Pepco and Pepco Energy Services
Contract No. 4500013120

HEALTH AND SAFETY PLAN (FINAL)

Benning Road Facility

3400 Benning Road, N.E.

Washington, DC 20019

Prepared for:

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Health and Safety Plan Expiration Date: June 2013

Project No: 60249055
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Health and Safety Plan

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

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Benning Road Facility site. This HASP has been written for the exclusive use of AECOM, its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

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EXECUTIVE SUMMARY

AECOM has prepared this Health and Safety Plan (HASP) to address health and safety concerns related to AECOM managed Remedial Investigation/Feasibility Study (RI/FS) activities located at Pepco's Benning Road facility (the Site), located at 3400 Benning Road NE, Washington, D.C., and a segment of the Anacostia River adjacent to the Site. Together, the Site and the adjacent segment of the River are referred to herein as the "Study Area". The specific roles, responsibilities, authority, and requirements as they pertain to the safety of employees and the scope of services are discussed herein. The document is intended to identify known potential hazards and facilitate communication and control measures to prevent injury or harm. Additionally, provisions to control the potential for environmental impact from these activities are included where applicable.

SUMMARY TABLE	
AECOM Scope of Work (SOW)	AECOM will be performing the following activities in support of the RI effort at the site: electrical resistivity imaging (ERI); soil boring installation using direct push technology (DPT); monitoring well and geotechnical soil boring installation using a hollow stem auger (HSA) drill rig; collection of soil, groundwater and surface water (via boat) samples; aquifer testing; land surveying; bathymetric and utility surveying; and collection of sediment samples using a Petite Ponar grab sampler or the equivalent and vibracoring equipment. All investigative derived waste (IDW) generated will be containerized and temporarily staged on-site while awaiting characterization prior to proper disposal.
ERI Subcontractor SOW	Involves screening of the site using ERI to identify potential target zones for for further subsurface investigations.
DPT Subcontractor SOW	DPT borings will serve two purposes: Calibrate the electrical measurements from ERI activities against analytical and lithologic data collected during boring installations; and collection of subsurface soil and groundwater samples to delineate potential zones of impact.
HSA Drill Rig Subcontractor SOW	A geotechnical investigation will be conducted using a HSA drill rig to aid in the design of monitoring wells and confirm the presence of the confining layer (Arundel Clay). Following the completion of ERI, DPT and the geotechnical investigation, monitoring wells will be installed throughout the site using a HSA drill rig. Well development, well gauging, groundwater sampling and aquifer testing will occur after the installation of monitoring wells.
Surveying Subcontractor SOW	Top of casing elevations and locations for each groundwater monitoring well will be surveyed into existing Site datum by a licensed surveyor. In addition, one or more river gauging stations will be established in the Anacostia River and surveyed into the existing Site datum by a licensed surveyor.
Bathymetric and Utility Survey SOW	Prior to initiation of any intrusive sediment sampling, a bathymetric and utility survey will be conducted. The bathymetric survey will provide a basis for understanding the depth of the water column and the configuration of the river bottom and will be used to prepare a contour map of the top of the sediment surface in and around the investigation areas. The utility survey will be conducted to identify river bottom pipelines, cables and lines that may be located in the planned area of investigation.
Sediment Sampling SOW	All surface sediment samples will be collected from a depth of 0 to 6 inches below sediment surface with a Petite Ponar grab sampler or the equivalent. Forty-five Vibracore™ sediment borings will be installed in the Anacostia River (i.e., co-located with the surface sediment sampling locations). The sediment cores will be collected using a small boat equipped to advance a 3-

		inch diameter Vibracore™ sampler to a maximum depth of 10 feet below the sediment surface, or to refusal, whichever is encountered first.			
PRIMARY PHYSICAL HAZARDS					
x	Underground Utilities	x	Traffic Control	x	Electrical Hazards
x	Overhead Utilities	x	Slips, Trips/Walking Surface	x	Working on the water
x	Drill Rig Operations	x	Manual Lifting		

CHEMCIAL HAZARDS, MONITORING, ACTION LEVELS		
COPC	**MONITORING**	**ACTION LEVELS**
PCBs, PAHs, Heavy Metals (not anticipated to be of concern via airborne exposure during current SOW)	PID with 10.6eV (general field screening during sample collection) PDR 1500 (if dust generation unavoidable)	Upgrade to Level C at 1 ppm for Benzene Upgrade to Level C at 1 mg/m^3

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

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1 INTRODUCTION

This Health and Safety Plan (HASP) (including Attachments A-C) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the Remedial Investigation/Feasibility Study (RI/FS) project planned at the Benning Road site, located at 3400 Benning Road, N.E. in Washington, D.C and the adjacent segment of the Anacostia River. Together, the Site and the adjacent segment of the River are referred to herein as the "Study Area". This HASP also identifies chemical and physical hazards known to be associated with the AECOM-managed RI/FS activities as described in the work plan dated June 2012 and submitted under separate cover.

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

1.1 GENERAL

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

1.2 PROJECT POLICY STATEMENT

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

1.3 REFERENCES

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

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

2 SITE INFORMATION AND SCOPE OF WORK

AECOM will conduct RI/FS activities at the Study Area. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated June 2012 RI/FS Work Plan developed for the Study Area. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the project site, and the work procedures to be performed. The June 2012 RI/FS Work Plan prepared by AECOM as a companion document to this HASP provides more detail concerning both site history and planned work operations.

2.1 SITE INFORMATION

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

2.1.1 General Description

The Benning Road Facility site is located at 3400 Benning Road, N.E., Washington, D.C. The 77-acre site is bordered by a DC Solid Waste Transfer Station to the north, Kenilworth Maintenance Yard (owned by the National Park Service, NPS) to the northwest, the Anacostia River to the west, Benning Road to the south and residential areas to the east and south (across Benning Rd.). Most of the site is comprised of the Benning Service Center, which involves activities related to construction, operation and maintenance of Pepco's electric power transmission and distribution system serving the Washington, D.C., area. The Service Center accommodates more than 400 Pepco employees responsible for maintenance and construction of Pepco's electric transmission and distribution system; system engineering; vehicle fleet maintenance and refueling; and central warehousing for materials, supplies and equipment. The Site is also the location of the Benning Road Power Plant, which is scheduled to be shut down in 2012.

2.1.2 Site Background/History

The site is one of several properties along the Anacostia River that are suspected sources of contamination. There have been ~~five~~ six* instances since 1985 in which materials containing PCBs were released at the site. In each case, Pepco promptly cleaned up the releases in accordance with applicable legal requirements. Nonetheless, it is suspected that these releases, and possibly other historical operations or activities at the site, may have contributed to contamination in the river. In particular, a site inspection conducted for the U.S. Environmental Protection Agency (USEPA) in 2008 linked, PCBs and inorganic constituents detected in Anacostia River sediments to potential historical discharges from the site. The site inspection contractor also stated that currently the site is properly managed and that any spills or leaks of hazardous substances are quickly addressed and, if necessary, properly remediated.

2.1.3 Previous Investigations

Table 2-1 presents the most recent available data and was collected during the 2008 Site Inspection conducted by Tetra Tech, Inc. for the USEPA.

Table 2-1: Previous Investigation Data

Contaminants	Worst Case Soil Concentration (mg/kg)	Worst Case Sediment Concentration (mg/kg)
Maximum PAH (Fluoranthene)	4.4	2.3
Maximum PCB (Aroclor-1254)	2.7	1.0
Maximum Metal (Vanadium)	17,100	948

*Corrected February 2013

2.2 SCOPE OF WORK

The purpose of the RI/FS is to (a) characterize environmental conditions within the Study Area, (b) investigate whether and to what extent past or current conditions at the Site have caused or contributed to contamination of the river, (c) assess current and potential risk to human health and environment posed by conditions within the Study Area, and (d) develop and evaluate potential remedial actions.

2.2.1 Mobilization/Demobilization

Mobilization and demobilization represent limited pre and post-task activities. These activities include driving to and from the site; initial site preparations, such as trailer and toilet facilities setup; and post-work activities, such as removing files and office equipment and general housekeeping. This activity does not represent any intrusive activities. Electrical hook-up and disconnect for office trailers must be performed by a licensed electrical subcontractor.

2.2.2 Site Preparation

Site preparation includes utility mark-out and clearance, and the set-up of other work support related items are included as well. Other site preparation activities will include the verification of utility mark-outs and presence of the clear dig permits (on-site). All utility clearance shall be obtained by the authorizing authority for the subject site. If utility locations cannot be verified on-site by the public authority, then a private utility location contractor may need to be utilized to confirm/deny the presence of private underground utilities on the site. Typically lead time is 3 days and the permits generally valid for 10 days. Consult the specific clearance dates associated with the permit obtained for the site.

2.2.3 Surface Soil Sampling

Surface soil samples will be collected from within the top 12 inches of the subsurface after coring through existing pavement or ground cover. Each sample will be screened with a field Photoionization Detector (PID) and X-ray fluorescence (XRF) instrument and the results will be recorded.

2.2.4 Storm Drain Sampling

Any existing storm drain sampling data will be obtained from Pepco and reviewed. Next, AECOM will visit the site and identify the storm drains in vulnerable locations, based on discussions with Pepco personnel. The purpose of storm drain sampling is to determine, if current or historical discharges from the storm drain system contributed to the contamination in the River. Sediment/residue and water samples will be collected and a subset will be submitted for forensic analysis.

2.2.5 Electrical Resistivity Imaging

The ERI survey will be performed by installing specialized 3/8-inch diameter stainless steel electrodes into the ground along a straight line or transect. The electrodes are hammered into the ground just far enough to get good electrical contact with the earth, typically 6 to 15 inches.

The spacing between each electrode is dependent on the target depth of the survey. Since the target depth of the survey is the contact with the Arundel Clay, the electrode spacing will vary depending on the anticipated (from previous boring logs) depth of the Arundel Clay. The electrode spacing and transect line placement will be adjusted in the field to provide the appropriate depth of imaging while working within space constraints due to buildings, busy streets, property lines, and surface cover.

Data integration of available historical site data and confirmation direct push technology (DPT) work will be used to calibrate Aestus' electrical image data back to data types of interest such as chemical, physical, and biological properties of the subsurface. Confirmation DPT work will be performed as soon as possible following the ERI survey to maximize data correlation and minimize the potential for any changes in conditions in the surveyed areas.

2.2.6 Soil Borings

A geotechnical investigation will be conducted to aid in the verification of the existing data and design of monitoring wells. Soil borings will be advanced approximately 10 ft into the confining layer (Arundel Clay) using a Hollow Stem Auger (HSA) Drill rig to obtain split-spoon and Shelby tube samples. Split-spoon samples will be obtained using the standard penetration test (SPT) and logged in accordance with the USCS soil classification system. Split spoon samples will be collected continuously from the surface to the water table and then every five feet from the water table to the terminal depth of the boring. Soil samples will be field screened for VOCs using a calibrated PID. Shelby tubes or disturbed samples (from drill cuttings) will be collected from each boring and analyzed for ASTM Permeability, Grain size and Atterberg limits. Groundwater levels will be collected during installation of the geotechnical borings and 24 hours following completion of the borings. Soil cuttings generated during boring installation will be temporarily staged on-site in 55-gallon drums while awaiting characterization.

Upon completion of soil boring activities, soil borings will be properly abandoned with grout using a tremie pipe to the maximum extent possible. The ground surface will be restored to match the existing surface cover. Soil boring locations will be surveyed (x,y and z-planes) into existing site datum by a licensed surveyor.

2.2.7 DPT Subsurface Investigation

Following the completion of ERI and geotechnical investigative activities, DPT borings will be advanced to the top of the Arundel Clay or refusal with continuous photoionization detector (PID) readings to the top of the water table as well as continuous soil logging. Soil and groundwater samples will be collected and submitted for laboratory analysis. Soil boring locations and elevations will be surveyed into existing site datum following boring installation.

2.2.8 Monitoring Well Installation

Monitoring wells will be designed and installed based on the results of ERI, DPT, and geotechnical investigative activities. Upon consultation with DDOE, monitoring wells will be installed using a drill rig equipped with 12.25 in outer diameter hollow stem augers (8.25-in inner diameter). Split-spoon samples will be obtained in accordance with the ASTM Standard D1586. Soils will be logged in accordance with the USCS. Split-spoon samples will be collected continuously from the surface to the water table and then every five feet from the water table to the terminal depth of the boring. Soil samples collected from the vadose zone will be field screened using a PID for VOCs.

The monitoring wells will be constructed using four-inch diameter Schedule 40 polyvinyl chloride (PVC) well casing and slotted PVC well screen. If two water bearing zones within the Patapsco formation are confirmed, the wells will be constructed of 2-inch diameter PVC casing as nested wells with two discrete screened intervals. A certified clean sand filter pack will be installed in the annular space between the borehole and the well screen and casing from the bottom of the boring to approximately one foot above the screened interval. Approximately two feet of bentonite clay will then be placed on top of the sand pack and hydrated to form a seal above the sand. After allowing the bentonite to set, the remaining portion of the annular space will be tremmie grouted with a bentonite-portland cement mixture to grade. Each monitoring well will be completed inside a traffic-rated 18-inch road box/well vault.

Following installation, the wells will be developed using a surge block and submersible pump. After the well is surged, a submersible pump will be lowered into the well and groundwater will be withdrawn.

Drill cutting and development water will be managed as described in the previous section. Top of casing elevations and locations for each groundwater monitoring well will be surveyed into existing Site datum by a licensed surveyor. In addition, one or more river gauging stations will be established in the Anacostia River and surveyed as well.

2.2.9 Monitoring Well Gauging and Sampling

All groundwater monitoring wells will be allowed to equilibrate after development and prior to groundwater sample collection. Prior to the groundwater sampling, a site-wide water level measurement event will be

performed during the period of slack tide in order to determine groundwater elevations at the Site and accurately characterize local groundwater flow conditions. In addition, the Anacostia River elevations will be determined concurrently by collection of water levels at gauging stations. Two such gauging events will be conducted.

Groundwater samples will be collected from monitoring wells with portable bladder pumps using disposable bladders and low-flow sampling techniques. Disposable sampling materials, decon water and purge water will be containerized and properly disposed.

2.2.10 Aquifer Testing

Aquifer testing will be conducted using slug testing technique. Slug testing will be conducted on select monitoring wells to characterize hydraulic properties of the water table aquifer. The tests will consist of falling-head and rising-head slug tests to determine the hydraulic conductivity of the material in the vicinity of each well. The tests will proceed until the water levels have recovered to within 10% of the static pretest levels or 24 hrs have elapsed.

2.2.11 Bathymetric and Utility Survey

Prior to initiation of any intrusive sediment sampling, a bathymetric and utility survey will be conducted by a specialty subcontractor in the Waterside Investigation Area. The utility survey will be conducted to identify river bottom pipelines, cables and lines that may be located in the planned area of investigation. Their presence and Geographic Position System (GPS) benchmarked locations will be noted on a base map of the area.

Side scan sonar and/or magnetometer surveys will be used to identify any utilities or large pieces of debris that might interfere with the proposed sampling activities. The contractor will use a survey-grade precision fathometer (Odom Hydrotrack Fathometer or equivalent) to collect continuous water depth data along the track lines. The contractor will continuously log their geographic position (X-Y location) using Differential GPS (DGPS). Depth and geographic location will be sent to the survey computer using the Integrated Survey Software package.

