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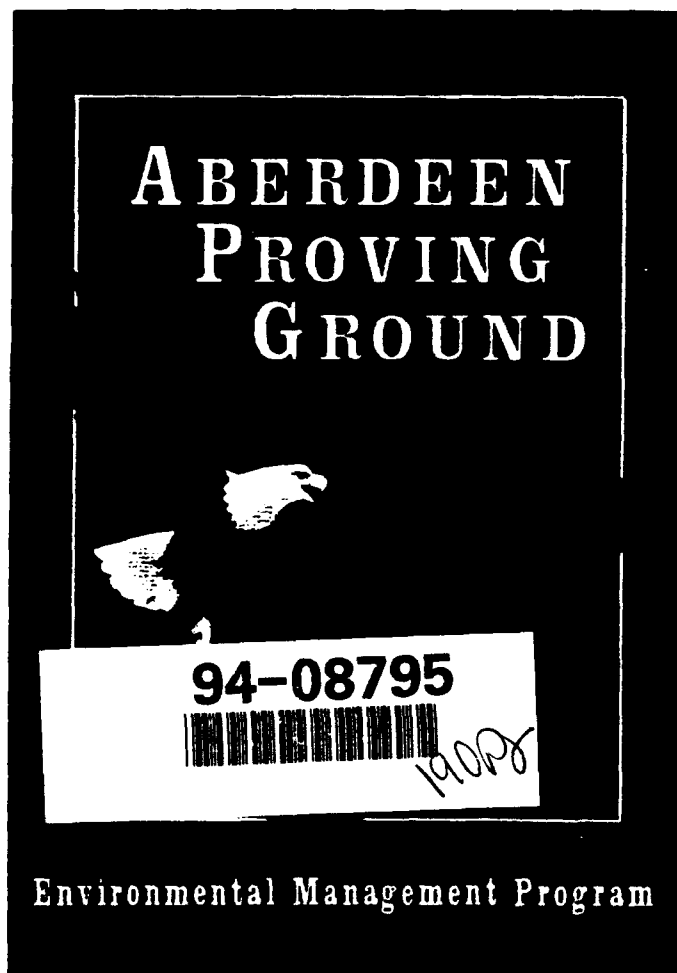
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*Beach Point Test Site*

*Aberdeen Proving Ground - Edgewood Area, Maryland*

## FOCUSED FEASIBILITY STUDY FINAL HEALTH AND SAFETY PLAN



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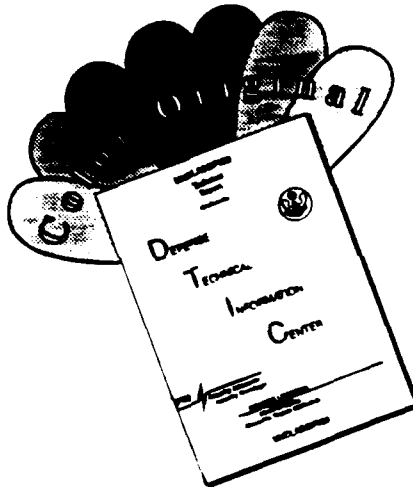
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**Appendices**

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2. MDE Well Permit Form
3. Toxic Aid Briefing (Appendix D of CRDEC Regulation 385-1)
4. Individual Field Training Record (JEG Form 3-6)
5. Daily Site Entry Log
6. Authorization for Medical Treatment
7. Employee Exposure/Injury Report
8. Employer's Report of Occupational Injury or Disease
9. Auto Accident Report
10. OSHA 200 Log
11. First Aid Register
12. UXO Subcontractor Work Plan and Site Safety Plan



This site specific Health and Safety Plan (HASP) has been written for use by Jacobs Engineering Group (JEG), its employees and subcontractors who are authorized by the Site Health and Safety Coordinator (SHSC) to access areas where site control is established for purposes of conducting field work in accordance with this HASP. It is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these operations or conditions change.

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*Focused Feasibility Study*

**PLAN AMENDMENTS**

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APPROVED:

DATE:



Jacobs Engineering Group Inc.  
Washington Operations

**HEALTH AND SAFETY PLAN**

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Jacobs Engineering Group Inc. (JEG) has been contracted by Environmental Management Operations (EMO)<sup>1</sup> to develop a Health and Safety Plan for Beach Point Test Site in the Edgewood Area of Aberdeen Proving Group (APG-EA). The task has been performed under the provisions of Master Agreement 071914-A-D7, Task Order 142133, Supplement Number 8.

The purpose of this task is to conduct a focused feasibility study in the Beach Point Test Site of Aberdeen Proving Ground's Edgewood Area (APG-EA). Field activities include locating wells, purging wells, sampling wells, collecting soil samples, drilling activities (soil borings and monitoring well installation), surface water sampling, sediment sampling, and decontaminating field equipment used to complete the task. Specific activities planned for Phase I include 12 sediment samples, 7 groundwater samples, and 10 soil samples. Figure 1-1 schematically outlines planned activities. The Sampling and Analysis Plan for the Beach Point Focused Feasibility Study details the specific pre-sampling, sampling and post-sampling activities.

The project has been separated into work phases to allow for data evaluation between some of the field tasks. Phase I of the project consists of an aerial photography investigation, surface/marine geophysical surveys, a flowmeter logging program, sampling surface and subsurface soils, a risk assessment of the Beach Point Test Site, and analysis of chemical groundwater data, generated through the separate Canal Creek Groundwater Monitoring Program.

This Health and Safety Plan (HASP) has been written for use by Jacobs Engineering Group (JEG) personnel and any other individuals authorized to access areas where site control is established for purposes of conducting or observing field work. The format of this HASP was developed in accordance with Draft Guidelines prepared by Bob Crouse of the APG Directorate of Safety, Health, and Environment (DSHE), using the content of the

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<sup>1</sup> EMO is operated for the U.S. Department of Energy by Battelle Memorial Institute.



O-Field HASP as a model.<sup>2</sup> This HASP shall be kept onsite during field activities and shall be reviewed and updated as necessary to reflect current site conditions and operations. A separate health and safety plan will be prepared by each subcontractor responsible for field activities. Each subcontractor HASP will be appended to this plan.

