

Appendix F

Health and Safety Plan (HASP)

Prepared for:
National Grid
Brooklyn, New York



HEALTH AND SAFETY PLAN

Remedial Investigation

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-060

AECOM Inc.
May 2009

Prepared for:
National Grid.

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AECOM Inc.
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Attachment B– Job Safety Analysis Form

Attachment C – Pre-Entry Briefing Attendance Sheet

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1.0 Introduction

1.1 HASP applicability

This Health and Safety Plan (HASP) has been developed by AECOM Environment (AECOM). It establishes the health and safety procedures to minimize potential risk to AECOM and contractor personnel involved with implementing the Remedial Investigation (RI) at the Metropolitan Former Manufactured Gas Plant (MGP) Site located at 124 -136 2nd Avenue in Brooklyn, New York. AECOM is conducting this investigation on behalf of National Grid USA (National Grid).

The provisions of this plan apply to AECOM personnel and AECOM subcontractor personnel who may potentially be exposed to safety and/or health hazards related to activities described in Section 3.0 of this document.

This HASP has been written to comply with the requirements of OSHA's Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). All activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable federal, state, and local health and safety regulations. All contractors and their subcontractors must conform to applicable guidance and regulations, as established by the regulatory agencies in the following documents:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Code of Federal Regulations, Title 29 (29 CFR), Part 1910.120.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910.1200.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910 and Part 1926.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.

Personnel covered by this HASP who cannot or will not comply will be excluded from site activities.

This plan will be distributed to each employee, including all contractor employees, involved with the proposed investigation activities. Each employee must sign a copy of the attached health and safety plan sign-off sheet (see Attachment A).

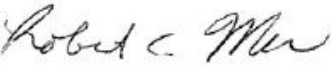
This HASP only pertains to the tasks that are listed in Section 3.0. A task -specific HASP or addendum to this HASP will be developed at a later date for any other subsequent investigative/remedial activities at this Site.

1.2 Health and safety expectations

1.2.1 AECOM Safety Policy

As a leading global provider of environmental, health, and safety (EHS) engineering and consulting services, AECOM is committed in the conduct of our operations to protecting the environment as well as the health and safety of our employees, clients, subcontractors, suppliers, and the communities which we serve. To demonstrate and support this steadfast commitment, AECOM has adopted nine EHS Guiding Principles. It is the expectation and responsibility of each AECOM employee to understand and fully support these Principles in the performance of all work activities. These principles are presented on the next page.

H&S SOP No. 1.1

<p>Environmental Health and Safety Policy</p>	<p>Issue Date: July 2007</p> <p>Approval:  Robert C. Weber President & CEO</p>
<p>As a leading global provider of environmental, health, and safety (EHS) engineering and consulting services, ENSR is committed in the conduct of our operations to protecting the environment as well as the health and safety of our employees, clients, subcontractors, suppliers, and the communities which we serve. To demonstrate and support this steadfast commitment, ENSR has adopted the following EHS Guiding Principles:</p> <ul style="list-style-type: none"> • We will conduct our day-to-day business in a manner consistent with our philosophy that protecting people and the environment is our highest priority and that no aspect of the Company's activities, including expediency and cost, shall ever take precedence; • We will take every reasonable measure to assure a workplace that is free from occupational injuries and illnesses; • We will comply with all relevant EHS legal and other voluntary requirements to which we subscribe; • We will promote environmental sustainability through the efficient use of energy, conservation of natural resources, and prevention of pollution through reuse, recycling, and reduction wherever practical at every stage of our business; • We will rigorously pursue the development and use of environmentally sound and intrinsically safe processes, technology, and management methods in the planning and execution of our services; • We will identify and effectively manage the environmental impacts and health and safety risks caused by our operations; • We will educate our employees and inform our subcontractors, as appropriate, on this Policy and the importance of fulfilling their EHS responsibilities, and will encourage our clients, suppliers, and service partners to commit to similar EHS standards; • We will strive to continually improve our EHS performance by setting and reviewing periodic goals and by regularly conducting assessments to ensure that our EHS programs, procedures, and practices are effectively and consistently implemented; and • We will provide the necessary human, financial, and material resources to adequately implement this Policy. <p>It is the expectation and responsibility of each ENSR employee and subcontractor to understand and fully support this Policy in the performance of all work activities.</p>	

1.2.2 Zero accident goal

The safety goal for this project is zero incidents and zero accidents, with work tasks designed to minimize or eliminate hazards to personnel, equipment, the environment and the general public. No individuals working at this site shall perform tasks that may endanger their own safety and health or that of others.

1.2.3 Stop work authority

Commitment to safety, health, and environmental excellence requires that all work proceed only after it is safe and environmentally sound to do so. The responsibility for ensuring that this takes place rests with every AECOM and contractor employee working at this project location. Effectively meeting these responsibilities depends upon open communication between individuals and their supervisors prior to work beginning, and – in certain cases – after safety, health and/or environmental issues are identified.

The safety and health of on-site personnel will take precedence over cost and schedule considerations for all project work. All AECOM personnel and AECOM contractors have the authority to STOP WORK if they see a potential or actual hazard that may threaten the safety of people or the environment. Upon stopping work, the AECOM Site Safety Officer (SSO) must be immediately notified and provided with information regarding the nature of the safety, health or environmental concern. The SSO will meet with the worker with the intent of resolving the worker's concerns. Once the concerns are resolved to the satisfaction of the worker, work can proceed.

If the concerns are not resolved to the satisfaction of the worker and/or the SSO, work does not proceed. The AECOM Regional Health and Safety Manager (RHSM) will be contacted to obtain assistance in resolving the concerns. Using his/her expertise of safety, health, and environmental rules, regulations, and procedures, the AECOM RHSM will attempt to resolve the matter with all parties involved. Work will not resume until this criterion is met.

1.3 Organization/responsibility

The implementation of health and safety at this project location will be the shared responsibility of the AECOM Project Manager (PM), the Regional Health and Safety Manager (RHSM), Site Safety Officer (SSO), other field staff, and contractor personnel implementing the proposed scope of work.

1.3.1 AECOM project manager

The AECOM PM (Peter Cox) is responsible for ensuring that the overall objectives of the safety program established for this project are met. Some of the PM's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including subcontractor personnel, have received a copy of it;
- Providing the RHSM with updated information regarding conditions at the Site and the scope of site work;
- Assigning a Site Safety Officer for the project and/or for each major field effort that occurs throughout the project;
- Providing adequate authority and resources to the SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO and RHSM;

- Conducting regular project reviews and on-site visits to verify that the components of this safety program are being implemented and to identify any improvements that could be made to increase the project's safety success;
- Ensuring that JSA's have been prepared for the AECOM tasks being implemented and for any additional tasks that AECOM might perform that have not been addressed in this HASP;
- Maintaining regular communications with the SSO and, if necessary, the RHSM;
- Participating as a member of the accident/incident investigation team and ensuring that all identified corrective actions are implemented in a timely fashion;
- Verifying that all contractors selected by AECOM to work on this program have completed AECOM's environmental, health and safety questionnaire (EHSQ) form within the past year and have been deemed acceptable for the proposed scope of work; and,
- Coordinating the activities of all AECOM subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project.