2.2.12 Surface Water Sampling

Surface water samples will be collected with a sampling boat using GPS coordinates. Upon arrival at each sampling station, a depth-to-sediment measurement will be collected to record the water depth. Two sets of field measurements of water quality will be taken at each station. One measurement will be taken near the water surface, approximately one foot below the water surface, and a second measurement within one foot from the top of the sediment surface. Only one water quality measurement will be taken, at mid-water depth, at stations where the water depth is less than three feet.

The surface water sample for chemical analysis will be obtained from approximately one foot above the sediment-water interface using a depth specific sampling device. The water samples will immediately be packaged for shipment to the laboratory following preservation and management protocols.

2.2.13 Surface Sediment Sampling

Surface sediment samples will be collected with a Petite Ponar grab sampler or the equivalent. A portion of the sample will be placed in a pan, inspected for sediment type, color, odor, obvious signs of biota and other notable features, and then returned to the river. The remainder of the sample will then be prepared for shipment to the laboratory.

The samples will be screened using a PID and oversized material such as twigs, shells, leaves, stones, pieces of wood, and vegetation will be removed by hand. The grab sample will be removed from the sampling device using a stainless steel spoon/scoop and placed in a decontaminated 1-gallon stainless steel or pyrex glass mixing bowl. Each sample will be visually examined for physical characteristics such as composition, layering, odor, and discoloration. Part of the sample will be homogenized in the mixing bowl and placed in appropriate sample containers. Sediment sampling equipment such as bowls, spoons, augers, and dredges will be decontaminated prior to and following sample collection.

2.2.14 Subsurface Sediment Sampling

Vibracore™ sediment borings will be performed using a small boat equipped to advance a 3-inch diameter sampler to a maximum depth of 10 feet below the sediment surface, or to refusal, whichever is encountered first. The sampling will be performed as follows:

- The core sampler, equipped with a plastic liner, will be driven and extracted at each of the designated sample locations;
- The core liner will be extracted from the core barrel and split open;
- The sediment sample will be screened for organic vapors with a PID and logged for physical characteristics; and
- Samples from up to three horizons within each core will be collected.

2.2.15 Investigativion-Derived Waste (IDW) Management

IDW will be collected and categorized as non-hazardous or hazardous. Potentially hazardous IDW (purge water, and decontamination fluids, and soil/sediment cuttings) will be tested and disposed of within 90 calendar days of completing the field activities. Potentially hazardous IDW waste will be staged onsite, then delivered to an IDW storage facility for processing. Non-hazardous IDW will be disposed of in a timely fashion during fieldwork.

2.2.16 Equipment Decontamination

AECOM and subcontractor personnel will perform decontamination of equipment used to perform work within controlled work areas.

Before any HSA drilling or sediment sampling has begun, and at the completion of activities, the subcontractor shall decontaminate the drill rig, casing, samplers, and all other drilling equipment that will be used on site. The drilling subcontractor shall provide a high-pressure steam cleaner for decontamination of all downhole drilling equipment. Soil sampling equipment shall be decontaminated between each use, using a phosphate free detergent and potable water in accordance with ASTM D 5088. The drilling subcontractor shall construct a temporary decontamination pad to contain all decontamination water generated during decontamination of drill rigs and tools.

Pre-cleaned and dedicated sampling materials/equipment will be used to collect the soil (DPT) and groundwater samples (DPT and monitoring wells) for laboratory analysis. After the samples are collected, any disposable, or one-time use equipment (tubing, bladders, etc.) will be placed in a plastic bag for disposal per accordance with the paragraph above. Non-disposable sampling and drilling equipment that contacted the soil and/or groundwater will be decontaminated between each sampling location. Gross sediments and/or contamination will first be removed from the sampling and drilling equipment. The equipment will then be washed with DI water and Alconox detergent and then rinsed with DI water, methanol, etc.

2.2.17 Site Restoration

Site restoration will involve the removal of staging areas, final repair and grading of any damage created by equipment, removal of temporary fencing and erosion control materials, and the disposal of construction debris.

2.2.18 Additional Work Operations

Operations at the site may require additional tasks not identified in this section or addressed in **Attachment A**, THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.

3 HAZARD ASSESSMENT (SAFETY)

3.1 PHYSICAL HAZARDS

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

3.1.1 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning.

Slippery, uneven footing and tripping hazards will likely be present at the site. Be vigilant, avoid puddles, and wear footwear with slip resistant soles.

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 might be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

During the winter months, snow shovels and salt crystals should be kept on site to keep work areas free of accumulated snow and ice. Furthermore, use sand or other aggregate material to help keep work surfaces from being slippery, especially where salt/calcium chloride cannot be used. In addition, make sure work boots have soles that provide good traction. When walking on ice is necessary crampons or Yaktrax® should be used.

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 out of walkways;
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish; and,
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand.

3.1.2 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Additional information on the requirements of housekeeping can be found in S3NA 307 PR, *Housekeeping, Worksite*.

3.1.3 Manual Lifting

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

3.1.4 Utilities

Various forms of underground/overhead utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. If insufficient data is available to accurately determine the location of the utility lines, AECOM will hand clear or use soft dig techniques to a depth of at least 5 feet below ground surface in the proposed areas of subsurface investigation. Should intrusive operations cause equipment to come

into contact with utility lines, the SSO and an AECOM SH&E Professional will be notified immediately. Work will be suspended until the applicable utility agency is contacted and the appropriate actions for the particular situations can be taken. The phone number for the applicable state agency is provided in the Emergency Contacts list found in Section 8. For additional requirements, refer to S3NA 417 PR, *Utilities Underground.*

Ensure drill rig and DPT operators, truck drivers, etc. and signal person are aware of overhead power lines when working around overhead power lines. Overhead power and utility lines may be present on, or adjacent to, the site and represent a potential hazard during the mobe/demobe of equipment and supplies. Maintain a minimum of 10 feet between overhead power lines and drill rig mast. Any deviation must be approved by the Regional Health & Safety Manager. Additional information on working adjacent to overhead power and utility lines can be found in S3NA 406 PR, *Electrical Lines, Overhead*.

3.1.5 Electrical hazards

Electrical and powered equipment may be used during a variety of site activities. Injuries associated with electrical and powered equipment include electric shock, cuts/lacerations, eye damage (from flying debris), and burns. To reduce the potential of injury from the hazards associated with electrical and powered equipment, always comply with the following:

- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Ensure generators are properly grounded, including the use of a grounding rod, driven to a depth of 3-feet.
- Wear ANSI-approved (Z87.1) safety glasses. Face shields may be required to provide additional face protection from flying debris.
- Wear appropriate work gloves. Work gloves may reduce the severity of burns and cuts/lacerations.

All temporary electric installations (site trailer, subpanels) will comply with OSHA (29 CFR 1926, Subpart K, and 29 CFR 1910, Subpart S) guidelines. Only qualified and competent individuals (licensed electrician) will provide electrical service/servicing. Refer to S3NA 410 PR, *Hazardous Energy Control*, for additional requirements and information.

3.1.6 Drilling Operations

Drilling operations, including hollow-stem, vibracoring and/or direct push drilling, present their own set of hazards. Several basic precautions that should be taken include, but are not limited to, confirming locations of underground and overhead utilities, wearing of appropriate PPE and the avoidance of loose clothing or jewelry, staying clear of moving parts, knowing the locations of emergency shut-off switches. Other operational safety precautions regarding moving the drilling equipment, raising and lowering the derrick(mast), and drilling can be found in S3NA 405 PR, *Drilling and Boring.*

3.1.7 Working On or Near the Water

The buddy system should be utilized whenever there is the possibility of falling into water, in which two persons operate as a single unit in order to monitor and assist each other in performing tasks. Whenever there exists the possibility of falling into water, personnel must be attired in a USCG approved Type III or Type V work vest. The vest must be properly sized for the individual and must be secured at all times. A throwable rescue device (Type IV flotation aid) along with whatever equipment (i.e., ladders, lifting gear, or rescue boat) necessary shall be immediately available to recover an individual from the water.

Waders may not be worn when working along, over, or in moving waters; or in waters influenced by tides or acted upon by waves when water depths exceed knee height unless specifically approved by the SH&E Manager. Waders may be worn in still waters in water depths up to the waist if bottom conditions are firm and well understood. Waders shall never be worn aboard a watercraft of any kind.

If workers have the potential to get stuck in mud or fluidized sediment, air injection equipment designed to free workers feet/legs may need to be available onsite. At a minimum, a safety line should be available to be deployed from safe ground. If a worker does get stuck, they should not struggle as this causes further sinking. Use a pole to conduct sediment probing to assess water depths, the stability of shoreline terrain, and the bearing capacity of bottom sediments ahead of the chosen path.

Take special care on slippery rocks along shorelines, lakeshores, riverbanks, and creeks. Always look ahead at the ground when walking around the water's edge and avoid stepping on stones that have algal growth, especially those in intertidal areas, as these are extremely slippery. It is suggested that workers not be permitted to access areas where these slip/fall hazards exists, especially in locations containing tidal water flow.

Refer to S3NA 315 PR, *Working Around Water*, and S3NA 419 PR, *Water-Marine Operations-Boating*, for additional requirements regarding working on or near the water.

3.1.8 Dust and Odor Control

If dust generation is anticipated, specific controls will be in place to prevent dust generation. If dust is observed reaching or approaching the site boundary, activities causing the dust will be immediately stopped. Dust control measures (water spray, soil covers, slower work pace, or change in work activities) will be deployed prior to resuming work. Corrective measures will be documented in the daily report.

Based on available data, odors are not anticipated to be of concern at the site. In the event that an odor complaint is received, the SS and/or SSO will immediately assess site conditions and determine the probable cause or causes. Appropriate odor mitigation measures will be deployed. These measures may include covering sediment piles, deploying odor suppressing foam, implementation of air monitoring or discontinuing activities that are generating the odor. Corrective measures will be documented in the daily report.

3.1.9 Spill Prevention

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

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

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

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- For drums/containers, follow the procedures in S3NA 308 WI, *Manual Lifting Safe Work Practices*, to minimize spillage.

In the event that a spill does occur the reporting quantities and response actions outlined in the Integrated Contingency Plan (ICP) for the Benning Road Facility will be followed. A copy of the ICP will be kept on Site along with this HASP.

3.1.10 Noise Exposure Monitoring

When heavy equipment is in operation, it will be necessary to ensure that each exclusion zone fully encompasses all areas where hazardous noise levels are present (85dBA or greater). If the sound pressure level exceeds 85 dBA at any location along the site perimeter, the exclusion zone boundary will be adjusted to fully encompass this region. All personnel working inside of the EZ will be required to wear hearing protection during the operation of heavy equipment. Refer to S3NA 510 PR, *Hearing Conservation Program*, for additional information and requirements.

3.1.11 Traffic Control

During certain work tasks, the establishment of traffic control to adequately protect workers and the public may be required on-site. Site specific requirements will be determined by the site supervisor/SSO on a case-by-case basis. Only approved traffic control devices per accordance with the Manual of Uniform Traffic Control Devices (MUTCD) will be used on public road ways per accordance with the applicable State regulatory guidance.

General traffic control precautions include placing a work vehicle between your worksite and oncoming traffic whenever possible. Not only is it a large, visible warning sign, but also if an oncoming car should fail to yield or deviate, the parked vehicle rather than your body would absorb the first impact of a crash. Turn the vehicle wheels so that if it was struck, it would swing away from the worksite. When using cones or other devices to modify traffic flow, ensure use of the proper taper length and device spacing to provide adequate warning distance to on-coming motor vehicles. In addition, proper PPE is to be worn during traffic operations, to include hardhat and high-visibility vests. Refer to S3NA 306 PR, *Highway and Road Work*, for additional requirements.

3.2 BIOLOGICAL HAZARDS

The likely hood of biological hazards being present is judged to be minimal since all work will be performed on a developed industrial facility; however, a general discussion of the most common biological hazards found on project sites.

3.2.1. Venomous Animals

Some animals have the ability to inject venom. These include: various types of spiders, and snakes. The two more venomous spiders likely to be encountered are the Black Widow and Brown Recluse. Both spiders like dark conditions. The Black Widow prefers moist conditions, and the Brown Recluse dry. Other spiders possess venom but they are not harmful to humans. Snakes have limited distributions, and generally avoid humans, so in most areas you are unlikely to encounter them.

If bitten by any of these animals special care should be taken to treat the wound as it may lead to complications due to the toxin. A bite from a venomous snake, which may inject varying degrees of toxic venom, is rarely fatal but should always be considered a medical emergency. Bites from a black widow should be treated as medical emergencies. All other bites should be reported, proper first aid implemented, and the wound progression tracked.

3.2.2. Poisonous Plants

Sensitivity to toxins generated by plants, insects and animals varies according to dosage and the ability of the victim to process the toxin, therefore it is difficult to predict whether a reaction will occur, or how severe the reaction will be. Staff should be aware that 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 result in severe scarring, blindness or even death.

Plants that field staff should recognize and take precautions to avoid include: Poison Sumac, Poison Ivy (terrestrial and climbing), Poison Oak, Giant Hogweed (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.

A large number of plants are not harmful to touch but may contain poisonous berries or foliage that could cause serious complications or death if they are ingested. It goes without saying not to eat any berries or plants that you are not absolutely sure of their identity. Examples of common poisonous or irritating plant species, common to the United States, are shown in Table 3-2.

Table 3-1: Hazardous Plant Identification Guide

Poison Ivy • Grows in West, Midwest, Texas, East • Several forms – vine, trailing shrub, or shrub • Three leaflets (can vary 3-9) • Leaves green in summer, red in fall • Yellow or green flowers • White berries	 
Poison Oak • Grows in the East (NJ to Texas), Pacific Coast • 6-foot tall shrubs or long vines • Oak-like leaves, clusters of three • Yellow berries	 
Giant Hogweed • Grows from MI to VA, found in western NY • 8- to 14-feet tall • Small, white flowers form a large flat-topped umbel • Leaves up to 5-feet across, lobed and deeply incised	

3.2.3. Insects

Insects for which precautionary measures should be taken include: mosquitoes (potential carriers of disease aside from dermatitis), black flies, wasps, bees, ticks, and European Fire Ant.

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.

Ticks can be encountered when walking in tall grass or shrubs. They crawl up clothing searching for exposed skin where they will insert mouthparts to drink blood. Most serious concern is possibility of contracting Lyme disease which is spread by the Black-legged or Deer Tick. Occasionally a tick can cause Tick Paralysis if it is able to remain feeding for several days. Full recovery usually occurs shortly after the tick is removed.

3.3 ULTRAVIOLET HAZARDS

The 2011 historical UV Index for the Washington D.C. area reported the following number of days in each exposure category: 92 in low; 92 in moderate; 44 in high; 134 in very high; and 3 in extreme. The very high and extreme UV index categories were identified between the months of April and September. Workers performing field work outdoors may be susceptible to sunburn if not properly protected with sunscreen or protective clothing and hats. Skin can burn in minutes when the UV Index is VERY HIGH. Protective measures are advisable.

3.4 CHEMICAL HAZARDS

If chemicals become a concern at the site, employees can be exposed by inhalation to the COPC during intrusive activities. Another route of potential exposure to the COPC is via direct dermal contact with soils and groundwater during sampling. Although highly unlikely, exposure to all of the COPCs can occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 7.3 address personal hygiene issues that will limit the potential for contaminant ingestion.