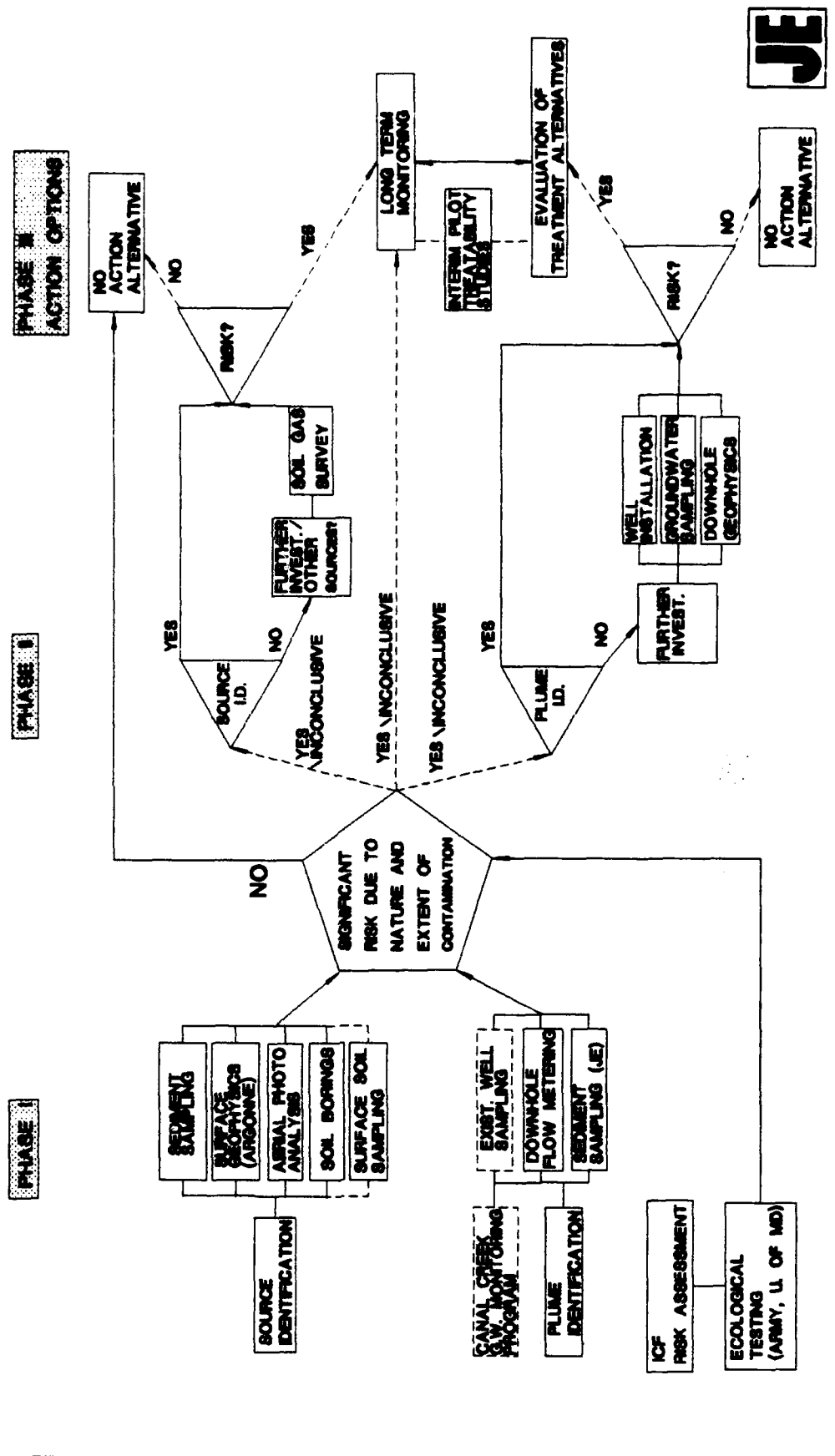
The HASP delineates policies and procedures that will be used to ensure worker health and safety throughout project activities at Beach Point. The HASP is organized into twelve sections. Project activities, organization, and responsibilities are outlined in Section 2. Section 3 describes the site's physical setting and history. An analysis of potential hazards at Beach Point, including chemical, physical and biological hazards is presented in Section 4, along with information to facilitate hazard recognition. The following sections define the controls planned to maintain a safe and healthful working environment, followed by procedures which will be implemented during emergencies: Section 5 delineates work zones at the site, Section 6 specifies personal protective equipment, monitoring methods and instrumentation are provided in Section 7, and decontamination methods comprise Section 8. Emergency response and contingency procedures for minimizing exposures of workers and the public are established in Section 9. Section 10 evaluates general health and safety issues; environmental control procedures are described in Section 11. Plan acknowledgement is found in Section 12, and additional information such as applicable SOPs, material safety data sheets, forms required by the health and safety program, and subcontractor procedures (e.g., UXO subcontractor procedures) are consolidated in the appendices.

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<sup>2</sup> The format of this HASP differs from the Draft Guidelines in one respect: Section 13.0 has been incorporated into the Appendices of this document. This change facilitates formatting of the document.



# FIGURE 2-1 BEACH POINT - FFS ACTIVITIES



## **1.1 TASKS**

During Phase I, 7 groundwater samples, 12 sediment samples, and 10 soil samples will be collected.

### **1.1.1 Methods and Equipment**

**1.1.1.1 Groundwater Sampling Procedures.** A total of seven groundwater samples will be collected from monitoring wells presently in the Beach Point Test Site. Samples will be collected first from wells which are shown to be least contaminated in historical monitoring data. This will reduce the risk of cross-contamination between wells. Specific procedures for site preparation, water level measurement, well purging, field parameter measurement, and laboratory sample collection are detailed in the Quality Assurance Project Plan (QAPP). An outline of the prescribed groundwater sampling protocol is described below.

**Static Water Level Measurement.** Measurement of the water level within the well will be taken prior to any well purging or groundwater sampling activity. Static water level will be measured to the nearest 1/100th of one foot (.01 ft.) from the water surface to an established measuring point (MP) marked on the riser casing. The MP should be marked on the highest point of the riser casing above ground level. If the MP is not permanently marked on the riser casing, the sampling team will determine the highest point of the riser casing and inscribe a permanent mark with a sharp knife to establish a new MP. Static water level and the location of the MP for each well will be recorded in the field logbooks and on the monitoring well sampling data sheet.

**Well Purging.** Each monitoring well will be purged using a low flow pump set at the recharge rate of the well. Purging assures that water samples are fresh and representative of groundwater conditions. During purging the pump is set in the middle of the screened interval (see SOP 013 for a complete description of groundwater sampling activities.)



Physical measurement data is missing for most of the monitoring wells. Sandpacks are estimated to extend at least two feet above the top of the screened interval in each monitoring well. A 30% sandpack porosity factor is assumed for the purpose of calculating saturated annulus volume. Actual volumes of water purged from each monitoring well will be recorded in field logbooks and on the monitoring well data sheet.

**Water Chemistry Parameters.** Physical water chemistry parameters consisting of pH, temperature, specific conductivity, dissolved oxygen, oxidation reduction potential, and turbidity will be monitored on a constant basis as the monitoring well is purged. Readings of these parameters will be taken every 5 minutes using an inline instrument. Well purging will be considered adequate if parameters remain stable to within  $\pm 10\%$  for 3 consecutive readings. If the parameters do not stabilize to within  $\pm 10\%$  before five well volumes have been removed from the well, the well will be considered adequately purged and available for water sampling upon removal of five well volumes. Physical parameter readings will be recorded in field logbooks and on the monitoring well data sheet.

If a monitoring well recharges extremely slowly ( $< 100$  ml/min), the well can be pumped dry and allowed to recharge. After the well recharges it can be sampled for all analytes except volatile organic compounds.

**Laboratory Samples.** Groundwater samples for laboratory analysis will be collected immediately after all field measurements are completed. Collection of laboratory samples will follow the procedures detailed in Standard Operating Procedures (SOP 013) provided in the QAPP.

Sampling teams will triple-rinse sample bottles with sample water before preservatives are added. Although sample bottles will be laboratory-cleaned according to EPA procedures, triple-rinsing is required to reduce the likelihood that any contaminants introduced into the bottles during shipment will be transferred to the sample.



Filtered water samples will be collected by passing the sample water through an inline disposable 0.45 µm filter. Sample bottles for filtered groundwater samples will first be triple-rinsed with filtered sample water before preservatives are added.

Sample bottles will be labeled, custody-sealed, enclosed in a plastic bag, and placed in an ice chest maintained at 4°C immediately after each sample is collected. Sample numbers and corresponding analysis requirements will be recorded on each monitoring well data sheet and in field logbooks.

**1.1.1.2 Soil Boring Samples.** Soils samples at Beach Point will be collected as grab samples using a stainless steel bucket-type hand auger. Following mixing in a stainless steel bowl (except for VOAs), the soil jar will be filled directly and immediately after taking a sample. The sampler will fill the containers required for the requested analyses, attach the labels, initiate COC procedures, and complete the file sample data record.

Soil boring samples will be acquired in the Beach Point Test Site at locations that have been determined to be probable contaminant sources. A maximum of ten (10) soil borings will be performed with a maximum of ten (10) chemical soil samples acquired from this portion of the sampling program (one from each boring).

The soil sampling program will be undertaken to define the location, nature, and concentration of contaminants in the site surface and subsurface soils. The location/distribution of contaminants at the site are governed by (1) site operation or waste disposal practices, (2) site design, (3) waste characteristics, (4) site topography and surface drainage, (5) climate, and (6) site geology.

The techniques described in this section are those that have been selected to provide practical, efficient means of obtaining surface and subsurface soils in a manner consistent with safety protocol and QAPP requirements.



**Subsurface Soil Sampling Equipment and Techniques.** Subsurface analytical soil samples will be collected utilizing hollow-stem auger (HSA) techniques.

Before drilling begins at any boring location, installation personnel responsible for utility clearances will be notified and requested to clear the proposed drilling location based on the presence of utilities in the immediate area of the boring. In addition, all locations will be cleared for the presence of UXO prior to drilling. Drilling operations in areas of possible buried UXO or areas where possible UXO was detected before drilling, will follow procedures outlined in the Field Sampling Plan (FSP) and the QAPP.