1.3.2 AECOM regional health and safety manager

The AECOM RHSM (Peter Sullivan) is the individual responsible for the preparation, interpretation and modification of this HASP. Modifications to this HASP which may result in less stringent precautions cannot be undertaken by the PM or the SSO without the approval of the RHSM. Specific duties of the RHSM include:

- Writing, approving and amending the HASP for this project;
- Reviewing JSAs that are prepared prior to mobilizing for the various field events covered by this HASP as well as JSAs that are developed to manage change in the field;
- Advising the SSO on matters relating to health and safety;
- Recommending appropriate personal protective equipment (PPE) and safety equipment to protect personnel from potential site hazards;
- Conducting site visits to verify that the components of this HASP and the task-specific JSAs provide the necessary hazard control measures to ensure work is conducted safely and that the project's zero accident goal is achieved;
- Forming accident/incident teams and leading the accident/incident investigations and root cause analysis process; and,
- Maintaining regular contact with the SSO to evaluate site conditions and new information which might require modifications to the HASP.

1.3.3 AECOM site safety officer

AECOM field staff are responsible for implementing the safety requirements specified in this HASP. However, one AECOM employee will serve as the SSO. The PM will appoint a SSO for this program. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including all subcontractors, have submitted a completed copy of the HASP receipt and acceptance form;
- Assuring that all personnel to whom this HASP applies attend and actively participate in a pre-entry briefing and daily safety meetings that are conducted during the implementation of site activities;

- Maintaining a high level of health and safety consciousness among employees implementing the proposed activities;
- Working directly with contractor's SSOs to develop job safety analysis (JSA) to effectively manage change associated with the performance of new work tasks not addressed in this HASP;
- Procuring and distributing the PPE and safety equipment needed for AECOM employees;
- Verifying that all PPE and health and safety equipment used by AECOM is in good working order;
- Verifying that AECOM contractors are prepared with the PPE and safety equipment required for this project;
- Performing the required environmental air monitoring during the proposed activities;
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel, in coordination with the contractor's SSO, to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports in conjunction with AECOM's SSO and contractor representatives (if applicable);
- Conducting the pre-entry briefing and daily safety meetings in conjunction with the contractor's SSO; and,
- Initiating emergency response procedures, in coordination with the contractor's SSO, and in accordance with Section 11.0 of this HASP.

1.3.4 AECOM field personal

All AECOM field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the HASP in its entirety prior to the start of on-site work and bringing forth any questions or concerns regarding the content of the HASP to the AECOM PM or RHSM;
- Submitting a completed HASP Acceptance Form to the AECOM SSO prior to the start of work;
- Complying with the requirements of this HASP and the requests of the SSO;
- Attending and actively participating in the required pre-entry briefing and daily safety meetings that are conducted during the implementation of the program;
- Preparing JSAs that address the hazards associated with any new tasks that are performed on site;
- Stopping work in the event that an immediate danger situation is perceived; and,
- Reporting all accidents, injuries and illnesses, and near misses, regardless of their severity, to the SSO.

1.3.5 Contractors

Contractors working with AECOM to implement the proposed activities are responsible for:

- Reading the HASP in its entirety prior to the start of on-site work;
- Appointing an on-site safety coordinator to interface with the AECOM SSO;

- Attending and actively participating in the required pre-entry briefing prior to beginning on-site work and daily safety meetings that are conducted during the implementation of the program;
- Ensuring, via daily inspections, that their equipment is in good working order;
- Operating their equipment in a safe manner;
- Reporting all accidents, injuries and illnesses, and near misses, regardless of their severity, to the AECOM SSO;
- Stopping work in the event that an immediate danger situation is perceived;
- Providing AECOM with copies of material safety data sheets (MSDS) for all hazardous materials brought on-site; and,
- Providing all the required PPE and safety supplies to their employees.

1.4 Management of change/modification of the HASP

1.4.1 Management of change

The procedures in this HASP have been developed based on site history, previous site investigations and the proposed scope of work. Every effort has been made to address the chemical and physical hazards that may be encountered during the implementation of the proposed investigative activities. However, unanticipated site-specific conditions or situations may occur during the implementation of this project. Also, AECOM and their selected contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered **a working document** that is subject to change to meet the needs of this dynamic project.

AECOM and their selected contractors will complete a JSA when new tasks or different investigative techniques not addressed in the HASP are proposed. The use of new techniques will be reviewed and if new hazards are associated with the proposed changes, they will be documented on the JSA form. An effective control measure must also be identified for each new hazard. JSA forms will be reviewed by the SSO prior to being implemented. Once approved, the completed forms will be reviewed with all field staff during the daily safety meeting. A blank JSA form is presented as Attachment B.

1.4.2 HASP modification

Should significant information become available regarding potential on-site hazards, it may be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the RHSM before such modifications are implemented. Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the PM. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

2.0 Site description and history

2.1 Site location

The Metropolitan Former MGP site is located at 124 -136 2nd Avenue in Brooklyn, Kings County, New York. The site is located east of the Gowanus Canal, between the Gowanus Expressway (Highway 278) and the New York City Transit train bridge and associated subway rail line. The site is bounded by 10th Street and 11th Street to the north, 2nd Avenue to the east, 13th Street to the south and the Gowanus Canal to the west.

A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. This plan covers activities for those portions of the site that were not addressed by the previous remedial/redevelopment activities. The "Current Site" is comprised of seven parcels including:

- Block 1007 Lot 172 – Hamilton Plaza including a large grocery store (Pathmark) and small retail shops
- Block 1007 Lot 269 – Part of retail plaza
- Block 1025 Lot 16 – Parking lot of retail plaza
- Block 1025 Lot 18 – Parking lot of retail plaza
- Block 1025 Lot 20 – Parking lot of retail plaza
- Block 1025 Lot 100 – Retail parking lot selling used automobiles
- Block 1025 Lot 26 – Two-story maintenance garage/retail offices

2.2 Site history

A review of the historical information available for the Metropolitan former MGP site (Current Site and previously remediated areas) has been performed with the results summarized in a report prepared by Nelson, Pope & Voorhis, LLC (NP&V) entitled "*Phase I Environmental Site Assessment*", dated May 15, 1997 (NP&V, 2003). The report included a review of the historic Sanborn Fire Insurance maps for the site as well as other available information (including tax records, zoning records, and United States Geologic Society (USGS) Topographic Maps). The following section discusses site usage based on a review of Sanborn maps covering the 110 year period of 1886 through 1996.

In 1886, portions of current Block 1007 (the block bounded by 2nd Avenue, 9th Street, 12th Street and the Gowanus Canal) were occupied by the Metropolitan Gas Light Company (listed as storage only on the 1886 Sanborn map). Buildings included a coal shed, gasometer (No. 1 holder), and retorts. By 1904, the site was identified as the Metropolitan Works Branch, owned by BUG, and the MGP had been expanded to the east to include two additional holders (Holders 2 and 3) with gas manufacture infrastructure in the western portion of the site (closer to the canal) having been improved.

Historical records suggest that the site operated as a coal gas plant prior to 1915, by which time the plant appears to have been converted to a carbureted water gas process, an additional hydrogen holder (Holder 4) as well as oil storage tanks, located east of Holder 2, being present. By 1915, the facility had been expanded south onto a portion of Block 1025 (the block bounded by 12th Street, 13th Street, 2nd Avenue and the Gowanus Canal), where a large distribution holder (Holder 5) was located. An asphalt plant (Brooklyn Alcatraz Asphalt Company) is shown to be located adjacent to the former MGP on two separate parcels.