The chemical hazards associated with site activities can be controlled in several ways, including:

- Maintaining a upwind position;
- Use of personal protective equipment;
- Avoiding direct contact with contaminated media;
- Slow equipment down to prevent dusting;
- Use of water to prevent or minimize the generation of dust;
- Following decontamination procedures; and
- Washing hands prior to eating or using tobacco products.

3.5 WEATHER HAZARDS

The Site Safety Officer will be attentive to daily weather forecasts for the project area each morning . Predicted weather conditions of potential field impact are to be included in safety briefings and the Task Hazard Analysis (THA) for that day. Weather changes should initiate a review and updates (THA) as necessary. Weather-related hazards will directly correlate to the type of weather involved. Hot, dry weather may cause greater dust emissions, particularly during intrusive activities. Rain may increase slip/trip hazards, particularly for ground workers.

Severe weather can occur with little warning. Employees will be vigilant for the potentials for storms, lightning, high winds, and flash flood events. Additionally, lightning strikes during electrical storms could also be a potential hazard. The following procedures will be implemented once thunder is heard or lightning spotted:

1) If thunder is heard, all site personnel are to be alert of any visible lightning flashes. The SSO will observe the storm front and track the direction it is moving. The SSO will continue to observe the storm front until it passes or until the prevailing direction is determined to be away from the site.

2) If lightning is observed, the SS or SSO are to be notified. When the next lightning flash is observed, a "second" count shall be initiated from the time the lightning is observed until the thunder from the strike is heard.

3) The following action guidelines shall be implemented once the "second" count is ≤ 30 seconds:

   a) "second" count > 30, the SS or SSO will continually observe the storm front. If the front is moving away, work will continue. If the front is moving towards the site, the SS will initially place workers on alert for potential evacuation.

   b) "second" count ≤ 30, the SS will issue the evacuation command and all workers are to report to the break/lunch trailer. Work can be re-initiated once the front has passed by and thunder has not been heard for 30 minutes.

4) If lightning is observed and the storm front is moving away from or around the site and is > 20 miles away, work will be permitted to continue. The location of the storm can be confirmed via internet access to a local weather website that has a Doppler radar tracking system.

3.6 OTHER HAZARDS

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

- Mobe/Demobe,
- Drilling Oversight and Sampling
- Groundwater sampling,
- Surface water sampling
- Sediment sampling.
- Soil Sampling (Hand Auger)
- Geophysical Investigation

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

3.7 TASK SPECIFC SH&E PROCEDURES

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

Table 3-2: Applicable SOPs

	SOP#	TITLE		SOP#	TITLE
S3NA 300 Series—Field(Common)			S3NA 500 Series—Industrial Hygiene		
☐	S3NA-301-PR	Confined Spaces	☐	S3NA-501-PR	Asbestos
☒	S3NA-302-PR	Electrical, General	☐	S3NA-502-PR	Benzene
☐	S3NA-303-PR	Excavation and Trenching	☐	S3NA-503-PR	Blood borne Pathogen Program
☐	S3NA-304-PR	Fall Protection	☐	S3NA-504-PR	Cadmium
☒	S3NA-305-PR	Hand and Power Tools	☒	S3NA-505-PR	Cold Stress Prevention
☒	S3NA-306-PR	Highway and Road Work	☐	S3NA-506-PR	Compressed Gases
☒	S3NA-307-PR	Housekeeping, Worksite	☒	S3NA-507-PR	Hazardous Materials Communication / WHMIS
☒	S3NA-308-PR	Manual Lifting, Field	☒	S3NA-508-PR	Hazardous Materials Handling and Shipping
☒	S3NA-309-PR	Mobile or Heavy Equipment	☒	S3NA-509-PR	Hazardous Waste Operations and Emergency Response Activities
☒	S3NA-310-PR	Rigging, Hoisting, Cranes and Lifting Devises	☒	S3NA-510-PR	Hearing Conservation Program
☐	S3NA-311-PR	Scaffolding	☒	S3NA-511-PR	Heat Stress Prevention
☐	S3NA-312-PR	Ladders and Stairways	☒	S3NA-512-PR	Laboratory Safety
☒	S3NA-313-PR	Wildlife, Plants and Insects	☒	S3NA-513-PR	Lead
☐	S3NA-314-PR	Working Alone & Remote Travel	☐	S3NA-514-PR	Munitions and Explosives of Concern / Unexploded Ordnance (MEC-UXO)
☒	S3NA-315-PR	Water, Working Around	☐	S3NA-515-PR	Nanotechnology
			☐	S3NA-516-PR	Radiation Safety Programs
S3NA 400 Series Field (Uncommon)			☐	S3NA-517-PR	Radiation, Non-Ionizing

☐	S3NA-401-PR	Aircraft Charters	☐	S3NA-518-PR	Radiation, Gauge Source program
☐	S3NA-402-PR	All Terrain Vehicles (ATVs)	☐	S3NA-519-PR	Respiratory Protection Program
☐	S3NA-403-PR	Avalanches	☒	S3NA-520-PR	Spill Response, Incidental
☐	S4NA(US)-404-PR	Commercial Motor Vehicles			
☒	S3NA-405-PR	Drilling and Boring			
☒	S3NA-406-PR	Electrical Lines, Overhead			
☐	S3NA-407-PR	Electro-fishing			
☐	S3NA-408-PR	Elevated Work Platforms and Aerial Lifts			
☐	S3NA-409-PR	Forklifts (operation of)			
☐	S3NA-410-PR	Hazardous Energy Control			
☐	S3NA-411-PR	Machine Guarding			
☐	S3NA-412-PR	Powder-Actuated Tools			
☐	S4NA(US)-413-PR1	Process Safety Management			
☐	S4NA(US)-414-PR	Railway Sites			
☒	S4NA(US)-415-PR	RCRA Regulated Facilities			
☐	S3NA-416-PR	Tunnel and Underground Work			
☒	S3NA-417-PR	Utilities, Underground			
☐	S3NA-418-PR	Welding, Cutting and Other Hot Work			
☒	S3NA-419-PR	Water, Marine Operations, Boating			
☐	S3-NA420-PR	Water, Underwater Diving			

4 SH&E REQUIRMENTS (SAFETY)

4.1 HAZWOPER QUALIFICATIONS

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

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

4.2 SITE-SPECIFIC SAFETY TRAINING

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

4.2.1 Competent Person Training Requirements

In order to complete the planned scope of work, an (OSHA conformance) competent person must be designated to perform the required daily on site inspections of operations and/or equipment. The competent person may be an AECOM (if responsible for supervising that activity) or the subcontractor's employee. Designated competent person(s) for this project are shown in Table 4-1:

Table 4-1: Task-Specific Competent Persons

Employee Name	Organization	Area of Competency
TBD	Subcontractor TBD	Drilling Operations
TBD	Subcontractor TBD	Survey Operations
TBD	Subcontractor TBD	ERI Operations

Note: The training requirements for competent persons are specified in the indicated SOPs and/or *S3NA-202-PR Competent Person Designation*. By identifying an employee as a "competent person", that person has now been authorized to take prompt corrective measures to eliminate hazards.

4.3 TAILGATE MEETINGS

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

4.4 HAZARD COMMUNICATION

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

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

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

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

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

4.5 CONFINED SPACE ENTRY

Confined space entry is not anticipated for this site. If confined spaces are identified, the SSO/site supervisor will inform all employees of the location of confined spaces and prevent unauthorized entry. Confined space entry procedures and training requirements are listed in S3NA 301 PR, *Confined Spaces.*

4.6 HAZARDOUS, SOLID, OR MUNICIPAL WASTE

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

4.7 GENERAL SAFETY RULES

All site personnel shall conduct themselves in a safe manner and maintain a working environment that is free of additional hazards, in adherence to *S3NA-001-PR Safe Work Standards and Rules* and *S3NA-307-PR Housekeeping, Worksite*.

4.7.1 Housekeeping

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

4.7.2 Smoking, Eating, or Drinking

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

4.7.3 Personal Hygiene

The following personal hygiene requirements will be observed:

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

> *Potable Water* - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water - Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water
Not Intended for Drinking Water Consumption

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

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

4.7.4 Buddy System

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

4.8 STOP WORK AUTHORITY

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

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

4.9 CLIENT SPECIFIC SAFETY REQUIREMENTS

Prior to performing any work on-site, site specific training provided by the client must be completed. This training consists of general facility information and applicable safety requirements.

5 EXPOSURE MONITORING PROCEDURES (HEALTH)

5.1 CONTAMINANT EXPOSURE HAZARDS

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical hazards known, suspected or anticipated to be present on site. AECOM has based its evaluation on available data and maximum concentrations reported for the project site. The contaminants identified in Table 2-1 (Section 2) have been evaluated for exposure potential.. If there is any information that is contrary to AECOM's conclusions in this HASP, it is anticipated that the client will provide this information prior to the initiation of site activities.

5.1.1 Coal Tar Pitch Volatiles

Coal tar **CAS 8007-45-2; RTECS GF8600000; UN 1999**

Coal tar pitch **CAS 65996-93-2; RTECS GF8655000**

Coal tar distilate **CAS 65996-92-1; RTECS GF8617500; UN 1136 and UN 1137**

Coal tar creosote CAS 8001-58-9; RTECS 8615000; UN 1993

Coal tar pitch volatiles represent a group of polycyclic aromatic hydrocarbons (PAHs) that include the PAHs found at the site. The term "coal tar products," as used by NIOSH, includes coal tar and two of the fractionation products of coal tar, creosote and coal tar pitch, derived from the carbonization of bituminous coal. Coal tar, coal tar pitch, and creosote derived from bituminous coal often contain identifiable components which by themselves are carcinogenic, such as benzo[a]pyrene, benzanthracene, chrysene, and phenanthrene. Other chemicals from coal tar products, such as anthracene, carbazole, fluoranthene, and pyrene may also cause cancer, but these causal relationships have not been adequately documented.

Additional information on Coal Tar Pitch Volatiles may be found at the following website:

http://www.cdc.gov/niosh/npg/npgd0145.html

5.1.2 Polychlorinated biphenyl (PCB)

CAS 42% chlorine 53469-21-9; RTECS TQ1356000

CAS 54% chlorine 11097-69-1; RTECS TQ1360000

Polychlorinated biphenyls (PCBs) are a series of technical mixtures, consisting of many isomers and compounds that vary from mobile oily liquids to white crystalline solids and hard non-crystalline resins. The variability is based upon the degree of chlorination (and location of chlorine atoms) on the diphenyl rings that act as the skeleton for PCBs. The name Aroclor® 1221, 1233, 1242, 1248, 1254, 1260 etc. correspond as to the percentage that the diphenyl rings have been instituted, i.e., 21%, 33%, 42%, etc. The most commonly encountered PCBs are chlorodiphenyl (42% chlorine) [Aroclor® 1242] and chloridiphenyl (54% chlorine) [Aroclor® 1254]. These compounds are light, straw-colored liquids with typical chlorinated aromatic odors; 42% chlorodiphenyl is a mobile liquid and 54% chlorodiphenyl is a viscous liquid. Chlorodiphenyl (42% chlorine) boils between 617^{o} and 691^{o} and freezes at -2^{o}F. Chlorodiphenyl (54% chlorine) boils between 689^{o} and 734^{o}F and freezes at 50^{o}F. The synonyms for PCBs are chlorodiphenyls, Aroclors, and Kanechlors. Names further defining PCBs, based upon chlorine substitution are Aroclor® 1221, 1232, 1242, 1248, 1254, 1260, 1262, 1268, 2565, 4465, 5442, 5460 and Kanechlor 300, 400, 500. PCBs are incompatible with strong oxidizers.

PCBs are used alone and in combination with chlorinated naphthalenes. They are stable, thermoplastic, and nonflammable, and find chief use in insulation for electric cables and wires, in the production of electric condensers, as additives for extreme pressure lubricants, and as a coating in foundry use. PCBs are one member of a class of chlorinated aromatic organic compounds which are of increasing concern because of their apparent ubiquitous dispersal, persistence in the environment, and tendency to accumulate in food chains, with possible adverse effects.

Additional information on PCB's may be found at the following website:

http://www.cdc.gov/niosh/npg/npgd0125.html

5.1.3 Heavy Metals

Heavy metals are a group of metals including lead, arsenic, chromium, nickel, cadmium, and selenium. Exposure to heavy metals can be prevented through dust control measures, administrative controls (e.g., no consumption of food/beverages in the work area or smoking/chewing tobacco), chemically-protective gloves, and decontamination procedures.

Additional information on Heavy Metals and their health effects may be found at the following website:

http://www.osha.gov/SLTC/metalsheavy/index.html

5.1.4 Vanadium

CAS 7440-62-1; RTECS YW1355000

Vanadium is a light-grey or white, lustrous powder or fused hard lump insoluble in water. There are no synonyms. It is produced by roasting the ores, thermal decomposition of the iodide, or from petroleum residues, slags from ferrovanadium production, or soot from oil burning.

Most of the vanadium produced is used in ferrovanadium and of this the majority is used in high speed and other alloy steels with only small amounts in tool or structural steels. It is usually combined with chromium, nickel, manganese, boron, and tungsten in steel alloys.

Additional information on Vanadium may be found at the following website:

http://www.cdc.gov/niosh/npg/npgd0653.html

5.2 Real-Time Exposure Measurement

Monitoring shall be performed within the work area on site in order to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Table 5-1 specifies the real-time monitoring equipment, which will be used for this project.

Table 5-1: Monitoring Parameters and Equipment

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED
Photo Ionization Detector (PID)	RAE Systems Mini-RAE or Multi-RAE (min. 10.6 eV bulb)	To be used as general screening tool during sample collection. Petroleum hydrocarbons Organic Solvents
Particulate Monitor **For respirable dust**	MIE Model PDR Thermo Scientific Model PDR 1500	To be used if visible dust generated during site activities. Aerosols, mist, dust, and fumes including Respirable dust

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

5.3 Health and Safety Action Levels

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

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions to limit, etc.) must be implemented prior to commencing activities at the specific work area.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of SSO or the Safety Professional.

Reasons to upgrade:

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

Reasons to downgrade:

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

5.4 Monitoring Procedures

The following monitoring procedurewill be followed during all groundwater monitoring activities.

Any well which has been sealed for longer than 6 hours will be allowed to ventilate for a minimum of 5 minutes upon opening, then monitored for volatile organic compound (VOC) concentration using a PID. A reading in excess of [1] ppm will require additional ventilation, followed by re-monitoring. If an acceptable VOC concentration cannot be reached within 30 minutes of opening a well, reseal it and contact the DHSM for guidance.

The tools outlined above, and their subsequent action levels defined below, have been based on the existing data for the site. Currently, exposure issues are not anticipated, however; a PID will be used for general screening purposes during soil and groundwater investigation/sampling activities.

Since PAH's, PCB's and metals are of concern when suspended in dust, the dust monitoring procedures outlined below should be used if any visible dust is generated during the proposed SOW activities. Based on the current SOW, no dust hazards are currently anticipated, and the procedures outlined below are for precautionary purpose only.

