19 outside of work **must be reviewed** at the start of the workday and Job Briefing.

(Employees working alone shall conduct a self-assessment to determine if they may have been exposed to COVID-19 outside of work or should their condition change during the workday)

The questions are:

- ☐ Are you feeling ill in any way? For instance, do you have any of the following symptoms: A fever? A cough? Shortness of breath? Chills? Repeated shaking with chills? Muscle pain? Headache? Sore throat? New loss of taste or smell?
- ☐ Have you had close contact with a symptomatic person (e.g., fever, cough, and/or shortness of breath, chills, repeated shaking with chills, muscle pain, headache, sore throat, new loss of taste or smell) within the last 14 days?
- ☐ Have you had close contact with a person who was tested with results pending or positive for coronavirus within the last 14 days?
- ☐ Have you recently been out of state for non-work related travel (within the last 14 days)?

*Employees who answer **"YES"** to any of these questions must distance themselves from others, not enter the work area, and immediately contact their supervisor privately for further instruction.*

The employee must also contact the National Grid Employee Services Hotline 1-888-483-2123.

Employees who answer **"NO"** to all of these questions proceed with work activities as planned.

Please note on the Job Brief that you asked these COVID-19 Screening Questions.

To reduce multiple people handling the job brief during the COVID-19 pandemic crew leaders should handle all documentation and record who is present on site after they have reviewed the job brief with each employee or visitor.

REMINDER - Please be sure to follow CDC recommendations

- Maintain a minimum 6' social distance from other people
- Employees must wear a face covering: when working in public places, when working in a customers premise, or when social distancing is not able to be maintained with a co-worker, customer, or member of the public in a National Gird facility, barn/yard, work location, or company vehicle.
- Avoid touching your eyes, nose, and mouth.
- Clean and disinfect frequently touched objects and surfaces using either a EPA registered disinfectant (Lysol, Clorox, etc.), soap and water, or a bleach and water mixture (1/3rd cup bleach per gallon of water)
- Use the fold of your arm to cover a sneeze or cough
- Wash your hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.
    - If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty.

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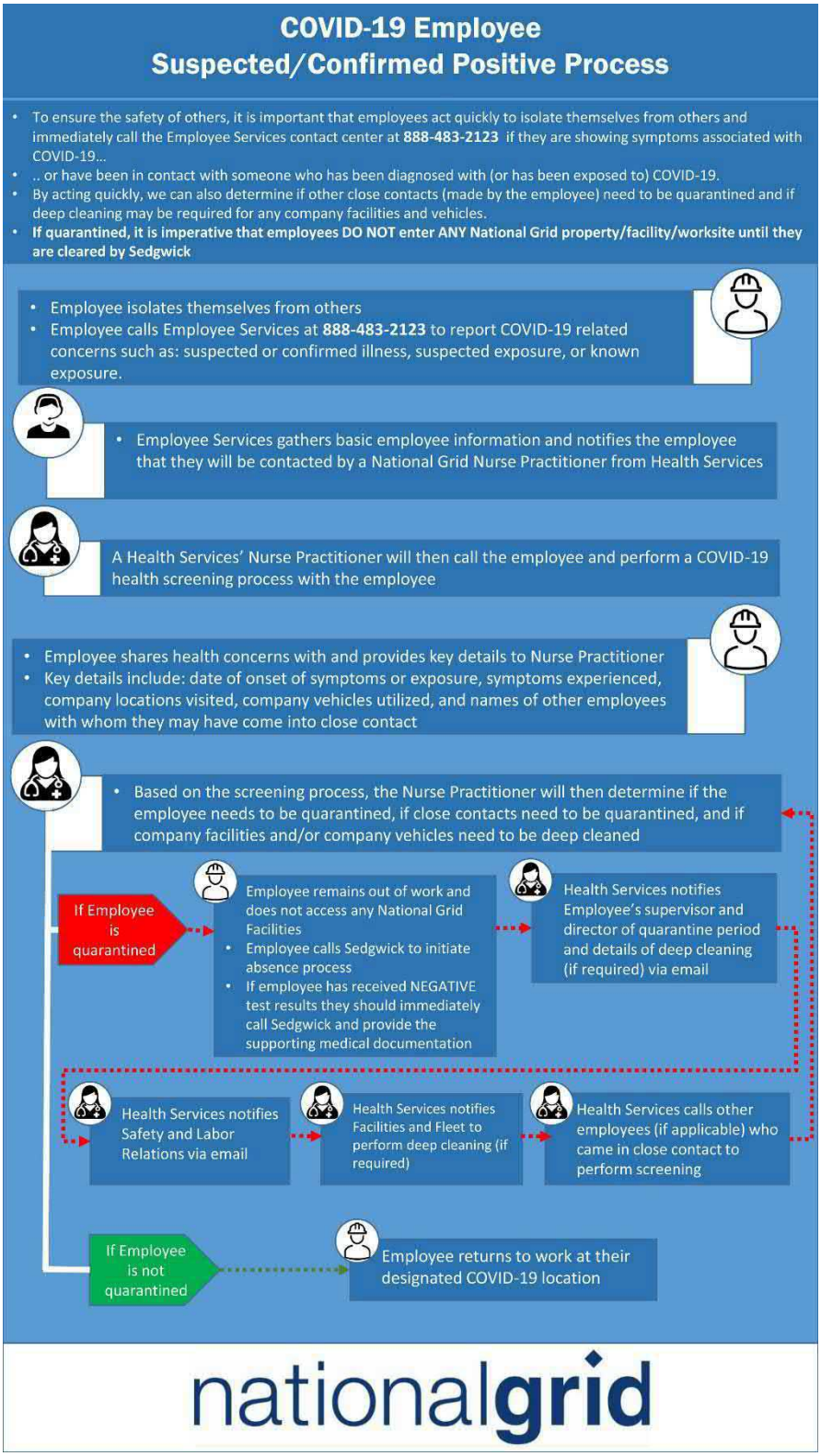
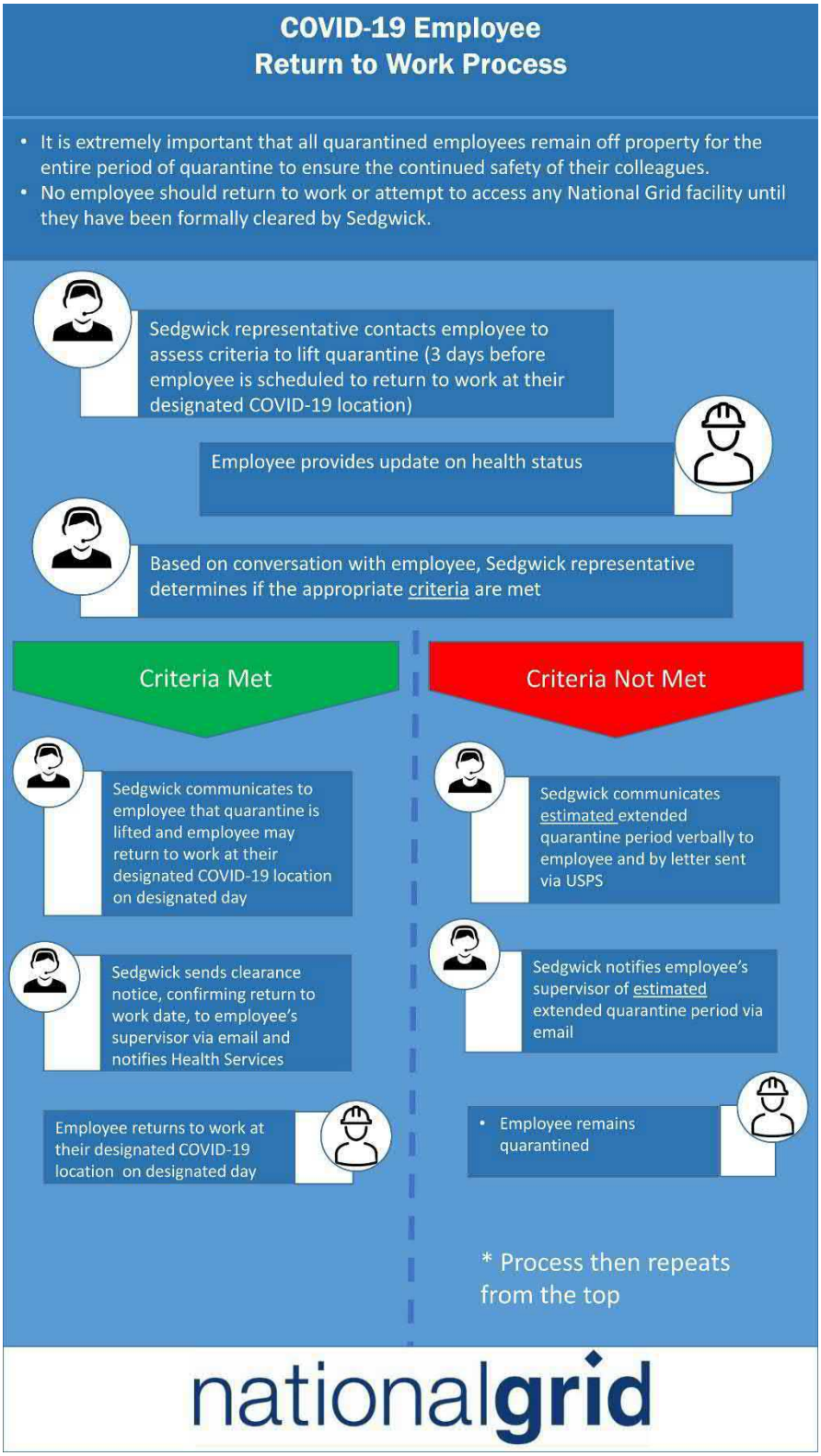
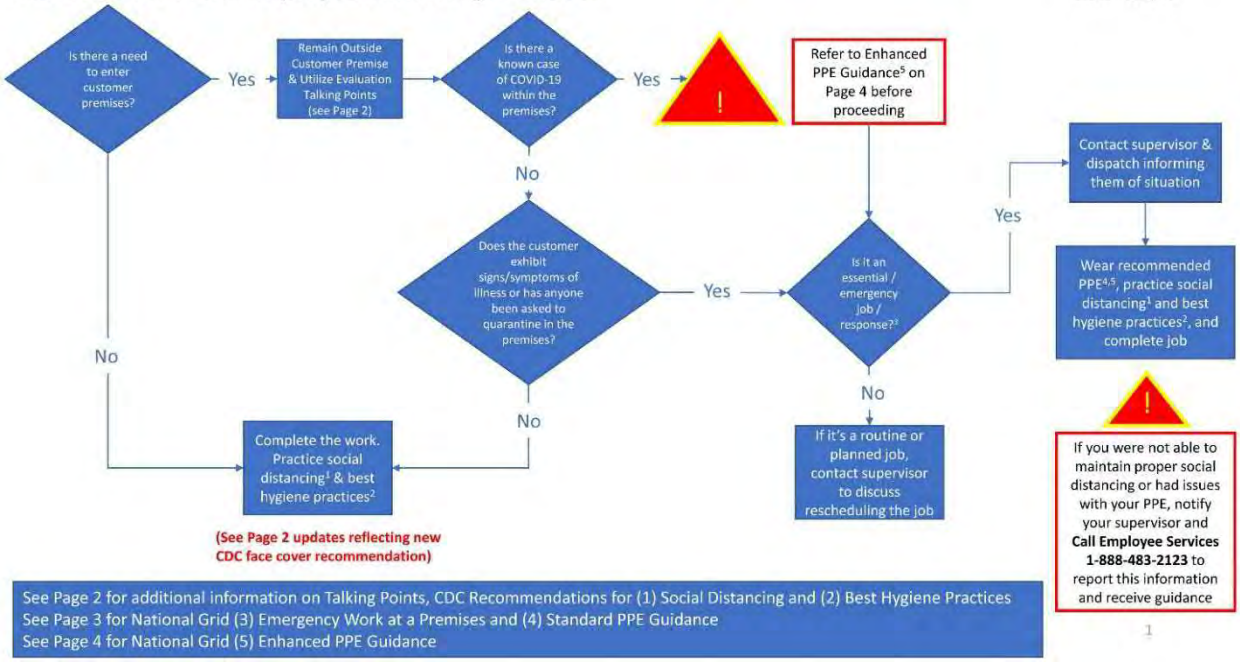




Guidance for Field Employees Entering Premises

Issued 4/7/20



(See Page 2 updates reflecting new CDC face cover recommendation)

See Page 2 for additional information on Talking Points, CDC Recommendations for (1) Social Distancing and (2) Best Hygiene Practices
See Page 3 for National Grid (3) Emergency Work at a Premises and (4) Standard PPE Guidance
See Page 4 for National Grid (5) Enhanced PPE Guidance

1

Issued 4/8/20

Talking Points - Engage Customer

Prior to entry, engage the customer and advise of social distancing practices. Here are some questions and statements.

- Does someone within the premises have a known case of COVID-19? Has someone within the premises tested positive for the COVID-19 virus?

(IF ANSWER IS 'YES' TO EITHER OF THE ABOVE QUESTIONS, REFER TO ENHANCED PPE GUIDANCE ON PAGE 4)

- Do you mind if I follow the social distancing practice today?
- Is anyone currently sick inside the premises?
- If you are feeling sick, would you mind remaining in another room while I am working This is a best practice policy my company is recommending. Can you tell me where your equipment is located?
- I will do my job, keep you updated and tell you when I am done

(1) Social Distancing

- Maintain at least 6 feet distance between yourself and the customer at all times
- Where social distancing measures cannot be maintained, face cover can be worn to help limit the spread of the virus (see National Grid's Face Cover Guidance for details)

(2) Best Hygiene Practices

- Face covering can be worn in public settings where social distancing measures cannot be maintained (see National Grid's Face Cover Guidance for details)
- Use alcohol-based hand sanitizer (at least 60% alcohol), before and after each home visit; OR wash hands using soap and water for 20 seconds

2

Issued 4/8/20

(3) Emergency Work at a Premises

On arrival, assess the premise/situation in its entirety and consider these questions.

- Is it a multi-unit building?
  - Is the unit where work is required affected?
- What work can be done without interaction/entry?
- Is entry through a side or back door possible to limit exposure?
- Can make safe actions be taken without interaction/entry?
  - Securing Outside Meter/Curb Valve
- Would a hardship be caused by isolating the service?

Note: These questions and considerations are meant to help guide in the decision making process. There may be instances where access to a premise cannot be avoided in order to address immediate public safety concerns. Please reference the Social Distancing and applicable PPE Guidance in all situations.

(4) Standard PPE Guidance for Entering a Premises (No Known COVID-19 cases are present)

- Avoid touching ANYTHING in customer premises other than company equipment and customer equipment related to the job
- Wear disposable latex or nitrile gloves to prevent touching contaminated surfaces
- Latex or nitrile gloves should be donned before entering the home
  - If work gloves are needed to perform the task, remove disposable latex or nitrile gloves and dispose of them. Don work gloves and perform task. Once task is complete remove work gloves and store them. Don a new pair of disposable latex or nitrile gloves to exit the home.
- Remove latex or nitrile gloves and dispose in way that won't create other opportunities for exposure
- Immediately wash / sanitize hands after removing latex or nitrile gloves
- All other PPE normally required for the work being performed should be used

3

Issued 4/8/20

(5) Enhanced PPE Guidance for Entering a Premise (Where a Known COVID-19 Case is Present)

The most effective way to protect the employees from contracting the virus is physical distance; if at all possible, the customer diagnosed with COVID-19 should be asked to move to a separate room before premises entry. When available and practicable, the following PPE items may be used at the premises with a known COVID-19 case present. These PPE items can be used in combination with our Social Distancing and Best Hygiene Practices to limit the spread of the virus.

- N-95 / KN-95 mask (see Page 5 for pictures of typical N-95 / KN-95 masks available)
- Reusable Face Shield
- Disposable Surgical Gloves (nitrile or latex)
- All other PPE required for doing the work (i.e. safety glasses, hard hat, etc.)
- If desired, FR-rated balaclava may be worn to provide additional protection while working

The following steps should be taken while conducting work in the premises:

- Prepare a paper or plastic bag for disposal of used PPE prior to entering the premises.
- Avoid touching ANYTHING in customer premises other than company equipment and customer equipment related to the job.
- Wear disposable latex or nitrile gloves to prevent touching contaminated surfaces.
- Any PPE should be donned before entering the home.
- If a mask is in use, avoid touching your face or adjusting the mask.
- If work gloves are needed to perform the task, remove disposable latex or nitrile gloves and dispose of them. Don work gloves and perform task. Once task is complete remove work gloves and store them. Don a new pair of disposable latex or nitrile gloves to exit the home.

Once work is completed in the home, follow these steps to safely remove the PPE items

- Remove face shield, taking care to avoid touching your face. Clean / disinfect and store properly.
- Remove mask from the back of the head first, taking care to avoid touching your face. Place used mask in a bag and dispose in normal trash.
- If balaclava has been worn, remove covering from back of head, similar to removal of mask.
- Remove latex or nitrile gloves (turn inside out while removing) and place in a bag. Dispose of bag in normal trash.
- Immediately wash / sanitize hands after removing latex or nitrile gloves, following Best Hygiene Practices.

4

Issued 4/8/20

Typical N-95 / KN-95 masks

5

Safeguarding your Vehicle

Now, more than ever, with COVID-19, precautions to safeguard your vehicle when transferring the vehicle to another employee, or when taking your vehicle in for maintenance, is very important.

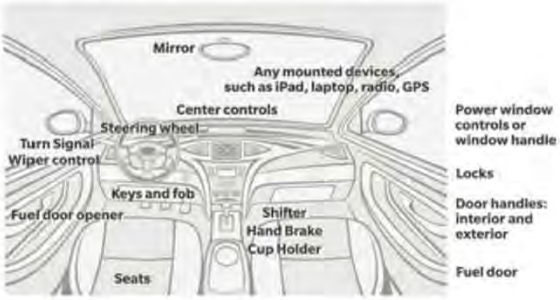
Here are some high-touch areas that should **never** be missed:

• Mirror • Center controls • Keys and fob • Wiper control • Climate control • Audio controls • Hand brake • Seats *(driver/passenger)*/Seatbelts • Fuel door opener • Windows • Headrests • Armrests	• All mounted devices *(any and all electronic devised used - i.e. iPad, laptop, radio, GPS, phone chargers)* • Steering wheel • Headlight • All cabin lighting controls • Shifter • Cup holder • Door handle*(inside and out)*/Window control/locks • Air vent • Sun visors

Use disinfectant wipes, diluted bleach solution, or damp soapy water wipes when cleaning all hard surfaces throughout the vehicle.

To guide your efforts when cleaning the vehicle, think about where droplets would fall when you sneeze or cough (*for example: do you turn your head to the side?) and remember to think about your own personal safety:*

- Be sure to wash your hands for **20 seconds** after completing the cleaning process.
- If you take your vehicle home at night, be sure to lock it to prevent it from being compromised.
- Make sure you have a mask and gloves (when/where appropriate).



Before you leave or enter the vehicle – here's a checklist to keep you safe and your team members safe as well:

Activity to Safeguard	☑
Keys / Fob	
Door Handles (interior/exterior)	
Steering Wheel, Shift Lever, Brake Lever, Wiper Stalk, Turn Signal Stalk	
Air Vents, Console, Dashboard, Cup Holder	
Exterior and Interior Fueling Latch, Cover, Cap	
Seats, Seatbelts, Headrests	
Mirrors, Windows, Window Controls	
Interior Lights	
Sun Visors	
Passenger and Driver Door Armrests, Grab Handles, Seat Adjusters	
All Electronic Devices used while in vehicle (iPads, Navigation Systems, Phone Chargers, Laptops, etc.)	

Additional considerations for crew trucks:

Handles on bin doors	
Equipment controls (bucket / digger)	

**** Please consider any other touch point identified by a crew member but not listed***

APPENDIX G

FRONT STREET HOLDER STATION

FIELD SAMPLING PLAN

AECOM Imagine it. Delivered.

FIELD SAMPLING PLAN
for the
K - FRONT ST. STATION

SITE #224063

Prepared for:
National Grid
One Metrotech Center
Brooklyn, New York 11201

Prepared by:
AECOM USA, Inc.
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Buffalo, New York 14202

Project Number: 60412543

Submittal Date:
November 2020

FIELD SAMPLING PLAN
For The
FRONT STREET HOLDER STATION
218 FRONT STREET
BROOKLYN, NEW YORK 11202
SITE #224063

Prepared For

NATIONAL GRID
ONE METROTECH CENTER
BROOKLYN, NEW YORK 11201

Prepared By

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NOVEMBER 2020

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FIGURE

(Following Text)

Figure 1 Site Location Map

Figure 2 Site Plan

Figure 3 Color Descriptions of Samples from Urban Impacted Sites

TABLES

(Following Tables)

Table 1 Summary of Analytical Parameters

Table 2 Analytical Parameters and Sample Container and Preservation Requirements, and Analytical Holding Times

APPENDICES

(Following Figures)

Attachment A National Grid Field Descriptors

Attachment B Field Activity Forms

1.0 INTRODUCTION

This Field Sampling Plan (FSP) was prepared as an appendix to the Interim Site Management Plan (ISMP) for the National Grid Front Street Holder Station (Site) located in Brooklyn, New York (**Figure 1 and 2**). This FSP provides a description of the anticipated procedures to be followed during field activities.

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) are the lead regulatory agencies overseeing the remediation, if necessary, at the Site. This work is being performed in accordance with the Administrative Consent Order, Index #A2-0552-0606.

1.1 Scope of Work

The ISMP requires annual site inspections to assess and document Site conditions. No other activities are currently planned. However, it is possible that activities associated with utility maintenance (*e.g.*, a water line repair), further Site characterization, remediation, or Site development could require subsurface investigation and the collection of soil and/or groundwater samples. Also, Site development could result in the construction of residential units without removal of subsurface impacts. Thus, the potential for soil vapor intrusion (SVI) would need to be assessed through an SVI evaluation. Because these are considered potential conditions, there are no specific sample collection locations. **Table 1** presents a list of likely parameters for soil, groundwater, and SVI analyses.

1.2 Site Geology

Investigations performed as part of the Site Characterization included drilling in the former holder foundations and in the sidewalks around the perimeter of the Site. Observations from the borings on the sidewalks indicate that the Site area is underlain by varying amounts of fill which is underlain by natural deposits of fine to coarse sand with varying amounts of gravel and cobbles. The maximum depth drilled was 55 ft below ground surface (ft bgs). Bedrock was not encountered.

Groundwater occurs at a depth of approximately 40 ft bgs with overall flow to the northwest towards the East River.

1.3 Site Description

The Front Street Holder Station is composed of one parcel, 49,200 square feet (sq ft) in size, and is occupied by a one-story warehouse. The remainder of the 218 Front Street property and the structures that affront on 171 York Street are part of an active lumber yard. The lumber yard includes covered open-air lumber storage racks. The parcel is owned by Great Front Realty Corporation (GFR). National Grid does not own any of the property that comprises the Site.

A Site Characterization (SC) performed by URS Corporation (an AECOM USA, Inc. company) confirmed the presence of two water-sealed gas holder tanks (Holders No. 4 and 5) buried beneath the Site. Water-sealed gas holders were commonly used for the low pressure storage of gas produced at MGP sites. A water-sealed gas holder is a cylindrical structure with a water tank beneath. The cylindrical shell is made up of one or more telescopic lifts coupled together with rims containing water to seal the gas. The lifts rise and fall depending on the volume of gas stored. The gas holder tank houses the lifts when down and contained water in which the holder rose and fell depending on gas flow. The water functioned as a gas-tight seal. The tanks could be constructed below the surrounding ground surface, partially below ground, or aboveground.

The SC was performed to identify environmental conditions on and immediately adjacent to the Site, to determine whether human health or the environment are being affected by the impacts, if any, and to guide any required measures to remediate the impacts, if any. The results of the SC are described in detail in the *Site Characterization for the Former Front Street Holder Station*, dated July 2013, revised April 2015.

The SC determined that the gas holder tanks were still present the subsurface beneath the Site and that they had been backfilled with fill consisting of varying amounts of sand, gravel, brick, concrete, glass, metal, and wood. The presence of volatile organic compounds (VOCs) in the soil samples from borings into the gas holder, especially indicators of potential MGP-related impacts such

as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs), along with the field observations of naphthalene-like odors, suggests the presence of impacts that are potentially MGP-related. However, as petroleum odors were also observed, the detected VOCs could also indicate the presence of some petroleum impacts. It is also noted that chlorinated VOCs were detected in one off-site well. Chlorinated VOCs are not associated with MGP processes, but are often related to dry cleaning processes. A dry cleaner was historically located upgradient of the Site.

Semi-volatile organic compounds (SVOCs) or, more specifically, PAHs, were detected in all seven samples from the gas holder borings. Although PAHs are associated with MGP wastes, it is not uncommon to find these compounds in urban fill.

The metals copper, lead, and mercury exceeded the New York State commercial and/or restricted residential use soil cleanup criteria in several samples collected from within the gas holder tanks. While metals can be derived from a variety of sources, the presence of cyanide, albeit at below criteria concentrations, suggests MGP/gas storage operations are a source of some impacts in the fill within the former gas holders.