By 1938, most of the operating structures and Holders 1 through 3 had been removed and the site was listed as the BUG "12th Street Holder Department", suggesting that gas manufacturing had ceased and the site was used for gas storage only. At this time, the Ernst Zobel Pitch Paint Manufacturing Plant was reportedly in operation adjacent to and northeast of the site. However, the adjacent Brooklyn Alcatraz Asphalt Company was no longer in operation.

By 1950, the north-eastern portion of the former MGP was listed as housing the US Post Office Garage and Repair shop, with some former MGP structures (a coal bunker where relief Holder 4 was previously located and a boiler house) still existing closer to the Gowanus Canal on the western portion of the site. The southern portion of the former MGP still housed Holder 5 and the exhaust house, with the parcel listed as a storage area for old electric cables.

By 1969, all former MGP structures had been removed from the surface of Block 1007, and a food products warehouse was present adjacent to the Gowanus Canal, in the western section of the former MGP. However BUG was still listed as the owner of the parcels on Block 1025, where Holder 5 was still present. By 1972, all structures from the former MGP had been removed from the surface of the site. Sanborn maps from 1982 through 1996 show no major changes in site usage, with the US Postal Service, the food products warehouse, and parking covering the footprint of the former MGP.

The eastern portion of the MGP (Block 1007, Lots 219 and 220) and two adjacent parcels (Block 1007, Lots 1 and 218) were investigated and remediated through extensive excavation of the former oil tanks and Holders 1 through 3. In addition, approximately 44 recovery wells were installed to allow recovery of free phase non-aqueous phase liquid (NAPL). This work, completed in 2003 by FC Gowanus, LLC, allowed the eastern portion of the former MGP and the two adjacent parcels to be closed under NYSDEC oversight in September 2003. The remediation/closure of these areas, with subsequent redevelopment as a Lowe's Supply Store, provides the basis for the definition of the Current Site. Recent information on the Current Site is limited to a Tank Closure Report and a Phase II, both dated 2007, for a maintenance and garage facility (Block 1025, Lot 26 [60 12th Street]).

3.0 Scope of work

3.1 Purpose of investigation

The overall objective for the proposed remedial investigation is to complete the investigation of the remaining site areas and lay the groundwork for the selection of site remedy.

As indicated previously, the southern half of the main MGP parcel was investigated and remediated. The remaining portions of the MGP will be investigated during this RI. The key features of the former MGP to be investigated include:

- The former MGP structures on the western portion of the main MGP parcel where the Hamilton Plaza is currently located.
- The southern portion of the former MGP, which housed Holder 5 and additional gas storage (valve house) facilities.
- The areas west of Holder 5 that previously housed the Brooklyn Alcatraz Asphalt Company.
- Along 12th Street between the Gowanus Canal and 2nd Avenue, adjacent to several former MGP structures.
- One upgradient area with suspected impacts near the intersection of 12th Street and 2nd Avenue, and,
- The downgradient property boundary areas along 13th Street and the Gowanus Canal.

3.2 Field investigation

The field activities being conducted during the proposed remedial investigation include:

- Excavation of test pits in and around former Gas Holder No 5 using a backhoe or excavator;
- Collection of soil samples from each test pit for field screening using a photoionization detector (PID) and subsequent laboratory analyses;
- Advancement of subsurface soil borings to varying depths {maximum 70 feet below ground surface (bgs)} across the site using either rotosonic or hollow-stem auger drilling methods and possibly direct push drilling methods in areas with access limitations;
- Collection of surface soil and subsurface soil samples for field screening and laboratory analyses;
- Conversion of nine borings into overburden groundwater monitoring wells;
- Development of each newly installed groundwater monitoring well;
- Gauging of each newly installed and select existing groundwater monitoring wells for non-aqueous phase liquids (NAPL) prior to sampling;
- Collection of groundwater samples from all newly installed monitoring wells using low-flow techniques with a peristaltic or submersible pump;
- Conducting hydraulic conductivity test (i.e. slug test) on at least three monitoring wells; and,
- Collection of sub-slab soil vapor samples from immediately below the concrete floor slabs inside two on-site buildings, as well as three corresponding indoor air and one outside ambient air sample.

4.0 Chemical hazard assessment and control

4.1 Chemical hazards

Typical wastes associated with former MGP operations could include volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), tar-like materials, purifier box wastes (potentially containing cyanide complexes and compounds) and certain trace metals associated with ash and clinkers.

4.1.1 Volatile organic compounds

The VOCs associated with MGP wastes include BTEX. Exposure to the vapors of BTEX above their respective OSHA permissible exposure limits (PELs) may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system (CNS). Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behaviors.

Prolonged overexposure to benzene vapors has detrimental effects on the blood-forming system ranging from anemia to leukemia. The PEL for benzene is 1 part per million (ppm), as an 8 hour time-weighted average (TWA). The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 0.5 ppm. The OSHA PEL for ethylbenzene is 100 ppm, as an 8-hr TWA. The PEL for toluene is 200 ppm, as an 8-hr TWA; however, the ACGIH recommends a TLV of 10 ppm for toluene. Xylene is a flammable, colorless liquid with an OSHA PEL of 100 ppm, as an 8-hour TWA.

4.1.2 Polycyclic aromatic hydrocarbons

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

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

4.1.3 Oxide box wastes

Blue staining is the characteristic associated with the presence of oxide box wastes (ferrocyanide). Therefore, the presence of this material is very easily identified during field investigations. The cyanides associated with oxide box wastes are present in a form that is generally unavailable or complexed with metals such as iron, which makes the cyanide more stable. Thus, the reported effects of free cyanide are not applicable. OSHA has not established a PEL for ferro/ferri cyanide compounds. Similarly, the ACGIH has not recommended a TLV for these compounds.

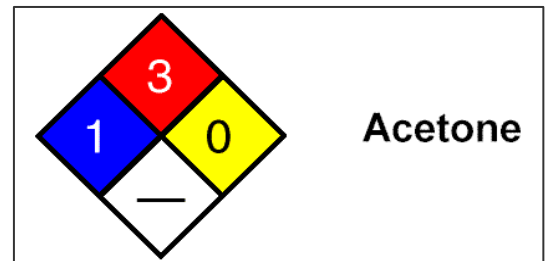
4.1.4 Metals

Lead is a common component of urban fill and soils present at industrial sites, such as former MGP and electrical generating sites. In general, the inhalation of metal dusts is irritating to the upper respiratory tract and nasal mucous membranes. Most metal dusts may cause dermatitis and/or eye irritation. The early symptoms of lead poisoning, as a result of overexposure (either through ingestion or inhalation) include fatigue, sleep disturbance, headache, aching bones and muscles, digestive irregularities, abdominal pains, and decreased appetite. Chronic overexposures to lead affect the CNS and male and female reproductive systems. Lead has also been identified as a fetotoxin. The OSHA PEL for inorganic lead is 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), as an 8-hr TWA.