Table 5-2: Monitoring Procedures and Action Levels

PARAMETER	LOCATION AND INTERVAL	RESPONSE LEVEL (Meter units/ppm above background)	RESPONSE
Hydrocarbons, VOCs, SVOCs (Total by PID)	Continuous in the worker's breathing zone or in the immediate work area for sustained reading of 2 minutes in duration.	< 1 ppm	Level D work and continue monitoring (not applicable for initial assessment of unknown drums or containers.
		≥ 1 ppm	Contact the SSO, and if no potential for change in conditions exist (drum/container activities increasing airborne levels), don Level C (GME/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring.
	Confined spaces will require initial and continuous monitoring.	Initial entry or opening/sampling unknown drums/containers	Stop Work. Not consistent with chemical contamination and concentrations identified in the specifications. Based upon the inconsistency, additional chemical specific monitoring and/or upgrade to Level B may be required. Consult with PM and H&S Professional.
		≥ 5 ppm	
Dust, Mist, Aerosols	Continuous during intrusive activities involving impacted materials. In addition, site	< 1 mg/m^3 (Sustained for more than 2 minutes)	Continue Level D work and continue monitoring.

(Respirable)	perimeter monitoring may be initiated by the SSO based on elevated air monitoring results.	≥ 1 mg/m^3 (Sustained for more than 2 minutes)	Upgrade to Level C PPE. Contact the PM and SSO, implement mitigation measures, and continue Level C (minimum GME/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring.
		≥ 3 mg/m^3 (Sustained for more than 2 minutes)	Temporarily cease work operations, contact the PM and SH&E Manager to discuss improving site mitigation measures.

5.4.1.1 Monitoring Equipment Calibration

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

5.4.1.2 Personal Sampling

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

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

5.5 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress.

Heat stress can be a significant field site hazard, particularly for non-acclimated personnel operating in a hot, humid setting. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in S3NA 511 PR, *Heat Stress.*

5.5.1.1 Responding to Heat-Related Illness

The guidance below will be used in identifying and treating heat-related illness.

Table 5-3: Identification and Treatment of Heat-Related Illness

Type of Heat-Related Illness	Description	First Aid
Mild Heat Strain	The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.	• Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. • If an air-conditioned spot is available, this is an ideal break location. • Once the victim shows improvement, he/she may resume working; however, the work pace should be moderated to prevent recurrence of the symptoms.
Heat Exhaustion	Usually begins with muscular weakness and cramping, dizziness, staggering gait, and nausea. The victim will have pale, clammy moist skin and may perspire profusely. The pulse is weak and fast and the victim may faint unless they lie down. The bowels may move involuntarily.	• Immediately remove the victim from the work area to a shady or cool area with good air circulation (*avoid drafts or sudden chilling*). • Remove all protective outerwear. • Call a physician. • Treat the victim for shock. (*Make the victim lie down, raise his or her feet 6–12 inches, and keep him/her cool by loosening all clothing*). • If the victim is conscious, it may be helpful to give him/ her sips of water. • Transport victim to a medical facility ASAP.
Heat Stroke	The most serious of heat illness, heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperature may rise to 104 degrees Fahrenheit or higher. As the victim progresses toward heat stroke, symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.	• Immediately evacuate the victim to a cool/shady area. • Remove all protective outerwear and as much personal clothing as decency permits. • Lay the victim on his/her back w/the feet slightly elevated. • Apply cold wet towels or ice bags to the head, armpits, and thighs. • Sponge off the bare skin with cool water. • The main objective is to cool without chilling the victim. • Give no stimulants or hot drinks. • Since heat stroke is a severe medical condition requiring professional medical attention, emergency medical help should be summoned immediately to provide onsite treatment of the victim and proper transport to a medical facility.

5.1.1.1 Responding to Cold-Related Illness

If work on this project is conducted in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Work will cease under unusually hazardous conditions (e.g., wind-chill less than 0°F, or wind-chill less than 10°F with precipitation). Systemic cold exposure is referred to as hypothermia. Localized cold exposure is generally labeled frostbite. Recognition of the symptoms of cold related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities. Refer to the 2003 ACGIH TLV for Chemical Substances and Physical Agents for additional information on cold stress prevention, monitoring, and work-warming regimens. Work-rest cycles will be determined and the appropriate measures taken to prevent heat stress as outlined in S3NA 505 PR, *Cold Stress.*

5.1.1.2 Hypothermia

Hypothermia is a life-threatening condition in which the core body temperature falls below 95°F. Hypothermia can occur at temperatures above freezing particularly, when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe. This accounts for the progressive

signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness (see Table 4-2).

Table 5-4: Progressive Clinical Symptoms of Hypothermia

Core Temperature (°F)	Clinical Signs
95°	Maximum shivering
87° - 89°	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84° - 86°	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°	Victim rarely conscious
70° - 72°	Maximum risk of ventricular fibrillation

The ability to sustain metabolic rate and to reduce skin blood flow is diminished by fatigue. Thus, fatigue increases the risk of severe hypothermia by decreasing metabolic heat. Additionally, because blood flow through the skin is reduced to conserve heat, the skin and underlying tissues become more susceptible to frostbite.

5.1.1.3 Frostbite

Frostbite is both the general and medical term given to areas of cold injury. Unlike hypothermia, frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Frostbite injuries occur most commonly on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction. The three general categories of frostbite are:

- Frostnip - A whitened area of the skin, which is slightly burning or painful;
- Superficial frostbite - Waxy, white skin with a firm sensation but with some resiliency. Symptomatically feels “warm” to the victim with a notable cessation of pain; and
- Deep frostbite - Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb, and hard.

5.1.1.4 Preventing Cold Related Illness

The following are precautions that will be taken to prevent illness relating to cold stress:

- Educate worker to recognize the symptoms of frostbite and hypothermia;
- Ensure the availability of an enclosed, heated environment within the vehicles. The nearest heated environment will be the interior of the vehicles at the site;
- Ensure the availability of dry changes of clothes;
- Record temperature readings; and
- Ensure the availability of warm beverages, preferably non-caffeinated.

5.1.1.5 Monitoring for Cold Exposure

Cold stress monitoring will be conducted in accordance with the ACGIH cold stress TLV. The TLV objective is to prevent the deep body core temperature from falling below 96.8°F and to prevent cold injury to body extremities. Temperature monitoring and recording will be initiated in the following situations:

- At the SSO discretion when suspicion is based on changes in worker's performance or mental status;
- At worker's request;
- As a screening measure whenever any one worker on the site develops hypothermia; and

- Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

6 ENVIRONMENTAL PROGRAM (ENVIRONMENT)

6.1 ENVIRONMENTAL COMPLIANCE AND MANAGEMENT

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

6.1.1 Hazardous Waste Management

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

7 PERSONAL PROTECTIVE EQUIPMENT

7.1 PERSONAL PROTECTIVE EQUIPMENT

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

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

Table 7-1: Personal Protective Equipment

TYPE	MATERIAL	ADDITIONAL INFORMATION
Minimum PPE		
Safety Vest	ANSI Type II high-visibility	Must have reflective tape/be visible from all sides
Boots	Leather	ANSI approved safety toe
Safety Glasses		ANSI Approved; ≥98% UV protection
Hard Hat		ANSI Approved; recommended wide-brim
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs	In hazardous noise areas
Leather Gloves		If working with sharp objects or powered equipment.
Protective Chemical Gloves	Nitrile	During handling of all potential COPC impacted media.
Protective Chemical Coveralls	Tyvek	For use where contact potential with COPC impacted media exists.
Protective Chemical Boots	Rubber Overbooties or dedicated rubber boots	For use where contact potential with COPC impacted media exists.
Level C Respiratory Protection	MSA (Full Face or equivalent) equipped with GME/P100	Upgrade based on air monitoring requirements established in Section 5.0.
Sunscreen	SPF 30 or higher	
Cold Weather Gear	Hard hat liner, hand warmers, insulated gloves	
Life Vest	USCG approved Type III or Type V work vest	Use within 6 feet of the edge of the water.

7.2 PPE DOFFING AND DONNING (UTILIZATION) INFORMATION

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

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

7.3 DECONTAMINATION

7.3.1 General Requirements

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

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

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

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

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

7.3.2 Decontamination Equipment

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

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

7.3.3 Personal/Equipment Decontamination

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

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

Personnel decontamination should consist of the following glove removal procedure:

1. For Overbootie Removal

- Grasp top of overbootie and roll downward (inside out)
- Using gloved hands, place booties in receptacle

2. For Suit Removal

- Unzip suit and remove arms, turning inside-out
- Slide suit down, over waist
- Slide suit downward over legs, and step out
- Using gloved hands, grasp inside of suit, and place in receptacle.

3. For Glove removal:

- Grasp the cuff of the dominant hand and pull glove over the bulk of the hand, leaving the fingers inside the glove.
- Use the dominant hand to grasp the cuff of the non-dominant hand and pull the glove completely off (inside-out) and place inside of the dominant hand glove.
- Once removed, employee should only touch the inside material of the dominant hand glove.
- Thoroughly wash hands.

4. For APR Removal

- Remove cartridges and place in receptacle
- Loosen straps, grasp back strap and face piece, and doff mask
- Decon mask and hang to dry

All employees who are expected to don respiratory protection must have successfully passed a qualitative or quantitative fit-test within the past year for the brand, model and size respirator they plan to don. If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning. Respirators will be thoroughly cleaned using disinfectant material within one week following any respirator use. Refer to the cleaning instructions provided with the respirator or specified in the OSHA regulations at 29 CFR 1910.134.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination. Before heavy equipment and trucks are taken offsite, the SS and/or SSO will visually inspect them for signs of contamination. If contamination is present, the equipment must be decontaminated

For smaller equipment, use the following steps for decontamination:

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

All decontaminated equipment shall be visually inspected for contamination prior to leaving the Contaminant Reduction Zone (CRZ). Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

8 PROJECT HEALTH AND SAFETY ORGANIZATION

8.1 PROJECT MANAGER [RAVI DAMERA, P.E.]

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

8.2 SITE SUPERVISOR [SEAN CROUCH]

The site supervisor has the overall responsibility and authority to direct work operations at the job site according to the provided work plans. The PM may act as the site supervisor while on site.

8.2.1 Responsibilities

The site supervisor is responsible to:

- Discuss deviations from the work plan with the SSO and PM.
- Discuss safety issues with the PM, SSO, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable SOPs.

8.2.2 Authority

The site supervisor has authority to:

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

8.2.3 Qualifications

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

8.3 SITE SAFETY OFFICER [TBD]

8.3.1 Responsibilities

The SSO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in AECOM Safety Policy.
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the SOPs using the appropriate audit inspection checklist provided by an AECOM Safety Professional.
- Work with the site supervisor and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.

- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation.
- Check that all site personnel and visitors have received the proper training and medical clearance prior to entering the site.
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation).
- Present tailgate safety meetings and maintain attendance logs and records.
- Discuss potential health and safety hazards with the Site Supervisor, the Safety Professional, and the PM.
- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site. The alternate SSO must be approved by the PM.

8.3.2 Authority

The SSO has authority to:

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

8.3.3 Qualifications

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

8.4 EMPLOYEES

8.4.1 Employee Responsibilities

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

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

8.4.2 Employee Authority

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

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

8.5 SAFETY PROFESSIONAL [SEAN LIDDY, CSP]

The Safety Professional is the member of the AECOM Safety, Health and Environmental Department assigned to provide guidance and technical support for the project. Duties include the following:

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

8.6 SUBCONTRACTORS

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

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

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

8.7 VISITORS

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

8.7.1 Visitor Access

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

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

If the site visitor requires entry to any EZ, but does not comply with the above requirements, all work activities within the EZ must be suspended. Until these requirements have been met, entry will not be permitted.

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

9 SITE CONTROL

9.1 GENERAL

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

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. General examples of zone layouts have been developed for drilling and earth moving activities [(e.g., excavating, trenching, etc.)] and are attached to this section.

9.2 CONTROLLED WORK AREAS

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

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

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

9.2.1 Exclusion Zone

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

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

- **ERI Activities**. A distance of 20 feet (minimum) in all directions will be cleared from the ERI equipment. The cleared area will be sufficient to accommodate movement of necessary equipment and supplies. Vehicles and other hard barriers should be used where applicable to protect employees and public.
- **Direct Push Drilling Activities**. A distance of 20 feet (minimum) in all directions will be cleared from the rig. The cleared area will be sufficient to accommodate movement of necessary equipment and soil sampling supplies. Vehicles and other hard barriers should be used where applicable to protect employees and public.
- **HSA Drilling**. Determine the mast height of the drill rig. This height will be cleared (minimum), if practical, in all directions from the bore-hole location and designated as the exclusion zone. The cleared area will be sufficient to accommodate movement of necessary equipment and the stockpiling of spoils piles. Vehicles and other hard barriers should be used where applicable to protect employees and public.
- **Hand Augering/GW Sampling**. A distance of 10 feet (minimum) will be cleared in all directions from the sampling location in order to accommodate additional sampling equipment. Vehicles and other hard barriers should be used where applicable to protect employees and public.

- **Surface Water and Sediment Sampling**. A distance of 20 feet (minimum) will be cleared in all directions from the sampling location in order to accommodate additional sampling vessels if needed. Vessels should be used where applicable to protect employees and public.

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

9.2.2 Contamination Reduction Zone

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

9.2.3 Support Zone

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

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

9.3 SITE ACCESS DOCUMENTATION

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

9.4 SITE SECURITY

Site security is necessary to:

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

To maintain site security during working hours:

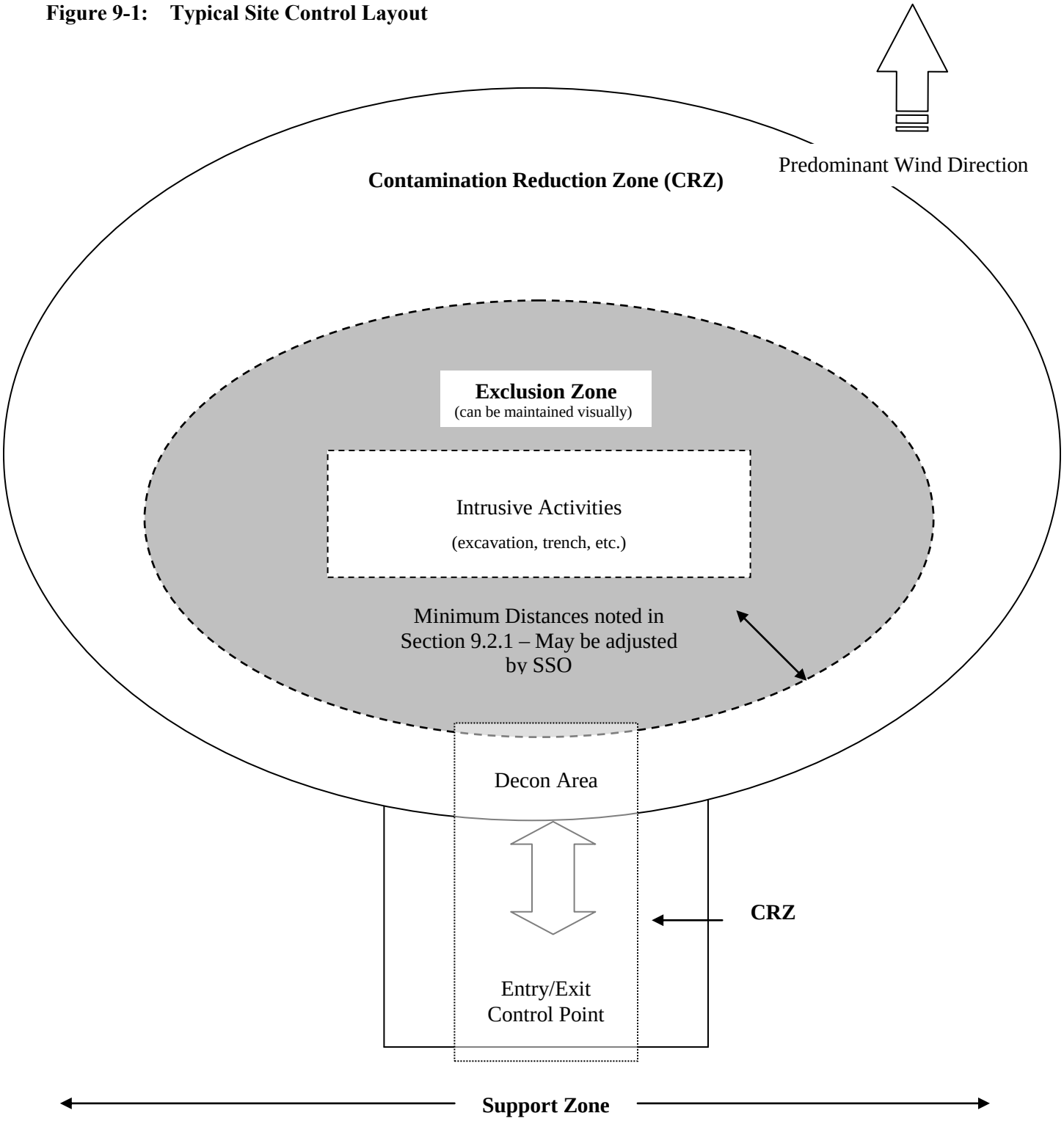
1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. Assign responsibility for enforcing authority for entry and exit requirements.
4. When feasible, install fencing or other physical barrier around the site.
5. If the site is not fenced, post signs around the perimeter and whenever possible, use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
6. Have the PM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

1. If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards, and respiratory protection techniques.

2. If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
3. Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.
4. Secure the equipment.