To evaluate groundwater conditions in the area of the Site, two monitoring wells were installed in the sidewalk on Front Street and two monitoring wells were installed in the sidewalk on York Street. No VOCs were detected at concentrations above the soil cleanup criteria in the monitoring well boring samples. SVOCs were detected at concentrations above soil cleanup criteria in four of the ten samples collected from the well borings. However, because no evidence of MGP impacts (*e.g.,* naphthalene-like odors, staining, coatings, etc.) was observed during drilling, it is likely that the SVOCs are associated with the urban fill. The metals analytical results also suggest the absence of MGP impacts.

Groundwater was encountered in Holder No. 5. However, the water surface elevation was distinctly elevated compared to the groundwater surface in the wells installed in the adjacent sidewalks, which suggests that the groundwater within the holder is perched. Furthermore, the groundwater samples collected from former Holder No. 5 showed the presence of VOCs, SVOCs, metals and cyanide. The suite of BTEX, PAHs, and cyanide detected in the perched groundwater

sample from Holder No. 5 are potentially indicative of MGP-related impacts. The absence of this suite of contaminants in the samples from the wells located on the sidewalk suggests that the potentially MGP-related impacts present in the perched water in the Holder No. 5 tank are not significantly impacting local groundwater quality.

Because the perched groundwater is not used as a water supply, the potential for human exposure through direct contact, inhalation, or ingestion of the perched groundwater is minimal. All monitoring wells at the Site were decommissioned with NYSDEC approval in October 2013.

The potential for contaminant vapors to migrate upward though the subsurface and create an inhalation exposure pathway to workers in the lumber yard is minimal as contaminant concentrations would be further reduced by biodegradation and diffusion. Furthermore, because the lumber yard is located outdoors, any vapors that reach ground surface would quickly dissipate into the atmosphere. Therefore, the potential for human exposure is minimal with the existing engineering controls (*i.e.,* cover and integrity of former Holder No. 5). However, there is a potential for future exposure to construction and/or utility workers who may encounter the contaminants during intrusive subsurface work, or to future residents and/or property users if there is future onsite construction.

The Site is identified as No. 224063 and is currently in the New York State Inactive Hazardous Waste Disposal Site Remediation Program Site, which is administered by NYSDEC. An ISMP, which has been prepared for the Site, is a required element of the remediation program.

Institutional and Engineering Controls (ICs and ECs, respectively) have been incorporated into the site remedy to control exposure to target compounds and target analytes detected at concentrations exceeding applicable Standards Criteria and Guidance (SCGs) in environmental samples collected at the Site (*i.e.*, impacts) to ensure protection of public health and the environment. An Environmental Easement (EE), to be granted to the NYSDEC by the property owner, requires compliance with this ISMP and all ECs and ICs placed on the Site.

The ECs include an existing cover system (*i.e.*, warehouse and concrete, asphalt, and gravel). ICs consist of the EE. Periodic inspections of the Site are required to assess compliance with the provisions of the EE and the ISMP.

Since the final remedy has not yet been completed for the Site, the ISMP will be implemented to address intrusive activities prior to the final remedy or any portion of the final remedy at the Site. If a remedy is determined to be necessary to address sources of non-MGP-related impacts present at the Site, this will be evaluated separately for further action. Any necessary remediation will be completed prior to, or in association with, redevelopment. Depending on the scope and success of the remedy, the NYSDEC may require a SMP once the final remedy for the Site has been implemented.

The ISMP includes the following items which are pertinent to this FSP:

a. an Excavation Work Plan which details the provisions for management of limited excavations in areas of remaining contamination;

b. a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible;

c. a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

d. provisions for the management and inspection of the identified engineering controls;

e. maintaining site access controls and NYSDEC notification;

f. a monitoring plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to a schedule of monitoring and frequency of submittals to the NYSDEC; and

g. monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan.

The ISMP was prepared to manage impacts at the Site until the final remedy is complete. At that time, if required, the ISMP will be replaced by a SMP, which will be in effect until the EE is extinguished.

2.0 SITE INVESTIGATION PROCEDURES

Potential Site subsurface activities may include drilling for the collection of soil samples, installation of monitoring wells, or installation of soil gas sampling points; and test pit excavation for the collection of soil samples, inspection of subsurface conditions, or utility repair. The following subsections describe the specific procedures that will be followed during Site subsurface investigation activities.

All subsurface investigation activities must be performed by a qualified contractor following the equipment manufacture's methods and procedures. All activities must be coordinated, supervised, and documented by a qualified environmental geologist or engineer.

2.1 Utility Clearance

Proposed subsurface investigation locations will be identified and marked with paint or flagging prior. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protective Organization (UFPO) 1-800-962-7962. Private utility locating services may also be used. All private utilities and agencies will be contacted separately.

Vehicle access routes to subsurface investigation locations will be determined and cleared by the field representative prior to any field activities. The contractor will be responsible for acquiring sidewalk opening permits for proposed sidewalk work.

2.2 Equipment Decontamination and Inspection

All equipment used for subsurface investigations (HSAs, rods, drill rig, excavator) must be thoroughly decontaminated using a high-pressure steam cleaner prior to use. Also, the drill rig and excavator must be inspected for oil leaks and any leaks reported prior to starting operations.

Equipment decontamination must be performed on a decontamination pad constructed to enable to collection of decontamination water and solids. All decontamination materials (water, solids, plastic, etc.) must be containerized for proper offsite disposal at a permitted facility.

2.3 Drilling and Soil Sampling Procedures

The drilling procedure(s) to be used will depend on the purpose of the investigation. Drilling procedures for the collection of soil samples include direct-push, hollow stem auger (HSA), and Sonic. Drilling procedures for well installation include HSA or Sonic. Prior to drilling, each proposed soil boring will be manually cleared to a depth of 5 ft.

Typically, soil samples will be collected continuously as the borehole is advanced. Soil is usually sampled during HSA drilling using a 2-ft long split-spoon sampler advanced in accordance with American Society for Testing and Materials (ASTM) D 1586. Soil samples collected during direct-push drilling are usually collected using a 4 or 5-ft long macrocore sampler. Soil samples collected during Sonic drilling are usually collected using a double cased barrel.

The borings will be advanced incrementally to permit continuous subsurface soil sampling. The use of water or other drilling fluids is not permitted during soil sampling.

As the boring is advanced, the soil samples will be inspected and described following the procedures presented in **Attachment A**.

2.4 Monitoring Well Installation

Groundwater monitoring wells are installed to enable monitoring of groundwater levels and acquiring groundwater samples for laboratory testing. For the purpose of this FSP, it is assumed that overburden monitoring wells constructed using 2-inch (in) inside diameter (ID) Schedule 40 polyvinyl chloride (PVC) and installed through HSAs. Screens will be of a sufficient length to span the water table. The screens will have 0.020-in machined slots. The bottom of the screen will be fitted with a 1-ft long sump.

Procedure:

1) Advance the subsurface boring to the desired depth by means of HSA drilling.

2) Remove the center plug from the HSAs and verify borehole depth using a weighted measuring tape.

3) Add washed and graded medium sand as needed to the bottom of the borehole.

4) Insert the well screen fitted with a plug and riser pipe into borehole through the HSAs. Cap the riser to prevent well construction materials from entering the well.

5) Add sand to the screen section of the well while slowly removing the augers. The sand pack should extend at least 2 ft above the top of the screened material.

6) Slowly add bentonite chips/pellets to seal the borehole as the augers are slowly removed. The bentonite seal should be at least 2 ft thick. If the bentonite seal is placed above the groundwater level within the borehole, add water to the borehole to hydrate the bentonite pellets. Allow the pellets to hydrate for at least 30 minutes. The rate of removal of the auger from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.

7) The flush-mount well risers will be cut off just below the ground surface.

8) Backfill to 6 in below the top of the well riser with concrete.

9) Install a protective casing (road box) over the well riser pipe and set it into the concrete backfill.

10) Lock the protective casing cover.

11) Document well construction in the field notebook and later on a Monitoring Well Construction Detail Diagram (**Attachment B**).

2.4.1 Monitoring Well Development Procedures

At least 48-hours following completion of drilling and well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state. Developing the well not only removes any sediment but also may improve the hydraulic properties of the formation. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidity meter will be used to monitor effectiveness of development. A turbidity reading of < 50 Nephelometric Turbidity Units (NTU) and steady state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development. The monitoring wells will be

developed as described below. Development water will be containerized in 55-gallon drums for off-site disposal.

Procedure:

1) An appropriate well development method should be selected, depending on water level depth, well productivity, and sediment content of water. Well development options include surging while manual pumping and powered suction-lift or hydrolift pumping.

2) Equipment should be assembled, decontaminated (if necessary), and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.

3) Well development should proceed by repeated surging and removal of water from the well until the discharged water is relatively sediment-free. Effectiveness of development should be monitored at regular intervals using a portable turbidity meter. The volume of water removed, and turbidity, pH, temperature, and conductivity measurements will be recorded on a Well Development/Purging Log Form (**Attachment A**).

4) Well development will be discontinued when the turbidity of the discharged water is below 50 NTU.

2.4.2 Water Level Monitoring Procedures

Determination of groundwater depths in monitoring wells is necessary to calculate required purge volumes prior to groundwater sampling and to make potentiometric surface maps. Water levels in monitoring wells scheduled to be sampled during the fieldwork will be measured using an electronic interface probe/water level indicator. Water levels to be used to generate potentiometric surface contour maps will be collected sequentially from all site wells during one continuous monitoring event. Water level measurement procedures are presented below.

Procedure:

1) Clean the water level probe and the lower portion of cable following standard decontamination procedures and test water level meter to ensure that the batteries are charged.

2) Lower the probe slowly into the monitoring well until the solid audible alarm indicates water.

3) Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference.

3) Repeat the measurement for confirmation and record the water level.

4) Lower the probe slowly to the bottom of the monitoring well. If the solid audible alarm becomes intermittent, this indicated the presence of dense non-aqueous phase liquid (DNAPL). Record the depth to the top of the DNAPL and record the bottom depth of the well.

6) Slowly remove and dry the cable and probe with a clean paper towel.

7) Replace the well cap and lock protective cap in place.

8) Decontaminate the water level meter if additional measurements are to be taken.

Each new and existing well will also be checked for the presence of DNAPL using the electronic interface probe/water level indicator. Alternately, if the interface probe cannot detect the DNAPL due to its viscosity, a weighted cotton strong will be lowered to the bottom of the well and the bottom portion of the string stained by DNAPL will be measured to determine the DNAPL thickness.

2.4.3 Well Purging Procedures

Well purging will be completed using the low-flow purging technique as follows:

1) Calibrate field instruments (*e.g.*, pH, specific conductance, PID, turbidity).

2) The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using a photoionization detector (PID). If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

3) Using an electronic interface probe/water level detector, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells.

4) Purge the required water volume (*i.e.*, until stabilization of pH, temperature, specific conductivity, and turbidity, a minimum of three well volumes) using a low-flow pump and dedicated HDPE tubing. New dedicated tubing will be used for each well.

5) Purge the well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full-scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity <50 NTU.

6) Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7) Well purging data are to be recorded in the field notebook and on the Well Purge Log (**Attachment B**).

2.5 Monitoring Well Sampling Procedure

The following groundwater sampling procedures will be used for new monitoring wells after purging has been conducted:

Procedures

1) After well purging is completed, a sample will be collected into the appropriate laboratory supplied containers.

2) Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.

3) All sample bottles will be labeled in the field using a waterproof permanent marker.

4) Samples will be collected into sample bottles, containing preservatives as needed, and placed on ice in coolers for preservation and packing prior to shipment to the analytical laboratory. A chain-of-custody (COC) record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.

5) Remove dedicated/disposable HDPE tubing and foot-valve.

5) Well sampling data are to be recorded in the field notebook and on the Well Purging Log.

6) Groundwater samples will be placed on ice and shipped overnight to the laboratory under COC control. Samples will be shipped the same day as collection.

Groundwater sampling for per- and polyfluoralkyl substances (PFAS) must be collected in accordance with the current version of NYSDEC's *Sampling, Analysis, and Assessment of Per- and Polyfluorakyl Substances (PFAS)* guidance document.

2.6 Excavation/Test Pit Procedures

Excavation/test pit digging enables the visual inspection of subsurface conditions, repair of utilities, and recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1. A competent person must be present during all work that involves entry by personnel into trenches or excavations greater than 5 ft in depth.
2. Once excavation commences, if applicable, remove the top layer of sod to preserve it in order to cover the trench once backfilling is completed. Excavation shall be conducted in a manner that minimizes environmental impact.
3. If the walls of an excavation or trench are not sloped or cutback, barriers shall be placed around the perimeter. The barrier shall be at least 3.6 ft in height.
4. The spoils should be placed 3.2 ft from the edge of the excavation, or further if local regulations are more stringent. Proper soil classification and sampling should take place at every depth where a soil change is present. Soil samples and classifications should be taken from the pile of spoils unless entry into the trench is necessary.
5. If entry into the trench is necessary, proper shoring shall be installed which shall be determined by the competent person overseeing the excavation.
6. All excavations shall be appropriately secured at the end of the day to prevent unauthorized entry or inadvertent entry into the excavation. This may require a protective covering, barriers, fencing, signage or other measures appropriate to the excavation and associated conditions.
7. Backfill trenches as soon as reasonably possible after work is complete and then decontaminate excavator and equipment before moving to the next location.

2.7 Soil Sample Descriptions

It is important that descriptive qualifiers are consistently used to characterize degree and nature of contaminant impacts and visual-manual soil classification. **Attachment A** presents National Grid descriptors for urban impacted sites.

Figure A-1 in Appendix A presents a color chart that is intended to help visually depict the nature and location of impacts observed during an investigation. The colors should be included in investigation summaries on cross sections to support an understanding of the nature and extent of

impacts. In addition, the colors may also be placed on boring logs (although not a requirement) in the final report. In either case, the colors will be used in interpretive depictions of nature and extent once the lines of evidence support a determination of the appropriate color selection. Since the investigation of a site is dynamic, the use of a particular color or a combination of colors may change if other lines of evidence suggest such a change is appropriate.

In instances where multiple impacts are present, a combination of colors should be used (such as a color with cross hatching) to clearly identify where these co-mingled impacts are present.

2.8 Soil Sample Collection for Laboratory Analysis

Soil samples will be retained for chemical analysis by the subcontracted laboratory. Samples for waste disposal characterization would be collected in accordance with NYSDEC's DER-10 guidance document.

2.9 Vapor Intrusion Sampling

The following are instructions for the collection of indoor air, sub-slab vapor, and outdoor air samples. These procedures are based on NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*. Depending on site -specific requirements, sampling frequencies may vary from those discussed below.

Indoor air investigations generally include collecting one air sample each from the breathing zones of the first floor areas, and collecting one collocated soil vapor sample from beneath the building concrete slab. In addition, one outdoor air sample is collected from the sampling area for each day of sampling.

2.9.1 Sub-Slab Vapor Sampling Procedures

At least one sub-slab vapor sample will be collected at each sampled building. The sub-slab samples will be tested for adequate surface seals before and after testing using the helium tracer gas test procedures. The sub-slab vapor sampling procedures are summarized below:

1) Select and prepare the sub-slab sample collection point by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and a potential location of a subsurface probe will be selected. Flooring with suspected asbestos containing tiles are to be avoided. The location will ideally be central to the building, and away from the foundation walls, apparent penetrations and buried pipes. Photograph and document all sample locations.
1) Perform a utility clearance survey to identify and avoid subsurface utilities and structures.
2) In locations where bare concrete is available, drill a 5/8-in diameter hole about 1 in into the concrete using an electric hammer drill. Extend the hole through the remaining thickness of the slab using a ½ in drill bit. Lengthen the hole about 3 in beyond the sub-slab using the drill bit.
3) Remove the concrete dust within and around the hole using wire brushes and a brush and dustpan, then dabbing the surface with modeling clay.
4) Insert a tapered 5/8 in outside diameter (OD) by ¼ in ID rubber stopper onto and 3 in beyond the end of a ¼ in OD by 1/8 in ID Teflon tube. Insert the Teflon tube into the hole so the stopper is seated into the top of the hole.
5) Seal the annular space between the 5/8 in hole and the Teflon tubing with modeling clay (or equivalent). Extend the clay above the floor's surface and around the tubing in a volcano-like shape.
6) Purge the sampling tube by connecting the Teflon tubing to the inlet of an air-sampling pump with 3/8 in OD silicone tubing, and connecting a 1 liter (L) Tedlar bag to the outlet of the pump with silicone tubing. Purge approximately 1 L of gas from the subsurface probe into the Tedlar bag using the air-sampling pump. Analyze the Tedlar bag containing the sub-slab purged air with a multi-gas detector that records the concentrations of methane, carbon dioxide, and oxygen. Record the purge times (start

and stop) and the gas concentrations on a Summa Canister Data Sheet. Purging flow rates must not exceed 0.2 L per minute (L/min).

7) Assign sample identification to the Summa canister identification tag and record on COC and the Summa Canister Data Sheet. Also, record the Summa canisters serial number on the Summa Canister Data Sheet.
8) Remove the brass plug from canister fitting.
9) Attach a pre-calibrated/certified flow controller and particulate filter to the Summa canister. Record the regulator serial number on the Summa Canister Data Sheet.
10) Attach the sample tube to the Summa canister using a ¼ in Swagelok nut with appropriate ferrules, via the flow controller/particulate filter assembly.
11) Open canister valve to initiate sample collection and record sample start time, date, and initial vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 in Hg), do not use. Take a photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID and date.
12) After the predefined sampling duration, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve.
13) Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Seal canister with brass plug.
14) Seal the hole in the floor slab with hydraulic cement patch.
15) Ship samples and COCs overnight to the selected laboratory for TO-15 analysis.

2.9.2 Using Helium Tracer Gas to Test Floor Seals

1) Drill the concrete floor and attach and seal the Teflon sample tubing to the floor as described above.
2) Using a 2-quart (or similar size) plastic bucket, drill two ¼ in holes in the bottom and one ¼ in hole in the side of the bucket. While placing the bucket topside down over the hole in the floor, thread the Teflon sample tube through one of the holes in the bucket. Seal the tube to the bucket with clay and seal the bucket to the floor with clay.
3) Connect helium (99.999%) cylinder tubing to the open hole in the bottom of the bucket and seal the connection. Insert a helium detector probe to the hole in the side of the bucket.

4) Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure.
5) Connect the Teflon sample tubing to a GilAir vacuum pump or equivalent using 3/8 in OD silicone tubing. Connect a 1 L Tedlar bag to the outlet of the pump using silicone tubing and collect a 1 L sample. Analyze the Tedlar bag for helium using the helium detector and record the results on the Summa Canister Data Sheet. Also, analyze the Tedlar bag for the presence of methane, hydrogen sulfide, carbon dioxide, and oxygen and record the results on the Summa Canister Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample tubing to the floor. If the seal is poor, the tubing must be resealed to the floor and another helium test conducted.
6) After purging, remove the bucket enclosure and collect the sub-slab sample as described in Section 1.1 above.

2.9.3 Indoor and Outdoor Air Sampling Procedures

1) Place the Summa canister at the breathing zone height of approximately 3 to 5 ft above the floor.
2) Record the canister's serial number on the Summa Canister Data Sheet.
3) Assign sample identification to the canister identification tag and record on COC and the Summa Canister Data Sheet.
4) Remove brass plug from canister fitting.
5) Attach a pre-calibrated/certified flow controller and particulate filter to the Summa canister, open valve completely to initiate sampling, and record the sample start time and date, and beginning vacuum reading on the canister identification tag and the Summa Canister Data Sheet. Also record the regulator serial number on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 in Hg), do not use.
6) Take a photograph of canister setup and surrounding area. Include a dry erase board or similar display which presents sample ID and date.
7) After the predefined sampling duration, record end time and pressure on the Summa Canister Data Sheet, and close valve.

8) Disconnect flow controller/particulate filter assembly from canister.
9) Seal canister with brass plug.
10) Ship canister and COC to the selected laboratory for TO-15 analysis.

2.9.4 Soil Vapor Sampling Procedures

Soil vapor points will be advanced to a depth of 10 ft bgs. Upon reaching the target depth, a 6-inch long, stainless steel vapor sampling implant (*e.g.*, Geoprobe AT86 series) connected to the Teflon or polyethylene tubing using a stainless steel swage-lock or clamp fitting to prevent leakage during sample collection, will be inserted down to the base of the borehole (*i.e.*, 10 ft). The implants will have a "PRT" style thread, the same fitting style used with Geoprobe PRT vapor sampling tools. The annular space around the vapor sampling implant will be filled with # 1 silica sand. The silica sand will extend no more than 6-in above the implant. Bentonite will be placed immediately above the silica sand to 1-ft below grade. The remaining 1-ft will be backfilled with concrete. Each soil vapor sampling point will be finished with a 5-in diameter flush-mount protective casing set in the concrete.

Soil vapor samples will be collected using a Summa canister as follows:

1) Remove the brass plug from canister fitting.
2) Attach a pre-calibrated/certified flow controller and particulate filter to the Summa canister. Record the regulator serial number on the Summa Canister Data Sheet.
3) Attach the sample tube to the Summa canister using a ¼ in Swagelok nut with appropriate ferrules, via the flow controller/particulate filter assembly.
4) Open canister valve to initiate sample collection and record sample start time, date, and initial vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 in Hg), do not use. Take a photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID and date.
5) After the predefined sampling duration, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve.

2.9.5 Quality Control

Field duplicates will be collected by attaching the T-fitting supplied by the laboratory to two Summa canisters with attached regulators. The inlet for the T-fitting will then be attached to the sub-slab sample tubing. Indoor air and outdoor air duplicates will also use T-fittings connected to two Summa canisters. Tubing will not be required unless needed to the raise the sampling point to the breathing zone. For sampling, both Summa canister valves are to be opened and closed simultaneously.

2.9.6 Field Documentation

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, purge forms and notebooks used during field activities must be maintained. Example forms are provided in **Attachment B.** Indoor air sampling procedures will be photo-documented.

The field sampling team will maintain sampling records that include the following data:

1) Sample Identification
2) Date and time of sample collection
3) Identity of samplers
4) Observations
5) Sampling methods and devices
6) Purge volumes (soil vapor)
7) Volume of soil vapor sample extracted
8) The Summa canister vacuum before and after samples collected
9) Chain of Custody and shipping information

The proper completion of the following forms/logs will be considered correct procedure for documentation during the VI sampling program:

1) Field Logbook - weather-proof hand-bound field book

2) Summa Canister Data Sheet
3) Chain of Custody Form

2.10 Sample Labeling

In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Each will have the following information placed on the laboratory supplied sample label:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Analysis required

The following terminology shall be used to identify samples:

SITE ID-SG-xx

Where Site ID is the site identification number, SG is the type of sample (e.g., SG for soil gas) and xx is the ascending numerical number assigned to the sample.

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the data of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on February 22, 2020 would be assigned the following sample number using the code shown below:

YYYYMMDD-FD-1 = 20200222-FD-1

Subsequent duplicates collected on the same day would be assigned FD-2, FD-3 etc. Field sampling crew will record the duplicate sample information on the appropriate Sampling Field Data Sheets and also in the field book.

3.0 FIELD DOCUMENTATION

Field notebooks will be used during all on-site work. A dedicated field notebook will be maintained by the field technician overseeing the site activities. In addition to the notebook, any and all original sampling forms, purge forms and notebooks used during field activities will be submitted as part of the final report.

The field sampling team will maintain a sample log sheet summarizing the following data:

1) Sample Identification
2) Date and time of sample collection
3) Sampling depth
4) Identity of samplers
5) Sampling methods and devices
6) Purge volumes (groundwater)
7) Groundwater purge parameters
8) Chain of custody and shipping information

Field notes will include descriptions of materials encountered, sample numbers, and types of samples. Additionally, the notes will include time and material expenditures for later verification of contractor invoices, if warranted. Upon completion of daily activities, the sampler will initiate the COC on any samples recovered for chemical laboratory testing.

4.0 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as COC procedures. COC procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. COC procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this investigation follow the COC guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

1) The COC record should be completely filled out with all relevant information.
2) The original COC goes with the samples. It should be placed in a Ziplock bag and placed inside the cooler/box containing the samples. The sampler should retain a copy of the COC.
3) Groundwater and soil samples should be shipped on ice in the laboratory supplied coolers.
4) Place the lab address on top of sample box/cooler. Affix numbered custody seals across box lid flaps and cooler lid. Cover seals with wide, clear tape.
5) Ship samples via carrier the same day that they are collected.

5.0 FIELD SAMPLING INSTRUMENTATION

Calibration procedures for electronic instruments can be found in the equipment operating manuals. Calibration and maintenance procedures for the common instrumentation that will be used during field investigations are discussed in the equipment operating manuals. A copy of the manufacturer's operating manual for each instrument will be kept with the instrument or the operator. All field sampling equipment will be calibrated as recommended by the manufacturer. The calibration procedures and results will be recorded in the field notebook.

5.1 Preventative Maintenance

In case of equipment malfunction, the equipment rental vendor and/or the instrument manufacturer will be contacted. Some instrumentation rental vendors provide either local same day delivery and/or overnight service (*e.g.*, Pine Environmental Services, Inc. - 800-242-3910)

6.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all equipment used to collect samples/data during the field investigations.

1) Thoroughly clean equipment with laboratory-grade soap and water, until all visible contamination is gone.

2) Rinse with water, until all visible evidence of soap is removed.

3) For stainless steel trowels and bowels used for surface soil sampling, rinse equipment with nitric acid, then rinse with deionized water, and then rinse with methanol.