4.2 Hazardous substances brought on-site by AECOM and/or contractors

A material safety data sheet (MSDS) must be available for each hazardous substance that AECOM or AECOM contractors bring on the property. This includes solutions/chemicals that will be used to decontaminate sampling equipment, fuels, and calibration gases for air monitoring equipment.

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



4.3 Chemical exposure and control

4.3.1 Chemical exposure potential

The proposed investigation locations were selected to target areas most likely to contain MGP residuals or delineate the extent of previously identified soil and groundwater impacts. As such, the field team should be prepared to encounter contamination during the proposed investigation of the property. The most likely routes of potential chemical exposure during the implementation of this field program include the following:

- Inhalation of VOC vapors and impacted dusts during soil boring advancement and well installation, as well as during the excavation of test pits and/or the installation of soil gas vapor probes.
- Direct dermal contact with potentially contaminated soils and groundwater during sampling.
- Direct dermal contact with NAPL (if encountered) during well gauging, the collection of NAPL samples and/or oil-saturated soil samples

4.3.2 Chemical Exposure Control

The potential chemical hazards associated with the proposed activities can be controlled in several ways, including:

- Direct-reading air monitoring instrumentation will be used, as described in Section 6.0 of this HASP, to determine the concentration of VOC vapors that may be present in the work area and in the employee's breathing zone during intrusive site activities as described above. If necessary, respiratory protection, as defined in Section 7.2 of this HASP, may be donned to control employee exposure to the vapors of VOCs.
- Dusts from contaminated soils may be generated during intrusive site activities. If necessary, a light mist of water can be applied to the borehole or excavation to suppress dust generation. A MIE Data-

Ram total dust monitor, or its equivalent, will be used to monitor the effectiveness of these engineering controls and to determine if respiratory protection is required.

- Polyethylene sheeting will be placed over any soil stockpiles to prevent vapor release as well as dust generation.
- All work conducted inside buildings will be performed using electric drilling devices so that exhaust gases from internal combustion engines will not accumulate within any occupied tenant space or public access area.
- To avoid direct dermal contact with contaminated media, protective clothing, as described in Section 7.1, will be required when handling and collecting samples .
- Although highly unlikely, exposure to all of the contaminants of concern may occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 9.0 address personal hygiene issues that will limit the potential for contaminant ingestion.

5.0 Physical hazards and controls

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

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

5.1 Utility hazards

5.1.1 Underground utilities

New York law requires that a utility clearance be performed at the site at least 48 hours prior to initiation of any subsurface work. The drilling and excavation contractors will contact NYC/LI One Call Dig Safely (1.800.272.4480) to request a mark-out of natural gas, electric, telephone, and cable television, in the proposed test pit and soil boring areas. Indoor sub-slab vapor sampling locations must also be included in this request. The contractor will also contact the local water and sewer authorities to request a mark out of any lines in the proposed work areas.

Public utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the contractor must exercise due diligence and try to identify the location of any private utilities at the work areas. Due diligence can be fulfilled in several ways, including:

- obtaining as-built drawings for the areas where subsurface work is being conducted from the property owner(s);
- visually reviewing each proposed subsurface work area with the property owner(s) or knowledgeable site representative(s);
- performing a geophysical survey to locate utilities or hiring a private line locating firm to determine the location of utility lines that are present at the property;
- identifying a no-drill/no-dig zone; or
- hand digging in the proposed subsurface locations if insufficient data is available to accurately determine the location of the utility lines.

For this program, following the NYC/LI One Call Dig Safely mark-out request and a review of all available site plans, AECOM will contact a private company to conduct a geophysical investigation to locate subsurface utility lines in the proposed investigative areas. As a final measure of due diligence to safely advance the proposed soil borings, the first five feet of each boring will be advanced using hand method or vacuum extraction methods.

5.1.2 Overhead utility hazards

Contractors must perform a site reconnaissance at each work location to identify all overhead lines located in and around the work areas and to determine if the minimum clearance requirements can be met. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill rig, crane etc.) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

If the required clearance cannot be maintained at any work area at the site, additional precautions must be taken to ensure contact with the overhead lines does not occur. Options include, but may not be limited to, de-energizing the line or placing an insulating barrier over the line. Both of these options will require coordination with the owner of the lines in question.

5.2 Working inside buildings to conduct sub-slab vapor sampling

Following utility clearance, sub-slab soil vapor samples will be collected immediately below the concrete floor slabs of two on-site buildings. The soil vapor sampling points will be installed by drilling a 3/4-inch diameter hole through the concrete slab. Indoor air samples will also be collected at the same location as the sub-slab samples.

AECOM representatives will work with the building owners to ensure that the sampling being conducted inside their properties will not interfere with ongoing operations but that will also ensure that sample integrity is maintained. If necessary, AECOM will set up a small exclusion zone around each indoor sampling area so employees of the facility as well as patrons and visitors do not trip, slip or fall over the sampling equipment or otherwise potentially interfere with the sampling process.

5.3 Slips, trips and fall hazards

5.3.1 Site conditions

On any work area, it is expected that the ground may be uneven. The ground surface may be unreliable due to settling. Surface debris may be present and wet or swampy areas may exist.

To avoid the potential for slip, trips and falls, employees must wear sturdy footwear. Additionally, employees should walk around, not over or on top of, debris or trash piles. When carrying equipment, identify a path that is clear of any obstructions. It may be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

5.3.2 Good housekeeping

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

- orderly placement of materials, tools and equipment;
- placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and,
- awareness on the part of all employees to walk around, not over or on, equipment that may have be stored in the work area

The SSO will conduct regular inspections of each work area with the Contractor's SSO to verify that each drilling area is being maintained in an orderly fashion and that materials are being stored in the dedicated areas so that tripping hazards are minimized.

5.4 Traffic hazards

The proposed investigative areas include paved areas used for parking and/or sidewalk right-of-ways along 12th Street. Each presents unique safety hazards that are addressed below.

5.4.1 Pedestrian Walkways on 12th Street

AECOM will ensure that temporary pedestrian walkways are established when work is conducted on 12th Street. The walkway will, to the extent possible, re-route pedestrians away from the drilling areas while still allowing access to the plaza and other businesses in the area.

5.4.2 Parking lots

Much of the proposed work is taking place in the parking areas of the retail plaza. As such, motor vehicle traffic will be a significant hazard for the field teams. When working in high traffic areas, AECOM should:

- Notify the property owner of the proposed work location, dates of work and the anticipated work times. AECOM should suggest the possibility of a detour around the work area.
- All employees working in high traffic areas will wear an ANSI-approved Class II safety vest.
- Create an exclusion zone around the work area by setting up traffic barriers and/or cones at least 50 feet in front of the work area. "Men at Work" signs should also be placed in a conspicuous area to warn others of your presence.

5.5 Drilling hazards

A variety of drilling techniques may be used to install soil borings and groundwater monitoring wells including direct-push techniques using a Geoprobe™ rig, hollow-stem auger drilling and/or rotosonic drilling.