Figure 9-1: Typical Site Control Layout



10 EMERGENCY RESPONSE PLANNING

10.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the AECOM team. The Emergency Action Plan (EAP) will be reviewed by all personnel prior to the start of field activities. A test of the EAP will be performed within the first three (3) days of the project field operations. This test will be evaluated and documented in the project records.

Three major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Workplace Violence, Bomb Threat
4. Safety equipment problems

10.1.1 Emergency Coordinator

The duties of the Emergency Coordinator (EC) include:

- Implement the EAP based on the identified emergency condition
- Notify the appropriate project and SH&E Department personnel of the emergency (Table 9-3)
- Verify emergency evacuation routes and muster points are accessible
- Conduct routine EAP drills and evaluate compliance with the EAP

10.1.2 Site-Specific Emergency Procedures

Benning Road Facility emergency response procedures outlined in the ICP will be followed in lieu of an AECOM developed procedure. A copy of the ICP will be kept on-site along with this HASP.

Table 10-1: Emergency Planning

Emergency	Evacuation Route	Muster Location
Chemical Spill	• Upwind [See Pepco ER Plan]	• [See Pepco ER Plan]
Fire/Explosion	• [See Pepco ER Plan]	• [See Pepco ER Plan]
Tornado/Severe Weather	• [See Pepco ER Plan]	• [See Pepco ER Plan]
Lightning	• [See Pepco ER Plan]	• See Pepco ER Plan
Additional Information		
Communication Procedures	Direct verbal communications, however; must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight cannot be easily maintained 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. AECOM personnel will bring a mobile phone to the site to ensure that communications with local emergency responders is maintained, when necessary.	
CPR/First Aid Trained Personnel	[TBD]	
Site-Specific Spill Response Procedures	Chemicals brought onsite will be limited to fuel for vehicles and small quantities of laboratory preservatives. In the event of a minor spill, sorbent material will be placed on the spill and then	

	transferred to a container for disposal. Field personnel will immediately notify the PM who in turn will notify the account manager and the Department project representative. In addition, Pepco's ER plan will be followed for spill response protocols.

10.1.3 Spill Containment Procedure

Work activities may involve the use of hazardous materials (i.e. fuels, solvents) or work involving drums or other containers. If anything beyond these procedures are required, a site specific spill reporting card/procedure must be developed for the site. Procedures outlined below will be used to prevent or contain spills:

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

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

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- Drums/containers will be secured and handled in a manner which minimizes spillage and reduces the risk of musculoskeletal injuries.

10.1.4 Safety Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSO and the immediate supervisor.

If any AECOM employee is injured and requires medical treatment, the Site Supervisor will report the incident in accordance with AECOM's incident reporting procedures. A copy of the final Supervisor's Report of Incident will be provided to the SH&E Professional before the end of the following shift.

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

All accidents/incidents will be investigated Copies of all subcontractor accident investigations will be provided to the SSO within five (5) days of the accident/incident.

10.1.5 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 to the PM and AECOM H&S Department. In determining whether a spill or release must be reported to a regulatory agency, the Site Supervisor will assess the quantity of the spill or release and evaluate the reporting criteria against the state-specific reporting requirements, your applicable regulatory permit, and/or client-specific reporting procedures. **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.**

Table 10-2: Emergency Contacts

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Mobile Phone**
Fariba Mahvi	Pepco Project Manager	202-331-6641	202-345-7647
Ravi Damera	Account/Client Manager	240-565-6510	443-832-8221
Ravi Damera	Project Manager	240-565-6510	443-832-8221
Sean Crouch	Site Supervisor	240-565-6501	443-878-0551
TBD	Site Safety Officer		
Phil Platcow	Regional SH&E Manager		617-899-5403
Sean Liddy	District SH&E Manager		410-869-6164
Incident Reporting	**Incident Reporting Line**	**(800) 348-5046**	
TBD	TDG/IATA Shipping Expert, Level 1 Shipper		
Ann Alyssa Hill	TDG/IATA Shipping Expert, Level 2 Shipper	804-515-8506	804-640-4815

Organization / Agency	
Name	**Telephone Number**
Police Department (local)	911
Fire Department (local)	911
Ambulance Service ***(EMT will determine appropriate hospital for treatment)***	911
Emergency Hospital ***(Use by site personnel is for emergency cases only)***	
Providence Hospital	202-269-7001
1150 Varnum Street, N.E.	
Washington, DC 20017	
Emergency Hospital Route: See Figure 10-1	
WorkCare: 24-hr On-Call Occupational Nurse **(*Non-Emergency assistance only – Employees must notify SH&E prior to calling*)**	(800) 455-6155
Poison Control Center	(800) 222-1222
Pollution Emergency	(800) 292-4706
National Response Center	(800) 424-8802
Info-Trac: 24-hr Response Services– Account # 74984	(800) 535-5053
Title 3 Hotline	(800) 424-9346

Public Utilities	
Name	**Telephone Number**

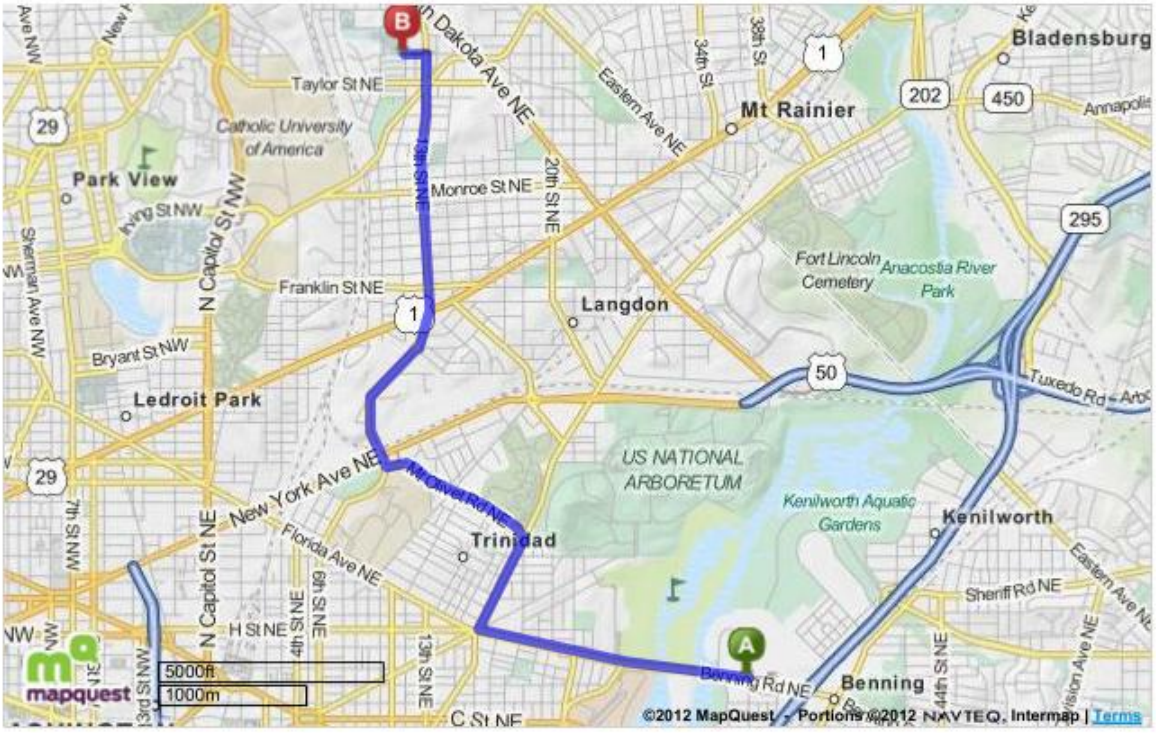
Call Before You Dig	811 or MD/DE/DC - Miss Utility 800-257-7777

Figure 10-1: -Emergency Occupational Hospital Route/Detail Map

3400 Benning Rd NE, Washington, DC 20019-1503

	1. Start out going **west** on **Benning Rd NE** toward **34th St NE**. Map	**1.4 Mi** *1.4 Mi Total*
	2. Turn **right** onto **Bladensburg Rd NE**. Map *Bladensburg Rd NE is 0.1 miles past 16th St NE* *If you are on H St NE and reach Florida Ave NE you've gone a little too far*	**0.5 Mi** *1.9 Mi Total*
	3. Turn **left** onto **Mt Olivet Rd NE**. Map *Mt Olivet Rd NE is just past M St NE* *Beth Shalom Ame Zion is on the corner* *If you reach R St NE you've gone about 0.4 miles too far*	**0.8 Mi** *2.8 Mi Total*
	4. Turn **right** onto **9th St NE**. Map	**0.4 Mi** *3.1 Mi Total*
	5. Turn **slight right** onto **Brentwood Rd NE**. Pass through 1 roundabout. Map *Brentwood Rd NE is 0.1 miles past T St NE* *Us Post Office is on the corner*	**0.6 Mi** *3.7 Mi Total*
	6. Turn **slight left** onto **13th St NE**. Map	**1.3 Mi** *5.0 Mi Total*
	7. Turn **left** onto **Varnum St NE**. Map *Varnum St NE is just past Upshur St NE* *If you reach Webster St NE you've gone a little too far*	**0.1 Mi** *5.1 Mi Total*
	8. **1150 VARNUM ST NE** is on the **right**. Map *Your destination is just past 12th St NE* *If you reach 10th St NE you've gone about 0.1 miles too far*	

Providence Hospital
1150 Varnum St NE, Washington, DC 20017
(202) 269-7000



11 : PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the AECOM Health and Safety Plan for the Benning Road Facility. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE

Attachment A

Task Hazard Analyses

Contents

TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

Drilling Operation Oversight and Soil Sampling
AECOM Technical Services, Inc. Project 60249055

TASK DESCRIPTION	HAZARD IDENTIFICATION	HAZARD CONTROL
General Physical Hazards	– Slip/Trip/Fall – Cold/Heat Stress – Biological Hazards – Cuts/Scrapes/Bruises – Manual lifting – Adverse Weather	– Level D PPE required. – Maintain a clean and organized work area. – Watch your step and ensure proper footing. – Provide drinking water and first aid kit. – Wear appropriate clothing for weather conditions. – Assess work area for poisonous plants and animals and communicate observations to avoid them. – Wear appropriate work gloves for task – Use proper lifting techniques by bending and lifting with legs and not back, and do not over extend or twist (Do not lift over 49lb. without assistance) – Be aware of changing weather condition and provide appropriate weather gear. – When work is halted due to inclement weather, personnel are to seek shelter in vehicles or building designated Shelter in Place (SIP)
Utility Clearances	– See General Physical Hazards	– In addition to General Physical Hazards… – Review available maps and have utility locate performed by One Call or private locator.
Establish exclusion zone/site setup	– Traffic in adjacent roadway	– Use combination of vehicles, cones, traffic barriers and caution tape
Drill Rig operation.	– Overhead and underground utilities – Noise Hazard – Pinch points/swing radius – Chemical exposure potential – Eye Injury – Fire	– Confirm Utility Locations – Inspect vehicles and equipment daily (Checklists provided in HASP) – Maintain clean and organized work area. – Wear appropriate clothing and PPE, (no loose clothing or jewelry) – Earplugs and/or ear muffs required in EZ – Position the drill rig and personnel up wind of drilling location – Monitoring breathing zone with PID and upgrade PPE as required. – Avoid creating splash hazards while drilling. – Keep a safe distance from drill rig. – Use hand signals, keep clear of moving equipment, and ensure eye contact with operator prior to approaching. – Have fire extinguisher on site.
Sample collection and packaging	– Chemical exposure potential – Cuts/Scrapes – Manual lifting of equipment	– Inspect glassware for breakage and avoid sharp edges and wear gloves (nitrile and cut resistant leather or Kevlar) – Follow proper decontamination procedures – Use proper lifting techniques and do not over-extend
Material Handling	– Chemical Exposure – Splash Hazard – Spills	– Wear modified level D PPE when necessary (Tyvek and face shields or dust masks) – Have portable eyewash on site – Inspect Drums/Containers prior to use for integrity and contaminants – Place soil in drums/containers as soon as practicable. – Store drums/containers in designated area
Drill Rig Decontamination	– High pressure water – Splash Hazard	– Spray away from body – Wear full-face shield, gloves, rubber boots and tyvek or other suitable attire.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

CHEMICAL HAZARDS & MONITORING PROCEDURES

PAHs, PCBs and metals - Refer to Section 5 of the HASP for additional information.
Note - Area monitoring with PID (Mini Rae 10.6eV) for general precautionary purposes.
≥ 1 ppm requires upgrade PPE according to Table 5-2.
Dust hazard not anticipated with current SOW. If dust generation observed, implement dust monitoring.

ADDITIONAL SAFETY CONSIDERATIONS

1. Ensure all personnel have read the HASP
2. Ensure all equipment is equipped with necessary fire extinguishers (min 5 lbs BC). Ensure equipment has a working kill switch and back-up alarms, and follow equipment inspection procedures.
3. Ensure underground utilities are verified with facility, marked, markings maintained, and operator aware of location
4. All equipment operators must be Competent Persons for the task/equipment being performed/operated.
5. All ground personnel must stay clear of equipment and make eye contact (and receive confirmation) with operator prior to approaching. Wear high visibility reflective vests and stay out of travel lanes and swing radius of heavy equipment.
6. Dust hazard expected to be minimal due to saturated state of soils and regular precipitation. If visible emissions of dust observed, then dust suppression techniques will be implemented.
7. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path.
8. Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate THAs or SOPs.
9. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed of the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.
10. When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.
11. Conduct equipment inspection of all hoses and switches. Stay clear of running equipment.
12. Maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting.
13. Stay clear of moving rig, do not move rig with mast raised, do not drive on slopes greater than 30 degrees, avoid soft areas when moving rig and setting up, chock wheels. Use spotter when moving rig, check for overhead obstructions.
14. Wear nitrile gloves when collecting samples in soil to avoid dermal contact with potential contaminants. Be observant for tripping hazards, holes, stickups, vines, old fence lines, etc.
15. For equipment decontamination, triple rinse using distilled or deionized water and alconox for first rinse and distilled or deionized water for second and third rinses. Always clean materials between locations and at the site. Do not bring equipment back to the office without proper decontamination.