Soil samples will be collected from soil borings utilizing HSA techniques with continuous core samplers, five (5) feet in length, or 24-inch split spoon samplers. The sampler is pushed into undisturbed soil below the HSA. After the sampler has been advanced to the desired depth, it will be withdrawn from the borehole and the sampler opened.

Intact soil samples for physical descriptions, retention, and potential physical and chemical analyses will be taken and retained at 5-foot intervals or at each major stratigraphic change. These samples will be representative of their host environment and will be obtained from the sampler.

As soon as the sampler is withdrawn from the borehole and opened, the sample will be collected and documented, employing the following procedures (discussed in greater detail in the QAPP):

- Scan the soil with a photoionization detector (PID) and record measurements.
- Visually examine the sample.
- Peel sample out of split-spoon using cleaned stainless steel tools.
- If there is detection of photoionizable compounds, above background, over the surface of the sample, the sample will be packed in a laboratory container and retained for submittal as a chemical soil sample. Each subsequent sample will be screened in a similar matter. Of the samples collected one (1) with the highest PID reading (or if no readings are determined by the PID, the sample at the groundwater interface) will be selected for laboratory chemical analysis.



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- Record each sample's physical characteristics (e.g., texture, color, consistency, moisture content, layering, and other pertinent data), and classify using the Unified Soil Classification System (USCS).
- Discard any excessively disturbed or loose material found in the sampler which may not be representative of the interval sampled. This material will be appropriately discarded with boring spoils at each boring location.
- Decontaminate the sampling device in accordance with the procedure specified in Section 6.7.

The drilling monitor will exercise considerable care while collecting samples for chemical analysis. Methods to assure that high quality samples are collected include:

- Ensuring that the sample is obtained from undisturbed soil below the casing or auger by monitoring or checking the drill crew's measurements, observing the sampling process, and examining the sample once it is retrieved.
- Carefully removing and discarding portions of the sample that may have become contaminated by contacting the casing, auger, or drilling fluids.
- Conserving sample volume because under certain soil conditions it may be difficult or impossible to achieve good sample recovery with the split spoon.
- Peeling, bottling, and capping VOC samples immediately after opening the sampler (within 15 seconds, if possible), and storing in a cooler with ice (<4° C).

Procedures employed to prevent cross-contamination during test boring sampling operations include the following:

- Samples are taken immediately after the boring is advanced to the desired sampling elevation.
- The sampling tools are decontaminated prior to taking each sample.
- The drilling contractor is not permitted to use petroleum-based lubricants on the drill rods, casing, or sampling tools.

Immediately after the samples are collected, all labeled vials and jars are checked for completeness of the sampling objective and COC procedures are initiated. The boring log is also updated at this time by the drilling monitor. Boring logs may be completed by the



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driller, but for purposes of completeness and documentation, a separate boring log is also compiled by the drilling monitor. The boring logs will include interpretations of subsurface materials and conditions encountered, sample locations, and other notes pertinent to how the boring was conducted. The drilling monitor's boring log shall be completed on a boring log form.

Each boring log will fully describe the subsurface environment and the procedures used to gain that description. Logs will be recorded directly in the field without transcribing from a field logbook or other documents.

Each original boring log will be submitted directly from the field to the Contracting Officer's designated office within three working days of boring completion. In those cases where a monitoring well or other instrument is to be inserted into the boring, both the log for that boring and the installation diagram must be submitted within three working days of instrument installation. Only the original boring log (and diagram) will be submitted from the field to fulfill this requirement. Carbon, typed, or reproduced copies will not be submitted.

The following information should be entered on the boring log or attached to the log:

- Record depths/heights in feet and fractions thereof (tenths of feet). Metric measurements are not acceptable.
- Record soil classifications in accordance with the USCS (equivalent to ASTM D 2487-69).
- Prepare soil classifications in the field at the time of sampling by the geologist; the classifications are subject to change based on laboratory tests and/or subsequent review. The apparent difference between laboratory and field classification is not sufficient to change the field classification. Additional factors to consider before changing a field determination include representative character of the tested sample, and labeling errors. Any changes made after this consideration will be discussed and incorporated in the project report(s).



- Generally describe the drilling equipment used either on each log or in a general legend. Record such information as rod size, bit type, pump type, rig manufacturer, and model.
- Record the drilling sequence on each log.
- Record all special problems and the resolution of those problems on the log (i.e., hole squeezing, recurring problems at a particular depth, sudden tool drops, excessive grout takes, drilling fluid losses, unrecovered tools in hole, and lost casings).
- Record the dates for the start and completion of borings on the log along with notation by depth for drill crew shifts and individual days.
- Note each sequential boundary between the various soils and individual lithologies on the log by depth. When depths are estimated, the estimated range shall be noted along the boundary.
- Indicate the depth of first-encountered free water along with the method of determination. Allow the first-encountered water to partially stabilize (5 to 10 minutes) and record this secondary level and time between measurements before proceeding. Also describe any other distinct water level(s) from below the first.
- Note the estimated interval by depth for each sample taken, classified, and/or retained on the log. For each driven sampler (split spoon), record the length of sampled interval and length of sample recovery. Record the sampler type and size (diameter and length).
- Record the blow counts, hammer weight, and length of hammer fall for driven samplers. For thin wall samplers, indicate whether the sampler was pushed or driven. Record blow counts in 0.5-foot increments when standard (1-3/8 inch ID and 2-inch OD) samplers are used. For penetration less than a 0.5 foot, annotate the count with the distance over which the count was taken.
- Note the total depth of drilling or sampling, whichever is deeper on the log.
- Record significant color changes in the drilling fluid return, even when intact soils samples or rock core are being obtained. Include the color change (from and to), depth at which change occurred, and a lithologic description of the cuttings before and after the change.

**1.1.1.3 Sediment Sampling Procedures.** Sediment samples will be collected to a depth of < 1 foot below the water/sediment interface. The sampling locations will first be screened for UXO and chemical agent contamination. Samples will be taken using stainless steel samplers (e.g., auqer, scoop, dredge).



The sediment will be placed in a clean stainless steel bowl. The UOC sample will be immediately placed in the appropriate certified clean sample jar. The remaining sediment will be homogenized and placed in certified clean sample jars. Each jar, after filling, will be immediately placed in a cooler and maintained at a temperature of 4°C.

#### **1.1.2 Personnel Requirements**

Please refer to section 2.2.2.1 for a listing of required personnel.

#### **1.1.3 Applicable Regulations**

##### **1.1.3.1 OSHA. 29 CFR 1904, Recording and Reporting Occupational Injuries and Illnesses**

29 CFR 1910.20, Access to Employee Exposure and Medical Reports

29 CFR 1910.95, Occupational Noise Exposure

29 CFR Subpart H, Hazardous Materials

29 CFR 1910.1000, Air Contaminants

29 CFR 1910.120, Hazardous Waste Operations and Emergency Response

29 CFR 1910.147, Control of Hazardous Energy Sources (Lockout/Tagout)

29 CFR 1910 Subpart I, Personal Protective Equipment

29 CFR 1910.1001-1910.1048, Standards for Specific Toxic Substances

29 CFR 1910.1200, Hazard Communication



**1.1.3.2 EPA.** Superfund Amendments and Reauthorization Act of 1986

EPA Order 1440.2, Health and Safety Requirements for Employees Engaged in Field Activities.

**1.1.3.3 Department of the Army.** AMC Regulation 385-131, Safety Regulation for Chemical Agents H, HD, HT, GB, and VX

DA Draft Implementing PAM 385-61

**1.1.4 References**

- Jacobs Engineering Group, Corporate Health and Safety Manual for Environmental Field Programs, 1992.
- NIOSH, Pocket Guide to Chemical Hazards, 1990.
- NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.
- Sax, N. Irving and Richard J. Lewis, Dangerous Properties of Industrial Materials, 1989.
- Sax, N. Irving and Richard J. Lewis, Hawley's Condensed Chemical Dictionary, 1987.
- U.S. Army Environmental Hygiene Agency (AEHA), Edgewood Area RCRA Facility Assessment, 1989.

**1.1.5 Permits**

**1.1.5.1 Excavations.** Excavation permits must be obtained from the APG Directorate of Public Works (DPW) before soil intrusive activities. The contractor completes the top portion of the EAP Excavation Permit (Attachment 1), and attaches a map of the planned digging location. After the form is provided to DPW, Building 5256, DPW coordinates with Maryland's "Miss Utility" and with the APG Directorate of Information Management (DOIM).