4) Rinse several times with deionized water.

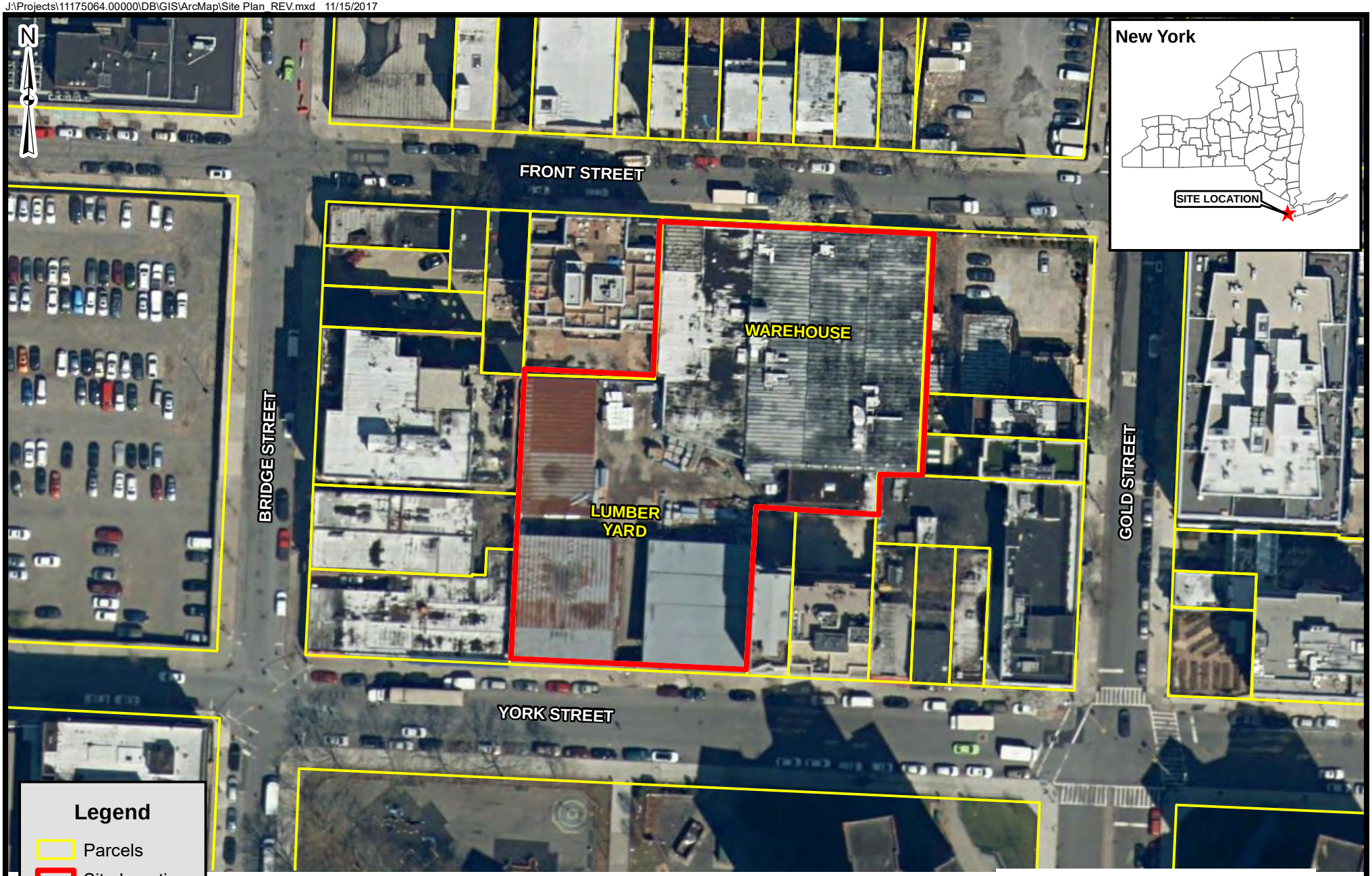
5) Air dry before using.

6) If equipment will not be used immediately, wrap in aluminum foil.

Decontamination materials will be collected and placed in 55 gallon drums.

FIGURES

J:\Projects\11175064.00000\DB\GIS\ArcMap\Site Plan_REV.mxd 11/15/2017



AECOM

FRONT STREET FORMER GAS HOLDER SITE
SITE LOCATION MAP

FIGURE 1

J:\Projects\11175064.00000\DB\GIS\ArcMap\Site Plan Area of Concern_REV.mxd 11/13/2017

AECOM

FORMER FRONT STREET HOLDER STATION SITE PLAN

FIGURE 2

	RGB Color	Auto Cad Index
NAPL SATURATED	255,0,0	10
NAPL COATED MATERIAL	255,0,255	210
SOLID NAPL	129,64,0	34
NAPL BLEBS, GLOBS, SHEEN	255,191,0	40
STAINING, ODOR	255,255,0	50
INDUSTRIAL IMPACTS - (PETROLEUM OR OTHER UNNATURAL) SATURATION & SHEENS	0,191,255	140
INDUSTRIAL IMPACTS - (PETROLEUM OR OTHER UNNATURAL) STAINING & ODORS	170,234,255	141
WOOD CHIPS/BLUE DISCOLORATION/SULFER-LIKE ODOR	0,0,255	170
NO OBSERVED IMPACTS	0,165,0	92

Note: In instances where multiple impacts are present, a combination of colors should be used (such as a color with cross hatching) to clearly identify where these co-mingled impacts are present.

AECOM

FRONT STREET FORMER GAS HOLDER SITE
COLOR DESCRIPTIONS OF SAMPLES AT URBAN IMPACTED SITES

FIGURE 3

TABLES

TABLE 1
SUMMARY OF ANALYTICAL PARAMETERS
FRONT STREET HOLDER STATION
NATIONAL GRID SITE #224063

Parameter	Analytical Method[1]
Soil Samples	
TCL VOCs	8260D
TCL SVOCs	8270E
TCL Pesticides	8081B
Herbicides	8151A
PCBs	8082A
TAL Metals	6010D/7471B
Total Cyanide	9010C/9012A
PFAS	537 Modified
Groundwater Samples	
TCL VOCs	8260D
TCL SVOCs	8270E
TCL Pesticides	8081B
Herbicides	8151A
PCBs	8082A
TAL Metals	6010D/7470A
Total Cyanide	9014
PFAS	537 Modified
Soil Vapor	
VOCs	TO-15
Waste Characterization - Aqueous - Based on Clean Waters of New York	
TOX	9023
PCBs	8082A
Solids	SM2540B-11
Flash point	1010A
VOCs[2]	8260D
Waste Characterization - Solids- Based on Bayshore Soil Management[3]	
VOCs	8260D
TCLP VOCS	1311/8260D
SVOCs	8270E
TCLP SVOCs	1311/8270E
TAL Metals	6010D/7471B
TCLP METALS	1311/6010D/7470A
EOX	8015B Modified
PCBs	8082A
Sulfur	ASTM D 1522

1 - NYSDEC Analytical Services Protocol (ASP), July 2005 Edition

- America Society for Testing and Materials (ASTM)

- Target Compound List (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) as listed in USEPA CLP Statement of Work SOM01.2

- Target Analyte List (TAL) metals as listed in USEPA CLP Statement of Work ILM05.3.

2 - Analyses may be requested by Clean Waters

3 - Toxicity Characteristic Leaching Procedure (TCLP) will be required for any parameter which exceeds the RCRA 20X Rule

PCB - polychlorinated biphenyls
MS/MSD/MD - matrix spike/matrix spike duplicate/matrix duplicate
PFAS - Per and Polyfluoroalkyl Substances

TABLE 2
ANALYTICAL PARAMETERS AND CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
FRONT STREET HOLDER STATION
NATIONAL GRID SITE #224063

Analytical Parameter	Analytical Method	Container Size/Type*	Containers Per Sample	Preservation	Maximum Holding Time (from VTSR)
I. Soil Samples					
TCL VOCs	8260C	2 oz. glass	2	4 °C	Analysis: 14 days
TCL SVOCs	8270D	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TCL Pesticides	8081B	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Herbicides	8151A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
PCBs	8082A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TAL Metals	6010D/7471B	4 oz. glass	1	4 °C	Analysis: 180 days (26 days for Hg)
Total Cyanide	9010B/9012A	4 oz. glass	1	4 °C	Analysis: 14 days
PFAS	537 Modified	250 ml HDPE	2	4 °C	Extraction: 14 days Analysis: 28 days
II. Groundwater Samples					
TCL VOCs	8260C	40 mL glass	3	HCl to pH<2, 4 °C	Analysis: 14 days
TCL SVOCs	8270D	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
TCL Pesticides	8081B	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
Herbicides	8151A	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
PCBs	8082A	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
TAL Metals	6010D/7470A	1L plastic	1	HNO_3 to pH<2, 4 °C	Analysis: 180 days (26 days for Hg)
Total Cyanide	9010B/9012A	500 ml amber glass	1	NaOH to pH>12, 4 °C	Analysis: 12 days
PFAS	537 Modified	8 oz HDPE	1	4 °C	Extraction: 14 days Analysis: 28 days
IV. Waste Characterization - Aqueous - Based on Clean Waters of New York					
TOX	9023	250 ml glass	1	H2SO4 to pH<2, 4 °C	Analysis: 7 days
PCBs	8082A	1L amber glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Solids	SM2540B-11	500 ml plastic	1	4 °C	Analysis: 7 days
Flash point	1010A	250 ml plastic	1	none	Analysis: 10 days
VOCs	8260D	40 mL glass	3	HCl to pH<2, 4 °C	Analysis: 14 days
V. Waste Characterization - Solids - based on Bayshore Soil Management Acceptance Requirements for MGP-Impacted Solids					
VOCs	8260D	2 oz. glass	3	4 °C	Analysis: 14 days
TCLP VOCS	1311/8260D	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 14 days
SVOCs	8270E	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TCLP SVOCs	1311/8270E	4 oz. glass	1	4 °C	TCLP Extraction: 14 days, SVOC extraction: 14 days Analysis: 40 days
PCBs	8082A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TAL Metals	6010D/7471B	4 oz. glass	1	4 °C	Extraction: 180 days (5 days for Hg) Analysis: 180 days (28 days for Hg)
TCLP METALS	1311/6010D/7470A	4 oz. glass	1	4 °C	TCLP Extraction: 14 days. Extraction: 180 days (5 days for Hg) Analysis: 180 days (28 days for Hg)
EOX	8015B Modified	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Sulfur	ASTM D 1522	4 oz. glass	1	4 °C	None

Notes:
*Number and size of containers may vary based on laboratory sample volume requirements.
VTSR - Validated time of sample receipt HDPE - High Ddensity Polyethlene
Field duplicates, rinse blanks and matrix/matrix-spike duplicates are required at a frequency of 1 per 20 samples.

ATTACHMENT A

NATIONAL GRID FIELD DESCRIPTORS

Appendix A

National Grid Field Descriptors

The intent of this document is to provide field personnel guidelines for logging soil conditions and observed impacts in a consistent and factual manner. This guidance recognizes that prejudging field conclusions regarding the potential source(s) or nature of a particular impact should be avoided and instead conclusions should be based on multiple lines of evidence (field observations, laboratory physical and chemical analyses, historic site uses, location of observed impacts, etc.).

SOIL LOGGING

- All soils are to be logged using the **Unified Soil Classification System** (ASTM D 2488 field descriptions).
- A photograph of the entire sample core should be taken. Additional photographs may be necessary to document impacted material.
- A calibrated **PID** (Photoionization Detector) should be used to screen all soil samples. PID readings should be taken every 6 inches of recovery and the interval reading should be included on the boring logs.
- The soil sample core should be scored or cut along the long axis so that the all of the soil lithology can be observed, when practical.
- **Moisture terms**: dry, moist and wet.
- **Color terms** –Color terms should be used to describe the "natural color" of the sample as opposed to staining caused by contamination (see below).
- **Representativeness** – Soil logs should include specific notes if the field representative believes that there is a possibility the soil sample being described is not representative of the interval sampled or is indicative of multiple sources of contamination.
- **Intervals for Description** – the field description should be for discrete intervals within the sampler, specifically pointing out small-scale units and changes within each sample interval. The description should also include the amount of sample recovered and note other conditions (such as a change in drilling conditions, etc.), as well as consistently adjusting the sample interval described (i.e. – identify the percentage of sample actually recovered and note any potential causes of the loss if possible) and note other conditions (such as a change in drilling conditions, etc.).

DESCRIPTION OF CONTAMINANTS

Visual Contamination Descriptors

- **NAPL** (Non Aqueous Phase Liquid) – a separate phase liquid that may be lighter than water (LNAPL) or denser than water (DNAPL). NAPL arises from a variety of industrial sources and can have varying consistency (viscosity) and can range from non-viscous to highly viscous (taffy-like). NAPL observations should be accompanied by applicable

olfactory with smell for industrial sources (see descriptors below) and other visual observations (e.g., color and viscosity).

- **Sheen –** iridescent sheen. This is not to be used to describe a "bacterial sheen", which can be distinguished by its tendency to break up at angles on the water surface; whereas a non-bacterial sheen will be continuous and will not break up.

- **Blebs –** discrete, spherical shaped NAPL in or on the soil matrix. Include additional descriptors to the extent practicable such as the approximate size and quantity (number of blebs or qualitative estimate) to the extent practical.

- **Coated –** soil grains are coated with NAPL – there is not sufficient NAPL present to saturate the pore spaces. Use modifiers such as light, moderate or heavy to indicate the degree of coating.

- **Saturated –** the entirety of the pore space for a sample interval is saturated with NAPL. Care should be taken to ensure that the saturation described is not related to water in the sample. Depending on the viscosity, NAPL saturated materials may freely drain from a soil sample and should be documented accordingly.

- **Stained** – visible, unnatural discoloration of the soil, with no visible free product.

- **Solid NAPL –** NAPL that is in a solid or semi-solid phase. The magnitude of the observed solid NAPL should be described (discrete granules or a solid layer).

  Other Visual Impacts and Descriptors– Other visual impacts that are not naturally occurring should also be noted along with appropriate visual descriptors. These other visual observations could include the observation of debris, wood chips, staining, anthropogenic materials, or other notable visual characteristics and general observations characterizing common urban fill. The above impacts should be described using other visual descriptors as applicable. Descriptors may include, but not be limited to, color, consistency, thickness, etc.

Olfactory Descriptors

- Note odors similar to mothballs, driveway sealer, highway paving oil or other odors that are acrid, burnt, or sulfur-like, etc.
- Other odors that are not believed to be natural should also be identified with descriptors such as organic, ammonia, sweet, chemical etc., as applicable.
- Use modifiers such as strong, moderate or slight to indicate intensity of the observed odor.
- In instances where multiple odors are present, a combination of descriptors should be used to clearly identify where these co-mingled impacts are present.

DNAPL/LNAPL

- **Density of NAPL –** a jar shake test can be performed to preliminarily determine in the field whether observed NAPL is either denser or lighter than water. Care should be taken in recording and interpreting the results, as experience indicates that the apparent result immediately following the test may change with time. Laboratory testing for density of the NAPL is recommended to confirm results. The depth at which the NAPL is encountered on soil with respect to the groundwater surface is not diagnostic and should not be used a basis for identifying the density of NAPL in the field.

- **Viscosity of NAPL –** if NAPL is present a qualitative description of viscosity should be made. The following should be used:

  Highly Viscous (taffy-like)
  Viscous (No. 6 fuel oil or bunker crude-like)
  Low viscosity (No. 2 fuel oil-like or water-like)

GROUNDWATER SAMPLING OBSERVATIONS

- Any observations of sheen, blebs, NAPL, smearing or coating of the sampling equipment, odor, etc. made during groundwater sampling are to be included in the groundwater sample collection log.

COLOR CHART (ATTACHED) For Use in Cross-Sections, Extent Maps, and Similar Interpretative Depictions

The color chart attached is intended to help visually depict the nature and location of impacts observed during an investigation. The chart would be used for new sites or sites transitioning from the Site Characterization to the Remedial Investigation phase (or are in the early stages of the Remedial Investigation phase). The colors should be included in investigation summaries on cross sections to support an understanding of the nature and extent of impacts. In addition, the colors may also be placed on boring logs (although not a requirement) in the final report. In either case, the colors will be used in interpretive depictions of nature and extent once the lines of evidence support a determination of the appropriate color selection. Since the investigation of a site is dynamic, the use of a particular color or a combination of colors may change if other lines of evidence suggest such a change is appropriate.

In instances where multiple impacts are present, a combination of colors should be used (such as a color with cross hatching) to clearly identify where these co-mingled impacts are present.

ATTACHMENT B

FIELD ACTIVITY FORMS

DAILY DRILLING RECORD

AECOM

PROJECT TITLE: _____ DATE: _____

CLIENT: _____ CONTRACTOR: _____

FROM	TO	PRODUCTIVE HOURS	ACTIVITIES/COMMENTS
TOTAL PRODUCTIVE HOURS			LEVEL B / LEVEL C / LEVEL D (CIRCLE ONE SELCTION)

LABOR:		MATERIALS / SUPPLIES:	
UNITS		UNITS	

WEATHER:

_____ URS ONSITE COORDINATOR	_____ CONTRACTOR REPRESENTATIVE

WELL DEVELOPMENT LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.0	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.0	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ___)	=	0	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: _____ Site: _____ Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: ***AECOM***

Purging/ Sampling Device: _____ Tubing Type: _____ Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water: _____ Depth to Well Bottom: _____ Well Diameter: _____ Screen Length: _____

Casing Type: PVC Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (^{o}C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	**0.1**	**---**	**3%**	**10%**	**10%**	**+ or - 10**	**---**	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft; 4 inch diameter well = 2470 ml/ft ($vol_{cyl} = \pi r^2 h$)

Remarks:

WELL PURGING LOG

AECOM

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.00	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.00	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x 3)	=	0.00	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	INITIAL										INSTRUMENT
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											
TURBIDITY (NTU)											
DISSOLVED OXYGEN											
WATER LEVEL											
TIME											

COMMENTS:

AECOM

TEST BORING LOG

PROJECT:	BORING NO:
CLIENT:	SHEET: 1 of
BORING CONTRACTOR:	JOB NO.:
GROUNDWATER:	BORING LOCATION:
	GROUND ELEVATION:
	DATE STARTED:
	DATE FINISHED:
	DRILLER:
	GEOLOGIST:
* POCKET PENETROMETER READING	REVIEWED BY:

DATE	TIME	LEVEL	TYPE		CAS.	SAMPLER	CORE	TUBE
				TYPE				
				DIA.				
				WT.				
				FALL				

DEPTH FEET	SAMPLE STRATA SYMBOL	"S" NO.	"N" NO.	BLOWS PER 6"	REC% RQD%	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	USCS	REMARKS MOISTURE PID
5										
10										
15										
20										
25										
30										

COMMENTS:	PROJECT NO.
	BORING NO.

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

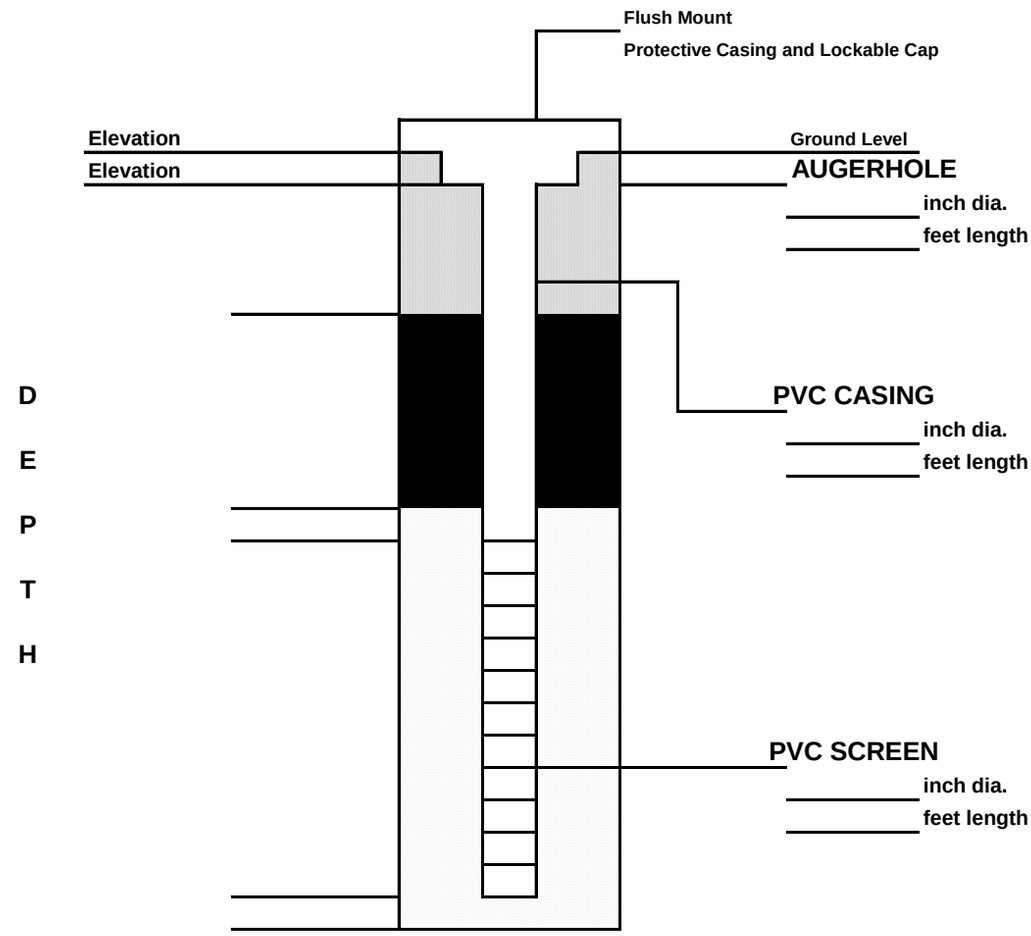
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel grade box	**Type:** 4" PVC	**Type:** #2 Sand **Setting:**
Monitor: 4" PVC	**Slot Size:** .020"	***SEAL MATERIAL***
		Type: Bentonite **Setting:**

COMMENTS:

LEGEND

- Cement/Bentonite Grout
- Bentonite Seal
- Silica Sandpack

Client:	**Location:**	**Project No.:**
AECOM	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:**

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

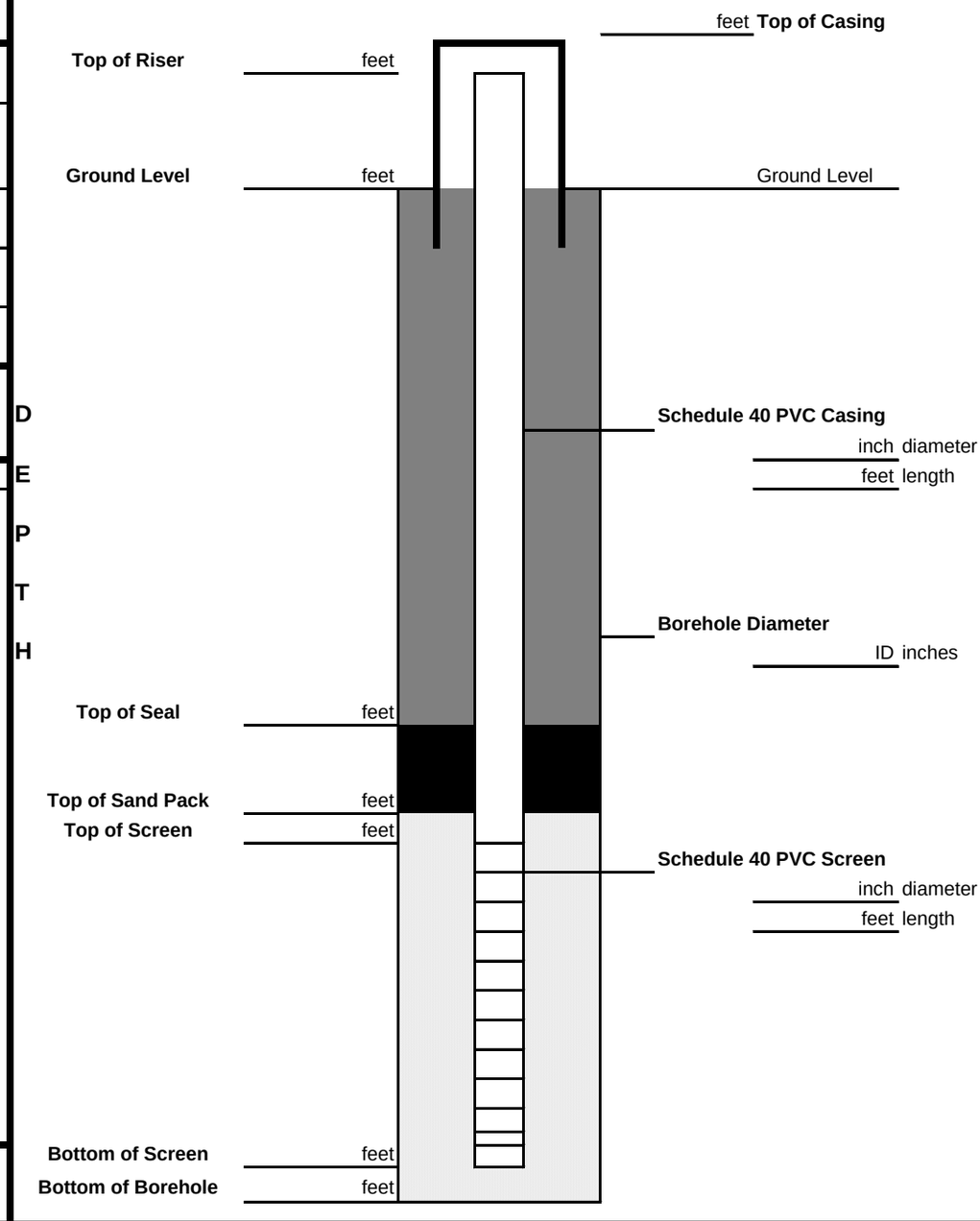
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL		SCREEN MATERIAL		FILTER MATERIAL
Surface:	12" Steel protective cover (Stick Up)	**Type:**	4" Schedule 40 PVC	**Type:** #2 well sand **Setting:**
Monitor:	4" Schedule 4O PVC	**Slot Size:**	0.020"	**SEAL MATERIAL** **Type 1:** Bentonite chips **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client: NYC	**Location:**	**Project No.:**
AECOM	**MONITORING WELL CONSTRUCTION DETAILS**	**Well Number:**

AECOM

SITE NAME_____

JOB NUMBER_____

DAILY INSTRUMENT CALIBRATION CHECK SHEET

DATE	INSTRUMENT	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	CALIBRATED BY

APPENDIX H

FRONT STREET HOLDER STATION

QUALITY ASSURANCE PROJECT PLAN

AECOM Imagine it. Delivered.