5.5.1 Geoprobe™ hazards

Use of the Geoprobe™ System to collect soil samples will require all personnel in the vicinity of the operating unit to wear steel-toed boots, hardhats, hearing protection, and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- A remote vehicle ignition is located on the control panel of the Geoprobe™ unit. This allows the operator to start and stop the vehicle engine from the rear. This device must be tested prior to job initiation and periodically thereafter. All employees should be aware of how to access and operate the rear ignition.
- The driller must never leave the controls while the probe is being driven.
- Drillers, helpers, and geologists must secure all loose clothing when in the vicinity of drilling operations.
- The Geoprobe™ vehicle shall not be moved any distance with the probe in the extended position. Check for clearance at roof or the vehicle before folding the Geoprobe™ out of the carrier vehicle.
- Be sure the parking brake is set before probing.

- Never allow the derrick foot to be lifted more than 6" off of the ground surface.
- Deactivate hydraulics when adding or removing probe rods, anvils, or any tool in the hammer.
- Verify that all threaded parts are completely threaded together before probing.

5.5.2 Auger Drilling

Use of a drill rig to advance soil borings and install monitoring wells will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools which could rotate, the driller must shut down the rig prior to initiating such work.
- Drillers, helpers and geologists must secure all loose clothing when in the vicinity of drilling operations.
- Only equipment which has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed
- No person shall climb the drill mast while tools are rotating.
- No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder which meets the requirements of OSHA standards.

5.5.3 Sonic Drilling

The hazards of sonic drilling are unique. The lead driller will review the JSAs the drilling firm has prepared for this type of drilling with the AECOM environmental technician overseeing the drilling during the morning safety meetings to ensure that the technician is aware of the hazards associated with sonic drilling oversight.

5.6 Excavation hazards

5.6.1 Working around machinery

Heavy equipment, including bobcats or excavators, will be used to excavate test pits. The use of such equipment poses a potential hazard to the support crew working around the equipment. Use of heavy equipment at the site requires AECOM employees working in the exclusion zone to wear ANSI-approved hard hats, steel-toed safety shoes/boots, safety glasses, hearing protection and ANSI-approved traffic vests.

AECOM employees will be conducting monitoring and sampling during test-pitting activities and may be located in close proximity to the operating machinery. When working around heavy equipment, employees should:

- make sure that the operator is aware of your presence/activities;
- stay in the operator's line of sight, don't work in his/her blind spot;
- develop a series of hand signals to facilitate communication with the operator;
- approach areas where equipment is operating from a direction visible to the operator;
- be aware of the swing radius of the excavator;
- do not walk or work underneath loads handled by digging equipment;
- do not ride in buckets of loaders; and,
- stand away from soil stockpile areas to avoid being struck by any spillage or falling materials

5.6.2 Trench/excavation cave-in or collapse

The expected depth of the test pits will exceed five feet ground surface (bgs). Due to the potential for cave-in and collapse, all samples collected from the test pits will be done so with a remote sampling device or collected directly from the bucket of the backhoe. This eliminates the need for employees to enter the excavation or trench. **NO AECOM EMPLOYEE WILL ENTER A TEST PIT TO COLLECT ANY SAMPLES.**

5.6.3 Open excavations

To the extent possible, all excavations should be backfilled as soon as possible after work is completed. If excavations are to be left open, the perimeter of the excavation will be marked with high-visibility snow fencing. Additional protection, such as the use of metal plates, may be required by the facility, depending on where the open excavation is located.

5.7 Noise exposure

The use of drill rig or excavation equipment may expose the field team to noise levels that exceed the OSHA PEL of 90 dB for an 8-hour day. Exposure to noise can result in the following:

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

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 dB.

5.8 Hand and power tools

A variety of hand and power tools may be used during the proposed activities. The use of each can pose serious safety hazards to the user.

5.8.1 Hand tools

The greatest hazards posed by hand tools result from misuse and improper maintenance.

- When using hand tools be sure you have selected the right tool for the job. If a screwdriver is used as a chisel, the tip of the screwdriver may break or fly off, hitting the user or others.
- Inspect tools for damage such as mushroomed chisel heads or broken hammer handles. If jaws of a wrench are sprung, the wrench may slip. If a wooden handle is loose, splintered or cracked, the head of the tool may fly off.
- Do not use damaged tools.
- Be sure you know how to use the tool you are working with.

5.8.2 Using knives or blades

Geoprobe™ soil samples are contained within an acetate liner that must be cut open in order to retrieve the sample. As such, employees are at an increased risk of cutting themselves since a knife or blade is typically used to open the liner and the liner is often placed on an irregular or unstable work surface (i.e., the back of the Geoprobe™ van or the ground). However, a hooked knife is typically used to cut the liners open which will reduce the potential for being cut.

Additionally, a knife must be used to open boxes of materials or equipment and to cut groundwater sampling tubing. The only acceptable type of utility knife will be those with automatically retracting blades.

When using knives or blades, follow the safety precautions listed below:

- Keep your free hand out of the way when cutting.
- Secure whatever it is you are cutting, especially if it is located on an uneven surface.
- Use only sharp blades; dull blades require more force which results in less knife control.
- Pull the knife toward you; pulling motions are easier to manage.
- Don't put your knife in your pocket.
- Wear leather or Kevlar™ gloves when using knives or blades.

5.8.3 Power tools

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords away from heat, oil and sharp edges.
- Disconnect tools when not using them, before servicing or cleaning them and when changing accessories such as blades, bits and cutters.
- If a tool is only temporarily being removed from the power source and the cord is not in the immediate control of the user, it is strongly suggested that a cord plug lockout be used to prevent the tool from accidentally being re-plugged in.
- Secure work with clamps or vise, freeing up both hands to operate the tool.

- Avoid accidental starting. Do not hold fingers on the switch button when carrying a plugged-in tool.
- Keep tools sharp and clean for best performance.
- Wear appropriate clothing. Loose clothing or jewelry can become caught in moving parts.
- Keep all guards in place.

5.8.4 Electric tools

A variety of power tools may also be used during the proposed activities. When using portable tools that are electrically powered, follow the safety precautions listed below:

- Check to see that electrical outlets used to supply power during field operations is of the three wire grounding type.
- Extension cords used for field operations should be of the three wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO or SJTO.
- NEVER remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings or floors.
- Protect the cord from becoming damaged if the cord is run through doorways, windows or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades **MUST BE REMOVED** from service immediately.
- All portable or temporary wiring which is used outdoors or in other potentially wet or damp locations must be connected to a circuit that is protected by a ground fault circuit interrupter (GFCI). GFCI's are available as permanently installed outlets, as plug-in adapters and as extension cord outlet boxes. **DO NOT CONTINUE TO USE A PIECE OF EQUIPMENT OR EXTENSION CORD THAT CAUSES A GFCI TO TRIP.**
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.
- Do not touch a victim who is still in contact with current. Separate the victim from the source using a dry, nonmetallic item such as a broomstick or cardboard box. Be sure your hands are dry and you are standing on a dry surface. Turn off the main electrical power switch and then begin rescue efforts.

5.9 Generator safety

Generators may be needed to provide power to equipment being used on site. When using a generator, follow these safety guidelines:

- Make sure the wattage of the generator is sufficient for your project needs;
- Make sure the voltage rating of the generator matches the rating of the equipment you need to operate;
- Gasoline and its vapors may ignite if they come in contact with hot components or an electrical spark. Turn the generator off and make sure it has cooled down (i.e. 10-minutes) before re-fueling. Do not refuel when the generator is running or hot. Smoking is not permitted during refueling operations or in the vicinity of any diesel-fueled equipment

- Properly ground the generator
- Keep water away from the generator. Protect it from rain.
- Use a heavy-duty, three-prong, grounded extension cord.