**1.1.5.2 MDE Well Permits.** The drilling subcontractor applies for this permit. The permit must be completed by a State of Maryland licensed driller. An example of the permit form is provided in Attachment 2.

**1.1.6 Utilities**

No utilities will be required for field activities. To avoid damage to underground utilities during drilling activities, DPW coordinates with Maryland's "Miss Utility" and with the APG Directorate of Information Management (DOIM). Additional information can be found in SOP 7.7 in JEG's Corporate Health and Safety Manual for Environmental Field Programs.

**1.1.7 Notifications** (refer to Section IX, Emergency Response and Contingency Procedures)

**1.1.8 Subcontractors**

Six subcontractors will be performing work for JEG; two supporting contractors will be working along with JEG. The supporting contractors will provide:

- Surface Geophysics — Argonne National Laboratories (ANL) will recommend and supply all appropriate geophysical surveys for the FFS.
- Risk Assessment — ICF-Kaiser will provide a Risk Assessment for groundwater at Beach Point. The University of Maryland will provide a bioassessment of the groundwater and sediment at Beach Point.

The six subcontractors will perform the following activities:

- UXO Surveys — will be conducted by a qualified company in conjunction with any subsurface field activities;
- Land Survey — a State of Maryland certified surveyor will validate well installation locations as needed;
- Laboratory Analysis — analytical services for all groundwater, surface water, soil and sediment samples will be performed by an EPA Contract Laboratory Program participant using the methods specified in the Quality Assurance Project Plan;





- **Downhole Geophysics Logging** — a geophysical company will support all downhole geophysical requirements;
- **Drilling** — a contractor will perform drilling for soil borings and groundwater monitoring well installations and provide an on-site driller licensed by the State of Maryland;
- **Pilot Treatment Study** — if needed, the contractor will provide support, including equipment and maintenance, for this study, and will provide a detailed treatability report.

#### **1.1.9 Site Preparation**

The sampling team will spread a clean piece of polyethylene sheeting on the ground around the well. This will prevent decontaminated sampling equipment from becoming contaminated by contact with soils. The sheeting will also minimize contact of potentially contaminated water with surface soils if spills occur. Sampling equipment and wastewater containers will be staged in convenient locations at the well site.

While standing upwind from the well, the sampling team will remove the well cap and obtain readings for organic vapors at the wellhead and in the breathing zone with a photoionization detector (PID) and/or a flame-ionization detector (FID). Personal protective equipment (PPE) will be modified in accordance with requirements in this Health and Safety Plan HASP based upon PID/FID readings obtained at the wellhead. PID/FID readings and any modifications to PPE will be recorded in field logbooks and on the monitoring well sampling data sheet.

#### **1.1.10 Site Project Schedule**

Figure 1-2 presents a summary schedule of project activities.

#### **1.1.11 Site Deactivation and Clean-Up**

Procedures for site deactivation and clean-up will be developed to return the Beach Point Site to its natural condition.



Figure 1-2. Project Schedule

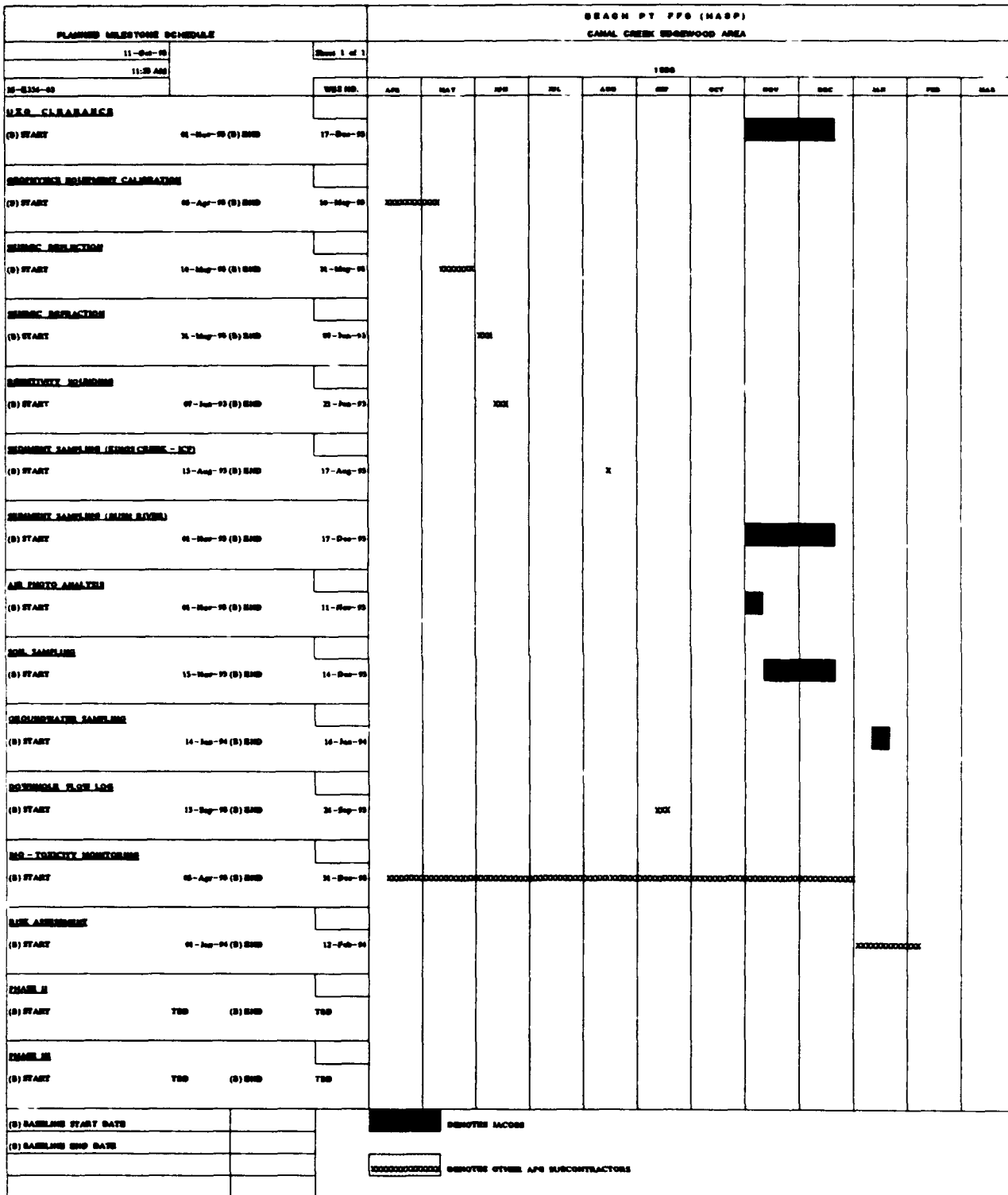
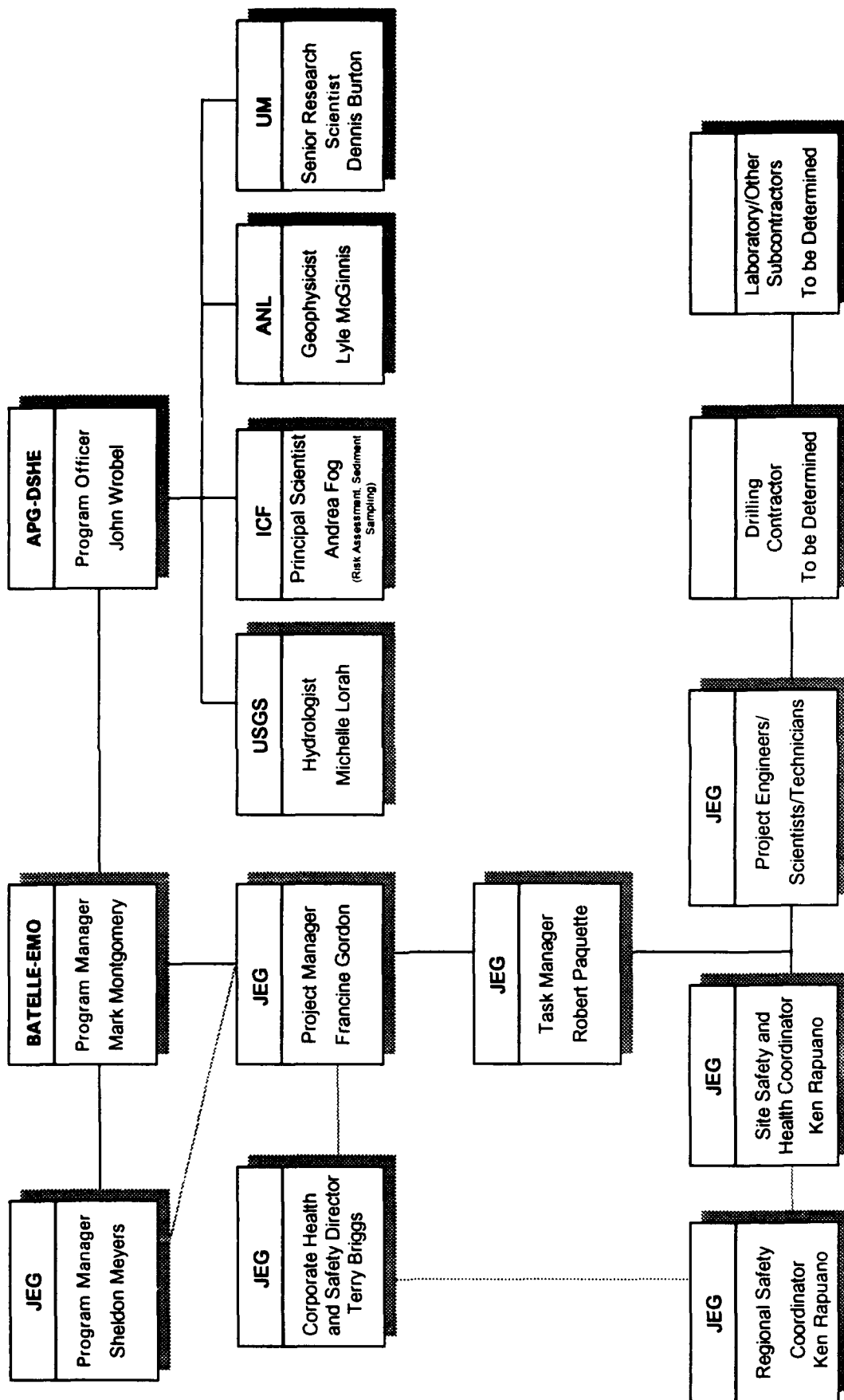