QUALITY ASSURANCE PROJECT PLAN for the K - FRONT ST. STATION

SITE #224063

Prepared for:
National Grid
One Metrotech Center
Brooklyn, New York 11201

Prepared by:
AECOM USA, Inc.
257 West Genesee Street, Suite 400
Buffalo, New York 14202

Project Number: 60412543

Submittal Date:
November 2020

QUALITY ASSURANCE PROJECT PLAN

For The

K - FRONT ST STATION

218 FRONT STREET

BROOKLYN, NEW YORK 11202

SITE #224063

Prepared For

NATIONAL GRID

METROTECH CENTER BROOKLYN

NEW YORK 11201

Prepared By

AECOM USA, INC.

257 WEST GENESEE STREET

BUFFALO, NEW YORK 14202

NOVEMBER 2020

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ATTACHMENTS

Attachment A	Example Chain-Of-Custody

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is designed to provide an overview of quality assurance/quality control (QA/QC) procedures and programs that will be adhered to during field and laboratory activities to be implemented at the K- Front St Station site (Site #224063) in Brooklyn, New York. This QAPP was prepared as an appendix to the Interim Site Management Plan (ISMP).

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) are the lead regulatory agencies overseeing the remediation, if necessary, at the Site. This work is being performed in accordance with the Administrative Consent Order (ACO), Index #A2-0552-0606.

1.1 Scope of Work

The ISMP requires annual site inspections to assess and document site conditions. No other activities are currently planned. However, it is possible that activities associated with utility maintenance (*e.g.*, a water line repair), further site characterization remediation, or site development could require subsurface investigation and the collection of soil and/or groundwater samples for disposal characterization. Also, site development could result in the construction of residential units without removal of subsurface impacts. Thus, the potential for soil vapor intrusion (SVI) would need to be assessed through an SVI evaluation. Because of these potential conditions, there are no specific sample collection locations. However, **Table 1** presents a list of likely analytical parameters.

2.0 PROJECT/SITE DESCRIPTION

The Site is composed of one parcel, 49,200 square feet (sq ft) in size, and is occupied by a one-story warehouse. The remainder of the 218 Front Street property and the structures that affront on 171 York Street are part of an active lumber yard. The lumber yard includes covered open-air lumber storage racks. The parcel is owned by Great Front Realty Corporation (GFR). National Grid does not own any of the property that comprises the Site.

A SC performed by URS Corporation (an AECOM USA, Inc. company) confirmed the presence of two water-sealed gas holder tanks (Holders No. 4 and 5) buried beneath the Site. Water-sealed gas holders were commonly used for the low pressure storage of gas produced at MGP sites. A water-sealed gas holder is a cylindrical structure with a water tank beneath. The cylindrical shell is made up of one or more telescopic lifts coupled together with rims containing water to seal the gas. The lifts rise and fall depending on the volume of gas stored. The gas holder tank houses the lifts when down and contained water in which the holder rose and fell depending on gas flow. The water functioned as a gas-tight seal. The tanks could be constructed below the surrounding ground surface, partially below ground, or aboveground.

The SC was performed to identify environmental conditions on and immediately adjacent to the Site, to determine whether human health or the environment are being affected by the impacts, if any, and to guide any required measures to remediate the impacts, if any. The results of the SC are described in detail in the Site Characterization for the Former Front Street Holder Station, dated July 2013, revised April 2015.

The SC determined that the gas holder tanks were still present in the subsurface beneath the Site and that they had been backfilled with fill consisting of varying amounts of sand, gravel, brick, concrete, glass, metal, and wood. The presence of volatile organic compounds (VOCs) in the soil samples from borings into the gas holder, especially indicators of potential MGP-related impacts such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs), along with the field observations of naphthalene-like odors, suggests the presence of impacts

that are potentially MGP-related. However, as petroleum odors were also observed, the detected VOCs could also indicate the presence of some petroleum impacts. Chlorinated VOCs were detected in one off-site well. Chlorinated VOCs are typically not associated with MGP sites, but are often related to dry cleaning processes. A dry cleaner was historically located upgradient of the Site and might have been the source of the chlorinated VOCs.

Semi-volatile organic compounds (SVOCs) or, more specifically, PAHs, were detected in all seven samples from the gas holder borings. Although PAHs are associated with MGP wastes, it is not uncommon to also find these compounds in urban fill.

The metals copper, lead, and mercury exceeded the New York State commercial and/or restricted residential use soil cleanup criteria in several samples collected from within the gas holder tanks. While metals can be derived from a variety of sources, the presence of cyanide, albeit at below criteria concentrations, suggests MGP gas storage operations are a source of some impacts in the fill within the former gas holders.

To evaluate groundwater conditions in the area of the Site, two monitoring wells were installed in the sidewalk on Front Street and two monitoring wells were installed in the sidewalk on York Street. No VOCs were detected at concentrations above the soil cleanup criteria in the monitoring well boring samples. SVOCs were detected at concentrations above soil cleanup criteria in four of the ten samples collected from the well borings. However, because no evidence of MGP impacts (*e.g.*, naphthalene-like odors, staining, coatings, etc.) was observed during drilling, it is likely that the SVOCs are associated with the urban fill. The metals analytical results, specifically the absence of cyanide, also suggest the absence of MGP impacts.

Groundwater was encountered in Holder No. 5. However, the water surface elevation was distinctly elevated compared to the groundwater surface in the wells installed in the adjacent sidewalks, which suggests that the groundwater within the holder is perched. Furthermore, the groundwater samples collected from former Holder No. 5 showed the presence of VOCs, SVOCs, metals and cyanide. The suite of BTEX, PAHs, and cyanide detected in the perched groundwater sample from Holder No. 5 are potentially indicative of MGP-related impacts. The absence of this

suite of contaminants in the samples from the wells located on the sidewalk suggests that the potentially MGP-related impacts present in the perched water in the Holder No. 5 tank are not significantly impacting local groundwater quality.

Because the perched groundwater is not used as a water supply, the potential for human exposure through direct contact, inhalation, or ingestion of the perched groundwater is minimal. All monitoring wells at the Site were decommissioned with NYSDEC approval in October 2013.

The potential for contaminant vapors to migrate upward though the subsurface and create an inhalation exposure pathway to workers in the lumber yard is minimal as contaminant concentrations would be further reduced by biodegradation and diffusion. Furthermore, because the lumber yard is located outdoors, any vapors that reach ground surface would quickly dissipate into the atmosphere. Therefore, the potential for human exposure is minimal with the existing engineering controls (*i.e.*, cover and integrity of former Holder No. 5). However, there is a potential for future exposure to construction and/or utility workers who may encounter the contaminants during intrusive subsurface work, or to future residents and/or property users if there is future on-site construction.

The Site is identified as No. 224063 and is currently in the New York State Inactive Hazardous Waste Disposal Site Remediation Program , which is administered by NYSDEC. An ISMP, which has been prepared for the Site, is a required element of the remediation program.

Institutional and Engineering Controls (ICs and ECs, respectively) have been incorporated into the Site remedy to control exposure to target compounds and target analytes detected at concentrations exceeding applicable Standards, Criteria, and Guidance (SCGs) in environmental samples collected at the Site (*i.e.*, impacts) to ensure protection of public health and the environment. An Environmental Easement, to be granted to the NYSDEC by the property owner, requires compliance with this ISMP and all ECs and ICs placed on the Site.

The ECs include an existing cover system (*i.e.*, warehouse and concrete, asphalt, and gravel). ICs consist of the Environmental Easement. Periodic inspections of the Site are required to assess compliance with the provisions of the Environmental Easement and the ISMP.

Since the final remedy has not yet been completed for the Site, the ISMP will be implemented to address intrusive activities prior to the final remedy or any portion of the final remedy at the Site. If a remedy is determined to be necessary to address sources of non-MGP-related impacts present at the Site, this will be evaluated separately for further action. Any necessary remediation will be completed prior to, or in association with, redevelopment. Depending on the scope and success of the remedy, the NYSDEC may require a SMP once the final remedy for the Site has been implemented.

The ISMP includes the following items which are pertinent to this QAPP:

a. an Excavation Work Plan which details the provisions for management of limited excavations in areas of remaining contamination;

b. a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

c. a provision for evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;

d. provisions for the management and inspection of the identified engineering controls;

e. maintaining site access controls and NYSDEC notification;

f. a monitoring plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to a schedule of monitoring and frequency of submittals to the NYSDEC; and

g. monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan.

The ISMP was prepared to manage impacts at the Site until the final remedy is complete. At that time, if required, the ISMP will be replaced by a SMP, which will be in effect until the Environmental Easement is extinguished.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The AECOM Project QA Officer will ensure that all project deliverables undergo a thorough QA review by senior staff members who are qualified and experienced in appropriate disciplines.

The AECOM Project Manager will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The AECOM Project Manager will serve as the initial and primary contact with the client throughout the project and will be responsible for successful implementation of the field QA/QC activities. The AECOM Project Manager may delegate a portion of the tasks required for successful implementation of the work plans to a qualified individual who will be on site during site activities. This person will work under the direction of the AECOM Project Manager and will be responsible for implementing applicable QC procedures in the field and verifying that all other AECOM field personnel adhere to these procedures and perform all activities as described in the project work plans.

The AECOM Project Chemist is responsible for verifying that the analytical laboratory(ies) adheres to the QA/QC requirements specified in this QAPP. The AECOM Project Chemist will be the point of contact for the Laboratory Project Manager and will be in continual contact with the Laboratory Project Manger to verify that all efforts are being made to perform sample analyses in a manner such that the resulting data will be of sufficient quality for its intended purpose.

Laboratories to provide analytical testing services in support of this investigation are required to hold applicable NYSDOH Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Each laboratory used must maintain its own QA/QC program and employ the required staff to implement this program. The QA Officer for each laboratory will be responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, this QAPP, and other applicable regulations.

4.0 PROJECT QUALITY OBJECTIVES

4.1 Background

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions. More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

4.2 Environmental Problem

The objective of investigation activities is to clearly characterize whether there are impacts from activities associated with a manufactured gas holder facility formerly located at the Site, and determine whether those impacts are a significant threat to human health or the environment.

4.3 Sampling Techniques

Sampling techniques to be used will be dependent upon the media being sampled. Anticipated media would include soil, groundwater, and soil vapor. Sample container, preservation, and holding time requirements are identified in **Table 1**.

4.4 Target Analytes/Contaminants and Analytical Methods

The target analytes/contaminants and the analytical methods to be used by the laboratories performing the analyses of samples collected are identified in **Tables 3a, 3b,** and 3**c**.

4.5 Measurement Performance Criteria

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured from data collected from off-site chemical analyses performed by the laboratories.

4.5.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of matrix spike/matrix spike duplicate/matrix duplicate (MS/MSD/MD) and field duplicate (FD) samples. These provide a measure not only of sampling and analytical precision, but also of analytical precision based on the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of this work assignment are specified in **Tables 3a** and 3**b**, where applicable.

4.5.2 Accuracy

Accuracy measures the analytical bias of a measurement system. Sources of measurement error may include the sampling process, field contamination, sample preservation and handling, sample matrix, and sample preparation and analysis techniques. Sampling accuracy may be assessed by evaluating the results of equipment rinsate blanks and trip blanks. These data help to assess the potential contamination contribution from various outside sources.

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Accuracy can be estimated based on the recovery of spiked analytes in the MS/MSD and laboratory control samples (LCS) or matrix spike blanks (MSB). MS/MSD analyses, which will give an indication of matrix effects that may be affecting target compound identification and quantitation, are also a good gauge of method efficiency. Acceptable ranges of recovery for all analyses being performed as part of this work assignment are specified in **Tables 3a** and 3**b**, where applicable.

4.5.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigation objectives.

4.5.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (*e.g.*, precision, accuracy, representativeness, completeness, and sensitivity) because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.5.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that were expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then the client and AECOM project personnel will determine whether the deviations may cause the data to be rejected and what, if any, further actions need to be taken. Completeness of the analytical data obtained for the samples collected during this investigation will be evaluated during the validation process, and will be discussed in the Data Usability Summary Report (DUSR), which will be prepared in accordance with NYSDEC *DER-10, Technical Guidance for Site Investigation and Remediation, Appendix 2B - Guidance for Data Deliverables and Development of Data Usability Summary Reports*, May 2010.

4.5.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. MDLs for the parameters to be analyzed as part of this work assignment, where applicable, are presented in **Tables 3a** and 3**b**.

5.0 SAMPLING LOCATIONS AND PROCEDURES

There are no defined sampling locations at this time. Proposed sampling locations will be provided in future work plans/scopes of work and as an addendum to this QAPP. Procedures for the collection of soil, groundwater, soil vapor, and vapor intrusion samples are provided in the Field Sampling Plan.

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the on-site AECOM Representative (or his/her designee).
- Under Custody - A sample is "Under Custody" if:
  - It is in one's possession, or
  - It is in one's view, after being in one's possession, or
  - It was in one's possession and one placed it under lock, or
  - It is in a designated secure area.

6.2 Responsibilities

The on-site AECOM Representative will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.
- Ensure that field sampling personnel are properly trained in the methodologies for carrying out COC activities and the proper use of all COC and record documents.

- Monitor the implementation of COC procedures.
- Submit copies of the completed COC records to the Project Chemist.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the empty sample containers are shipped for use in the field. When the empty containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to, incomplete COC records, broken COC seals, or any evidence of tampering. Filled sample containers will be returned to the laboratory using appropriate COC procedures. Upon receipt of the samples, the laboratory sample custodian will check for any breach of custody. The Laboratory Project Manager will notify the AECOM Project Chemist immediately if there are any problems with the COC documentation. Examples of COC records (*i.e.*, for multi-media and air samples) are provided in **Attachment A**.

6.4 Sample Containers and Holding Times

Sample container and preservation requirements and analytical holding times for the analytical methods are listed in **Table 2**. All holding times begin with the validated time of sample receipt (VTSR) at the laboratory.

7.0 ANALYTICAL PROCEDURES

The specific analytical methods to be used for the analysis of samples collected during this work assignment are identified in **Tables 1 and 2**. Quality control criteria to be followed the laboratory when performing the analyses are provided in **Tables 3a** and 3**b**.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing and analysis procedures, laboratory and field instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions will be obtained from sources traceable to National Institute of Standards and Technology (NIST), or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced in **Table 1**. All standards and standard solutions are to be formally documented (*i.e.*, in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions will be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (*e.g.*, separating volatile standards from nonvolatile standards). The laboratory will continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances will be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials (ASTM) Class 1 weights that bracket the expected balance use range. The laboratory will check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory will be monitored and recorded daily. This will verify that the quality of the standards and

reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (4°C ± 2°C for refrigerators) will be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Sample Containers - All sample containers supplied by the laboratories will meet the requirements of the analytical methods identified in **Table 1** and/or the requirements specified in the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Pre-cleaned sample containers may be purchased by the laboratory and provided for sample collection as long as the containers meet the requirements of each analytical method identified in Table 1 and/or the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Documentation of sample cleaning procedures and/or certifications provided by vendors will be maintained by the laboratories.

8.2 Laboratory Instruments

Calibration of laboratory instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet the project-required quantitation limits for each analytical method, as identified in **Tables 3a** and 3**b**. Each instrument for organic analysis will be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s) and/or the specific requirements of the work assignment. Calibration of laboratory instruments will be performed according to the analytical methods specified in **Table 1**.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All

corrective action procedures taken by the contract laboratory are to be documented, summarized within the report case narrative, and submitted with the analytical results.

8.3 Field Instruments

Various types of portable instruments may be used in the field during this work assignment, which may include one or more of the following: multi-purpose meters capable of measuring pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, and/or temperature; photoionization detectors (PID) and/or flame ionization detectors (FID) used to monitor organic vapors; dust monitors to measure concentrations of particulates; multi-gas meters and analyte-specific devices (*e.g.* Drager tubes/chips) for health and safety purposes; and helium detectors used for leak-checking during soil vapor sample collection. Other instruments may also be used as needed based on the requirements of the work assignment. The calibration and maintenance of field instrumentation will be performed according the manufacturer's requirements and documented by the on-site AECOM Representative.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect that sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the analytical methods listed in **Table 1** and the specific requirements of this work assignment. Acceptable criteria and/or target ranges for these QC samples are listed in **Tables 3a** and **3b**.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers to the analytical data, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples, including any project-specific QC samples, will be analyzed as discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch or as required by the analytical methods listed in **Table 2**. Concentrations of all analytes in the method blanks should be below the quantitation limits listed in **Tables 3a** and **3b**. The Laboratory Project Manager will contact the AECOM Project Chemist to determine the appropriate course of action if analyte concentrations in any blank are greater than the quantitation limit.

Laboratory Control Samples (LCS) – An LCS, or matrix spike blank (MSB), is an aliquot of laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air spiked (fortified) with all, or a representative group, of the analytes being analyzed. The LCS (or MSB) recoveries and RPD are a measure of precision and accuracy that are used to verify that the analysis being performed is in control. LCS (or MSB) analyses shall be performed for each matrix as required by the methods listed in **Table 1**. Acceptance criteria for LCS (or MSB) analyses are specified in **Tables 3a** and **3b**.

9.2 Matrix-Specific QC

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – MS/MSD samples consist of an aliquot of a sample that is spiked (fortified) with known concentrations of specific compounds as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery (%R) for each analyte and the RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs samples will be collected and analyzed at the frequency specified in **Table 2**. Acceptance criteria for MS/MSD analyses are specified in **Tables 3a** and **3b**. In those instances where no MS/MSD sample will be collected, the laboratory will provide results for batch MS/MSD analyses.

Matrix Duplicates (MD) - The matrix duplicate (MD) is a second aliquot of a sample that is prepared and analyzed in a manner identical to that used for the parent sample. Collection of matrix duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. A matrix duplicate will be performed instead of the matrix spike duplicate for metals and cyanide analyses only. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of soil samples, the analytical results are not always reproducible.

9.3 Additional QC

Additional QC samples that may be collected as part of this work assignment are described in this section. The specific number and type of QC samples to be collected will be determined on a project specific basis..

Equipment/Rinsate Blanks – An equipment or rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples, and also serves as a measure of potential contamination from ambient sources during sample collection. When collecting solid or water samples, the equipment blank is a sample of laboratory demonstrated analyte-free water passed over and/or through cleaned sampling equipment. The water must originate from one

common source within the laboratory and must be the same water used by the laboratory when performing the analyses (*i.e.*, for method blanks). Equipment blanks will be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks typically are not needed when dedicated and/or disposable sampling equipment is used.

Trip Blanks - Trip blanks are only required when collecting aqueous samples for volatile organic or dissolved gas analyses. They are not required for non-aqueous matrices or for analysis of any other parameters. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. Trip blanks accompany the empty sample containers that are shipped from the laboratory into the field, and then back to the laboratory along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of containers they accompanied to the field.

Field Duplicates – A field duplicate (FD) sample pair consists of two independent samples that are collected at approximately the same time and place, using the same collection methods. Both are containerized, handled, and analyzed in an identical manner. Field duplicates are useful in documenting the precision of the sampling process, and also provide a measure of analysis precision. Field duplicates are typically labeled so that the laboratory cannot determine or identify the location from which the field duplicate was collected.

10.0 CALCULATION OF DATA QUALITY INDICATORS

10.1 Precision

Precision is evaluated using results from field or matrix duplicate, MS/MSD, and/or LCS/LCSD (MSB/MSBD) analyses. The RPD between the concentrations detected in the above-listed sample pairs is calculated using the following formula:

$$RPD = \left| \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \right| x\,100\%$$

where:

X_1 = *Measured value of sample, MS, or LCS (MSB)*

X_2 = *Measured value of field (or matrix) duplicate, MSD, or LCSD (MSBD)*

RPD criteria for this work assignment are listed in **Tables 3a** and **3b**.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the percent recovery (%R) of a compound or analyte that has been added to the environmental sample or laboratory demonstrated analyte-free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, LCS (MSB) samples as well as from surrogate compounds that are added to samples prior to extraction and analysis (typically used for organic fractions only). Accuracy is calculated using the following formula:

$$\%R = \frac{(X_s - X_u)}{K} x\,100\%$$

where:

X_s - *Measured value of the spike sample*

X_u - *Measured value of the unspiked sample*

K - *Known amount of spike in the sample*

Accuracy criteria for this work assignment are listed in **Tables 3a** and **3b**.

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\%\ Completeness = \frac{(N - X_n)}{N}\ x\ 100\%$$

where:

N - *Number of valid measurements expected to be obtained*

X_n - *Number of invalid measurements*

11.0 CORRECTIVE ACTIONS

The on-site AECOM Representative will discuss with and receive approval from the AECOM Project Manager or National Grid prior to taking any corrective actions in the field that may need to be implemented in order to meet project objectives. The on-site AECOM Representative will document any corrective actions taken in the Field Logbook.

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

The laboratory shall document problems noted during sample receipt. The Laboratory Project Manager will contact the AECOM Project Chemist as soon as possible if any problems are encountered. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Laboratory Project Manager will contact the AECOM Project Chemist immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards fail

to meet the required criteria, recalibration must be performed and, if necessary, all samples going back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must make every attempt to meet all quantitation limits as specified for each method listed in **Tables 3a** and **3b**. The quantitation limits listed in **Tables 3a** and **3b** are based on undiluted sample analyses and are not adjusted for moisture content (soil/solid samples). Sample-specific quantitation limits may be affected by any dilution that is needed because of elevated analyte concentrations, moisture content (soil/solids), and/or matrix interferences. If difficulties arise in achieving the required quantitation limits due to a particular sample matrix, the Laboratory Project Manager will contact the AECOM Project Chemist for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory shall report results from both the initial analyses and secondary dilution analyses. Dilution should only be used to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Laboratory Project Manager shall contact the AECOM Project Chemist so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC samples, including blanks, matrix spikes, matrix spike duplicates, matrix duplicates, surrogate recoveries, laboratory control samples, and other method-specified QC samples, shall meet the acceptance criteria listed in **Tables 3a** and **3b**. Failure to these criteria will result in the possible qualification of all affected data. When the criteria are not met, the affected sample(s) should be reanalyzed within the required holding times to verify the presence or absence of matrix effects. It should be noted that reanalysis is not always required. The Laboratory Project Manager shall contact the AECOM Project Chemist to discuss possible corrective actions should unusually difficult sample matrices be encountered. The laboratory shall follow the requirements of the analytical methods and any instructions provided by the AECOM Project Chemist when determining if samples require reanalysis. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2, or as otherwise identified for the work assignment.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be requested to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

Unless otherwise noted in **Table 1**, NYSDEC ASP Category B deliverable requirements (or equivalent) will be required for documentation and reporting of all data. Where applicable, the standard NYSDEC Data Package Summary Forms should be completed by the analytical laboratories and included in the deliverable data packages.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Results for aqueous samples will be reported in concentration units of micrograms per liter (µg/L) or milligrams per liter (mg/L). Results for solid samples will be reported in concentration units of micrograms per kilogram (µg/kg) or milligrams per kilogram (mg/kg) and adjusted for moisture content.

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by a qualified AECOM chemist. All analytical samples collected will receive a data review including a review of holding times, completeness of all required deliverables, review of QC results (blanks, instrument tunings, calibration standards, calibration verifications, surrogates recoveries, spike recoveries, replicate analyses, and laboratory controls) to determine if the data are within the protocol-required limits and specifications, a determination that

all samples were analyzed using established and agreed upon analytical protocols, an evaluation of the raw data to confirm the results provided in the data summary sheets, and a review of laboratory data qualifiers. The methods referenced in **Table 1** as well as the general guidelines presented in the following USEPA Region II documents (most recent versions) will be used to aide the chemist during the data review.

- Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW-846 Method 8260B & 8260C, HW-24, Revision 4, October 2014;
- Validating Semivolatile Organic Compounds by SW-846 Method 8270D, HW-22, Revision 4, August 2008;
- Validating PCB Compounds by Gas Chromatography SW-846 Method 8082A, HW-45, Revision 1.0, October 2006;
- CLP Organics Data Review and Preliminary Review, HW-6, Revision, September 2006;
- Evaluation of Metals Data for the CLP Program ICP-AES, ICP-MS, and Mercury/Cyanide SOP HW-3a, HW-3b, HW-3c Revision 1, September 2016;
- TCLP Data Validation, SOP HW-7, Revision 3, 1994; and
- Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15, SOP HW-31, Revision 6. June

12.3 Data Usability

A DUSR will be submitted to National Grid and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems will be identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs are available for inspection by auditing personnel.

Maintenance of field instrumentation will be performed as needed by the vendor and/or AECOM personnel according to the manufacturer’s requirements.

14.0 PERFORMANCE AND SYSTEMS AUDITS

Audits are evaluations of laboratory QA/QC procedures, and are performed before or shortly after systems are operational, and on an ongoing basis thereafter. Problems detected during these audits shall be reviewed by the Laboratory QA Manager and other laboratory management personnel, and corrective action shall be instituted as necessary.

14.1 Performance Audits

Performance audits are conducted by introducing control samples into the data measurement, reduction, and reporting processes. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes. In addition to conducting internal reviews and performance audits as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance audits/evaluations from state and federal agencies. They are typically conducted as part of the certification process and to evaluate laboratory performance and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance, and to take appropriate corrective actions as needed.

14.2 Systems Audits

Systems audits are thorough, on-site qualitative audits of facilities, equipment, instrumentation, personnel, training procedures, record keeping, data review/management, and reporting aspects of a system. They provide a qualitative measure of the data produced by one section of, or the entire, measurement process. The audits are performed against a set of requirements, which may include laboratory standard operating procedures, a quality assurance project plan or work plan, a standard method, and/or a project statement of work. The primary objective of the systems audits is to verify that all procedures are being performed according to the requirements specified above. Systems audits are performed internally by the Laboratory QA Manager, and also by external parties such as state and federal regulatory agencies and private-sector clients. Typically, state and federal

agencies perform systems audits in conjunction with performance audits/evaluations during the laboratory certification process. As part of its QA program, the Laboratory QA Manager shall also conduct periodic checks and audits of the analytical, data reduction, and reporting systems. The purpose of these is to verify that the systems are operating properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits assist in determining or detecting where problems are occurring.

REFERENCES

NYSDEC. 2010. DER-10 Technical Guidance for Site Investigation and Remediation. June.

NYSDEC. 2005. Analytical Services Protocol. July (or most current).

USEPA. 2016. Evaluation of Metals Data for the CLP Program, SOP HW-3a, HW-3b, HW-3c Revision 15. September.

USEPA. 2005. Uniform Federal Policy for Quality Assurance Project Plans; Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs, Final, Version 1. March. EPA-505-B-04-900A.

USEPA. 2015. Polychlorinated Biphenyl (PCB) Aroclor Data Validation, HW-37A, Revision 0. June.

USEPA. 2010. Validating Semivolatile Organic Compounds by SW-846 Method 8270D, HW-22, Revision 5. December.

USEPA. 2017. National Functional Guidelines for Organic Superfund Methods Data Review (SOM02.4). EPA-540-R-2017-002. January.

USEPA. 1999. Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, 25/R-96/010b. January.

USEPA. 2014. Validating Volatile Organic Compounds by GC/MS SW-846 Method 8260B & 8260C, HW-24, Revision 4. Region II. October.

USEPA. 2016. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15, SOP HW-31, Revision 6. September.

USEPA. National Enforcement Investigations Center (NEIC) Office of Enforcement. NEIC Policies and Procedures. Washington.

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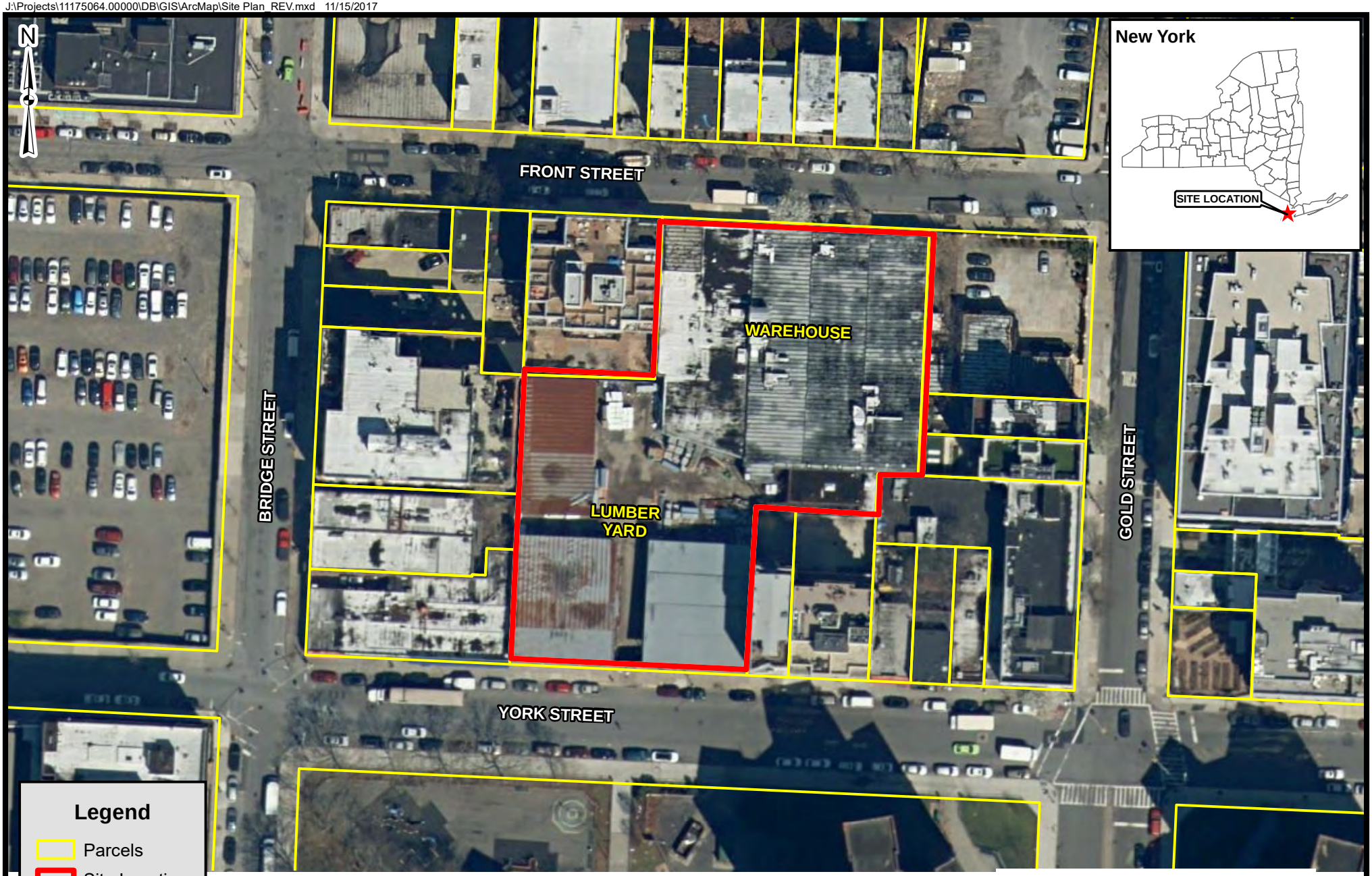

AECOM

FRONT STREET FORMER GAS HOLDER SITE
SITE LOCATION MAP

FIGURE 1

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AECOM

FORMER FRONT STREET HOLDER STATION SITE PLAN

FIGURE 2

TABLE 1
SUMMARY OF ANALYTICAL PARAMETERS
FRONT STREET HOLDER STATION
NATIONAL GRID SITE #224063

Parameter	Analytical Method[1]
Soil Samples	
TCL VOCs	8260D
TCL SVOCs	8270E
TCL Pesticides	8081B
Herbicides	8151A
PCBs	8082A
TAL Metals	6010D/7471B
Total Cyanide	9010C/9012A
PFAS	537 Modified
Groundwater Samples	
TCL VOCs	8260D
TCL SVOCs	8270E
TCL Pesticides	8081B
Herbicides	8151A
PCBs	8082A
TAL Metals	6010D/7470A
Total Cyanide	9014
PFAS	537 Modified
Soil Vapor	
VOCs	TO-15
Waste Characterization - Aqueous - Based on Clean Waters of New York	
TOX	9023
PCBs	8082A
Solids	SM2540B-11
Flash point	1010A
VOCs[2]	8260D
Waste Characterization - Solids- Based on Bayshore Soil Management[3]	
VOCs	8260D
TCLP VOCS	1311/8260D
SVOCs	8270E
TCLP SVOCs	1311/8270E
TAL Metals	6010D/7471B
TCLP METALS	1311/6010D/7470A
EOX	8015B Modified
PCBs	8082A
Sulfur	ASTM D 1522

1 - NYSDEC Analytical Services Protocol (ASP), July 2005 Edition

- America Society for Testing and Materials (ASTM)

- Target Compound List (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) as listed in USEPA CLP Statement of Work SOM01.2

- Target Analyte List (TAL) metals as listed in USEPA CLP Statement of Work ILM05.3.

2 - Analyses may be requested by Clean Waters

3 - Toxicity Characteristic Leaching Procedure (TCLP) will be required for any parameter which exceeds the RCRA 20X Rule

PCB - polychlorinated biphenyls
MS/MSD/MD - matrix spike/matrix spike duplicate/matrix duplicate
PFAS - Per and Polyfluoroalkyl Substances

TABLE 2
ANALYTICAL PARAMETERS AND CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS
FRONT STREET HOLDER STATION
NATIONAL GRID SITE #224063

Analytical Parameter	Analytical Method	Container Size/Type*	Containers Per Sample	Preservation	Maximum Holding Time (from VTSR)
I. Soil Samples					
TCL VOCs	8260C	2 oz. glass	2	4 °C	Analysis: 14 days
TCL SVOCs	8270D	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TCL Pesticides	8081B	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Herbicides	8151A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
PCBs	8082A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TAL Metals	6010D/7471B	4 oz. glass	1	4 °C	Analysis: 180 days (26 days for Hg)
Total Cyanide	9010B/9012A	4 oz. glass	1	4 °C	Analysis: 14 days
PFAS	537 Modified	250 ml HDPE	2	4 °C	Extraction: 14 days Analysis: 28 days
II. Groundwater Samples					
TCL VOCs	8260C	40 mL glass	3	HCl to pH<2, 4 °C	Analysis: 14 days
TCL SVOCs	8270D	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
TCL Pesticides	8081B	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
Herbicides	8151A	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
PCBs	8082A	1L amber glass	2	4 °C	Extraction: 5 days Analysis: 40 days
TAL Metals	6010D/7470A	1L plastic	1	HNO_3 to pH<2, 4 °C	Analysis: 180 days (26 days for Hg)
Total Cyanide	9010B/9012A	500 ml amber glass	1	NaOH to pH>12, 4 °C	Analysis: 12 days
PFAS	537 Modified	8 oz HDPE	1	4 °C	Extraction: 14 days Analysis: 28 days
IV. Waste Characterization - Aqueous - Based on Clean Waters of New York					
TOX	9023	250 ml glass	1	H2SO4 to pH<2, 4 °C	Analysis: 7 days
PCBs	8082A	1L amber glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Solids	SM2540B-11	500 ml plastic	1	4 °C	Analysis: 7 days
Flash point	1010A	250 ml plastic	1	none	Analysis: 10 days
VOCs	8260D	40 mL glass	3	HCl to pH<2, 4 °C	Analysis: 14 days
V. Waste Characterization - Solids - based on Bayshore Soil Management Acceptance Requirements for MGP-Impacted Solids					
VOCs	8260D	2 oz. glass	3	4 °C	Analysis: 14 days
TCLP VOCS	1311/8260D	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 14 days
SVOCs	8270E	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TCLP SVOCs	1311/8270E	4 oz. glass	1	4 °C	TCLP Extraction: 14 days, SVOC extraction: 14 days Analysis: 40 days
PCBs	8082A	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
TAL Metals	6010D/7471B	4 oz. glass	1	4 °C	Extraction: 180 days (5 days for Hg) Analysis: 180 days (28 days for Hg)
TCLP METALS	1311/6010D/7470A	4 oz. glass	1	4 °C	TCLP Extraction: 14 days. Extraction: 180 days (5 days for Hg) Analysis: 180 days (28 days for Hg)
EOX	8015B Modified	4 oz. glass	1	4 °C	Extraction: 14 days Analysis: 40 days
Sulfur	ASTM D 1522	4 oz. glass	1	4 °C	None

Notes:
*Number and size of containers may vary based on laboratory sample volume requirements.
VTSR - Validated time of sample receipt HDPE - High Ddensity Polyethlene
Field duplicates, rinse blanks and matrix/matrix-spike duplicates are required at a frequency of 1 per 20 samples.

TABLE 3a
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - GROUNDWATER
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Groundwater					
Analytical Method	**Parameter**	**QL (ug/L)**	**MDL (ug/L)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
8260D - VOCs	1,1,1-Trichloroethane	5	0.481	42	182	40
	1,1,2,2-Tetrachloroethane	5	0.394	75	119	40
	1,1,2-Trichloro-1,2,2-trifluoroethane	5	2.100	0	330	40
	1,1,2-Trichloroethane	5	1.062	78	121	40
	1,1-Dichloroethane	5	0.748	57	139	40
	1,1-Dichloroethene	5	0.532	40	140	40
	1,2,4-Trichlorobenzene	5	0.748	47	130	40
	1,2-Dibromo-3-chloropropane	5	3.668	41	100	40
	1,2-Dibromoethane	5	0.454	62	128	40
	1,2-Dichlorobenzene	5	0.544	70	127	40
	1,2-Dichloroethane	5	0.369	40	161	40
	1,2-Dichloropropane	5	0.224	71	135	40
	1,3-Dichlorobenzene	5	0.691	65	131	40
	1,4-Dichlorobenzene	5	0.480	59	128	40
	2-Butanone	5	0.729	7	166	40
	2-Hexanone	5	1.606	20	172	40
	4-Methyl-2-pentanone	5	0.514	28	150	40
	Acetone	25	4.155	20	132	40
	Benzene	5	0.359	70	131	40
	Bromodichloromethane	5	0.324	53	162	40
	Bromoform	5	0.693	58	131	40
	Bromomethane	5	1.010	30	158	40
	Carbon disulfide	5	0.454	45	150	40
	Carbon tetrachloride	5	0.422	62	166	40
	Chlorobenzene	5	0.543	70	133	40
	Chloroethane	5	0.710	36	155	40
	Chloroform	5	0.527	43	170	40
	Chloromethane	5	0.601	12	180	40
	cis-1,2-Dichloroethene	5	0.394	55	142	40
	cis-1,3-Dichloropropene	5	0.266	18	140	40
	Cyclohexane	5	1.083	0	393	40
	Dibromochloromethane	5	0.552	53	153	40
	Dichlorodifluoromethane	5	0.686	0	245	40
	Ethylbenzene	5	0.592	61	141	40
	Isopropylbenzene	5	0.422	66	134	40
	Methyl acetate	5	0.562	45	153	40
	Methyl tert-butyl ether	5	0.413	40	108	40
	Methylcyclohexane	5	0.439	46	200	40

TABLE 3a
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS, AND QUALITY CONTROL CRITERIA - GROUNDWATER
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Groundwater					
Analytical Method	**Parameter**	**QL (ug/L)**	**MDL (ug/L)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
8260D - VOCs	Methylene chloride	5	2.104	51	115	40
	Styrene	5	0.526	66	125	40
	Tetrachloroethene	5	0.314	59	150	40
	Toluene	5	0.279	71	126	40
	trans-1,2-Dichloroethene	5	0.803	39	127	40
	trans-1,3-Dichloropropene	5	0.406	34	125	40
	Trichloroethene	5	0.702	72	127	40
	Trichlorofluoromethane	5	0.727	7	213	40
	Vinyl chloride	5	0.514	25	164	40
	m,p-Xylene	10	0.549	73	128	40
	o-Xylene	5	0.633	67	126	40
	n-Propylbenzene	5	0.376	72	124	40
	p-Isopropyltoluene	5	0.372	66	127	40
	1,2,4-Trimethylbenzene	5	0.348	63	140	40
	1,3,5-Trimethylbenzene	5	0.380	61	144	40
	n-Butylbenzene	5	0.443	47	150	40
	sec-Butylbenzene	5	0.220	54	138	40
	t-Butylbenzene	5	0.484	63	143	40
	Naphthalene	5	0.584	42	130	40
	1,2-Dichloroethane-d4 (surrogate)	NA	NA	78	123	NA
	4-Bromofluorobenzene (surrogate)	NA	NA	85	108	NA
	Dibromofluoromethane (surrogate)	NA	NA	78	135	NA
	Toluene-d8 (surrogate)	NA	NA	84	108	NA
8270D - SVOCs	1,1'-Biphenyl	10	NA	77	112	40
	2,2'-oxybis(2-Chloropropane)	10	0.445	67	109	40
	2,4,5-Trichlorophenol	10	2.757	92	118	40
	2,4,6-Trichlorophenol	10	1.911	86	109	40
	2,4-Dichlorophenol	10	3.220	83	107	40
	2,4-Dimethylphenol	10	2.338	58	119	40
	2,4-Dinitrophenol	25	7.111	19	191	40
	2,4-Dinitrotoluene	10	0.469	67	120	40
	2,6-Dinitrotoluene	10	0.749	94	109	40
	2-Chloronaphthalene	10	0.430	73	112	40
	2-Chlorophenol	10	2.427	54	110	40
	2-Methylnaphthalene	10	3.117	87	107	40
	2-Methylphenol (o-cresol)	10	6.462	53	115	40
	2-Nitroaniline	10	3.264	84	112	40
	2-Nitrophenol	10	1.148	85	111	40

TABLE 3a
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - GROUNDWATER
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Groundwater					
Analytical Method	**Parameter**	**QL (ug/L)**	**MDL (ug/L)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
8270E - SVOCs	3,3'-Dichlorobenzidine	10	0.720	44	122	40
	3-Nitroaniline	10	2.751	83	123	40
	4,6-Dinitro-2-methylphenol	25	1.388	26	181	40
	4-Bromophenyl-phenylether	10	0.404	91	110	40
	4-Chloro-3-methylphenol	10	1.307	63	122	40
	4-Chloroaniline	10	4.495	52	140	40
	4-Chlorophenyl-phenylether	10	0.455	91	102	40
	4-Methylphenol (p-cresol)	10	5.325	84	115	40
	4-Nitroaniline	10	3.035	82	119	40
	4-Nitrophenol	10	1.640	1	117	40
	Acenaphthene	10	0.437	54	120	40
	Acenaphthylene	10	0.382	78	103	40
	Acetophenone	10	NA	73	85	40
	Anthracene	10	0.276	89	104	40
	Atrazine	10	NA	78	104	40
	Benzaldehyde	10	NA	26	111	40
	Benzo(a)anthracene	10	0.214	86	112	40
	Benzo(a)pyrene	10	0.144	90	105	40
	Benzo(b)fluoranthene	10	0.350	86	111	40
	Benzo(g,h,i)perylene	10	0.352	90	102	40
	Benzo(k)fluoranthene	10	0.545	89	102	40
	bis(2-Chloroethoxy)methane	10	0.808	89	104	40
	bis(2-Chloroethyl)ether	10	1.049	83	102	40
	bis(2-Ethylhexyl)phthalate	10	0.284	86	121	40
	Butylbenzylphthalate	10	0.242	71	129	40
	Caprolactam	10	NA	32	95	40
	Carbazole	10	0.308	90	103	40
	Chrysene	10	0.261	88	105	40
	Dibenz(a,h)anthracene	10	0.198	91	106	40
	Dibenzofuran	10	2.224	97	106	40
	Diethylphthalate	10	0.470	93	108	40
	Dimethylphthalate	10	0.279	83	106	40
	Di-n-butylphthalate	10	0.343	92	109	40
	Di-n-octylphthalate	10	0.228	87	122	40
	Fluoranthene	10	0.220	68	101	40
	Fluorene	10	0.378	51	125	40
	Hexachlorobenzene	10	0.499	88	105	40
	Hexachlorobutadiene	10	0.862	0	158	40

TABLE 3a
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS, AND QUALITY CONTROL CRITERIA - GROUNDWATER
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	**Groundwater**					
Analytical Method	**Parameter**	**QL (ug/L)**	**MDL (ug/L)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
8270E - SVOCs	Hexachlorocyclopentadiene	25	1.775	4	138	40
	Hexachloroethane	10	0.645	0	152	40
	Indeno(1,2,3-cd)pyrene	10	0.254	94	109	40
	Isophorone	10	0.342	84	98	40
	Naphthalene	10	0.697	16	146	40
	Nitrobenzene	10	0.793	80	111	40
	N-Nitroso-di-n-propylamine	10	0.785	60	112	40
	N-Nitrosodiphenylamine	10	0.340	71	108	40
	Pentachlorophenol	25	1.990	24	158	40
	Phenanthrene	10	0.223	90	105	40
	Phenol	10	1.396	3	103	40
	Pyrene	10	0.194	57	128	40
	2,4,6-Tribromophenol (surrogate)	NA	NA	75	123	NA
	2-Fluorobiphenyl (surrogate)	NA	NA	48	123	NA
	2-Fluorophenol (surrogate)	NA	NA	22	101	NA
	Nitrobenzene-d5 (surrogate)	NA	NA	50	128	NA
	Phenol-d5 (surrogate)	NA	NA	1	95	NA
	Terphenyl-d14 (surrogate)	NA	NA	44	132	NA
8082 - PCBs	Aroclor 1016	0.25	0.0998	68	139	40
	Aroclor 1221	0.25	0.1496	NA	NA	NA
	Aroclor 1232	0.25	0.1315	NA	NA	NA
	Aroclor 1242	0.25	0.0624	NA	NA	NA
	Aroclor 1248	0.25	0.1041	NA	NA	NA
	Aroclor 1254	0.25	0.0496	NA	NA	NA
	Aroclor 1260	0.25	0.0434	69	148	40
	Decachlorobiphenyl (surrogate)	NA	NA	22	139	NA
	Tetrachloro-m-xylene (surrogate)	NA	NA	39	127	NA
Metals	Aluminum	180	56.5	75	125	20
	Antimony	15	3.77	75	125	20
	Arsenic	7.5	4.64	75	125	20
	Barium	50	0.361	75	125	20
	Beryllium	4	0.0864	75	125	20
	Cadmium	3.5	0.591	75	125	20
	Calcium	2000	155	75	125	20
	Chromium	50	0.528	75	125	20
	Cobalt	20	0.466	75	125	20
	Copper	50	1.07	75	125	20
	Iron	275	62.9	75	125	20

TABLE 3a
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - GROUNDWATER
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	**Groundwater**					
Analytical Method	**Parameter**	**QL (ug/L)**	**MDL (ug/L)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
Metals	Lead	4	1.62	75	125	20
	Magnesium	2000	33.1	75	125	20
	Manganese	40	0.512	75	125	20
	Mercury	0.7	0.13	75	125	20
	Nickel	50	0.838	75	125	20
	Potassium	5000	73.4	75	125	20
	Selenium	40	10.2	75	125	20
	Silver	20	0.554	75	125	20
	Sodium	5000	105	75	125	20
	Thallium	10	5.74	75	125	20
	Vanadium	50	1.09	75	125	20
	Zinc	50	3.03	75	125	20
537 Mod - PFAS (All RLs/MDLs in ng/l)	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2)	2.7	0.91	70	130	30
	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2)	4.5	1.8	70	130	30
	N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.7	0.45	70	130	30
	N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	1.8	0.54	70	130	30
	Perfluorobutanesulfonic acid (PFBS)	1.8	0.45	70	130	30
	Perfluorobutanoic acid (PFBA)	4.5	1.8	70	130	30
	Perfluorodecane sulfonate (PFDS)	1.8	0.45	70	130	30
	Perfluorodecanoic acid (PFDA)	1.8	0.45	70	130	30
	Perfluorododecanoic acid (PFDoA)	1.8	0.45	70	130	30
	Perfluoroheptanesulfonic acid (PFHpS)	1.8	0.45	70	130	30
	Perfluoroheptanoic acid (PFHpA)	1.8	0.45	70	130	30
	Perfluorohexanesulfonic acid (PFHxS)	1.8	0.45	70	130	30
	Perfluorohexanoic acid (PFHxA)	1.8	0.45	70	130	30
	Perfluorononanoic acid (PFNA)	1.8	0.45	70	130	30
	Perfluorooctane sulfonamide (PFOSA)	1.8	0.45	70	130	30
	Perfluorooctanesulfonic acid (PFOS)	1.8	0.45	70	130	30
	Perfluorooctanoic acid (PFOA)	1.8	0.45	70	130	30
	Perfluoropentanoic acid (PFPeA)	1.8	0.45	70	130	30
	Perfluorotetradecanoic acid (PFTeA)	1.8	0.45	70	130	30
	Perfluorotridecanoic acid (PFTriA)	1.8	0.45	70	130	30
	Perfluoroundecanoic acid (PFUnA)	1.8	0.45	70	130	30
9014	Total Cyanide	10	6	75	125	20

1 - Analytical Services Protocol (ASP), NYSDEC, June 2000.
Method and reporting limits are specific to each laboratory and are updated periodically. These values should be reviewed on a project specific basis.