5.10 Materials handling

5.10.1 Mechanical devices for safe lifting

All drums and containers of investigation-derived waste should be lifted and transported using drum dollies, hand carts, or other devices that remove the potential for employee back injury. This will also help reduce the potential for the containers to become ruptured or damaged during transport.

5.10.2 Back safety during manual lifting

The following precautions should be implemented when mechanical devices are not available to move materials:

- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards.

5.11 Thermal stress

The proposed activities are scheduled for Summer 2009. However, since the exact dates of field work are not known, the hazards of both heat and cold stress are addressed in this HASP.

5.11.1 Heat stress

Types of heat stress

Heat related problems include **heat rash, fainting, heat cramps, heat exhaustion and heat stroke**. **Heat rash** can occur when sweat isn't allowed to evaporate, leaving the skin wet most of the time and making it subject to irritation. **Fainting** may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time. **Heat cramps** are painful spasms of the muscles due to excessive salt loss associated with profuse sweating. **Heat exhaustion** results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea and headache.

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

Early Symptoms of Heat-Related Health Problems:

- decline in task performance
- un-coordination
- decline in alertness
- unsteady walk
- excessive fatigue
- reduced vigilance
- muscle cramps
- dizziness

Susceptibility to Heat Stress Increases due to:

- lack of physical fitness
- lack of acclimation
- increased age
- dehydration
- obesity
- drug or alcohol use
- sunburn
- infection

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

The effect of personal protective equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to avoid heat stress:

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

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

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the project manager, on-site field coordinator, and health and safety officer. Potable water and fruit juices should be made available each day for the field team.

Heat stress monitoring techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method: Check radial pulse rates by using fore-and middle fingers and applying light pressure to the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beat/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, shorten the work cycle by one-third.

5.11.2 Cold stress

Types of cold stress

Cold injury is classified as either localized, as in frostbite, frostnip or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30° F. When fluids around the cells of the body tissue freeze, skin turns white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of cold stress

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

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

Maximum severe shivering develops when the body temperature has fallen to 95° F. Productive physical and mental work is limited when severe shivering occurs. Shivering is a serious sign of danger. Immediately remove any person who is shivering from the cold.

Methods to prevent cold stress

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

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

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

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

6.0 Air monitoring

6.1 Work zone monitoring

There are two main potential routes of exposure to the compounds of concern. The vapor pressure of PAHs, and metals is negligible. Therefore, the inhalation of PAH or metal vapors is not a concern. However, the inhalation of PAH and/or metal-impacted dusts is a concern as the potential for dust generation may occur during rotary drilling and test pitting, especially if site soils are dry. The VOCs associated with MGP wastes are volatile enough to pose a potential vapor hazard to those working in the immediate drilling and excavation areas. Therefore, monitoring in the worker's breathing zone will be conducted to ensure that the concentrations of total VOC vapors and airborne dusts, if any, are maintained at safe levels during all subsurface field investigations.

6.1.1 VOC monitoring/benzene

A photoionization detector (PID), such as a RaeSystems MiniRae 2000 PID equipped with a 10.6 eV lamp or equivalent, will be used to screen the breathing zone of employees during all subsurface investigations as site conditions warrant but no less than at least once every hour. If breathing zone concentrations of total VOCs are sustained (15 minutes) at 1 unit above background, a measurement will be made for the presence of benzene using a colorimetric detector tube. In the absence of benzene, respiratory protection will be donned if total VOC concentration is sustained at 10 units as indicated by the PID. If benzene is present at concentrations of 1 ppm or more as indicated by the detector tube, respiratory protection will be donned. Requirements for respiratory protection are outlined in Section 7.2 of this HASP.

6.1.2 Dust monitoring

Dust control measures, as described in this HASP, will be implemented to prevent and/or control the concentration of airborne dust levels during the subsurface activities. A MIE Data-Ram total dust monitor, or its equivalent, will be used to monitor the effectiveness of these engineering controls and to determine if measures to mitigate the dust are effective and/or if respiratory protection is required.

An action level of 150 $\mu\text{g}/\text{m}^3$ has been established for total dust (sustained downwind at breathing zone for 15-minutes). The total dust monitor will be used to determine that total dust levels upwind and downwind of the work area.

6.2 Personal exposure monitoring

Personal exposure monitoring will not be conducted during the proposed remedial investigations.

6.3 Calibration and recordkeeping

Equipment used by AECOM will be calibrated in accordance with the quality assurance plan and AECOM's standard operating procedures. The PID will be calibrated to an isobutylene-in-air mixture. The dust monitor will be zeroed daily. All calibrations will be recorded in a field notebook or separate equipment calibration sheets.

6.4 Community air monitoring program

The Community Air Monitoring Plan (CAMP) is provided as Appendix E in the Remedial Investigation Work Plan. The CAMP includes provisions for monitoring for VOCs and particulates (as total dust) at the downwind

perimeter of each designated work area when subsurface investigative activities are taking place. The CAMP specifies action levels which require increased monitoring, corrective actions to abate emissions, and/or work shutdown during the proposed intrusive activities.

7.0 Personal protective equipment

Personal protective equipment (PPE) will be worn during these activities to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. Given the congested and high traffic nature of the site, all workers will wear an ANSI-approved Class II safety vest at all times. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the site's chemical contaminants.

7.1 Protective Clothing

PPE Item	Advance Soil Borings/Install Monitoring Wells	Excavation of Test Pits	Soil Sampling	Well Development and Water Level Gauging	Groundwater Sample Collection and Slug Testing	Sub-Slab Soil Vapor and Indoor Air Sampling
Hard Hat	✓	✓	✓	If the facility requires such	If the facility requires such	If the facility requires such
Steel Toed Safety Shoes	✓	✓	✓	✓	✓	Waterproof if necessary
Safety Glasses with Sideshields	✓	✓	✓	✓	✓	✓
ANSI-approved Class II safety vest	✓	✓	✓	✓	✓	✓
Disposable nitrile gloves			✓	✓	✓	
Kevlar gloves	When handling drill rods		When cutting open acetate liners		When cutting tubing	When installing probes and cutting tubing
Hearing Protection	✓	✓	If working near operating rig or excavator			✓

7.2 Respiratory protection

As described in Section 6.1 of this HASP, direct reading instrumentation will be used to screen the breathing zone of employees during subsurface investigations and sampling activities. Exceedance of the following action limits will require that work be temporarily stopped and cause of the exceedance assessed. If the cause of the condition can be isolated such that the condition no longer persists or the activity that produced the exceedance can be modified to prevent future exceedance, then the work can continue in Level D PPE. If these alternatives cannot be realized then wearing of Level C respiratory protection will be required, as described below.

Contaminant	Action Limit (Sustained for 15 minutes)	Respirator Selection
Total VOCs (in the absence of benzene as determined by colorimetric indicator tube)	10 units on PID	Half-mask air-purifying respirator (APR) with organic vapor cartridges.
Benzene (as indicated by colorimetric indicator tube)	1 ppm to 10 ppm	Half-mask air-purifying respirator (APR) with organic vapor cartridges.
	> 10 ppm	Suspend work and contact PM and RISM.
Dust	150 $\mu\text{g}/\text{m}^3$	Apply light mist of water to borehole. If engineering controls are not sufficient, don half-mask APR with P-100 filters.