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 305, Hand & Power Tools SH&E 308, Manual Lifting SH&E 313, Wildlife, Plants, Insects SH&E 405, Drilling and Boring SH&E 406, Overhead Electrical Lines SH&E 417, Identifying Underground Utilities SH&E 508, Hazardous Materials and Sample Shipping SH&E 511, Heat Stress	**LEVEL D** • ANSI approved hard hat • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • ANSI approved steel safety-toe boots or approved equivalent. • High visibility reflective traffic vest • Nitrile Gloves • Leather work gloves • Hearing protection required when around operating machines (85 dba OSHA PEL). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle). **Modified LEVEL D (biohazard avoidance)** • Tyvek suit **LEVEL C (upgrade per Air Monitoring Requirements)** • APR with GMC/P100 cartridges

Evaluated by: Sean Liddy, CSP **Date: June 2012**

Acknowledgement

All employees, subcontractors, and visitors must sign the Acknowledgement form, in this section, before conducting field activities at this site.

By signing this form, AECOM employees agree that:

- I have read this Task Hazard Analysis and I understand the requirements of the THA.
- I will conduct work at this site in accordance with the requirements of the THA.

By signing this form, subcontractors and visitors agree that:

- I have read and understood the potential hazards associated with the site.
- I will ensure compliance with my company's policies on health and safety.

Print Name & Company	Date	Signature
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TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

GROUNDWATER SAMPLING & MONITORING WELL DEVELOPMENT

AECOM Technical Services, Inc. Project #60249055

TASK DESCRIPTION	HAZARD IDENTIFICATION	HAZARD CONTROL
General Physical Hazards	– Slip/Trip/Fall – Cold/Heat Stress – Biological Hazards – Cuts/Scrapes/Bruises – Manual lifting – Climbing into back of truck – Adverse Weather	– Level D PPE required. – Maintain a clean and organized work area. – Watch your step and ensure proper footing. – Provide drinking water and first aid kit. – Wear appropriate clothing for weather conditions. – Assess work area for poisonous plants and animals and communicate observations to avoid them. – Wear appropriate work gloves for task. – Maintain 3 points of contact when climbing into truck – Use proper lifting techniques by bending and lifting with legs, do not over extend or twist (item >49lb. require assistance) – Be aware of changing weather conditions and provide appropriate weather gear. – When work is halted due to inclement weather, personnel are to seek shelter in vehicles and buildings.
Establish EZ around well and unload/set-up equipment	– Traffic in roadways and parking lots – Cuts/scrape – Stacking heights – Manual lifting	– Use combination of vehicles, cones, traffic barriers and caution tape. – Wear leather gloves. – Avoid stacking equipment and boxes. – A traffic plan may be necessary depending on location.
Open well and take water level measurement.	– Cuts/scrapes – Biological Hazards – Exposure potential	– Wear leather gloves when un-bolting well lid – Look for spiders, scorpions, etc. in the well head. – Use ventilation procedures on each well, monitoring at well head and breathing zone. – Wear nitrile gloves to remove plug and taking measurement.
Sample/develop purge using a bladder pump, bailer or whale pump Well will be purged prior to sampling.	– Exposure potential – Cuts/scrapes – Electrical – Manual lifting	– Wear nitrile gloves while taking flow rates – Monitor breathing zone continuously during sampling event. – Ensure employees are properly trained in the use of the compressors, i.e., use correct contacts for 12volt batteries and avoid arcing situations – Use proper lifting techniques and ergonomics awareness. – Use only approved cutting devices for tubing boxes and proper tools for pump repairs/maintenance.
IDW handling	– Chemical Exposure – Manual lifting – Splash Hazard – Spills	– Wear modified level D PPE when necessary (Tyvek and face shields or dust masks) – Have portable eyewash on site – Inspect Drums/Containers prior to use for integrity and contaminants – Pour water from buckets into drums/containers as soon as practicable. – Place used PPE and disposable sampling equipment in garbage bags to be disposed of properly.
Sample collection and packaging	– Chemical exposure potential – Cuts/Scrapes – Manual lifting of equipment	– Inspect glassware for breakage and avoid sharp edges and where gloves. – Use proper lifting techniques and do not over-extend. – Follow proper decontamination procedures.
Decontamination	– Chemical exposure potential – Cuts/Scrapes – Manual lifting of equipment	– Wear modified level D PPE when necessary (Tyvek and face shields or dust masks) – Have portable eyewash on site – Pour water from buckets into drums/containers as soon as practicable and lifting with legs.

TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

CHEMICAL HAZARDS & MONITORING PROCEDURES

PAHs, PCBs and metals - Refer to Section 5 of the HASP for additional information.
Note - Area monitoring with PID (Mini Rae 10.6eV) for general precautionary purposes.
≥ 1 ppm requires upgrade PPE according to Table 5-2.
Dust hazard not anticipated with current SOW. If dust generation observed, implement dust monitoring.

ADDITIONAL SAFETY CONSIDERATIONS

1. Ensure all personnel have read the HASP
2. Watch for traffic. Wear high-vis vests and ensure exclusion zone around work area is clearly marked and delineated at adequate distance to protect employees and public (min 10 ft).
3. Follow well venting procedure.
4. Consult with Level 2 Shipper if free-phase liquids present in samples.
5. Ensure use of proper cutting devices and other tool selection during pump assembly/disassembly.
6. Evaluate surrounding work area for additional hazards that may be present. Stand upwind to avoid exposure whenever possible.
7. Self retracting cutting devices are only to be used.
8. Be aware of surroundings and set up traffic cones/barrier around work zone when in parking lots or other areas subject to traffic.
9. Sample bottles for VO+10 analysis are 40-ml glass – do not overtighten. Confirm no acid preservative is outside bottle before use. Wrap in paper towels as needed.
10. Check sample location for potential hazards such as poison ivy, surface obstructions such as rubble, old foundations or rebar. Identify possible slip, trip, and fall hazards such as holes, obstructions protruding from the ground, or debris that may be scattered on the ground.
11. Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path.
12. Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate THAs or SOPs.
13. Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed of the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.
14. Maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting.
15. For equipment decontamination, triple rinse using distilled or deionized water and alconox for first rinse and distilled or deionized water for second and third rinses. Always clean materials between locations and at the site. Do not bring equipment back to the office without proper decontamination.

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 313, Wildlife, Plants, Insects SH&E 505, Cold Stress Prevention SH&E 511, Heat Stress SH&E 508, Hazardous Materials and Sample Shipping SH&E 302, General Electric Safety SH&E 308, Manual Lifting SH&E 305, Hand & Power Tools	**LEVEL D** • ANSI approved hard hat • ANSI approved safety glasses • Shirts with sleeves and full-length pants. • ANSI approved steel safety-toe boots or approved equivalent. • High visibility reflective traffic vest • Nitrile Gloves • Leather work gloves • Hearing protection required when around operating machines (85 dba OSHA PEL). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle). **LEVEL C (upgrade per Air Monitoring Requirements)** • APR with GMC/P100 cartridges

AECOM

TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

Acknowledgement

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By signing this form, subcontractors and visitors agree that:

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- I will ensure compliance with my company's policies on health and safety.

Print Name & Company	Date	Signature
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TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

MOBILIZATION/DEMOBILIZATION

AECOM Technical Services, Inc. Project # 60249055

TASK DESCRIPTION	HAZARD IDENTIFICATION	HAZARD CONTROL
MOBE - Check the weather.	Unexpected storm – lightning, rain, snow (slip hazard), wind.	Check local weather forecast, have a weather radio for remote sites, observation and communication among team members. Discuss weather issues during tailgate safety meeting. At the first sign of lightning, thunder or strong winds, immediately move away and take shelter. Do not resume work until 30 minutes have passed without signs of storm.
	Heat and cold stress.	Know the symptoms of heat and/or cold stress, and the potential for their occurrence based on expected weather conditions. Take precautions to avoid them. Refer to the HASP or ask your supervisor if you have questions.
MOBE - Mobilize with equipment and supplies.	Vehicle accident.	Follow safe driving procedures. Always use the buddy system when moving vehicles. Plan your travel path ahead of time. Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path.
	Accidents caused by use of improper equipment/tools.	Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks.
	Injuries caused by improper lifting techniques.	Use proper bending/lifting techniques by bending and lifting with legs and not with back.
	Damage to equipment/tools and/or accidents with loose objects.	Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.
Perform perimeter walk around of vehicle for damage or unusual conditions.	Low air pressure, flat tire, blowout, impaired vision, collision, injury or death.	Complete Vehicle Inspection checklist. Assure tires are properly inflated and there is sufficient tread (including spare). Assure there are no cuts or bulges in the sidewalls, all wheels/rims are in good condition. Assure windshield and window glass is clean and free from obstructions. Lift wiper arms and check wiper blades for damage or deterioration. Check to see that all lights work. Check for fluid leaks under vehicle. Check oil, radiator, brake, transmission and washer fluid levels. Check behind vehicle for obstructions.
Slowly pull out of parking space.	Collision with other vehicles, pedestrians, or stationary objects.	Release parking brake. Check mirrors and over shoulder in all directions prior to slowly pulling out of parking space. Signal if parallel parked along a street. Use a spotter if available.

DURING TRIP - Keep your eyes moving.	Collision, injury or death to occupants or other parties.	DRIVE DEFENSIVELY. Move eyes at least every 2 seconds. Scan major and minor intersections before entry (left-right-left). Check mirrors when slowing or stopping vehicle. Scan mirrors frequently, at least one mirror every 5-8 seconds. Avoid staring while evaluating road conditions. Do not use cell phones or perform other distraction activities while car is in motion. If necessary, pull off the roadway and park prior to performing other activities. Be cautious about the use of cruise control if available on vehicle - never use in inclement weather, within cities and towns, or during hours without daylight.
Aim high in steering.	Collision, injury or death to occupants or other parties.	Maintain 12 second eye lead time (1 1/2 blocks in city traffic, 1/4 mile in highway traffic). Assess information from distant objects (i.e., flashers on?). Adjust eye lead distance to speed.
MOBE - Driving and/or walking to sample locations.	Damage to equipment or vehicles due to surface/subsurface obstructions.	Inspect area before driving and/or walking. Identify possible hazards such as holes, obstructions protruding from the ground, or debris that may be scattered on the ground. Contact site manager immediately and do not proceed if any conditions are observed that could make driving/walk in the area unsafe and that cannot be fixed with the equipment or personnel onsite.
	Fixed facilities	When parked near a fixed facility (building, monitoring well, bollards, etc…) use the buddy system when backing-up vehicle.
	Biologic hazards such as insects, poison ivy, spiders, and snakes.	Check immediate area for potential hazards such as poison ivy, spiders, wasps, snakes, etc. Use bug repellent and sunscreen as necessary. Use a bar to clear out objects and/or vegetation from spiders and/or snakes (don't use your hands or feet).
MOBE - Set up equipment at each location.	Biologic hazards such as insects, poison ivy, spiders, and snakes.	Check immediate area for potential hazards such as poison ivy, spiders, wasps, snakes, etc. Use bug repellent and sunscreen as necessary. Use a bar to clear out objects and/or vegetation from spiders and/or snakes (don't use your hands or feet).
	Injuries caused by improper lifting techniques.	Use proper bending/lifting techniques by bending and lifting with legs and not with back. Use buddy system to lift heavy objects.
	Injury/Damage from fencing and gates	Ensure fencing is secured and gates secured to prevent injury or damage from accidental closing. Use cables, locks, or drop pins to prevent accidental closure.
MOBE/DEMOBE - Secure equipment in vehicle.	Damage to equipment/tools and/or accidents with loose objects.	Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.
	Pinch points.	When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as

		well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.
Perform perimeter walk around of vehicle for damage or unusual conditions.	Low air pressure, flat tire, blowout, impaired vision, collision, injury or death.	Complete Vehicle Inspection checklist. Assure tires are properly inflated and there is sufficient tread (including spare). Assure there are no cuts or bulges in the sidewalls, all wheels/rims are in good condition. Assure windshield and window glass is clean and free from obstructions. Lift wiper arms and check wiper blades for damage or deterioration. Check to see that all lights work. Check for fluid leaks under vehicle. Check oil, radiator, brake, transmission and washer fluid levels. Check behind vehicle for obstructions.
Demobilize from site.	Vehicle accident. Fixed facilities	Follow safe driving procedures. Always use the buddy system when moving vehicles. Use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path. When parked near a fixed facility (building, monitoring well, bollards, etc…) evaluate and plan route prior to mobilization. Use the buddy system when backing-up vehicle.

ADDITIONAL SAFETY CONSIDERATIONS

No Chemical Hazards anticipated.

Use caution around delivery trucks and stay clear if not involved in spotting operation. Use one person to communicate with driver via hand signals to avoid unnecessary confusion. Watch for overhead utilities. Wear high vis vest at all times

Maintain eye contact with equipment operator during stone installation and use proper hand signals. Do not approach running equipment unless eye contact is made, and acknowledgment is received from operator.

Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.

When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.

Keep clear area around work area, maintain good housekeeping practices. When possible, use mechanical equipment to perform lifting of heavy objects. When lifting, follow safe lifting practices. Use the buddy system when lifting.

Avoid the use of chains for lifting. If necessary, ensure chain is equipped with annual load rating cert and proper hooks being used. For synthetic slings, ensure red warning line is not showing and item is in good condition. For wire ropes, inspect for broken wires (6 in a lay, 3 in a strand).

Keep line of site with co-worker and ensure regular verbal contact. If out of the line of site, ensure radio or cell phone contact is established and maintained.

AECOM

TASK HAZARD ANALYSIS (THA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 313, Wildlife, Plants, Insects SH&E 517, Non-Ionizing Radiation SH&E 505, Cold Stress Prevention SH&E 511, Heat Stress	**LEVEL D** • ANSI approved hard hat, • High visibility reflective traffic vest • Full-length pants. • ANSI approved steel safety-toe boots or approved equivalent • ANSI approved safety glasses • Hearing protection required when around operating machines (85 dba OSHA PEL). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).