VOCs - Volatile organic compounds
SVOCs - Semivolatile organic compounds
PFAS - Per and Polyfluoroalkyl Substances
PCBs - Polychlorinated biphenyls
QL - Quantitation limit
MDL - Method detection limit
ug/L - Micrograms per liter
%R - Percent recovery
RPD - Relative percent difference
NA - Not applicable or not available.

TABLE 3b
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - SOIL
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Soil					
Analytical Method	Parameter	QL (ug/Kg)	MDL (ug/Kg)	Accuracy Criteria (%R)		Precision Criteria (RPD)
				Lower Limit	Upper Limit	
8260D - VOCs	1,1,1-Trichloroethane	5	0.62	26	156	40
	1,1,2,2-Tetrachloroethane	5	0.58	28	121	40
	1,1,2-Trichloro-1,2,2-trifluoroethane	5	1.94	0	624	40
	1,1,2-Trichloroethane	5	0.42	17	127	40
	1,1-Dichloroethane	5	0.46	31	128	40
	1,1-Dichloroethene	5	1.04	17	132	40
	1,2,4-Trichlorobenzene	5	0.21	0	130	40
	1,2-Dibromo-3-chloropropane	5	0.78	13	118	40
	1,2-Dibromoethane	5	0.58	12	135	40
	1,2-Dichlorobenzene	5	0.34	11	120	40
	1,2-Dichloroethane	5	0.53	14	141	40
	1,2-Dichloropropane	5	0.65	22	135	40
	1,3-Dichlorobenzene	5	1.00	20	114	40
	1,4-Dichlorobenzene	5	0.75	4	124	40
	2-Butanone	5	1.93	18	121	40
	2-Hexanone	5	0.47	15	112	40
	4-Methyl-2-pentanone	5	0.51	16	158	40
	Acetone	25	3.73	37	261	40
	Benzene	5	0.30	11	141	40
	Bromodichloromethane	5	0.36	30	166	40
	Bromoform	5	0.13	16	214	40
	Bromomethane	5	0.96	3	145	40
	Carbon disulfide	5	0.78	5	164	40
	Carbon tetrachloride	5	1.00	13	157	40
	Chlorobenzene	5	0.42	14	122	40
	Chloroethane	5	0.94	0	164	40
	Chloroform	5	0.44	23	132	40
	Chloromethane	5	0.83	0	156	40
	cis-1,2-Dichloroethene	5	0.55	17	147	40
	cis-1,3-Dichloropropene	5	0.33	23	127	40
	Cyclohexane	5	1.34	0	231	40
	Dibromochloromethane	5	0.57	34	110	40
	Dichlorodifluoromethane	5	2.12	0	164	40
	Ethylbenzene	5	0.52	12	137	40
	Isopropylbenzene	5	0.41	22	136	40
	Methyl acetate	5	0.82	0	182	40
	Methyl tert-butyl ether	5	0.54	17	132	40
	Methylcyclohexane	5	1.33	18	219	40
8260D - VOCs	Methylene chloride	5	4.44	35	175	40
	Styrene	5	0.52	32	125	40
	Tetrachloroethene	5	0.71	11	124	40
	Toluene	5	0.39	18	124	40
	trans-1,2-Dichloroethene	5	1.38	19	132	40
	trans-1,3-Dichloropropene	5	0.50	31	127	40
	Trichloroethene	5	0.43	21	134	40
	Trichlorofluoromethane	5	1.51	19	131	40
	Vinyl chloride	5	0.92	0	144	40
	m,p-Xylene	10	1.04	21	150	40
	o-Xylene	5	0.36	16	133	40
	n-Propylbenzene	5	0.48	26	121	40
	p-Isopropyltoluene	5	0.51	17	136	40
	1,2,4-Trimethylbenzene	5	0.24	11	148	40
	1,3,5-Trimethylbenzene	5	0.44	3	154	40
	n-Butylbenzene	5	0.60	18	131	40
	sec-Butylbenzene	5	0.50	7	144	40
	t-Butylbenzene	5	0.38	28	133	40
	Naphthalene	5	0.21	17	110	40
	1,2-Dichloroethane-d4 (surrogate)	NA	NA	72	134	NA
	4-Bromofluorobenzene (surrogate)	NA	NA	69	121	NA
	Dibromofluoromethane (surrogate)	NA	NA	66	139	NA
	Toluene-d8 (surrogate)	NA	NA	71	122	NA
8270E - SVOCs	1,1'-Biphenyl	333	10.0	70	103	40
	2,2'-oxybis(2-Chloropropane)	333	18.7	64	98	40
	2,4,5-Trichlorophenol	333	70.5	49	120	40
	2,4,6-Trichlorophenol	333	74.7	67	97	40
	2,4-Dichlorophenol	333	70.9	68	96	40
	2,4-Dimethylphenol	333	40.4	58	113	40
	2,4-Dinitrophenol	833	282.4	0	149	40
	2,4-Dinitrotoluene	333	16.4	65	113	40
	2,6-Dinitrotoluene	333	32.7	70	112	40
	2-Chloronaphthalene	333	17.7	70	102	40
	2-Chlorophenol	333	119.8	27	131	40
	2-Methylnaphthalene	333	98.2	76	105	40
	2-Methylphenol (o-cresol)	333	328.1	59	104	40
	2-Nitroaniline	333	64.5	70	108	40
	2-Nitrophenol	333	108.5	66	99	40

TABLE 3b
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - SOIL
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Soil					
Analytical Method	Parameter	QL (ug/Kg)	MDL (ug/Kg)	Accuracy Criteria (%R)		Precision Criteria (RPD)
				Lower Limit	Upper Limit	
8270E - SVOCs	3,3'-Dichlorobenzidine	333	104.4	32	121	40
	3-Nitroaniline	333	181.3	42	123	40
	4,6-Dinitro-2-methylphenol	833	60.8	13	145	40
	4-Bromophenyl-phenylether	333	14.0	73	109	40
	4-Chloro-3-methylphenol	333	54.4	48	122	40
	4-Chloroaniline	333	206.0	20	125	40
	4-Chlorophenyl-phenylether	333	16.4	71	101	40
	4-Methylphenol (p-cresol)	333	252.3	71	103	40
	4-Nitroaniline	333	65.9	0	162	40
	4-Nitrophenol	333	66.1	15	154	40
	Acenaphthene	333	12.3	55	126	40
	Acenaphthylene	333	6.1	67	98	40
	Acetophenone	333	34.2	55	84	40
	Anthracene	333	10.8	52	128	40
	Atrazine	333	26.4	67	94	40
	Benzaldehyde	333	59.7	17	92	40
	Benzo(a)anthracene	333	10.8	57	130	40
	Benzo(a)pyrene	333	11.0	64	115	40
	Benzo(b)fluoranthene	333	13.8	59	121	40
	Benzo(g,h,i)perylene	333	18.0	63	102	40
	Benzo(k)fluoranthene	333	14.9	70	104	40
	bis(2-Chloroethoxy)methane	333	16.2	70	102	40
	bis(2-Chloroethyl)ether	333	43.0	64	99	40
	bis(2-Ethylhexyl)phthalate	333	50.0	77	115	40
	Butylbenzylphthalate	333	7.9	43	158	40
	Caprolactam	333	23.6	0	148	40
	Carbazole	333	9.3	67	107	40
	Chrysene	333	10.6	59	122	40
	Dibenz(a,h)anthracene	333	9.3	66	103	40
	Dibenzofuran	333	65.2	68	112	40
	Diethylphthalate	333	9.9	72	100	40
	Dimethylphthalate	333	13.5	70	102	40
	Di-n-butylphthalate	333	59.8	70	103	40
	Di-n-octylphthalate	333	7.4	76	115	40
	Fluoranthene	333	7.5	19	183	40
	Fluorene	333	11.2	61	113	40
	Hexachlorobenzene	333	13.4	65	103	40
	Hexachlorobutadiene	333	15.9	67	104	40
8270D - SVOCs	Hexachlorocyclopentadiene	833	63.1	0	158	40
	Hexachloroethane	333	26.7	56	98	40
	Indeno(1,2,3-cd)pyrene	333	14.5	69	106	40
	Isophorone	333	24.0	66	97	40
	Naphthalene	333	14.0	35	138	40
	Nitrobenzene	333	26.2	72	108	40
	N-Nitroso-di-n-propylamine	333	24.4	55	128	40
	N-Nitrosodiphenylamine	333	8.6	57	93	40
	Pentachlorophenol	833	73.6	7	171	40
	Phenanthrene	333	8.4	0	210	40
	Phenol	333	80.6	49	103	40
	Pyrene	333	9.1	28	170	40
	2,4,6-Tribromophenol (surrogate)	NA	NA	31	140	NA
	2-Fluorobiphenyl (surrogate)	NA	NA	47	113	NA
	2-Fluorophenol (surrogate)	NA	NA	36	114	NA
	Nitrobenzene-d5 (surrogate)	NA	NA	37	116	NA
	Phenol-d5 (surrogate)	NA	NA	32	113	NA
	Terphenyl-d14 (surrogate)	NA	NA	41	152	NA

TABLE 3b
IDENTIFICATION OF ANALYTICAL QUANTITATION AND DETECTION LIMITS,
AND QUALITY CONTROL CRITERIA - SOIL
FRONT STREET HOLDER STATION
SITE #224063

Matrix:	Soil					
Analytical Method	**Parameter**	**QL (ug/Kg)**	**MDL (ug/Kg)**	**Accuracy Criteria (%R)**		**Precision Criteria (RPD)**
				Lower Limit	**Upper Limit**	
8082 - PCBs	Aroclor 1016	25	1.2	40	168	40
	Aroclor 1221	25	6.4	NA	NA	NA
	Aroclor 1232	25	5.7	NA	NA	NA
	Aroclor 1242	25	4.0	NA	NA	NA
	Aroclor 1248	25	4.8	NA	NA	NA
	Aroclor 1254	25	3.9	NA	NA	NA
	Aroclor 1260	25	2.8	29	177	40
	Decachlorobiphenyl (surrogate)	NA	NA	27	178	NA
	Tetrachloro-m-xylene (surrogate)	NA	NA	7	196	NA
Metals (All RLs/MDLs in mg/Kg)	Aluminum	200	11.8	75	125	20
	Antimony	2	0.241	75	125	20
	Arsenic	2	0.347	75	125	20
	Barium	10	0.047	75	125	20
	Beryllium	0.6	0.0192	75	125	20
	Cadmium	0.6	0.0233	75	125	20
	Calcium	1000	2.72	75	125	20
	Chromium	5	0.07	75	125	20
	Cobalt	2.5	0.0414	75	125	20
	Copper	5	0.2	75	125	20
	Iron	200	3.32	75	125	20
Metals (All RLs/MDLs in mg/Kg)	Lead	5	0.235	75	125	20
	Magnesium	500	1.38	75	125	20
	Manganese	10	0.861	75	125	20
	Mercury	0.5	0.0668	75	125	20
	Nickel	5	0.0928	75	125	20
	Potassium	500	7.18	75	125	20
	Selenium	1.8	0.317	75	125	20
	Silver	2.5	0.0442	75	125	20
	Sodium	500	2.72	75	125	20
	Thallium	1.2	0.534	75	125	20
	Vanadium	10	0.038	75	125	20
	Zinc	10	0.327	75	125	20
537 Mod - PFAS (All RLs/MDLs in ng/g)	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2)	3.7	0.73	70	130	30
	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2)	2.4	0.73	70	130	30
	N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.4	0.24	70	130	30
	N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.4	0.24	70	130	30
	Perfluorobutanesulfonic acid (PFBS)	2.4	0.49	70	130	30
	Perfluorobutanoic acid (PFBA)	2.4	0.98	70	130	30
	Perfluorodecane sulfonate (PFDS)	0.73	0.24	70	130	30
	Perfluorodecanoic acid (PFDA)	0.73	0.24	70	130	30
	Perfluorododecanoic acid (PFDoA)	0.73	0.24	70	130	30
	Perfluoroheptanesulfonic acid (PFHpS)	0.73	0.24	70	130	30
	Perfluoroheptanoic acid (PFHpA)	0.73	0.24	70	130	30
	Perfluorohexanesulfonic acid (PFHxS)	0.73	0.24	70	130	30
	Perfluorohexanoic acid (PFHxA)	0.73	0.24	70	130	30
	Perfluorononanoic acid (PFNA)	0.73	0.24	70	130	30
	Perfluorooctane sulfonamide (PFOSA)	0.73	0.24	70	130	30
	Perfluorooctanesulfonic acid (PFOS)	0.73	0.24	70	130	30
	Perfluorooctanoic acid (PFOA)	0.73	0.24	70	130	30
	Perfluoropentanoic acid (PFPeA)	0.73	0.24	70	130	30
	Perfluorotetradecanoic acid (PFTeA)	0.73	0.24	70	130	30
	Perfluorotridecanoic acid (PFTriA)	0.73	0.24	70	130	30
	Perfluoroundecanoic acid (PFUnA)	0.73	0.24	70	130	30
9012	Total Cyanide	250	116	75	125	20

1 - Analytical Services Protocol (ASP), NYSDEC, June 2000.
Method and reporting limits are specific to each laboratory and are updated periodically. These values should be reviewed on a project specific basis.
VOCs - Volatile organic compounds
SVOCs - Semivolatile organic compounds
PCBs - Polychlorinated biphenyls
PFAS - Per and Polyfluoroalkyl Substances
QL - Quantitation limit
MDL - Method detection limit
ug/L - Micrograms per liter
%R - Percent recovery
RPD - Relative percent difference
NA - Not applicable

TABLE 3c
IDENTIFICATION OF ANALYTICAL DETECTION AND REPORTING LIMITS - AIR/VAPOR
FRONT STREET HOLDER STATION
NATIONAL GRID SITE #224063

Parameter	Method	CAS Number	Units	Reporting Limit	
				MDL	RL
Volatile Organic Compounds					
Benzene	TO-15	71-43-2	ppbv	0.076	0.2
Bromodichloromethane	TO-15	75-27-4	ppbv	0.066	0.2
Bromoform	TO-15	75-25-2	ppbv	0.078	0.2
Bromomethane	TO-15	74-83-9	ppbv	0.085	0.2
Carbon disulfide	TO-15	75-15-0	ppbv	0.07	0.5
Carbon tetrachloride	TO-15	56-23-5	ppbv	0.064	0.2
Chlorobenzene	TO-15	108-90-7	ppbv	0.06	0.2
Chloroethane	TO-15	75-00-3	ppbv	0.11	0.5
Chloroform	TO-15	67-66-3	ppbv	0.031	0.2
Chloromethane	TO-15	74-87-3	ppbv	0.18	0.2
Dibromochloromethane	TO-15	124-48-1	ppbv	0.057	0.2
1,1-Dichloroethane	TO-15	75-34-3	ppbv	0.054	0.2
1,2-Dichloroethane	TO-15	107-06-2	ppbv	0.073	0.2
1,1-Dichloroethene	TO-15	75-34-4	ppbv	0.091	0.2
cis-1,2-Dichloroethene	TO-15	156-59-2	ppbv	0.083	0.2
trans-1,2-Dichloroethene	TO-15	156-60-5	ppbv	0.072	0.2
1,2-Dichloropropane	TO-15	78-87-5	ppbv	0.08	0.2
cis-1,3-Dichloropropene	TO-15	10061-01-5	ppbv	0.087	0.2
trans-1,3-Dichloropropene	TO-15	10061-02-6	ppbv	0.087	0.2
Ethylbenzene	TO-15	100-41-4	ppbv	0.091	0.2
Methylene chloride	TO-15	75-09-2	ppbv	0.22	0.5
Styrene	TO-15	100-42-5	ppbv	0.11	0.2
1,1,2,2-Tetrachloroethane	TO-15	79-34-5	ppbv	0.071	0.2
Tetrachloroethene	TO-15	127-18-4	ppbv	0.096	0.2
Toluene	TO-15	108-88-3	ppbv	0.076	0.2
1,2,4-Trichlorobenzene	TO-15	120-82-1	ppbv	0.11	0.5
1,1,1-Trichloroethane	TO-15	71-55-6	ppbv	0.058	0.2
1,1,2-Trichloroethane	TO-15	79-00-5	ppbv	0.061	0.2
Trichloroethene	TO-15	79-01-6	ppbv	0.069	0.2
Vinyl chloride	TO-15	75-01-4	ppbv	0.059	0.2
m,p-Xylenes	TO-15	108-38-3 106-42-3	ppbv	0.19	0.5
o-Xylenes	TO-15	95-47-6	ppbv	0.059	0.2
Total Non-Methane Organic Carbon as Hexane	EPA 25C	7440-44-0	ppmc	0.33	6

Note:
Method and reporting limits are specific to each laboratory and are updated periodically. These values should be reviewed on a project specific basis.

ATTACHMENT A

EXAMPLE CHAIN-OF-CUSTODY

AIR SAMPLE
CHAIN OF CUSTODY RECORD

AECOM

PROJECT NUMBER | SITE NAME

SAMPLERS (PRINT/SIGNATURE)

DELIVERY SERVICE: _____ AIRBILL NO.: _____

LAB _____

SHIPPING CONTAINER _____ of _____

PAGE _____ of _____

SAMPLE INFORMATION

LOCATION IDENTIFIER	SAMPLE DATE	SAMPLE TIME	SAMPLE ID	MATRIX CODE	CANISTER SIZE (LITERS)	CANISTER ID	FLOW CONTROLLER ID	INITIAL PRESSURE/ VACUUM (" Hg)	FINAL PRESSURE/ VACUUM (" Hg)	PRESSURE/VACUUM UPON LAB RECEIPT (" Hg)	REQUIRED ANALYSIS			REMARKS	SAMPLE TYPE CODE

MATRIX CODES	AA - AMBIENT AIR AI - INDOOR AIR AQ - FIELD QC AS - SUB-SLAB AIR GS - SOIL GAS
SAMPLE TYPE CODES	N# - NORMAL ENVIRONMENTAL SAMPLE FD# - FIELD DUPLICATE MS# - MATRIX SPIKE (# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME

SPECIAL INSTRUCTIONS

Distribution: Original accompanies shipment, copy to project file

URSF-075K/1 OF 1/CofCR/GCM

CHAIN OF CUSTODY RECORD

AECOM

PROJECT NO. | SITE NAME

SAMPLERS (PRINT/SIGNATURE)

LAB _____

COOLER _____ of _____

PAGE _____ of _____

DELIVERY SERVICE: _____ AIRBILL NO.:_____

LOCATION IDENTIFIER	DATE	TIME	COMP/ GRAB	SAMPLE ID	MATRIX	TOTAL NO.# OF CONTAINERS	TESTS / BOTTLE TYPE AND PRESERVATIVE	REMARKS	SAMPLE TYPE	BEGINNING DEPTH (IN FEET)	ENDING DEPTH (IN FEET)	FIELD LOT NO.# (IRPIMS ONLY)

MATRIX CODES

AA - AMBIENT AIR; SE - SEDIMENT; SH - HAZARDOUS SOLID WASTE; SL - SLUDGE; WP - DRINKING WATER; WW - WASTE WATER; WG - GROUND WATER; SO - SOIL; DC - DRILL CUTTINGS; WL - LEACHATE; GS - SOIL GAS; WC - DRILLING WATER; WO - OCEAN WATER; WS - SURFACE WATER; WQ - WATER FIELD QC; LH - HAZARDOUS LIQUID WASTE; LF - FLOATING/FREE PRODUCT ON GW TABLE

SAMPLE TYPE CODES

TB# - TRIP BLANK; SD# - MATRIX SPIKE DUPLICATE; RB# - RINSE BLANK; FR# - FIELD REPLICATE; N# - NORMAL ENVIRONMENTAL SAMPLE; MS# - MATRIX SPIKE

(# - SEQUENTIAL NUMBER (FROM 1 TO 9) TO ACCOMMODATE MULTIPLE SAMPLES IN A SINGLE DAY)

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	DATE	TIME
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LAB BY (SIGNATURE)	DATE	TIME

SPECIAL INSTRUCTIONS

Distribution: Original accompanies shipment, copy to coordinator field files

APPENDIX I

FRONT STREET HOLDER STATION

COMMUNITY AIR MONITORING PLAN

AECOM Imagine it. Delivered.

COMMUNITY AIR MONITORING PLAN for the K - FRONT ST. STATION

SITE #224063

Prepared for:
National Grid
One Metrotech Center
Brooklyn, New York 11201

Prepared by:
AECOM USA, Inc.
257 West Genesee Street, Suite 400
Buffalo, New York 14202

Project Number: 60412543

Submittal Date:
November 2020

COMMUNITY AIR MONITORING PLAN
For The
K - FRONT ST STATION
218 FRONT STREET
BROOKLYN, NEW YORK 11202
SITE #224063

Prepared For

NATIONAL GRID
ONE METROTECH CENTER
BROOKLYN, NEW YORK 11201

Prepared By

AECOM USA, INC.
257 WEST GENESEE STREET
BUFFALO, NEW YORK 14202

NOVEMBER 2020

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List of Acronyms

ASTM	American Society for Testing Materials
BTEX	benzene, toluene, ethylbenzene, and xylene
CAMP	Community Air Monitoring Plan
CM	Construction Manager
DER	Draft Technical Guidance for Site Investigation and Remediation
EPA	Environmental Protection Agency
EWS	environmental weather station
GC	gas chromatograph
HASP	Health and Safety Plan
MGP	Manufactured Gas Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	photoionization detector
PM-10	particulate matter
ppm	parts per million
ppmv	parts per million volume
TVOC	Total volatile organic compounds
$\mu g/m^3$	micrograms per cubic meter
VOCs	volatile organic compounds

Executive Summary

This Community Air Monitoring Plan (CAMP) has been developed to provide specific procedures for measuring, documenting, and responding to potential airborne contaminants during the remedial action at the National Grid K- Front St Station site (Site #224063) located in Brooklyn, New York. The procedures in this CAMP are focused on the monitoring of airborne contaminants (volatile organic compounds [VOCs] and particulates) at the active work area and Site perimeter and complement the work zone monitoring conducted to protect Site workers as described in the Site Health and Safety Plan (HASP). This CAMP is based on and builds on the CAMP guidelines established by the New York State Department of Health (NYSDOH) in the New York State Department of Environmental Conservation (NYSDEC) DER-10 Draft Technical Guidance for Site Investigation and Remediation (DER-10) (May 2010). The CAMP is designed to provide monitoring procedures, Alert Levels, Action Levels, and contingency measures if Action Levels are approached. An Alert Level is a contaminant concentration or odor intensity that triggers contingent measures. An Alert does not suggest the existence of a health hazard, but serves instead as a screening tool to trigger contingent measures if necessary, to assist in minimizing offsite transport of contaminants and odors during remedial activities. An Action Level is a contaminant concentration or odor intensity that triggers work stoppage.

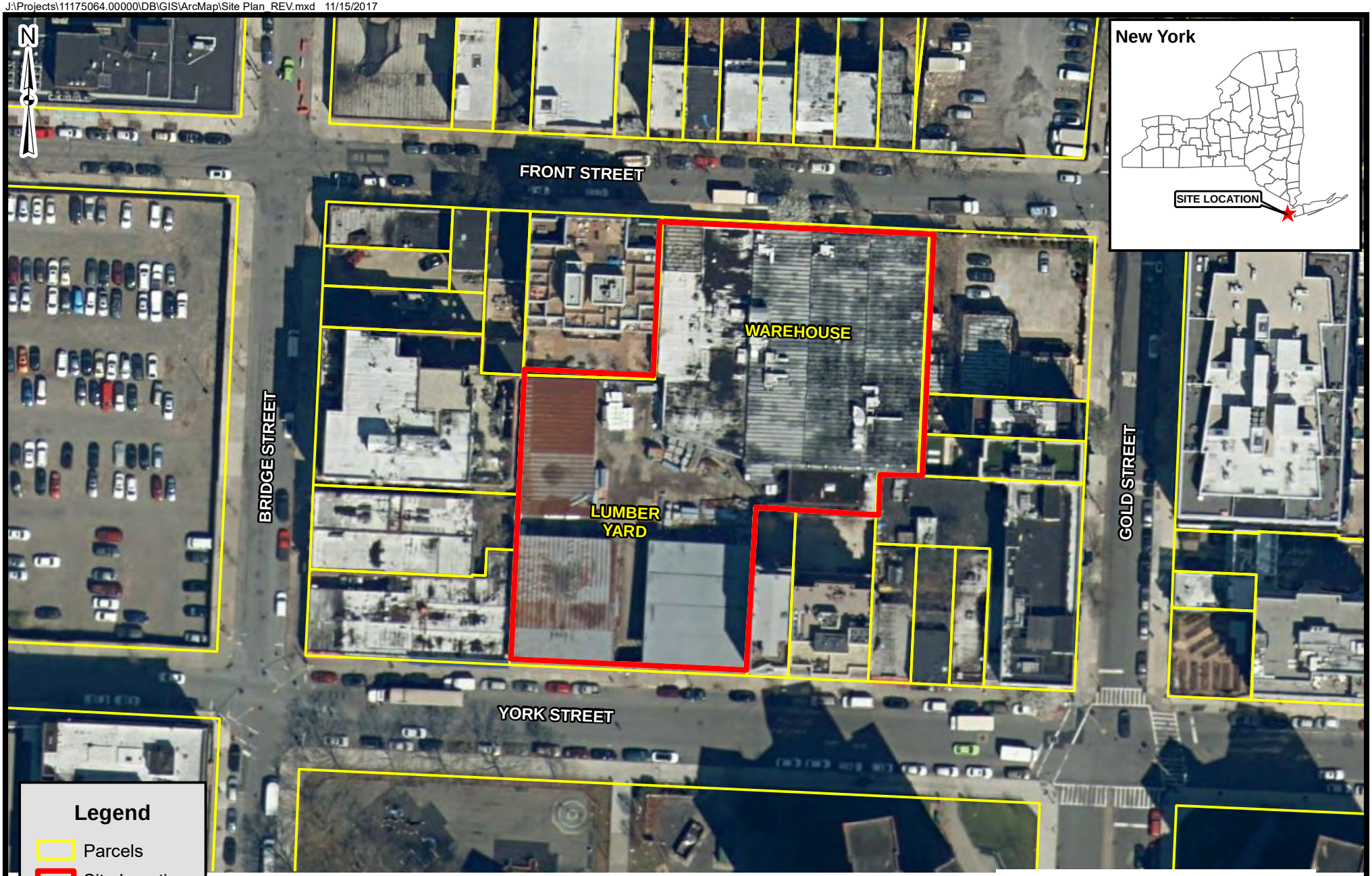
During times of ground intrusive activities, air monitoring will be conducted using a combination of real-time (continuous and almost instantaneous) air monitoring. Limited intrusive work activities, such as drilling or test pit excavations, will employ mobile monitoring units while more significant activities, such as remediation or site development, will employ air monitoring units at fixed locations 24 hours a day/7 days a week. Walk-around supplemental monitoring using hand-held instruments will be performed on an as-needed basis. Contaminants monitored include volatile organic compounds and dust. Relative odor intensity will also be monitored using an American Society for Testing Materials (ASTM) method.