FIGURE 1-3  
BEACH POINT FFS- PHASE I  
HEALTH AND SAFETY/MANAGEMENT ORGANIZATION



## **1.2 MANAGEMENT ORGANIZATION**

### **1.2.1 Organization Chart**

Figure 1-3 represents the project's management organization highlighting health and safety.

#### **1.2.1.1 Line of Authority.**

Project Manager (PM):	Francine Gordon
Task Manager (TM):	Wayne Mandell
Local Contact:	John Wrobel
Corporate Health and Safety Director (CHSD):	Terry Briggs
Site Health and Safety Coordinator (SHSC):	George Moore
Field Team Leader:	To be determined
Field Team Personnel:	To be determined

**1.2.1.2 Duties/Responsibilities.** In general, supervisory personnel are directly responsible for the health and safety of individuals under their direction by ensuring that the provisions of this HASP are adhered to and that all operations are performed with the utmost regard for employee health and safety. Likewise, all site personnel have the responsibility to follow the health and safety procedures necessary to perform their work without accident or injury.

#### **Task Manager (TM)**

- Functions as Site Manager and designates acting Site Manager when he will be off-site
- Reports to the Project Manager.
- Directs site activities.



- Obtains permission for site access and coordinates activities with appropriate organizations.
- Briefs field teams on specific assignments.
- Uses the SHSC to verify that safety and health requirements are met.
- Coordinates overall planning of work.
- Coordinates supervision of work.

**Field Team Leader (FTL)**

- Plans technical and administrative aspects of field work.
- Authorizes field team members to initiate field work.
- Supervises technical and administrative aspects of field work.
- Ensures field team member compliance with this HASP.

**Site Health and Safety Coordinator (SHSC)**

The Site Health and Safety Coordinator (SHSC) is selected based on demonstrated experience in conducting site safety operations to the level of protection anticipated for the site. The individual is an experienced industrial hygienist whose primary responsibility is to oversee field team site-specific Health and Safety Plan (HASP) compliance. The SHSC:

- Implements the HASP and informs the Task Manager of any conditions or modifications that may be appropriate.
- Coordinates with and supports the Task Manager in ensuring personnel health and safety and compliance with this plan.
- Performs monitoring as required by the HASP.
- Verifies with the Task Manager that assigned personnel have current "Fit-For-Duty" medical authorizations and have received appropriate training (please refer to section 2.2.2).
- Determines that equipment is used properly and is calibrated in accordance with manufacturer's instructions or other standard protocols, and that the results are properly recorded and filed.
- Provides ongoing review of protective level needs as project work is performed, and informs the Task Manager of the need to upgrade/downgrade protection levels.
- Ensures the safety of personnel and that PPE is used as required on the job.



- Identifies unsafe or potentially unsafe working conditions, or stops work in emergencies or imminent hazard situations until such conditions are corrected. Consults with Task Manager and Project Manager regarding circumstances and conditions dictating these actions.
- Conducts initial and periodic site training as required (see Section 1.2.2).
- Insures that the hazard communication program is carried out on-site.
- Ensures that all required safety equipment is on-site, uncontaminated, and operable.
- Determines and posts the locations of medical facilities, telephone numbers of emergency personnel, and arranges emergency transportation to medical facilities as required.
- Conducts preliminary site survey to detect the presence of any obvious hazards.
- Conducts on-site air monitoring.
- Notifies appropriate emergency personnel in the event of an accident, fire or explosion.
- Has the authority to cease any operations not in compliance with the health and safety plan, which threaten the health or safety of on-site personnel or the general public, or which may cause significant impact to the environment.
- Completes and submits recordkeeping forms per this HASP and corporate SOPs.
- Appoints qualified individual to serve as SHSC when she/he is offsite.
- Maintains all required site health and safety documentation.

#### **Field Team Members**

The field team includes those project personnel who have the potential to be exposed to hazardous or toxic substances or environments during the course of field activities. Each member of the team:

- Performs the work of this plan as directed by the FTL and SHSC.
- Signs the Plan Acceptance Form, thereby indicating that he/she has read, understands, and will abide by the project site-specific Health and Safety Plan.
- Takes all reasonable precautions to prevent injury to himself/herself and to fellow workers.
- Reports deviations from conditions anticipated in the safety plan and reports accidents or unsafe conditions to the SHSC for action.



**Project Manager (PM), Washington Operations Manager (WOM)**

- Provide TM with resources to execute work.
- Assure work is performed in accordance with JEG program policies and procedures.

**Corporate Health and Safety Director (CHSD)**

- Develops and implements JEG corporate Health and Safety Program.
- Reviews and approves site-specific Health and Safety Plans.
- Conducts site health and safety audits.

**Regional Safety Coordinator**

- Supports the project managers in implementation of the site safety plans.
- Maintains a regional recordkeeping system, including training certification records, equipment calibration and maintenance logs, the field-ready personnel matrix, and miscellaneous health and safety records.
- Assists supervisory personnel in investigating accidents/exposures to determine the cause and make recommendations to prevent recurrence.
- Ensures that no field work commences until the applicable site health and safety plan has been approved.

**JEG Occupational Medical Consultant (OMC):**

- Prescribes and interprets results of medical examination protocols and testing for employees who participate in the Occupational Medical Program.
- Provides emergency medical consultation.

**1.2.2 Training Requirements**

All site personnel shall be trained as hazardous waste site workers in accordance with 29 CFR 1910.120(e) before participating in this project. Hazardous waste site worker training includes 40 hours of initial training, annual eight hour refresher training, and annual eight hour supervisor training for those individuals who manage or supervise site personnel (e.g., the project manager, field team leader, task manager, and SHSC). At least one person per field team will have current certification in American Red Cross (or equivalent) first aid and



CPR. In addition, all personnel are required to be trained in the recognition of site hazards, the provisions of this HASP, compliance with OSHA's bloodborne pathogens program (29 CFR 1910.1030), and personnel responsibilities.