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Print Name & Company	Date	Signature

TASK HAZARD ANALYSIS (THA)
BENNING ROAD FACILITY
WASHINGTON, DC

Evaluated by: Sean Liddy, CSP **Date: June 2012**

TASK NAME

Surface Water & Sediment Sampling
AECOM Technical Services, Inc. Project 60249055

TASK DESCRIPTION	HAZARD IDENTIFICATION	HAZARD CONTROL
Establish EZ around sampling location on creek	-Traffic in parking lot and adjacent roadways -Manual lifting of equipment -Biological Hazards	-Use combination of vehicle and cones, traffic barriers and/or caution tape -Use proper lifting techniques and do not over-extend --Assess work area for biological hazards (poison ivy) and avoid. Upgrade to Modified Level D PPE if contact is unavoidable.
Surface water samples will be collected using a bailer, or other suitable mechanical means. Sediment samples collected using a clam-shell dredge.	-Manual lifting of bailers and clamshell -Cuts/lacerations -Slips, Trips on uneven surfaces and streambank (rocks)	-Use proper lifting techniques and ergonomics awareness. -Use only approved cutting devices for cutting tubing and proper tools for equip repairs/maintenance -Visually survey work area for slip, trips and fall hazards and maintain solid footing. Avoid clay banks and rocks with moisture and/or biological growth.
The samples will be collected and placed in containers with appropriate preservatives.	-Splash/dermal hazard	-Use nitrile gloves and tyvek suit for dermal protection.
The samples will subsequently be packed in an ice-filled cooler and shipped to appropriate laboratory facilities.	-Manual lifting of equipment and samples	-Use proper lifting techniques and do not over-extend

ADDITIONAL SAFETY CONSIDERATIONS	CHEMICAL EXPOSURE HAZARDS
Establish communication procedure with PM to ensure contact is made prior to replacement end after task is complete to ensure accountability of personnel performing task. Avoid performing this work during periods of heavy precipitation and be aware of potential for flash-floods and high/rising water levels. Currents can be fast and floating debris may impact work areas. Watch for traffic in parking area adjacent to stream. Wear high-vis vests and ensure exclusion zone around work area is clearly marked and delineated at adequate distance to protect employees and public (min 10 ft). Consult with Level 2 Shipper if free-phase liquids present in samples Ensure use of proper cutting devices and other tool selection during equipment assembly/disassembly. Upgrade to modified Level D possible based on presence of poisonous plants or splash/dermal hazard.	PAHs, PCBs, METALS Exposure issues not anticipated due to low levels.

TASK HAZARD ANALYSIS (THA)
BENNING ROAD FACILITY
WASHINGTON, DC

Evaluated by: Sean Liddy, CSP **Date: June 2012**

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 305, Hand & Power Tools SH&E 308, Manual Lifting SH&E 313, Wildlife, Plants, Insects SH&E 315, Working Around Water SH&E 419, Marine Operations SH&E 511, Heat Stress	**LEVEL D** • ANSI approved hard hat, • High visibility reflective traffic vest • Full-length pants. • ANSI approved steel safety-toe boots or approved equivalent • ANSI approved safety glasses • Nitrile Gloves • Hearing protection required when around operating machines (85 dba OSHA PEL). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle). **Modified LEVEL D (for biohazard and splash protection)** • Tyvek suit and overboots

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Print Name & Company	Date	Signature

TASK HAZARD ANALYSIS (THA)
BENNING ROAD FACILITY
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

TASK NAME		
Soil Sampling via Hand Auger AECOM Technical Services, Inc. Project 60249055		
TASK DESCRIPTION	**HAZARD IDENTIFICATION**	**HAZARD CONTROL**
1. Loading and driving vehicle.	• Heavy lifting	• Use two people for carrying/lifting heavy objects and use proper lifting techniques • Wear leather gloves or rubber coated cotton gloves for hand protection
	• Vehicle may roll or move	• Inspect Vehicle prior to transporting • Check tire pressure and brake lights on the vehicle • Check that materials for transport are properly secured before transporting. • Driver shall verify location of obstructions while backing up use ground if possible • Help guide driver or use spotter if necessary
	• Traffic and stationary structures	• Bring wheel chocks, secure the vehicle when it is parked or in service • Observe oncoming traffic for safe operation, • Observe poles and stationary structures, avoid backing up whenever possible • Wear traffic vests, radio & cell phone use prohibited while driving
	• Spill or leaks	• **ENVIRONMENTAL** - Bring spill kit or spill materials appropriate for the task
	• Safe vehicle operation	• Do not exceed payload of vehicle
2. Pre Task Assessment	• Physical and chemical hazards	• Have 10 lbs fire extinguisher within 25 feet of work location. • Conduct a tailgate meeting with the field crew and review critical actions, hazards, and methods to protect with individuals at the work site, include review of MSDS hazards.
	• Flammable materials	• **ENVIRONMENTAL** - Follow all requirements in the Waste Management Procedure for dealing with any waste product, sludge, soil or contaminated residue from this project.
	• Poor communication	• Radio/Phone – Use hand signals when appropriate
3. General Physical Hazards	• Slip/Trip/Fall	• Maintain clean and organized work area.
	• Minor Cuts and Bruises	• Wear appropriate clothing while working. • Use appropriate work gloves for the task to protect hands.
	• Cold/Heat Stress	• Wear clothing appropriate for temperatures and wind effects. • Provide liquids (water/electrolytes) when potential for heat stress is present. • Monitor personnel for fatigue and heat/cold stress.
	• Muscle Strain/Injury	• Avoid manual handling of heavy objects. Utilize mechanical methods when possible (e.g., drum dolly, hydraulic equipment, etc.). • When mechanical methods are not available get help in lifting heavy or awkward objects.
	• Lifting	• Lift with legs keeping back straight. • Do not twist. • Inspect footing and travel pathway prior to lifting. • Get help when lifting heavy objects.
	• Use of hand tools	• Wear leather gloves, safety glasses and other PPE as required. • Dispose and replace any broken tools. • Ensure proper storage of tools. • Review manual/instructions for proper tool usage.
4. Hand Augering	• Traffic	• Wear traffic vest and watch for vehicles.
	• Subsurface structures	• Follow all client and company-required protocols for borehole clearance. • Watch for changes in soil types or other indications of backfill or non-native material.

	• Back strain	• Use proper lifting techniques and tools. • When possible use buddy system when adding or removing T-handle, section of the shaft, or auger tip
	• Hydrocarbon exposure	• Wear appropriate PPE and monitor breathing space using calibrated PID.
5. Decontamination	• Contact with high pressure water and contaminated material	• Direct pressure spray wand away from people and keep hands and feet away from discharge. • Personnel performing decon to wear full-face shield, gloves, rubber boots and tyvek or polycoated tyvek.
6. Material Handling/Derived Wastes.	• Splash with liquid from drilling/sampling	• Wear proper PPE while working. • Avoid contact and use caution when working with potentially contaminated fluids. • Use portable eyewash station in the event of splashes to the head/upper torso as needed and notify emergency (911/site security) as required by the situation. Decontaminate personnel as needed.
	• Storage/Spill.	• Follow the Waste Management plan for solid and liquid derived wastes located in Off-site HASP. • Inspect drums/containers for integrity and contaminants prior to use. • Place soil and other material into drums/containers as soon as practicable. • Store drums/containers in a designated storage area. • Implement a Spill Contingency as needed. • Have containment, spill clean-up materials on hand and notify regulatory agencies and local authorities as necessary.
7. Material Handling/Derived Wastes. (continued)	• Vehicle/Equipment Failure	• Inspect vehicles and equipment intended for material handling or transport. • Ensure equipment (including rigging) is rated for proposed use.
8. Adverse Weather	• Inclement Weather conditions (high winds, lightning, etc.)	• Personnel are to be aware of changing weather conditions at and near the site. • When work is halted due to inclement weather (i.e. thunderstorms or high wind). • Personnel are to seek shelter in vehicles or buildings. • Personnel to use appropriate weather gear (i.e. rain coats, etc.).
9. Decontamination	• Spills/Leaks • Improper disposal of Decon Fluids	• **ENVIRONMENTAL** – Preplanning follow Waste Management Procedures for residuals management, recycling • Use proper spill containment materials • Follow current disposal protocol as instructed by operations and according to the Safe Work Permit conditions.
10. Site cleanup – Secure location	• Traffic	• Wear traffic vest and watch for vehicles.
	• Debris or equipment left onsite or unsecured can cause tripping hazard. • Notify the Operations Department AECOM is leaving the area	• Wear traffic vest and watch for vehicles. • Make careful visual sweep of site. • Check for tools, debris, or dirt left on site. • Exercise proper housekeeping practices. • Check out with the Unit Operation

AECOM

TASK HAZARD ANALYSIS (THA)
BENNING ROAD FACILITY
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 305, Hand & Power Tools SH&E 308, Manual Lifting SH&E 313, Wildlife, Plants, Insects SH&E 508, Hazardous Materials and Sample Shipping SH&E 511, Heat Stress	**LEVEL D** • ANSI approved hard hat, • High visibility reflective traffic vest • Full-length pants. • ANSI approved steel safety-toe boots or approved equivalent • ANSI approved safety glasses Nitrile Gloves • Hearing protection required when around operating machines (85 dba OSHA PEL). • First aid kit (located in vehicle). • Fire extinguisher (located in vehicle).

CHEMICAL EXPOSURE HAZARD

PAHs, PCBs and metals - Refer to Section 5 of the HASP for additional information.
Note - Area monitoring with PID (Mini Rae 10.6eV) for general precautionary purposes.
≥ 1 ppm requires upgrade PPE according to Table 5-2.
Dust hazard not anticipated with current SOW. If dust generation observed, implement dust monitoring.

ADDITIONAL SAFETY CONSIDERATIONS

- Follow safe driving procedures during mobe/demobe. Always use the buddy system when moving vehicles. Plan your travel path ahead of time and use maps and known construction zones to make your selection. Consult with the other team members before making any changes to travel path.
- Use an equipment checklist to verify you have the appropriate equipment/tools for your tasks. Consult appropriate SOPs.
- Stow all materials in vehicle properly, use appropriate cases and bags. Secure equipment in bed of truck with netting or straps. Do not leave any equipment loose in the cab or bed or the truck. It can cause property damage or serious injuries to others or yourself by falling-off from vehicle.
- When securing equipment, watch for pinch points. Straps and netting can get caught on objects and snap back as well as trap a finger if hand placement is not correct. Use a buddy to help secure equipment when possible.
- Ensure all personnel have read and acknowledged the THA.
- Verify that all subsurface features have been identified using maps, and utility notification service
- Check sample location for potential hazards such as evidence of underground pipes such as valves or vent pipes, surface obstructions such as rubble, old foundations or rebar.
- Identify possible slip, trip, and fall hazards such as holes, obstructions protruding from the ground, or debris that may be scattered on the ground.
- Use proper bending/lifting techniques by bending and lifting with legs and not with back. When possible, use mechanical equipment to perform lifting of heavy objects. Get assistance when needed.
- Ensure personnel using equipment have been properly trained to operate it.
- Wear nitrile gloves when collecting samples in water to avoid dermal contact with potential contaminants. Be observant for tripping hazards, holes, stickups, vines, old fence lines.
- For equipment decontamination, triple rinse using distilled or deionized water and alconox for first rinse and distilled or deionized water for second and third rinses. Always clean materials between locations and at the site. Do not bring equipment back to the office without proper decontamination.
- Consult with Level 2 Shipper if free-phase liquids present in samples.

AECOM

TASK HAZARD ANALYSIS (THA)
BENNING ROAD FACILITY
Washington, D.C.

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ACTIVITY HAZARD ANALYSIS (AHA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

TASK NAME
Geophysical Survey AECOM Project 60249055

TASK DESCRIPTION	HAZARD IDENTIFICATION	HAZARD CONTROL
Establish site EZs around survey locations.	-Heat Stress and UV sunlight -slips, trips, and uneven surfaces -Hazardous flora and fauna -Traffic in roads and parking lots	-Monitor for heat stress and use UV protection -Work in areas clear of surface encumbrances -Use proper PPE and repellants -Use combination of vehicle and cones, traffic barriers and/or caution tape
Collect survey data using geophysical equipment	-Heat Stress and UV sunlight -slips, trips, and uneven surfaces -Hazardous flora and fauna -Potential contaminant exposure -Manual lifting of equipment and cumulative samples -manual lifting of equipment -Traffic in roads and parking lots	-Monitor for heat stress and use UV protection -Work in areas clear of surface encumbrances -Use proper PPE and repellants -Potential contaminant exposure -Use proper lifting techniques and do not over-extend -Use proper lifting techniques -Use combination of vehicle and cones, traffic barriers and/or caution tape

ADDITIONAL SAFETY CONSIDERATIONS	CHEMICAL EXPOSURE HAZARDS
Dress appropriate for work. Contact Project Manager or Regional SH&E Manager if necessary for support.	None

APPLICABLE OPERATIONAL SAFETY PROCEDURES	PPE
SH&E 305, Hand & Power Tools SH&E 308, Manual Lifting SH&E 313, Wildlife, Plants, Insects SH&E 511, Heat Stress	**LEVEL D** • High visibility reflective traffic vest • Full-length pants • ANSI approved safety glasses • ANSI approved steel toe safety boots/shoes • Nitrile Gloves • First aid kit • Fire extinguisher

ACTIVITY HAZARD ANALYSIS (AHA)
Benning Road Facility
Washington, D.C.

Evaluated by: Sean Liddy, CSP **Date: June 2012**

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Print Name & Company	Date	Signature

Attachment B

Material Safety Data Sheets

Isobutylene in Air (Equivalent to 50 ppm EtO) January 2009

MATERIAL SAFETY DATA SHEET CHEMTREC Assistance: (800) 424-9300

Kem Medical Products – 5305 NW 35th Terrace, Ft Lauderdale, FL 33309

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME:	Isobutylene in Air 0.0001% to 0.9%
SYNONYM:	N/A
FORMULA:	C_4H_8 in Air
CAS:	N/A

SECTION II - HEALTH HAZARD DATA

Isobutylene is defined as a simple asphyxiant. Oxygen levels should be maintained at greater than 18 molar percent, but less than 23 molar percent. The amount of isobutylene in this mixture needed to cause the air to be unfit for human respiration is inadequate.

Symptoms of Exposure:

Very slight anesthetic effect may cause under prolonged exposure drowsiness, headaches, dizziness, loss of coordination, nausea, plus a slight irritation to the mucous membranes; however, there is an insufficient amount of isobutylene in this mixture to manifest most of these symptoms.

Toxicological Properties:

The concentration of isobutylene and the balance gas of air present in this mixture are both non-toxic.

Recommended First Aid Treatment:

Relocate affected personnel to uncontaminated area and inhale fresh air.

Potentially Hazardous Mixtures with Other Chemicals:

None.

SECTION III – FIRE AND EXPLOSION HAZARD INFORMATION

FLAMMABLE LIMITS % BY VOLUME:	N/A
EXTINGUISHING MEDIA:	N/A (Nonflammable gas), use water if involved in fire.
NFPA 704 NUMBER (HFR):	0 0 0 0
ELECTRICAL CLASSIFICATION:	Non-hazardous.
FLASH POINT:	N/A
AUTO IGNITION TEMPERATURE:	N/A
SPECIAL FIRE FIGHTING PROCEDURES:	When the mixture is involved in a fire, the compressed air balance gas at high pressures will accelerate the burning of materials at a greater rate.

SECTION IV – PERSONAL PROTECTION INFORMATION

RESPIRATORY/VENTILATION	Hood with forced ventilation
GLOVES:	Plastic or rubber (neoprene, butyl, poly)
EYES AND OTHER	Safety goggles or glasses only, contact lenses are not recommended. 15 minute shower/eyewash, protection shoes.

SECTION V - REACTIVITY INFORMATION

STABILITY:	Stable
INCOMPATIBILITY:	None
HAZARDOUS DECOMPOSITION PRODUCTS:	None
HAZARDOUS POLYMERIZATION PRODUCTS:	None
CONDITIONS TO AVOID:	Cylinder temperatures should not exceed 130°F (54°C)

SECTION VI - LEAK AND DISPOSAL INFORMATION

LEAK PROCEDURES:	Evacuate all personnel from the affected area. Use appropriate protective equipment. Shut off flow of gas, and purge lines with an inert gas.
WASTE DISPOSAL:	Do not attempt to dispose of any unused quantities of product or their containers without contacting Kem Medical for instructions.