Level C Specification – Half-mask air-purifying respirator equipped with organic vapor cartridges and P-100 filters

All employees who are expected to wear respirators must have successfully passed a qualitative fit-test within the past year for the brand, model and size respirator they plan to wear for this program. Proof of medical clearance to wear respirator and current fit test documentation must be provided to the SSO upon arrival to the site.

7.3 Other safety equipment

The following additional safety items will be available at the site:

- Portable, hand-held eyewash bottles
- Personal hygiene materials, e.g., hand wipes, paper towels, etc.
- First aid kit
- Type A-B:C fire extinguisher (on drill rig)
- Portable phones/radios

If a trailer is provided onsite for employee occupation, it will be equipped with fire extinguishers, appropriate signage (e.g. "EXIT" and "No Smoking"), and will meet code/safety requirements for placement at the site.

8.0 Site control

8.1 Designation of zones

AECOM designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November 1985. They recommend that the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone,
- Contamination Reduction Zone (CRZ), and
- Support Zone.

8.1.1 Exclusion zone

An exclusion zone will be established around each exterior and interior subsurface activity location as well as each sampling location. The perimeter of the exclusion zone will be marked with traffic barriers, traffic cones and/or caution tape. All personnel entering these areas must wear the prescribed level of protective equipment.

8.1.2 Contamination reduction zone

A mini-contamination reduction zone (CRZ) will be established immediately adjacent to each exclusion zone to facilitate prompt removal of contaminated PPE. This is where personnel will begin the sequential decontamination process when exiting the exclusion zone. To prevent cross contamination and for accountability purposes, all personnel will enter and leave the exclusion zone through the contamination reduction zone. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of.

8.1.3 Support zone

At this site, the support zone will include the area outside of the exclusion zone.

8.2 General site safety practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- AECOM personnel should avoid working alone on remote sites. On most sites, client, subcontractor, or public personnel are generally nearby in case of an emergency or accident. AECOM personnel, through coordination, can rely upon these personnel for assistance in an emergency. If no one else is nearby, scheduled calls on a cell phone may be used to assure personal safety.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in work areas.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.

- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.

8.3 Project communications plan

A call-in protocol has been established for this program. This call-in procedure is MANDATORY as it is the primary mechanism being used to verify that all AECOM employees have safely arrived at, and safely exited, their work areas.

Similar to a float plan that is created each time a boat leaves dock, a communication plan will detail when the individual or remote field team will call into the PM as a way to verify that the individual/team has made it to their destination, is continuing to work in safe conditions, has left the job site and has arrived back home safely.

The PM will create a communication protocol, similar to that described above, that identifies when the individual or team will call-in to the Project Manager. The plan will also outline what the PM will do in the event that the individual/team does not call-in within 1/2 hr of the designated call-in time (PM calls individual/team) and what the response will be if the individual/team does not respond to the PMs call to the individual/team (contact client, property owner, local police or emergency responders).

9.0 Decontamination

9.1 Personal decontamination

Proper decontamination is required of all personnel before leaving the exclusion zone. Decontamination will occur within the contamination reduction zone. Disposable PPE, such as gloves, will be removed in the decontamination reduction zone and placed in garbage bags for disposal as general refuse.

Regardless of the type of decontamination system required, as a minimum, a container of potable water and liquid soap should be made available so employees can wash their hands and face before leaving the site for lunch or for the day. Employees should always wash their face and hands with soap and water before eating, smoking or drinking.

9.2 Sampling equipment

Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, interface probes, *etc.*) will be either steam cleaned or washed with potable water and a phosphate-free detergent (such as Alconox™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, *etc.* The sampling equipment will then be rinsed with potable water followed by a deionized water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground. Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

9.3 Investigation derived waste

All investigative waste generated during the RI will be collected in properly labeled USDOT approved storage containers (55-gallon drums) or a small bulk roll-off container and grouped by environmental matrix (soil, water, plastic/PPE, construction debris) drill cuttings that are generated during this program will be drummed and labeled as investigation derived waste. Final disposal of this material will be determined after receipt of analytical data.

10.0 Medical monitoring and training requirements

10.1 Medical monitoring

All personnel performing activities covered by this HASP must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance examination and/or an initial baseline examination within the last year prior to performing any work on the site covered by this HASP.

10.2 Health and safety training

10.2.1 HAZWOPER

All personnel performing activities covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120 (e). Each individual must have completed an annual 8-hour refresher training course and/or initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

On-site managers and supervisors directly responsible for supervising individuals engaged in hazardous waste operations must have completed the specified 8-hour managers training course. (Note that AECOM corporate policy requires that whenever three or more AECOM employees are performing work on the same site, at least one of these individuals must have completed the manager's training course.)

10.2.2 First aid/CPR

At least one member of the AECOM field team must be currently certified in First Aid and CPR. All AECOM staff currently certified to provide First Aid and CPR are trained in the provisions of AECOM's Exposure Control Plan for Bloodborne Pathogens and will be prepared to implement those provisions in the event of an on-site emergency.

10.2.3 Hazard communication

All employees working on site will be advised of the associated hazards and the methodology to be utilized to mitigate those hazards and prevent exposures. This information will be presented to personnel prior to initiation of any field activities. The following information regarding hazardous materials will be presented to site workers per OSHA's Hazard Communication Program:

- Chemical/physical hazards of site contaminants and decontamination solvents and other hazardous materials brought on site;
- Appropriate PPE for protection from exposure to site contaminants and decontamination solvents;
- Review of MSDS and discussion about where MSDSs will be maintained on site; and
- Container labeling requirements and review of the NFPA labeling system.

10.3 On-site safety meetings

10.3.1 Pre-entry briefing

A pre-entry briefing will be conducted by the SSO to review the specific requirements of this HASP prior to the commencement of on-site activities. Attendance of the pre-entry meeting is mandatory for all personnel covered by this HASP and must be documented on the attendance form provided in Attachment C. HASP sign-off sheets should also be collected at the time of the pre-entry briefing. All documentation should be maintained in the project file.

The pre-entry briefing must be completed for each new employee before they begin work at the site. Short safety refresher meetings will be conducted, as needed, throughout the duration of the project. Specific topics that will be discussed during the pre-entry briefing include:

- Discussion of site responsibilities and project expectations
- Review of site history and contaminants of concern
- Discussion of work scope
- Review of the potential chemical hazards associated with contaminants of concern and how these potential hazards will be controlled
- Review of air monitoring requirements and action limits
- Review of PPE and engineering control requirements
- Review of respiratory protection requirements during various phases of site work
- Discussion of the potential physical hazards associated with implementing scope of work
- Review of decontamination procedures
- Review of emergency egress and hospital location/directions

10.3.2 Daily Safety Meetings

Daily meetings will also be held by the AECOM and Contractor SSO to ensure that all workers are prepared for and knowledgeable of that day's scope of work. Safety concerns will also be discussed at these meetings. Newly prepared JSAs will also be reviewed with the entire team. All AECOM and contractor field employees must be present and sign the attendance sheet.