Jacobs policy requires that field staff complete a minimum of 24 hours supervised field training in each level of protection (EPA-defined levels A through C) before working in that level of protection without supervision.

Site training will be conducted at the initiation of site work and wherever new employees or contractors arrive on site. The training will focus on specific site safety and health procedures, issues, and concerns. A review of the Health and Safety Plan will be included in this training. Daily site meetings will be conducted at the start of each job shift or phase.

A core of field personnel shall attend the Toxic Aid Briefing conducted by APG before being cleared to work in the field. This training discusses recognition of agent symptoms and required first aid/self aid procedures. Personnel who do not attend this briefing shall be required to read Appendix D of CRDEC Regulation 385-1, "Toxic Agent Briefing". APG uses this written briefing for contractors and other personnel who are not mandated by surety regulations to receive annual toxic agent briefing. The full text of the written briefing is provided in Attachment 3 of this plan.

**1.2.2.1 Personnel Resumes.** The employees listed below have received 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SHSC" have received an additional 8 hours of supervisor and 8 hours of instrument training, and are qualified to act as Site Health and Safety Coordinator (SHSC) for work conducted at the level of personal protection specified in Section 6.0. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. There must be at least one SHSC and one FA-CPR designated employee present during any task performed on-site with the potential for exposure to safety and health hazards.





Employee Name	Responsibility	FA-CPR	Supervisor Training	SHSC	Level
George Moore	SHSC	.	.	.	C/D
Ronald Highsmith	Chemical Engineer	.			D
David Iseri	Geologist	.	.	.	D
Bruce Kirchner	Geologist	.	.		B/C/D
Wayne Mandell	Geologist	.	.		B/C/D
Hugh Murphy	Geologist		.	.	D
Robert Paquette	Environmental Scientist	.	.	.	B/C/D
Kenneth Rapuano	Environmental Scientist	.	.	.	C/D

**1.2.2.2 Training Records/Current Training Records Available On-Site.** Training records, including certification of initial 40 hour training, refresher training, supervisory training, CPR, first aid, and Toxic Aid training, and logs of daily site meetings will be maintained on site. Copies of personnel training records shall be provided to the SHSC before an employee engages in field activities. As a minimum, the records shall document the dates of training.

Training records for each employee are also maintained at the employee's permanent office and at the corporate office. In accordance with 29 CFR 1910.120, these records will be maintained for the duration of employment.

Each active field employee is issued a wallet card which summarizes training and medical certifications.

### **1.2.3 Medical Surveillance Program**

Basic criteria for medical surveillance is documented in the JEG Medical Monitoring Program, established in accordance with 29 CFR 1910.120. Participation in the medical surveillance program is mandatory for all personnel involved in hazardous waste site



investigations who are exposed or potentially exposed to hazardous substances or health hazards at or above the established exposure levels for these substances, and for personnel who wear respirators.

The program consists of a baseline or initial examination, annual examination, and a baseline exit examination. In the event of personnel exposure, a post exposure examination is administered. Specific protocols are established for each type of examination.

The baseline exam is given to each participant prior to any work assignment involving potential exposure to hazardous materials. The exam is intended to determine that employees will be able to perform their jobs without undue risk to themselves, fellow employees, or to the public, and to provide a baseline against which future examinations may be measured.

Annual examinations are used for comparison with the baseline exam in order to detect any indication of a change in health status, whether work related or of a non-occupational origin.

**1.2.3.1 Specific Medical Requirements.** All field employees will participate in cholinesterase screening administered by the Kirk Army Health Clinic, located at APG-EA. Each employee must participate in baseline cholinesterase monitoring before beginning work on site.

Additional monitoring requirements are detailed in the JEG Medical Monitoring Program.

**1.2.3.2 Respiratory Protection.** All field employees will be fit tested before working on site. A respirator will be issued to each field team member, and respiratory protection training will be provided.



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*Beach Point Test Site, APG-EA, Maryland*  
*Focused Feasibility Study*

**1.2.3.3 Recordkeeping Requirements.** All medical records including exam results are maintained at the JEG contracted medical clinic. Medical clearance forms must be maintained on site for all site personnel. Clearance forms must be current and document physicals taken within one year. Summaries of results are also provided to individual employees following their exams. Records are the property of each employee; as such, each employee may request their records. Wallet cards issued to each active field employee document medical fitness for duty.



## 2.0 SITE BACKGROUND

## Beach Point Test Site, APG-EA, Maryland

*Focused Feasibility Study*

Figure 2-1 shows the regional location of the Edgewood Area of Aberdeen Proving Grounds.

## 2.1 SITE DESCRIPTION/PHYSICAL SETTING

APG lies within the Coastal Plain physiographic province. The land surface of the Coastal Plain is characterized by low hills, shallow valleys, and flat plains. Elevations within the main Aberdeen and Edgewood areas of APG range from sea level to approximately 60 feet above sea level. Soils vary in thickness and soil types range from silty sands to clays. Surface drainage is to the Chesapeake Bay, the Bush or Gunpowder River estuaries, or to creeks which discharge to these water bodies.

### 2.1.1 Climatology

The climate of the APG area is temperate and moderately humid. The climate is moderated by the Chesapeake Bay, with milder winters than locations farther inland. The mean annual precipitation is 45 inches and is fairly uniformly distributed throughout the year. The mean annual temperature is approximately 54° F.

### 2.1.2 Geology

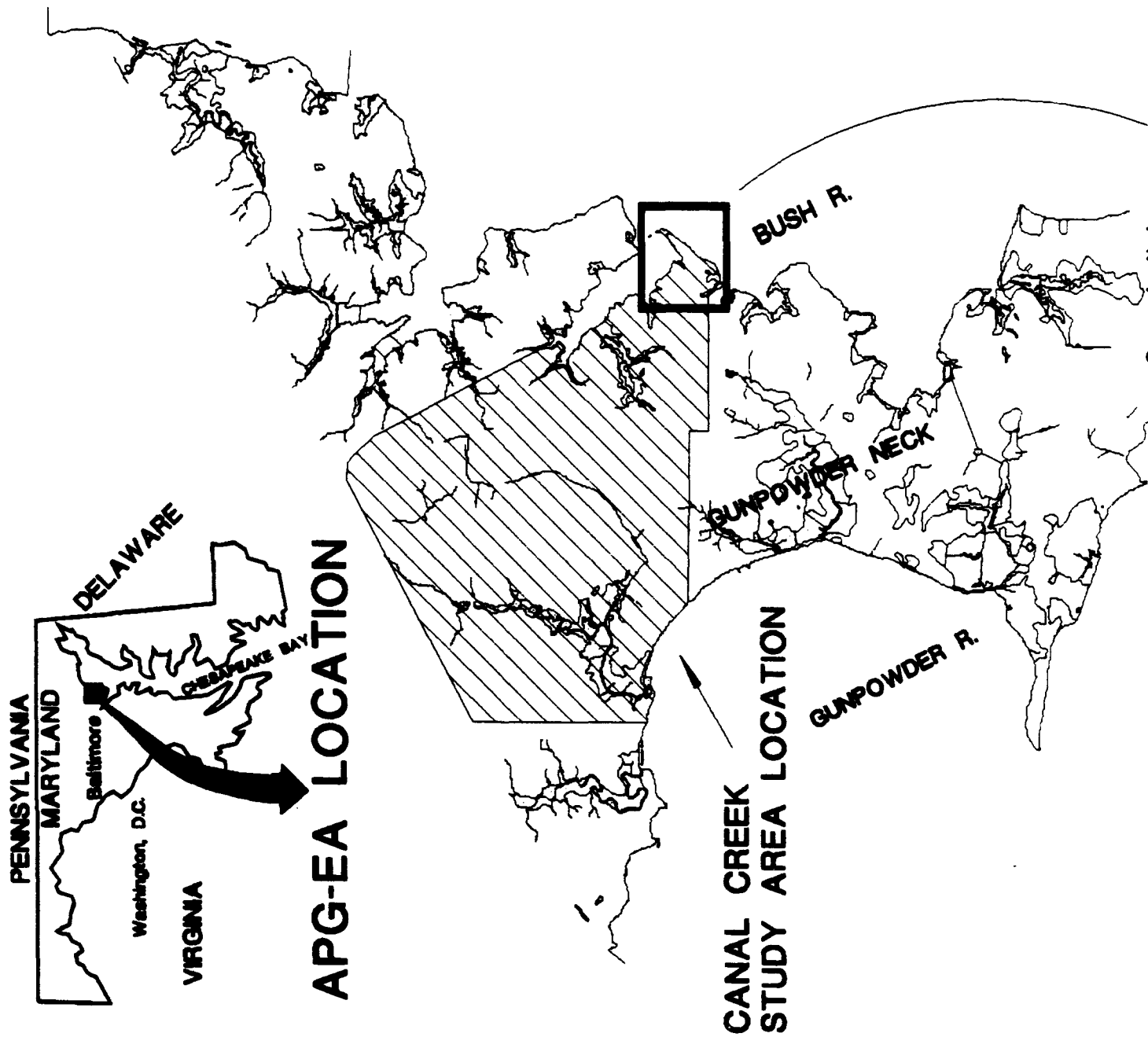
APG lies on coastal plain sediments that form a series of concentric bands sub-parallel to the Fall Line which lies just north of the installation. The Fall Line is the boundary between old resistant crystalline rocks of the Piedmont Plateau and the younger, softer sediments of the Coastal Plain. The Coastal Plain sediments are of Cretaceous and Quaternary ages and consist of unconsolidated beds of clay, silt, sand, and occasional gravel lenses. The sediments dip southeasterly, generally at an angle of less than one degree, and thicken to several hundred feet under the eastern shore of Chesapeake Bay. The crystalline rocks which underlie the Coastal Plain sediments are Precambrian to lower Paleozoic in age and consist chiefly of schist, gneiss, gabbro, granite, marble, and quartzite. The surface of this crystalline basement rock also dips to the southeast at an angle of less than one degree.