SECTION VII – SPECIAL SAFETY AND REGULATORY CONSIDERATIONS

LABELING:	
DOT SHIPPING NAME	Compressed Gases n.o.s.
TECHNICAL DESCRIPTION	Isobutylene, air
IDENTIFICATION #	UN 1956
HAZRD CLASS/DIVISION	Non-flammable gas 2.2
HANDLING:	Use only in well ventilated areas. The cylinder should be secured with a chain or strap. Do not drag, drop or roll the cylinder. Use both hands when carrying the cylinder. Do not heat the cylinder. One-way check valves in the use line are recommended to prevent backflow. Systems should be cleaned "for Oxygen service" before first use.
STORAGE:	Protect the cylinders from physical damage. Store the cylinders in a cool (130°F), dry, ventilated, posted "no smoking or open flames" area constructed of non-combustible materials, away from aisles and other traffic areas. Keep full cylinders separated from empties. Rotate stock first-in, first-out..
PACKAGING:	Use the cylinders as provided, with the recommended regulator. Do not attempt to refill the cylinder or transfill the product from one container to another.
OTHER PRECAUTIONS:	Conduct monitoring of gas exposure to personnel, do not rely on odor as a way to detect the presence of gas.

SECTION VIII - PHYSICAL DATA

MOLECULAR WEIGHT:	28.97
SPECIFIC GRAVITY:	1.0
LIQUID DENSITY AT BOILING POINT:	54.7 lb/ft^3 average
GAS DENSITY AT STP:	0.075 lb/ft^3 average
FREEZING TEMPERATURE:	-318°F
APPEARANCE AND ODOR	Shipped in compressed gas cylinders under pressure (typically 240-1000 psig). Vapor is colorless and odorless.
VAPOR PRESSURE:	@ 70°F, above Critical Temperatures
pH:	8.0 (mildly alkaline).

SECTION IX - COMMENTS

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak/Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves/Type:

Neoprene or rubber gloves.

Respiratory/Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye/Type:

Safety glasses with side-shields.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

MSDS Number: **H3886** * * * * * *Effective Date:* ***02/13/09*** * * * * * *Supercedes:* ***10/16/08***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HYDROCHLORIC ACID (10%-33%)

1. Product Identification

Synonyms: This MSDS applies to the concentrated standard used to make laboratory solutions and any solution that contains more than 10% but less than 33% Hydrochloric acid. For diluted product, see MSDS for Hydrochloric Acid (less than 10%).
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl in H2O
Product Codes:
J.T. Baker: 0323, 0327, 0365, 4654, 4657, 5618, 5619
Mallinckrodt: 2608, 2625, H151, H168, V035

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	10 - 33%	Yes
Water	7732-18-5	67 - 90%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Water or water spray. Neutralize with soda ash or slaked lime.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate

hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent odor.
Solubility:
Infinitely soluble.

Density:
1.05 @ 15 C (59 F)
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101 - 103C (214 - 217F)
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

11. Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2R
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and

the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 14.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **N3660** * * * * * *Effective Date:* ***11/07/08*** * * * * * *Supercedes:* ***02/15/08***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%
CAS No.: 7697-37-2
Molecular Weight: 63.01
Chemical Formula: HNO3
Product Codes:
J.T. Baker: 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670, 9761
Mallinckrodt: 1409, 2704, 2705, 2706, 2707, 2716, 6623, H862, H988, H993, H998, V077, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.
Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
Water spray may be used to keep fire exposed containers cool. Do not get water inside container.
Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear

full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA), 4 ppm (STEL)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.

Odor:
Suffocating, acrid.
Solubility:
Infinitely soluble.
Specific Gravity:
1.41
pH:
1.0 (0.1M solution)
% Volatiles by volume @ 21C (70F):
100 (as water and acid)
Boiling Point:
122C (252F)
Melting Point:
-42C (-44F)
Vapor Density (Air=1):
2-3
Vapor Pressure (mm Hg):
48 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Light and heat.

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11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 14.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **S3050** * * * * * *Effective Date:* ***11/21/08*** * * * * * *Supercedes:* ***03/16/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SODIUM BISULFATE

1. Product Identification

Synonyms: Sodium hydrogen sulfate; sodium acid sulfate; sulfuric acid, monosodium salt, monohydrate
CAS No.: 7681-38-1 (Anhydrous)
Molecular Weight: 138.08
Chemical Formula: NaHSO4 . H2O
Product Codes:
J.T. Baker: 3534
Mallinckrodt: 7432

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Bisulfate	7681-38-1	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE HARMFUL OR FATAL IF SWALLOWED.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur.
Eye Contact:
Acidic irritant. Pain, tearing and redness can occur. Crystalline dust may also be abrasive. Solutions are acidic and splashes may cause eye damage.
Chronic Exposure:
Lung irritation, tracheal bronchitis, persistent coughing, and corrosion of teeth are possible effects from long term exposure to dust, mist or fumes from wet or moist sodium bisulfate.
Aggravation of Pre-existing Conditions:
No information found.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Water may be used to cool containers and to knock down vapors in a fire situation. Do not use water on material itself or allow water to get inside container.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face respirator with an acid gas cartridge and particulate (NIOSH type N95 or better) filter may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an acid gas cartridge and particulate (NIOSH type N100) filter may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless crystals.
Odor:
Odorless.
Solubility:
67g/100g water.
Density:
2.10
pH:
1.4
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
Not applicable.
Melting Point:
58C (136F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Hygroscopic.
Hazardous Decomposition Products:
Oxides of sulfur and the contained metal.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong bases, calcium hypochlorite and sodium carbonate.
Conditions to Avoid:
Moisture, dusting and incompatibles.

11. Toxicological Information

Oral LD50 Rat: 2490 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Bisulfate (7681-38-1)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
Water Flea Data: 48 Hr EC50 Daphnia magna: 190 mg/L

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. (SODIUM BISULFATE)
Hazard Class: 8
UN/NA: UN3260
Packing Group: III
Information reported for product/size: 12KG

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. (SODIUM BISULFATE)
Hazard Class: 8
UN/NA: UN3260

Packing Group: III
Information reported for product/size: 12KG

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sodium Bisulfate (7681-38-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Bisulfate (7681-38-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Bisulfate (7681-38-1)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Bisulfate (7681-38-1)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Solid)

Australian Hazchem Code: 2X
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE HARMFUL OR FATAL IF SWALLOWED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **I8840** * * * * * *Effective Date:* ***05/04/07*** * * * * * *Supercedes:* ***08/27/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ISOPROPYL ALCOHOL (90 - 100%)

1. Product Identification

Synonyms: 2-Propanol; sec-propyl alcohol; isopropanol; sec-propanol; dimethylcarbinol
CAS No.: 67-63-0
Molecular Weight: 60.10
Chemical Formula: (CH3)2 CHOH
Product Codes:
J.T. Baker: 0562, 5082, 9037, 9080, U298
Mallinckrodt: 0562, 3027, 3031, 3032, 3035, 3037, 3043, 4359, 6569, H604, H982, V555, V566, V681

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Isopropyl Alcohol	67-63-0	90 - 100%	Yes
Water	7732-18-5	0 - 10%	No

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.
Ingestion:
Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).
Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 399C (750F)
Flammable limits in air % by volume:
lel: 2.0; uel: 12.7
Listed fire data is for Pure Isopropyl Alcohol.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Isopropyl Alcohol (2-Propanol):
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 400 ppm (STEL), A4 - not classifiable as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Rubbing alcohol.
Solubility:
Miscible in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
82C (180F)
Melting Point:
-89C (-128F)
Vapor Density (Air=1):
2.1
Vapor Pressure (mm Hg):
44 @ 25C (77F)
Evaporation Rate (BuAc=1):
2.83

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Isopropyl Alcohol (67-63-0)	No	No	3
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released

into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Isopropyl Alcohol (67-63-0)	No	No	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Isopropyl Alcohol (67-63-0)	No	No	No
Water (7732-18-5)	No	No	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Mixture / Liquid)
```

Australian Hazchem Code: 2[S]2
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **W0600** * * * * * *Effective Date:* ***05/04/07*** * * * * * *Supercedes:* ***08/10/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

Water

1. Product Identification

Synonyms: Hydrogen oxide; Dihydrogen oxide; Distilled water
CAS No.: 7732-18-5
Molecular Weight: 18.02
Chemical Formula: H2O
Product Codes:
J.T. Baker: 4022, 4201, 4212, 4216, 4218, 4219, 4221, 6906, 9823, 9831, XL-317
Mallinckrodt: 6795, H453, V564

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Water	7732-18-5	100%	No

3. Hazards Identification

Emergency Overview

Not applicable.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 0 - None
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Green (General Storage)

Potential Health Effects

Water is non-hazardous.

Inhalation:
Not applicable.
Ingestion:
Not applicable.
Skin Contact:
Not applicable.
Eye Contact:
Not applicable.
Chronic Exposure:
Not applicable.
Aggravation of Pre-existing Conditions:
Not applicable.

4. First Aid Measures

Inhalation:
Not applicable.
Ingestion:
Not applicable.
Skin Contact:
Not applicable.
Eye Contact:
Not applicable.

5. Fire Fighting Measures

Fire:
Not applicable.
Explosion:
Not applicable.
Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Non-hazardous material. Clean up of spills requires no special equipment or procedures.

7. Handling and Storage

Keep container tightly closed. Suitable for any general chemical storage area. Protect from freezing. Water is considered a non-regulated product, but may react vigorously with some specific materials. Avoid contact with all materials until investigation shows substance is compatible.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Not applicable.
Ventilation System:
Not applicable.
Personal Respirators (NIOSH Approved):
Not applicable.
Skin Protection:
None required.
Eye Protection:
None required.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Odorless.
Solubility:
Complete (100%)
Specific Gravity:
1.00
pH:
7.0
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
100C (212F)
Melting Point:
0C (32F)
Vapor Density (Air=1):
Not applicable.
Vapor Pressure (mm Hg):
17.5 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Not applicable.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong reducing agents, acid chlorides, phosphorus trichloride, phosphorus pentachloride, phosphorus oxychloride.
Conditions to Avoid:
No information found.

---

11. Toxicological Information

For Water: LD50 Oral Rat: >90 ml/Kg. Investigated as a mutagen.

--------\Cancer Lists\----------
---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
Not applicable.
Environmental Toxicity:
Not applicable.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be flushed to sewer. If material becomes contaminated during use, dispose of accordingly. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------

Ingredient	TSCA	EC	Japan	Australia
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: No Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
Not applicable.
Label Precautions:
Keep in tightly closed container.
Label First Aid:
Not applicable.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **S8234** * * * * * *Effective Date:* ***11/09/07*** * * * * * *Supercedes:* ***02/04/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SULFURIC ACID, 52 - 100 %

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid
CAS No.: 7664-93-9
Molecular Weight: 98.08
Chemical Formula: H2SO4 in H2O
Product Codes:
J.T. Baker: 5030, 5137, 5374, 5802, 5815, 5858, 5859, 5868, 5889, 5897, 5961, 5971, 5997, 6163, 6902, 9671, 9673, 9674, 9675, 9676, 9679, 9680, 9681, 9682, 9684, 9687, 9690, 9691, 9693, 9694
Mallinckrodt: 21201, 2468, 2876, 2878, 2879, 2900, 2904, 3780, 4222, 5524, 5557, H644, H850, H976, H996, V651, XL003

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	52 - 100%	Yes
Water	7732-18-5	0 - 48%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.
Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.
Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.
Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

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5. Fire Fighting Measures

Fire:
Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.
Explosion:
Contact with most metals causes formation of flammable and explosive hydrogen gas.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective

clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Sulfuric Acid:
- OSHA Permissible Exposure Limit (PEL) -
1 mg/m3 (TWA)
- ACGIH Threshold Limit Value (TLV) -
0.2 mg/m3(T) (TWA) for sulfuric acid - A2 Suspected Human Carcinogen for sulfuric acid contained in strong inorganic mists.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Odorless.
Solubility:
Miscible with water, liberates much heat.
Specific Gravity:
1.84 (98%), 1.40 (50%), 1.07 (10%)
pH:
1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
ca. 290C (ca. 554F) (decomposes at 340C)
Melting Point:
3C (100%), -32C (93%), -38C (78%), -64C (65%).
Vapor Density (Air=1):
3.4
Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.
Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.
Conditions to Avoid:
Heat, moisture, incompatibles.

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11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m3/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfuric Acid (7664-93-9)	No	No	None

Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified; LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

International (Water, I.M.O.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------

Ingredient	TSCA	EC	Japan	Australia
Sulfuric Acid (7664-93-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sulfuric Acid (7664-93-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sulfuric Acid (7664-93-9)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sulfuric Acid (7664-93-9)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 2P
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Do not contact with water.
Label First Aid:
In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS

INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **M2015** * * * * * *Effective Date:* ***05/04/07*** * * * * * *Supercedes:* ***08/10/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ALCOHOL

1. Product Identification

Synonyms: Wood alcohol; methanol; carbinol
CAS No.: 67-56-1
Molecular Weight: 32.04
Chemical Formula: CH3OH
Product Codes:
J.T. Baker: 5370, 5595, 5794, 5811, 5842, 5869, 9049, 9063, 9065, 9066, 9067, 9069, 9070, 9071, 9073, 9076, 9077, 9091, 9093, 9096, 9097, 9098, 9263, 9822, 9830, 9863, V654, XL-319
Mallinckrodt: 3004, 3006, 3016, 3017, 3018, 3024, 3041, 3701, 4295, 5160, 8814, H080, H488, H603, H985, V079, V571

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Alcohol	67-56-1	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES;

CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of overexposure may include headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma, and death. A person may get better but then worse again up to 30 hours later.
Ingestion:
Toxic. Symptoms parallel inhalation. Can intoxicate and cause blindness. Usual fatal dose: 100-125 milliliters.
Skin Contact:
Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure.
Eye Contact:
Irritant. Continued exposure may cause eye lesions.
Chronic Exposure:
Marked impairment of vision has been reported. Repeated or prolonged exposure may cause skin irritation.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:
lel: 6.0; uel: 36
Flammable Liquid and Vapor!
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.
Fire Extinguishing Media:
Use alcohol foam, dry chemical or carbon dioxide. (Water may be ineffective.)
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Methyl Alcohol:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)
- ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 250 ppm (STEL) skin

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Miscible in water.
Specific Gravity:
0.8
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
64.5C (147F)
Melting Point:
-98C (-144F)
Vapor Density (Air=1):
1.1
Vapor Pressure (mm Hg):
97 @ 20C (68F)
Evaporation Rate (BuAc=1):
5.9

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May form carbon dioxide, carbon monoxide, and formaldehyde when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber, and coatings. May react with metallic aluminum and generate hydrogen gas.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Methyl Alcohol (Methanol) Oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data-standard Draize test: skin, rabbit: 20mg/24 hr. Moderate; eye, rabbit: 100 mg/24 hr. Moderate. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Alcohol (67-56-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is

expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.

Environmental Toxicity:

This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHANOL
Hazard Class: 3
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 358LB

International (Water, I.M.O.)

Proper Shipping Name: METHANOL
Hazard Class: 3, 6.1
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 358LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Methyl Alcohol (67-56-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Alcohol (67-56-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Alcohol (67-56-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Alcohol (67-56-1)	5000	U154	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No

Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.
Label Precautions:
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Keep container closed.
Use only with adequate ventilation.
Keep away from heat, sparks and flame.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
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