The Contingency Plan, presented in Section 3 of this CAMP, defines Alert Levels, Action Levels, and specific response activities to be implemented during working hours if an exceedance of an Alert Level or Action Level for a measured compound occurs. The response actions, potentially including work stoppage, are intended to prevent or significantly reduce the migration of airborne

contaminants from the site. Although hydrogen cyanide has not been detected in the soil or groundwater, there will be a separate contingency plan for monitoring for its presence if cyanide-containing material is encountered during excavation.

This CAMP describes the monitoring to be conducted during both limited and significant ground intrusive activities. Where appropriate, an alternative and portable level of monitoring which is in compliance with NYSDOH CAMP Guidance in DER-10 and equally protective of the community may be employed. Based on specific field activities, a decision will be made as to the appropriate level of monitoring.

J:\Projects\11175064.00000\DB\GIS\ArcMap\Site Plan_REV.mxd 11/15/2017



AECOM

FRONT STREET FORMER GAS HOLDER SITE

SITE LOCATION MAP

FIGURE 1-1

1.0 Introduction

This document presents a Community Air Monitoring Plan (CAMP) for the National Grid K - Front St Station (Site), located in Brooklyn, New York (Figure 1-1). The Site was the location of gas holder station used for the sole purpose of distribution of gas produced from an off-site manufactured gas plant (MGP). No gas production occurred at the Site.

The results of a Site Characterization, performed in phases from 2007 through 2013, indicate that potentially MGP-related residuals are present in the subsurface at this Site. The potentially MGP-related residuals occur at depth and at relatively low concentrations. Under existing site conditions, the potential for human exposure through inhalation, direct contact or ingestion is minimal. Under future conditions, there is a potential for exposure.

The NYSDOH Generic CAMP, as presented in New York State Department of Environmental Conservation's (NYSDEC) document DER-10 Technical Guidance for Site Investigation and Remediation, requires that real-time monitoring for total volatile organic compounds (TVOCs) and particulates (i.e., dust) be conducted at the downwind perimeter of each designated work area during ground intrusive activities at contaminated sites. As such, this CAMP describes the proposed air monitoring means and methods that will be implemented during intrusive activities at the Site.

The purpose of the CAMP is to provide early detection in the field of potential short-term emissions. The early detection of potential emissions and associated contingency measures is intended to expedite any necessary mitigation measures, and to reduce the potential for the community and public to be exposed to hazardous constituents at levels above accepted regulatory limits and guidelines. During ground intrusive activities at the Site, the CAMP will be conducted using a combination of real-time air monitoring and supplemental walk-around perimeter monitoring using hand-held instruments as appropriate.

The objectives of the CAMP are as follows:

- Provide an early warning system to alert the Contractor, Construction Manager (CM), National Grid, and NYSDEC that concentrations of TVOCs, dust, odor, in ambient air are approaching Action Levels due to site activities.
- Provide details for a contingency plan that is designed to reduce the off-site migration of contaminants/odors if established Action Levels are approached or exceeded.
- Determine whether construction controls are effective in reducing ambient air concentrations to below Action Levels and make appropriate and necessary adjustments.
- Develop a permanent record that includes a database of perimeter air monitoring results and meteorological conditions, equipment maintenance, calibration records, and other pertinent information.

1.1 General Approach

The general approach to meet the objectives of the CAMP is two-fold:

1. Utilize a real-time system to monitor target compounds. Real-time monitoring data will be used as an early warning system so that the air monitoring contractor can alert National Grid and the construction manager that concentrations of target compounds are approaching Action Levels. Under this scenario, National Grid, the construction manager, and the air monitoring contractor can then begin to evaluate and implement appropriate site controls to maintain acceptable ambient air concentrations.

2. Develop comprehensive data management and analysis procedures. Data will be generated from a variety of sources, including real-time analytical monitoring, pre-construction baseline sampling, and supplemental hand-held equipment. Significant site work would include fixed-station monitoring and meteorological monitoring. These data will be reduced, evaluated, verified, and presented to National Grid and the CM in a timely manner to facilitate timely decision-making.

1.2 Roles and Responsibilities

The Consultant will implement the monitoring and reporting components of this CAMP under contract with National Grid. The contractor performing intrusive activities below the clean soil

cover is responsible for the selection and implementation of appropriate contingency measures that will mitigate the off-site migration of contaminants in response to Action Levels being approached or exceeded. The remainder of this section specifies the roles and responsibilities of each entity relative to the CAMP. A communication flowchart is shown in Figure 2 with each entity and lines of communication for the CAMP.

1.2.1 Air Monitoring Consultant

The scope of the Consultant's activities will be limited to CAMP monitoring and reporting used for the CAMP. The Consultant is responsible for the Health and Safety of their employees. The Consultant's CAMP roles and responsibilities are as follows:

- The Consultant will monitor and record TVOC and dust at various locations around the Site as described in the following sections of this CAMP.
- On a daily basis, the Consultant will communicate to the following entities whether TVOC or dust exceeded specified Response Levels or Action Levels and suggest corrective actions required to address the situation. The Consultant will convey the CAMP results to the entities listed below and inform them if the Alert or Response Levels have been exceeded. The Consultant will direct contractors at the Site to take action if warranted.
    - **Contractor – TBD**
    - **New York State Department of Environmental Conservation**

      R. Scott Deyette - Engineering Geologist 2
      Division of Environmental Remediation, NYSDEC Office
    - **National Grid**

      Donald Campbell, Project Manager
    - **Construction Manager – TBD**
- The Consultant will provide, maintain, and operate the equipment used to implement the CAMP.
- The Consultant will provide data summary reports to the Contractor, CM, National Grid, and NYSDEC each week during intrusive activity. The reports will identify Response Level and Action Level exceedances and will include data summary reports for all TVOC and dust data collected.

1.2.2 Contractor

The Contractor is the lead contractor responsible for site activities pertaining to the intrusive activities below the clean soil cover. The Contractor will be responsible for taking contingent actions in conjunction with National Grid in response to Response Level and Action Level exceedances. The Contractor will be responsible for taking contingent actions for Alert Levels, if required by the Consultant, CM, and/or National Grid. The Contractor is responsible for the Health and Safety of their employees.

1.2.3 National Grid

National Grid has the responsibility to provide mitigation services related to the release of MGP-related vapors in excess of CAMP Response Level and Action Levels. National Grid is also ultimately responsible for the remediation of and maintenance of engineering controls at the Site under an approved work plan with NYSDEC.

1.2.4 New York State Department of Environmental Protection

NYSDEC is responsible for the environmental regulatory enforcement for all activities conducted at the site including compliance with this CAMP, stormwater runoff mitigation (erosion and sediment control), and all environmental and remediation regulations, policies, and guidance applicable to the Site. NYSDEC may provide on-site oversight personnel for the work being conducted.

1.2.5 Construction Manager

During larger intrusive work, National Grid may hire a separate CM; for smaller projects, the Consultant may serve as the CM. The CM is National Grid's representative on site and is responsible for day to day operations on the Site. The CM will be responsible for directing the Contractor to take contingent actions in conjunction with National Grid in response to Alert Level (VOCs only), Response Level, and/or Action Level exceedances. The CM is responsible for the Health and Safety of CM employees and subcontractors.

2.0 Sampling and Analytical Procedures

This section of the CAMP presents a detailed description of the air monitoring sampling and analytical procedures, including data management that will be used.

Real-time sampling methods will be utilized to determine ambient air concentrations during the project. Real-time continuous monitoring for TVOC and respirable particulate matter (PM-10) will occur at a minimum of two locations. Meteorological conditions including wind speed and direction, temperature, and relative humidity will be monitored in real time during significant site instructive activities. Supplemental walk-around perimeter monitoring for TVOC, PM-10, and odor intensity will occur along the perimeter of the project site on an as-needed basis.

2.1 Alert Level, Response Level, and Action Level

Alert Levels are National Grid internally established concentration levels for TVOC only. Alert Levels are set below the levels established by the NYSDOH so that actions can be taken prior to exceeding a NYSDOH threshold. An Alert Level serves as a screening tool to trigger contingent measures if necessary, to assist in minimizing off-site transport of contaminants during intrusive activities.

A Response Level is a contaminant concentration level that triggers a temporary work stoppage, continued monitoring, reporting, and potential contingent measures. A Response Level serves as a screening tool for both TVOC and PM-10 to trigger contingent measures to assist in minimizing off-site transport of contaminants during ground intrusive activities. Response Levels are NYSDOH thresholds levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10.

An Action Level is a contaminant concentration that triggers work stoppage and implementation of contingent measures to mitigate potential airborne contaminants prior to resuming work activities. Action Levels are NYSDOH threshold levels established in the May 2010 NYSDOH Generic CAMP presented in Appendix 1A of DER-10.

For example, if high concentrations of dust are detected on the Site, contingent measures such as the use of spraying water may be required to reduce the concentrations and keep them below Response Levels.

The following target compounds and corresponding Response Levels and Action Levels were developed in accordance with the NYSDOH Generic CAMP. Alert Levels are National Grid internally established concentration levels for TVOC only.

An Alert Level is a contaminant concentration or odor intensity that when exceeded triggers contingent measures. For example, if odors are detected on Site, contingent measures such as the use of odor suppression foam may be required.

Target Compounds	**Alert Level**
TVOCs (15-minute average concentration)*	3.7 ppm greater than background**

Target Compounds	**Response Level**
TVOCs (15-minute average concentration)*	5.0 ppm greater than background**
PM-10 (15-min avg)*	100 µg/m^3 greater than background**

Target Compounds	**Action Level**
TVOCs (15-minute average concentration)	25 ppm greater than background**
PM-10 (15-min conc)	150 µg/m^3 greater than background**
Odor (n-butanol scale) (15-minute sustained)	3 (Verified related to construction)
Odor (nuisance)	Public complaints that are verified to be related to construction

ppmv - parts per million volume
µg/m^3 - micrograms per meter cubed
* 15-minute average concentrations updated every 1 minute
** Background is defined as the current upwind 15-minute average concentration.

2.2 Air Monitoring Procedures

During times of ground intrusive activities below the clean soil cover systems, air monitoring will be conducted using one or more of the following monitoring equipment configurations, as appropriate:

- Fixed-station air monitoring equipment,
- Moveable tripod-mounted air monitoring equipment, and/or
- "Walk-around" air monitoring equipment.

Monitoring will be performed for TVOCs and particulates along the Site perimeter 24 hours a day when fixed-stations are used or during active subsurface working hours if the movable tripod-mounted units are used.

Monitoring for TVOCs and particulates will occur at a minimum of two locations using real-time sampling equipment. Readings will be checked manually on a predetermined, periodic basis if tripod-mounted units are used or transmitted to a centralized data logger system station once per minute. Depending on the units used, monitoring will be conducted during active subsurface working hours or, for significant work, 24 hours a day 7 days a week. Supplemental "walk-around" perimeter monitoring for TVOCs and particulates, and odor will occur along the perimeter of the Site on an as needed basis. Each approach is detailed below.

It is anticipated that tripod-mounted stations will be used for minimally intrusive work such as shallow intrusive work during utility installation and maintenance. It is anticipated that fixed-stations will only be used in the event of significant excavation work below the clean soil cover at the Site.

2.2.1 Real-Time Fixed-Station Monitoring

Real-time air monitoring for TVOCs and particulates will be conducted at fixed-stations upwind and downwind of the work area along the Site perimeter during significant excavation below the cover at the Site. Instruments will be positioned to monitor around the active excavation work zone based on a particular day activities at a minimum of two locations adjacent to the work area. Real-time monitors will continuously gather data 24 hours a day 7 days a week. The air monitoring system consists of a minimum of two air monitoring stations, one meteorological tower, and one central computer system.

The real-time fixed-stations will be positioned between the work zone and the largest number of potential off-site receptors. Therefore, the placement of the fixed-stations is based on the need to document all potential off-site migration on the perimeter, but also recognizes the potential off-site receptors and the location of the proposed construction activities.

Each real-time fixed-station will contain the following:

1. Station enclosure
2. An organic vapor analyzer or photoionization detector (PID)
3. A particulate monitor
4. A radio telemetry device

Each monitoring station is housed in a weather-tight National Electrical Manufacturers Association-4 type enclosure. The internal capacity of each air monitoring shelter is illustrated in Figure 2-1. Each monitoring station will continuously measure and record TVOCs and particulates.

The PIDs will operate in the TVOC mode to determine the TVOC concentration in ambient air. In TVOC mode, the PIDs will collect and analyze samples at a rate of one sample every 10 seconds, producing one minute averages which are then used to make 15-minute averages. If the subsequent 15-minute average TVOC concentration measured at a station reaches an Alert Level (3.7 parts per million [ppm] or 75 percent of the Action Level for TVOC), then the PID will continue to measure TVOCs and the GC at that station will begin to continuously sample and measure in the compound-specific mode. In the compound-specific mode, quantitative concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) in ambient air will be determined.

Each portable particulate meter will also be equipped with a PM-10 sampler to monitor PM less than 10 microns (PM-10). Particulate meters analyze samples once every 10 seconds and produces one minute averages. These one-minute averages will be averaged to make 15-minute data averages.

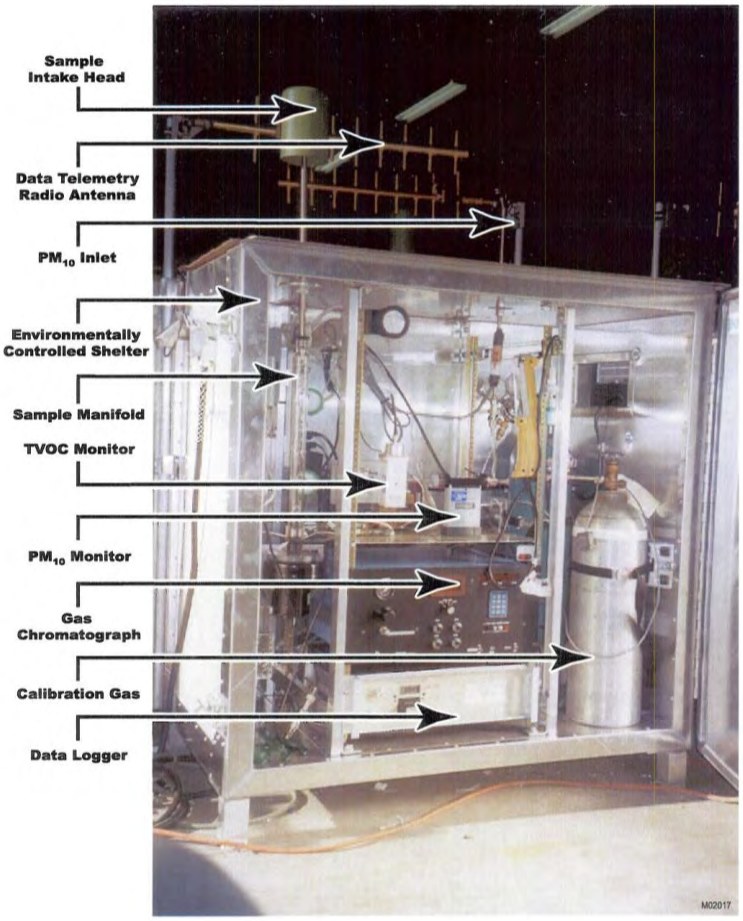
In addition to the fixed-stations, a Climatronics portable EWS meteorological monitoring system, or equivalent, will be established on site. The meteorological system will be set at a height of 3 meters (approximately 10 feet) aboveground and located at the central air monitoring shelter that is clear of buildings, trees, or other obstructions. The meteorological system will continuously monitor temperature, dew point temperature, wind speed, and wind direction. Fifteen-minute average values for each meteorological parameter will be stored in the meteorological system and downloaded continuously into the on-site central database.

All TVOC, individual VOC constituents (BTEX), PM-10, and meteorological data will be stored in data-loggers located within each monitoring station. Stored analytical data along with system

performance data from each station will be sent in real-time, via radio telemetry, to the central computer system located in the project office or trailer for monitoring and analysis.

Equipment calibration will be performed according to manufacturer's instructions. Each PID will be calibrated once daily using a certified standard isobutylene gas for TVOC mode. A certified standard gas mixture for BTEX specific compounds will be used to daily calibrate the onsite GC at each location. Particulate monitors will be zeroed daily plus a once-per-week upside check will be performed on each unit. Hand-held portable equipment will be calibrated before each use, and a minimum of once per week when not in use.

Figure 2-1: Internal Capacity of Each Air Monitoring Shelter



In the event of an exceedance of an Alert Level or Action Level for TVOC or PM-10, the air-monitoring consultant will be notified via phone paging. The central computer will be equipped with a modem or wireless card that is capable of sending text pages to cell phones. If a TVOC Alert Level

or Action Level is reached during non-working hours, the system will be checked remotely and an appropriate response action will be determined.

2.2.1.1 Integrated Volatile Organic Compound Measurements

Integrated VOC samples (24 hours) will be collected once per week at two air-monitoring stations plus one collocated sample per month. The samples are collected to demonstrate that the real-time monitoring stations are effective in measuring the concentration of the VOC target compounds. VOC samples will be collected using 6-liter Summa® canisters (or equivalent vacuum canisters) and analyzed using United States Environmental Protection Agency (EPA) Method TO-15 modified to include naphthalene. An accredited laboratory will perform the analytical testing on the canisters and will provide Category B deliverables as required by the New York Analytical Services Protocol. The data will be validated according to EPA and New York State Requirements.

2.2.1.2 Pre-Construction Baseline Sampling

Pre-construction sampling will be completed to establish baseline ambient air concentrations prior to the start of construction activities. Baseline conditions will be developed for TVOCs and PM-10 in ambient air using real-time fixed station sampling methods. In addition, a baseline odor survey plus integrated TO-15 VOC sampling at two sites per day will be completed during background sampling activities. Sample collection and analysis methods will follow those described in subsection 2.2.1 - Real-Time Fixed-Station Monitoring.

Pre-construction real-time sampling will take place at the fixed air monitoring station locations to determine TVOC and PM-10 baseline conditions. TVOC plus PM-10 data will be recorded 24 hours per day for a minimum of three days.

Pre-construction odors will also be established for 3 days prior to construction activities. On-site odor surveys will be conducted along the perimeter of the site. The off-site odor surveys will be conducted throughout adjacent neighborhoods.

2.2.1.3 Data Management Procedures

Data will be generated from a variety of sources, including real-time analytical monitoring, supplemental walk-around monitoring, preconstruction sampling, integrated TO-15 sampling, and

meteorological monitoring. These data must be reduced, evaluated, verified, and presented to National Grid and the construction manager in a timely manner to facilitate decision-making. The data management process for each source of data is discussed below.

Analytical data generated at each fixed-station monitoring location are sent to the central computer system via radio telemetry. The fixed-station baseline monitoring data will also be downloaded to the project database for data evaluation. The following daily charts or tables will be prepared:

- Instantaneous and averaged (15-minute averages updated every 1-minute) TVOC concentrations compared to the TVOC Action Level
- Instantaneous and averaged (15-minute averages updated every 1-minute) PM-10 concentrations compared to the PM-10 Action Level
- Supplemental Perimeter Walk-Around TVOC concentrations compared to the TVOC Action Level (if any)
- Supplemental Perimeter Walk-Around PM-10 concentrations compared to the Action Level (if any)

The following weekly data summaries will be prepared and transmitted to National Grid and the construction manager:

- Meteorological conditions (15-minute average wind speed, wind direction, humidity, and air temperature data)
- Maximum 15-minute average concentrations of TVOC, PM-10, and odor intensity
- Upwind and downwind comparison and discussion of Alert and Action Levels reached during the week
- Summary of site activities
- Air monitoring station locations

Monthly, the air-monitoring contractor will review all real-time data in a timely manner following collection and transmit a monthly summary report to National Grid.

In addition to the daily and weekly data reporting, sampling results for TVOCs and particulates will be reported to the construction manager to allow prompt evaluation and response to potential emission problems when action levels have been exceeded. The air monitoring contractor, together with National Grid and the construction manager will decide when shut-down and start-up criteria are met.

2.2.2 Tripod Mounted Monitoring Procedures

It is anticipated that tripod-mounted stations will be used for minimally intrusive work such as during shallow invasive work during utility installation and maintenance. Instruments will be positioned along the Site perimeter to monitor the air based on a particular day ground intrusive activities at a minimum of two locations (upwind and downwind). Real-time monitors will continuously gather data during periods of intrusive activity during working hours. The equipment will be manually read on a predetermined periodic cycle during the work activity.

The readings will be collected at a minimum of 15-minute intervals during periods of intrusive activities. Wind direction will be determined by using a wind sock or flagging placed on a pole at the Site.

Each air monitoring station would include the following:

1. Station Tripod and enclosure
2. An organic vapor analyzer
3. A particulate monitor

Each monitoring station will continuously measure and record TVOC and PM-10. All TVOC and PM-10 will be stored in data loggers located within each monitoring station. Data from each piece of equipment will be downloaded daily at the completion of intrusive activities and stored on a central computer system. The location of each station, the work zone, and the wind direction will be noted daily. At each monitoring station location, the 15-minute average value of TVOC and PM-10 will be recorded. The 15-minute average value of TVOC and PM-10 data from the upwind and downwind station will be compared and resultant downwind concentration will be calculated and recorded.

2.2.3 Supplemental Walk-Around Monitoring

Supplemental perimeter monitoring for TVOC, PM-10, and odor will occur along the perimeter of the project site on an as-needed basis. Specific-site conditions that may trigger walk-around perimeter monitoring include:

- Visible dust
- Odor complaints
- Detection of TVOCs and/or PM-10 at an air monitoring station at concentrations exceeding an Alert Level, Response Level and or Action Level
- Direction by National Grid or the construction manager

Readings will be collected continuously at a number of sites in the downwind direction between the work area and the nearest receptors.

When a triggering condition is observed during ground intrusive activity, the supplemental downwind perimeter monitoring will occur continuously until the conditions that triggered the monitoring have subsided. TVOC concentrations will be monitored and recorded using a PID or equivalent. Particulates will be measured and recorded using a portable real-time aerosol monitor equipped with a PM-10 impactor. Odors will be noted based on the n-butanol scale, as adapted from ASTM E544-99. At each monitoring point, the data value, sample time, and sample location will be collected and recorded. Additional temporary monitoring points may be established due to changing site or meteorological conditions.

The air monitoring contractor will be required to communicate periodically and proactively throughout each working day with the construction manager and the remedial action contractor's Site Safety Officer regarding the current site activities, especially if work is being performed within the on-site temporary fabric structure (a temporary fabric structure may be employed to assist in management of airborne contaminants.) The air monitoring contractor should be aware of any contingency measurers employed by the remedial action contractor, including PPE upgrades, additional foaming, and change-out of carbon in the vapor management system. This information will be helpful to the air monitoring contractor in understanding the current site conditions, and can serve as an indicator of possible elevation of levels at the Site perimeter.

2.2.4 Documentation

A field logbook and sensor calibration field forms, along with monthly data listings, will be maintained by the air monitoring contractor throughout the sampling effort. Information to be recorded will include:

- Description of remediation activities conducted during elevated data values;
- Daily Site maps showing the locations of all portable monitoring sites for the day;
- Any corrective actions used due to elevated real-time air monitoring readings such as shut-downs, covering stockpiles, reduced work pace, etc.;
- VOC sample media receipt dates, conditions, and numbers;
- Copies of chain-of-custody forms;
- Sampling equipment installation, operation, and removal dates;
- Sampling equipment calibration dates and results;
- General field weather conditions on sampling days;
- Any unusual situations which may affect samples or sampling;
- Sample dates; and
- Start and stop times.