11.0 Emergency response

11.1 General information

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." According to AECOM policy, AECOM personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). AECOM response actions will be limited to evacuation and medical/first aid as described within this section below. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- employee training
- alarm systems
- escape routes
- escape procedures
- critical operations or equipment
- rescue and medical duty assignments
- designation of responsible parties
- emergency reporting procedure
- methods to account for all employees after evacuation

11.2 Employee training

Employees must be instructed in the site-specific aspects of emergency evacuation. This information will be discussed during the pre-entry briefing. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed.

11.3 Alarm system/emergency signals

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices can not be clearly perceived above ambient noise levels (*i.e.*, noise from heavy equipment, drilling rigs, backhoes, *etc.*) and anytime a clear line-of-sight can not be easily maintained amongst all AECOM personnel because of distance, terrain or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. The facility is occupied; however, AECOM will bring a portable phone to the site to ensure that communications with facility representatives and local emergency responders is maintained, when necessary.

11.4 Escape routes and procedures

All personnel on site are responsible for knowing the escape route from the site and where to assemble after evacuation. The escape route from each site work area will be via established access roads that lead to the entrance/exit to the site.

These routes will be developed as part of the initial site reconnaissance that will take place immediately after the pre-entry briefing. All personnel working on the project should participate in the site reconnaissance so they are aware of how to evacuate each work area.

11.5 Rescue and medical duty assignments

The phone numbers of the police and fire departments, ambulance service, local hospital, and AECOM representatives are provided in the emergency reference sheet. This sheet will be posted in the AECOM site vehicle.

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

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

11.6 Designation of responsible parties

The SSO is responsible for initiating emergency response. In the event the SSO can not fulfill this duty, the alternate SSO will take charge. The SSO will coordinate all emergency response efforts with the contractor and the store manager, as necessary, and based on the level of the emergency.

11.7 Employee accounting method

The SSO is responsible for identifying all AECOM personnel on-site at all times. On small, short duration jobs this can be done informally as long as accurate accounting is possible.

11.8 Near miss/HSE observation reporting

A *Near Miss Incident* is defined as any undesired event that, under slightly different circumstances (e.g., timing, distance, chance, etc.) could have resulted in personal harm, property damage, an environmental release or any undesired loss of resources. In other words, a *Near Miss Incident* is a situation in which an accident almost occurred. The purpose of reporting, and following up on, *Near Miss Incidents* is the same as that for incidents that result in injuries, illnesses, property damage or environmental releases. TO PREVENT REOCCURRENCE.

By definition, a *Near Miss Incident* must result in an actual incident or event. Situations in which a hazard is identified and corrected before an incident occurs do not necessarily meet the definition of a *Near Miss Incident* and will be referred to in this program as *HSE Observations*. Reporting and following up on *HSE Observations* can also provide opportunities for learning and improvement in the same manner as reporting and following up on *Near Miss Incidents*.

All near misses and safety observations should be reported. Near Miss/HSE Observation Report forms will be available on each site for staff to use. These forms should be completed in the field and forwarded to your RHSM for review and corporate filing.

11.9 Accident reporting and investigation

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An AECOM accident investigation form is presented in Attachment D of this HASP. The injured AECOM employee's supervisor and the RHSM should be notified immediately of the injury.

If a subcontractor employee is injured, they are required to notify the AECOM SSO. Once the incident is under control, the subcontractor will submit a copy of their company's accident investigation report to the AECOM SSO.

Emergency References

Ambulance: 911






Fire: 911

Police: 911

Medical Services: 718.780.5500

New York Methodist Hospital

506 Sixth St - Brooklyn

- | | | |
|--|---|--------|
|  | 1: Start out going NORTHEAST on 2ND AVE toward 10TH ST. | 0.1 mi |
|  | 2: Turn RIGHT onto 9TH ST. | 0.9 mi |
|  | 3: Turn LEFT onto 8TH AVE. | 0.1 mi |
|  | 4: Turn LEFT onto 6TH ST. | 0.1 mi |
|  | 5: End at 506 6th St Brooklyn, NY 11215-3609 | |

Total Time: 4 minutes

Total Distance: 1.19 miles

AECOM Project Representatives:

AECOM/Westford, MA **978.589.3000**

- Peter Cox (PM) x 3012

- Peter Sullivan (Interim RHSM) x 3444

Hospital Route from Site to New York Methodist Hospital 506 6th Street – Brooklyn



Attachment A

Health and Safety Plan Receipt and Acceptance Form

Health and Safety Plan Receipt and Acceptance Form
Site Investigation
Metropolitan Former MGP Site
Brooklyn, New York

I have received a copy of the Health and Safety Plan prepared for the above referenced site, I have read and understand its content and I agree that I will abide by its requirements.

Name	Signature	Company	Date

Attachment B

Job Safety Analysis Form



Job Safety Analysis

JSA Type: <input type="checkbox"/> Investigation <input type="checkbox"/> O&M <input type="checkbox"/> Office <input type="checkbox"/> Construction <input type="checkbox"/> Other	<input type="checkbox"/> New <input type="checkbox"/> Revised	Date:
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Work Activity:

Personal Protective Equipment (PPE):

Development Team	Position/Title	Reviewed By	Position/Title	Date

❶ Job Steps ¹	❷ Potential Hazards ²	❸ Critical Actions ³	Stop Work Criteria
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•

- 1 – Target number of job steps: six to ten**
 - 2 – Codes for Potential Hazards:**
- | | | | | | |
|----------------------|-------------------|----------------|------------------------|------------------|---------------------|
| Caught Between (CBT) | Contacted By (CB) | Caught On (CO) | Fall To Below (FB) | Overexertion (O) | Struck Against (SA) |
| Caught In (CI) | Contact With (CW) | Exposure (E) | Fall - Same Level (FS) | Release To (R) | Struck By (SB) |

- 3 – Types of Critical Actions:** Elimination, Engineering Controls, Safe Work Practice / SOP, Administrative Controls, and/or PPE.
- 4 – Stop Work Trigger:** Condition or situation that would require work to be stopped and hazards re-assessed

Attachment C

Health and Safety Plan Pre-Entry Briefing and Daily Safety Meeting Attendance Form

Health and Safety Plan Pre-Entry Briefing and Daily Safety Meeting Attendance Form
Site Investigation
Metropolitan Former MGP Site
Brooklyn, New York

Conducted by:		Date Performed:	
Topics Discussed:	1. Review of the content of the HASP (Required)		
	2.		
	3.		
	4.		

Printed Name	Signature	Representing

Attachment D

Supervisor's Accident Investigation Report Form



H&S SOP No. 4.1

ATTACHMENT 8.1
Supervisor's Accident Investigation Report

Injured Employee _____ Job Title _____

Home Office _____ Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____ Nature of Injury _____

Engaged in What Task When Injured? _____

Will Lost Time Occur? _____ How Long? _____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

How Did the Accident Occur? _____

Why Did it Occur? _____

What Could Be Done to Prevent Recurrence of the Accident? _____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

Supervisor's Name _____ Signature: _____ Date: _____

Note: if the space provided on this form is insufficient, provide additional information on separate paper and attach. The completed accident investigation report must be submitted to the ENSR Regional Health and Safety Manager within three days of the occurrence of the accident.