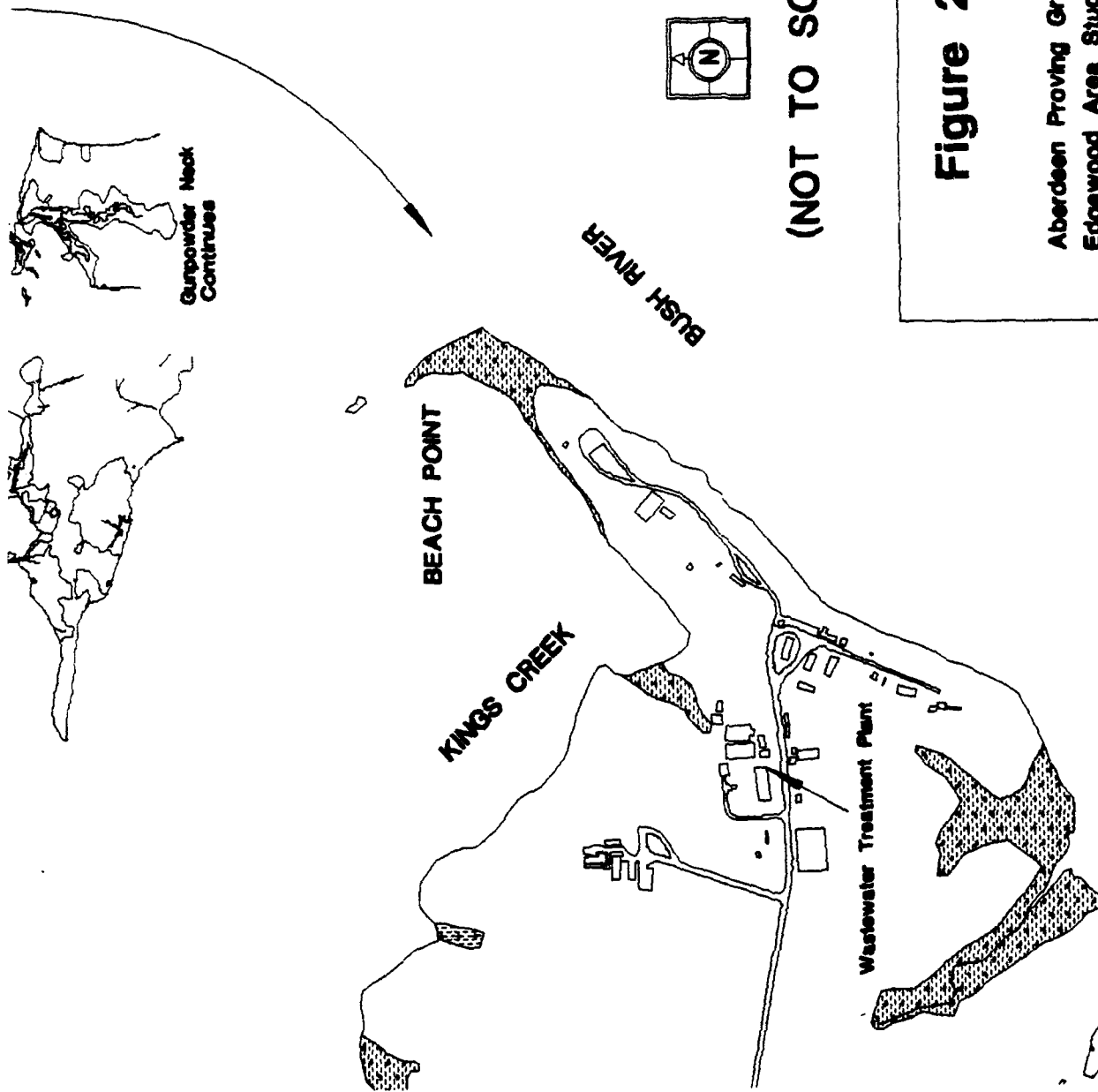


Jacobs Engineering Group Inc.  
Washington Operations

## HEALTH AND SAFETY PLAN

October 1993





(NOT TO SCALE)

Figure 2-1

Aberdeen Proving Ground -  
Edgewood Area Study Locations

11/28/02

JACOBS ENGINEERING GROUP INC.  
215 NEW YORK AVE, SUITE 1000, WASHINGTON, D.C. 20005

BEACH POINT FOCUSED  
FEASIBILITY STUDY LOCATION

### **2.1.3 Hydrology**

The principal water bearing formation in the Coastal Plain is the Patuxent Formation. The Patapsco Formation also contains beds of sand and gravel which yield large quantities of water. The Arundel Clay is considered to be a confining layer, but it can yield small quantities of water for domestic supplies. Clear differentiation of these Potomac Group formations in Harford County is reportedly difficult. The Pleistocene age deposits can yield significant quantities of water where the sand and gravel beds are thick. The Potomac Group and the Pleistocene age formations all provide, or have provided, water for usage on APG.

The Project Work Plan provides more detailed information about surface water and groundwater usage at APG-EA.

### **2.1.4 Soils**

The geologic formations that outcrop within APG, from oldest to youngest are the Potomac Group, Talbot Formation, and recent alluvium. The Potomac Group is Cretaceous in age and is subdivided into the Patuxent, Arundel, and Patapsco Formations. The Talbot Formation is Pleistocene in age and occupies the higher ground, while the alluvial deposits are recent in age and occur at the lower elevations.

The Potomac Group sediments are continental in origin and were deposited in the floodplain of rivers, lakes, and swamps. The lowest member, the Patuxent, consists generally of light gray to orange, moderately sorted, angular to sub-rounded sands with gray silt and clay beds. The silt and clay can constitute over 50 percent of the material in localized areas. The clays are usually white but may be brown, red, or purple. Gravel occurs mostly in abandoned channels and may be cemented by iron oxide. The Arundel Clay overlies the Patuxent and is primarily a red and brown clay with iron oxide stains. Where iron stains are absent, the colors are gray to dark gray. Sand lenses along with thin seams of cemented sandstone also occur. The uppermost sediments of the Potomac



Group, the Patapsco Formation, are somewhat similar to the Patuxent Formation. The noticeable difference is that the Patuxent contains more sand and gravel and the Patapsco is marked by a higher percentage of clay. The Patapsco sediments are composed essentially of red, brown, white, or gray gravel, sand, sandy clay, and clay. Crossbedding is common. Most beds are lenticular and change rapidly in character over short distances. The sands are fine-to-medium grained and sub-rounded with a minor amount of gravel.