3.0 Fixed-Station Monitoring Contingency Plan

The contingency plan is to identify potential site control measures that may be implemented in response to elevated levels of target compounds or odor measured during ground intrusive activities. In general, a tiered approach to site conditions with corresponding response actions will be implemented during the air monitoring program. Response actions will be enacted by the Contractor, CM, and National Grid. The Consultant will report any occurrences where a Response Level or Action Level is exceeded, which would require response measures to be enacted. The NYSDEC will be notified of any occurrence where an Action Level (NYSDOH threshold) is exceeded. If there is a verified exceedance, the Consultant will inform the CM, National Grid, and NYSDEC within 60 minutes of the exceedance via e-mail at a minimum. In general, a tiered approach to site conditions with corresponding response actions will be implemented during the air monitoring program.

The four tiers of site conditions are defined as follows.

- **Operational Condition**: Normal or ambient air-conditions where PM-10 concentrations are less than the Response Level an TVOC concentrations are less than the Alert Level;
- **Alert Condition:** Concentration of TVOC is greater than the Alert Level, but less than the Response Level;
- **Response Condition:** Concentration of PM-10 or TVOC is greater than the Response Level but less than the Action Level; and
- **Action Condition**: Concentration of PM-10 or TVOC is greater than the Action Level.

The contingency plan will rely on real-time data generated from the fixed-station monitoring, odor monitoring, and meteorological monitoring. These data sources will be evaluated together in order to make appropriate decisions concerning site conditions and potential control measures.

Additionally, the air monitoring contractor will be required to communicate periodically and proactively throughout each working day with the construction manager and the remedial action contractor's Site Safety Officer regarding the current site activities. The air monitoring contractor should be aware of any contingency measurers employed by the remedial action contractor, including PPE upgrades, additional foaming, and change-out of carbon in the vapor management system. This

information will be helpful to the air monitoring contractor in understanding the current site conditions, and can serve as an indicator of possible elevation of levels at the site perimeter.

An explanation of the notification system, specific conditions, and response actions for VOCs, PM-10, and odor are presented below.

3.1 Total Volatile Organic Compounds

Figure 3-1 presents the TVOC decision diagram that will be used to determine the appropriate site condition based on contaminant concentrations.

Operational Condition will be in effect when the total 15-minute TVOC concentration from all air monitoring locations is less than the Alert Level 3.7 ppm.

Under an Operational Condition, each PID located at the monitoring station will operate in the TVOC mode and will collect and analyze a TVOC sample at a frequency of one sample per minute.

An **Alert Condition** will occur if any 15-minute TVOC concentration measured at a station is greater than the Alert Level (3.7 ppm), but less than the Response Level (5.0 ppm).

At this time, the upwind and downwind TVOC concentrations will be compared to determine if the preliminary Alert Condition is due to Site activities. If downwind TVOC concentrations are greater than 3.7 ppm above upwind concentrations, then it will be assumed that the preliminary Site condition is due to Site activities.

A **Response Condition** will occur if any 15-minute TVOC concentration measured at the air monitoring station is greater than the Response Level (5.0 ppm), but less than or equal to the Action Level (25.0 ppm). Under a Response Condition, the GC at the fixed-station where the elevated concentration is recorded will automatically begin to analyze the individual BTEX compounds in the compound specific mode and the 15-minute concentration for each BTEX compound will be determined.

If the above condition is true, then a Response Condition will be verified. Under a verified Response Condition, a contingency meeting attended by the air monitoring consultant, National Grid, NYSDEC and/or NYSDOH representatives (when possible), and the construction manager will be held to determine appropriate response actions. This meeting will be held within 60 minutes of the Alert Level site condition verification. Possible Alert Level response actions are listed in **Table 3-1**. The site will remain in Alert Level as long as the TVOC concentration is between 3.7 ppm (Alert Level) and 5.0 ppm (Action Level), based on 15-minute averages.

Table 3-1: Levels and Response Actions

Site Condition	Response Action
Operational Level	• Normal Site Operations – No Response Action Required
Alert Level	• Establish trend of data and determine if evaluation/wait period is warranted • Temporarily stop work • Temporarily relocate work to an area with potentially lower emission levels • Apply water to area of activity or haul roads to minimize dust levels • Reschedule work activities • Cover all or part of the excavation area • Apply VOC emission suppressant foam over open excavation areas • Slow the pace of construction activities • Change construction process or equipment that minimize air emissions
Action Level	• Assess work activity modifications • Cease construction activities • Re-evaluate air monitoring work plan
Notes: The bulleted response actions specified under each site condition can be implemented in any order that is most appropriate under the existing site conditions.	

If average TVOC concentrations increase to greater than the Action Level of 5.0 ppm, then the site will enter into an Action Level site condition. An Action Level site condition will remain in effect if either of the following conditions is true:

- The 15-minute average TVOC concentration is greater than or equal to 5 ppm (Action Level)

- The 15-minute instantaneous TVOC concentrations are greater than 25 ppm (Upper Action Level)

Under an Action Level site condition, all construction activities will be halted. National Grid will immediately notify NYSDOH and NYSDEC. A meeting attended by the air monitoring contractor, NYSDEC and/or NYSDOH representatives (when possible), National Grid, and the construction manager will be held within 60 minutes of the Action Level notification to determine appropriate response actions. Possible Action Level corrective measures/actions are listed in **Table 3-1**. After appropriate corrective measures/actions are taken, work activities may resume provided that the TVOC concentration at the site perimeter is no more than 5 ppm above background for the 15-minute average.

If average TVOC concentrations fall below the Action Level, then the site will be returned to an Alert Level site condition, at which time work activities may resume. The Alert Level site condition will remain in effect as long as the following condition is true.

- The 15-minute average concentration for TVOCs is greater than 3.7 ppm (Alert Level) and less than 5.0 ppm (Action Level) above background.

The site will return to Operational Level site condition if the following condition is true:

- The 15-minute average concentrations for TVOCs at each of the fixed-stations are less than 3.7 ppm (Alert Level).

Under Operational Level site condition, the GCs in each of the fixed-stations that were in VOC compound-specific (BTEX) sampling mode will be automatically turned off.

Specific TVOC target concentrations for Operational Level, Alert Level, and Action Level site conditions are summarized in **Table 3-2**.

Table 3-2: Target Concentrations (above Background) for Site Conditions

		NYSDOH Generic CAMP		Site Condition		
Target	**Alert Level**	**Response Level**	**Action Level**	**Operational Level**	**Alert Level**	**Action Level**
TVOC (PID) – ppm	3.7	5.0	5.0	<3.7	$3.7 \leq [C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$
PM-10 - µg/m^3	NA	100	150	< 100	$100 \leq [C_{avg}] \leq 150$	$[C_{avg}] > 150$
Odor (n-butanol scale)	NA		3	OI<3 and No Odor Complaints	NA	OI ≥ 3 or Odor Complaints

Notes
ppmv = parts per million volume
µg/m^3 = micrograms per cubic meter
$[C_{avg}]$ = 15-minute average concentration of target
OI = Odor Intensity based on the n-butanol scale adapted from ASTM E544-99
Odor measurements made over a 15-minute interval.
NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert Level for odor.

3.2 Respirable Particulate Matter (PM-10)

PM-10 concentration in air will be measured and recorded by the fixed-station monitors. **Figure 3-2** presents the PM-10 decision diagram. Operational Level site condition will be in effect when the downwind 15-minute average PM-10 concentration is less than 100 µg/m^3 than the current average upwind conditions. An Alert Level site condition will occur if the 15-minute average PM-10 concentration at a fixed-station is greater than 100 µg/m^3. At this time, the construction manager and National Grid will be notified of elevated measurements and a possible Alert Level site condition. Under an Alert Level site condition, upwind and downwind PM-10 concentrations will be compared to determine if the Alert Level site condition is due to site activities. If downwind PM-10 concentrations are 100 µg/m^3 greater than upwind concentrations (Alert Level), then it will be assumed that the Alert Level site condition is due to site activities.

The Alert Level site condition will remain in effect as long as the 15-minute average PM-10 concentration is greater than or equal to 100 µg/m^3 above upwind conditions (Alert Level), and less than or equal to 150 µg/m^3 (Action Level). Under an Alert Level site condition, dust suppression techniques must be implemented. At this point, routine monitoring continues, and 15-minute averages continue to be evaluated. Work may continue with dust suppression techniques provided that

downwind PM-10 levels do not exceed 150 µg/m^3 above the upwind level (Action Level) and provided that no visible dust is migrating offsite from the work area. A contingency meeting attended by the air monitoring contractor, National Grid, the NYSDEC or NYSDOH representatives, and the construction manager will be held within 60 minutes of the Alert Level site condition if the condition is not mitigated by dust suppression techniques.

An Action Level site condition will go into effect if the average 15-minute PM-10 concentration exceeds 150 µg/m^3 above the current average upwind concentration (Action Level). Under an Action Level site condition, work must be stopped. National Grid will immediately notify NYSDOH and NYSDEC. A meeting attended by the air monitoring contractor, National Grid, the NYSDEC or NYSDOH representatives, and the construction manager will be held within 60 minutes of the Action Level notification to determine appropriate response actions. Work may resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

Specific PM-10 target concentrations for Operational Level, Alert Level, and Action Level site conditions are summarized in **Table 3-2**.

3.3 Visible Dust

In addition to measured PM-10 levels, the CAMP requires monitoring of visible dust conditions. If visible airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area. If this Action Level is met, National Grid will immediately notify NYSDOH and NYSDEC.

3.4 Odor

Odors from MGP sites are generally negligible due to surface soil cover of contaminated materials. However, excavation work may expose these materials and odors may become detectable. Odors may cause concern among the nearby community, visitors to the site, and on-site workers regarding potential health risks. Health risks or the potential for health risks do not rely strictly on

detectable odors. A detectable odor does not indicate health risks However, controlling odor emissions from a site can allay public fears about health risks and provide additional means of controlling nuisance emissions during remediation activities.

For MGP sites, the characteristic odor during remediation has been attributed primarily to naphthalene and indene, although additional compounds may contribute to the overall odor. (Pure naphthalene has the characteristic odor of mothballs). EPA provides a threshold for the initial presentation of naphthalene odors at 440 $\mu g/m^3$ (ATSDR, 1995; Amoore and Hautala, 1983). There is no reported odor threshold for indene. Odors emanating from the Site will be monitored for general odor intensity, as described below.

Odor intensity levels will be noted and recorded during as needed perimeter walk-around monitoring. Intensity levels will be based on the n-butanol scale as adapted from ASTM E544-99. Figure 3-3 illustrates the odor decision diagram. An Operational Level site condition will remain in effect if the odor intensity, based on the 8-point n-butanol scale, is less than 3 (Action Level). An Action Level site condition will go into effect when odor intensities are greater than 3, based on the 8-point n-butanol scale, or there are odor complaints from the public.

If an Action Level site condition, due to odor, is verified, National Grid will immediately notify NYSDOH and NYSDEC.A meeting attended by the air monitoring contractor, National Grid, NYSDEC or NYSDOH representatives, and the construction manager will be held within 60 minutes of the Action Level to determine appropriate response actions.

Figure 3-1: TVOC Decision Diagram

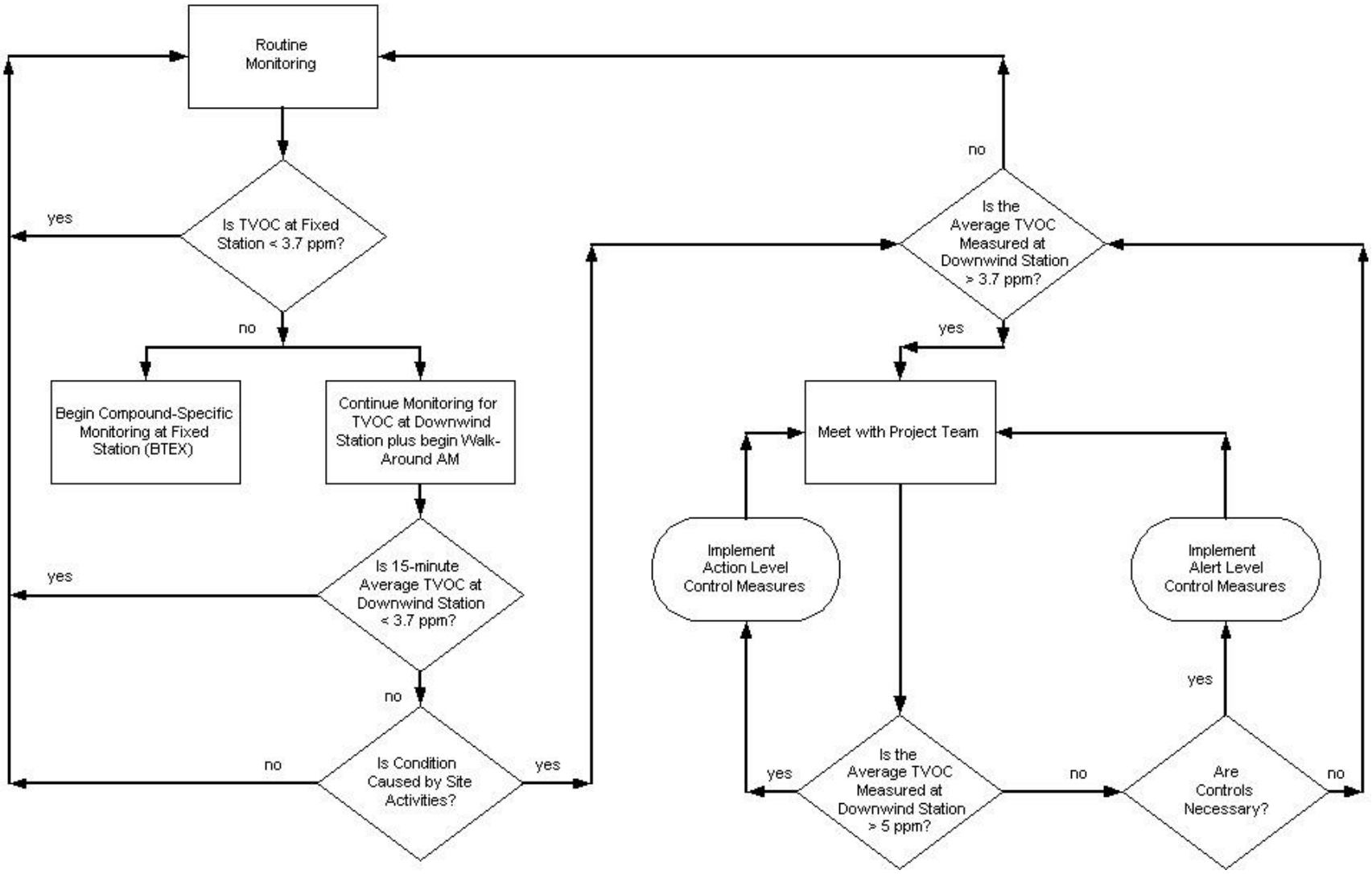


Figure 3-2: Respirable Particulate Matter (PM-10) Decision Diagram

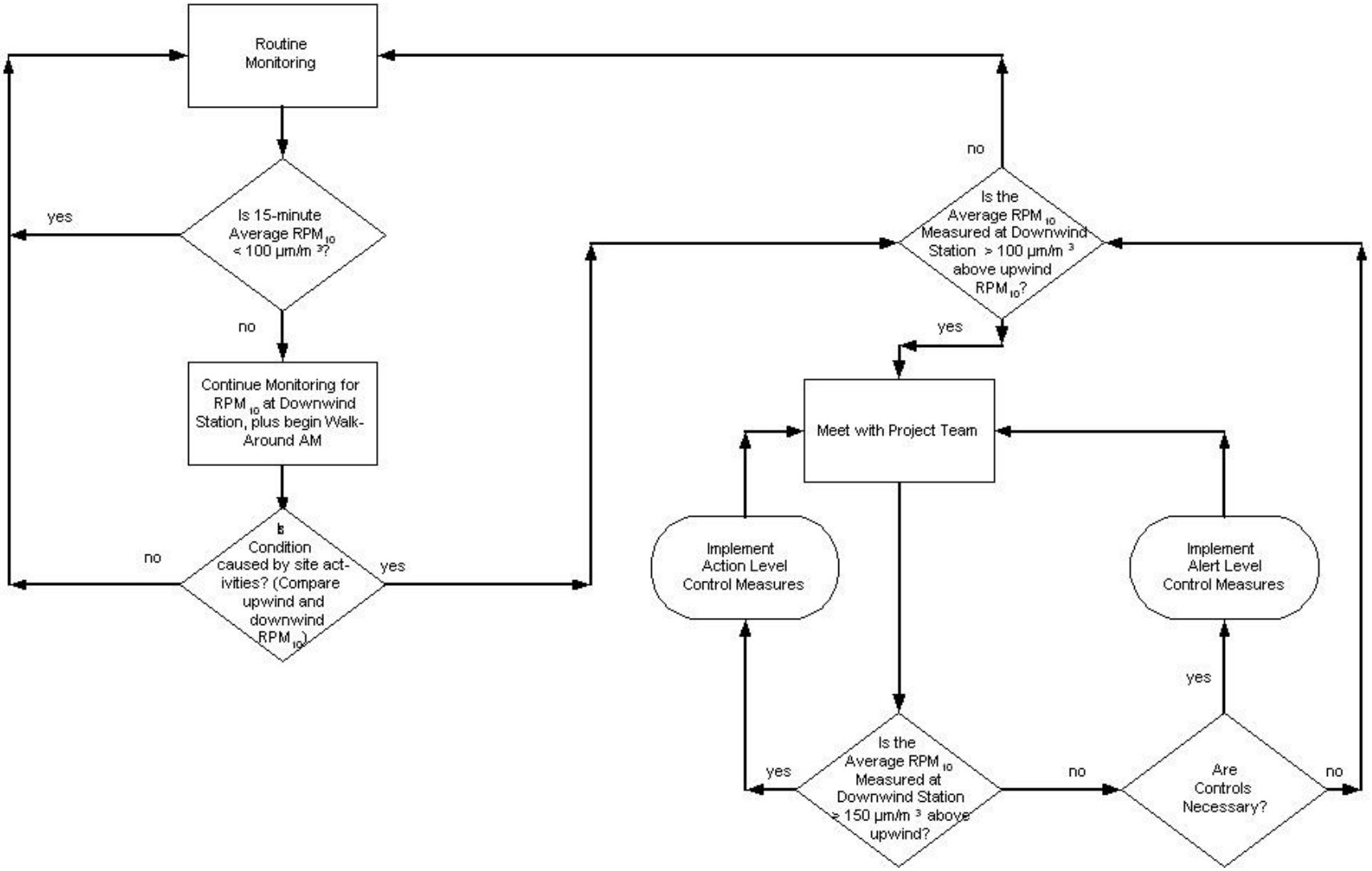
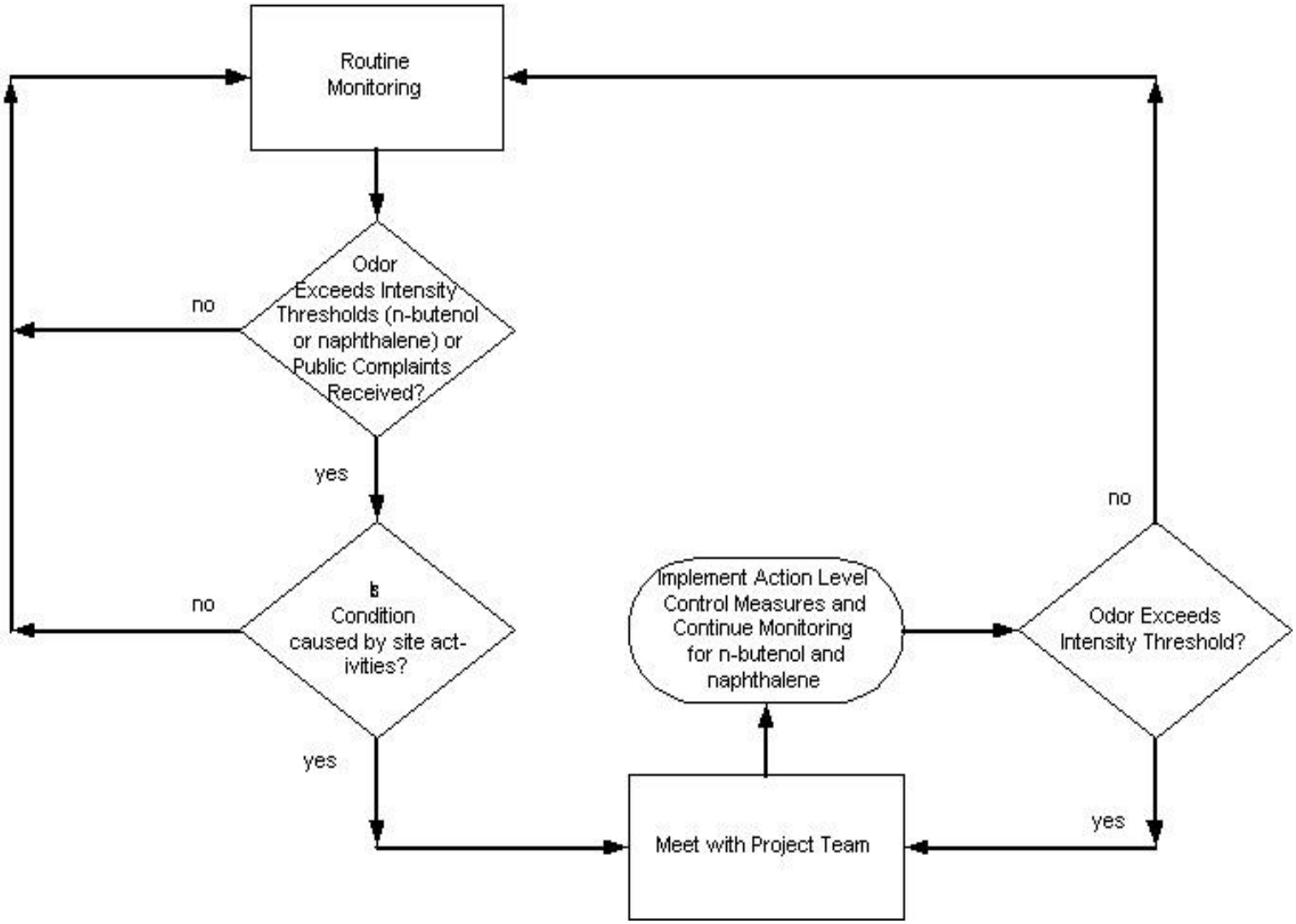


Figure 3-3: Odor Decision Diagram



4.0 Portable Monitoring Station Procedures

The procedures noted above are directed towards the monitoring of perimeter air during the conduct of significant ground intrusive activities. Significant ground intrusive activities are those excavations where there is reasonable expectation of encountering MGP-impacted materials. Where appropriate, an alternative and additional portable level of monitoring which is in compliance with NYSDOH CAMP Guidance in DER-10 and equally protective of the community may be employed. Based on the location of specific field activities, a decision will be made as to the appropriate level of monitoring. Specific activities could include drilling or test pit excavations.

Real-time air monitoring for TVOCs and suspended particulates will be conducted upwind and downwind of the work area at the Site perimeter. Real-time monitors will operate during periods of excavation/construction activity during working hours only.

Each portable air monitoring station would include the following (see **Figure 4-1**):

1. Station Tripod
2. Total organic vapor analyzer
3. A particulate monitor
4. Data logger
5. Radio Telemetry Hardware

Instruments will be positioned to monitor from the breathing zone.

Each monitoring station will continuously measure and record TVOCs and PM-10. All TVOC and PM-10 will be stored in data-loggers located within each monitoring station. Data from each piece of equipment will be stored on a computer on a daily basis. The location of each station, the work zone, and the wind direction will be noted daily. At each monitoring station location, the 15-minute data averages (60 concentrations per hour) of TVOC and PM-10 will be recorded. In the event of elevated concentrations for TVOC and/or PM-10, the 15-minute average value of TVOC and PM-10 data from the upwind and downwind stations will be compared and resultant downwind concentration will be calculated and recorded.

All contingency plans for the portable air monitoring units (TVOC and PM-10) will remain the same as described in Section 3.0.

Figure 4-1: Portable Air Monitoring Unit

APPENDIX J

FRONT STREET HOLDER STATION

SITE INSPECTION FORM

SITE INSPECTION FORM

GENERAL INFORMATION

Date:		**Inspector:**	
Weather:		**Signature:**	
Temperature:		**Company:**	
Season (circle one): Winter Spring Summer Fall			

SITE INSPECTION LOG SHEET*

Evidence of Site-Wide Disturbance(s)	Yes No	**Description of Disturbance(s)**	
Evidence of Cover System Disturbance(s)	Yes No	**Description of Disturbance(s)**	
Evidence of Site-Wide Excavation	Yes No	**Description of Excavation**	
Evidence of Cover System Excavation	Yes No	**Description of Demolition**	
Evidence of Building Construction	Yes No	**Description of Building Construction**	
Evidence of Change in Site Use	Yes No	**Description of New/Additional Site Use**	
Comments:			

* If answering Yes, attach map showing locations and any other information as required.