The Talbot Formation and recent alluvium cap the Cretaceous sediments throughout most of APG. The Talbot is the youngest of five terraces and originally consisted of a series of clay, silts, and gravels. The recent alluvium consists of silts, clays, and sands which border the drainage-ways and occupy the topographic lows.

#### **2.1.5 Site Specific Map**

Figure 2-1 shows the location of the Beach Point site.

## **2.2 HISTORY**

### **2.2.1 Previous Usage**

Beach Point was the former location of several testing and production activities that may have contributed to environmental contamination in the Kings Creek/Bush River area. These operations included the following major activities:

- Mobile and fixed-base clothing-impregnating plants were operated at Beach Point during and after World War II; these plants were used to treat clothing with a waxy material that provides resistance to penetration by chemical warfare agents such as mustard. The clothing-impregnating process involved several hazardous solvents as well as the impregnating chemical CC2 (N,N'-dichloro-bis(2,4,6-trichlorophenyl)urea) and chlorinated paraffin wax.
- Liquid rocket fuel testing, including the evaluation of fire and vapor suppression methods for these materials, was conducted in the northern area of the point from the early 1960s through the 1970s. Test materials included hydrazine, unsymmetrical dimethylhydrazine (UDMH), red fuming nitric acid (RFNA), nitrogen tetroxide, and other propellants and fuels.





- Pyrotechnic testing was performed by Chemical Research and Development Engineering Center (CRDEC) Research Directorate from the post-World War II period until about 1970; this testing included work with grenades and pots filled with obscurant (i.e., white) smoke, with limited testing of colored smokes. Fog oil was also used extensively in smoke and pyrotechnic testing at Beach Point.

In addition to these major operations, Beach Point was also used for small-scale storage of lethal agents (G-agents) during the 1950s, and was used as a firing position for testing of 4.2-inch mortars in the 1940s. However, neither of these activities is considered to be of major environmental significance compared to the clothing-impregnating, pyrotechnical, and rocket-fuel testing.

More detailed descriptions of these operations and the types and quantities of waste they generated may be found in the Project Work Plan.

#### **2.2.2 Previous Investigations/Sample Results**

Previous investigations and sampling activities identified potential chemical contaminants in the groundwater, surface water, soil, and to a limited extent, the chemical conditions in sediment and biota.

Analysis of soil samples detected metals (iron, manganese, calcium, magnesium, sodium and arsenic) and two organic compounds, phenol and trichlorofluoromethane (TCFM). The measured concentration of metals in the soil appear to be within the background range for Eastern U.S. soils. The phenol and TCFM were found in trace amounts (less than 1 µg/g).

Groundwater data indicated the presence of chlorinated volatile organic compounds (VOCs), particularly 1,1,2,2-Tetrachloroethane and trichloroethane (TCE); metals, including zinc, manganese, copper, silver, and nickel. No background data was available for comparing metals concentrations with the concentrations in nearby areas. However, some of the metals detected may be associated with clothing impregnating operations as well as pyrotechnic and smoke manufacturing. Of the VOCs, 1,1,2,2-tetrachloroethane predominated; like the other VOCs detected, it may have been disposed as a waste from the clothing-impregnating process.



Surface water analysis showed most major ions and nutrients within expected ranges, although relatively high concentrations of nitrate were found at all Beach Point locations. This may be the result of rocket fuel testing activities, however nitrate concentrations appear to be related in part to an upstream source in the Kings Creek drainage basin.

Other analytes detected and likely etiology are:

- **Metals** — Aluminum, iron, manganese, cadmium, lead, zinc, and mercury were detected at elevated concentrations. Several of these metals (e.g., zinc, aluminum and lead) may be related to past pyrotechnic/smoke testing activities.
- **VOCs** — Numerous VOCs were detected; 1,1,2,2-tetrachloroethane, TCE, and PCE predominate. Examples of other chlorinated VOCs found include 1,1-DCE, TCFM, chloroform, and carbon tetrachloride. Examples of detected aromatic VOCs are ethylbenzene and toluene. Since two of the VOCs found, 1,1,2,2-tetrachloroethane and PCE, were used in clothing-impregnating operations, it is possible that some of the other chlorinated solvents were used experimentally.



Soil boring and monitoring well installation activities associated with drill rigs are potentially the most hazardous tasks planned in this project. The primary hazards to field personnel will be via inhalation and/or dermal contact with potentially contaminated surface soils, subsurface soils, and groundwater. Some of the boreholes and monitoring wells will be located near suspect sources of contamination. Continuous air monitoring at the borehole and in the breathing zone using a PID or FID (and indicator tubes if deemed necessary by the SHSC) and visual observation of the subsurface materials during drilling will indicate the need (if any) to upgrade the level of protection.

**3.1 CHEMICAL HAZARDS**

Previous investigations at Beach Point indicate that the primary contaminants in the soil are volatile organic compounds. Concentrations for these compounds are in the parts per billion range. In the groundwater, the primary contaminants are metals and volatile organic compounds; concentrations for these contaminants are higher than for soil contaminants, falling into the parts per million range. Contaminants which could potentially pose an occupational health threat are listed in Table 3-1 under subsection 3.1.1. Table 3-2 identifies the symptoms and effects of overexposure to potential contaminants.

Chemical agents have been identified as potential contaminants and are included in Table 3-1. While these substances may have been disposed at Beach Point, they are not likely to pose a hazard to field personnel. None of the agents are expected to be environmentally persistent, and the likelihood of exposure during groundwater or soil sampling is low. If agent was disposed at Beach Point, it would most likely be associated with other wastes. The magnetometry survey would identify the location of such disposal sites. Since monitoring for chemical agent contamination will be conducted during UXO screening using an individual chemical agent detector (I-CAD), the hazard potential is further reduced.



The hazard, or exposure potential, for the contaminants of concern varies according to the substance concentration and the duration of exposure to the substance. Although the contaminants identified at Beach Point are potential health hazards, contaminant concentrations are expected to be low. Concentrations will likely be higher in the groundwater than in the soil, however, the overall chemical hazard assessment for the activities approved in this health and safety plan is low, requiring level C or D protection. Since the most likely routes of exposure are through the skin and the respiratory system, and since the potential of exposure is highest for groundwater sampling activities, personal protective equipment will emphasize skin and respiratory protection during groundwater sampling.

Hazard profiles for generic classes of compounds (e.g., metals, corrosives, petroleum based hydrocarbons, and spend ordnance residues) are provided in Appendix A. Material safety data sheets for specific substances (e.g., sample preservatives) are in Appendix B.

As a precaution, hydrochloric acid shall not be used to acidify samples; it may react with thiodiglycol to produce mustard agent. Acidifying samples containing cyanide may liberate hydrogen cyanide.

### **3.1.1 Chemicals of Concern**

Table 3-1 identifies contaminants which may pose an occupational health threat. For each contaminant, the following information is summarized for quick reference:

- Applicable exposure limits;
- Immediately dangerous to life and health (IDLH) levels<sup>3</sup>;
- Ionization potential;

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<sup>3</sup>Known or suspected carcinogens are listed under the IDLH column of Table 3-1 as "Carc.".



**Table 3-1. Potential Contaminants**

Contaminant	Exposure Limit <sup>1</sup> (PEL or TLV)	Ionization Potential (Ev)	IDLH <sup>1</sup>
Aluminum (metal and oxides) (soluble salts and alkyls)	10 mg/m <sup>3</sup> 2 mg/m <sup>3</sup>	N/A	n/a
Arsenic (metal)	0.01 mg/m <sup>3</sup>	N/A	100 mg/m <sup>3</sup>
Arsenic (compounds)	0.002 mg/m <sup>3</sup>	N/A	100 mg/m <sup>3</sup>
Benzene	1 (PEL) 0.1 (NIOSH REL)	9.24	Carc. 3,000
Bromine	0.1	10.55	10
Butylbenzyl phthalate	N/A	N/A	N/A
Cadmium (metal)	0.2 mg/m <sup>3</sup>	N/A	50 mg/m <sup>3</sup>
Cadmium (oxide)	0.1 mg/m <sup>3</sup>	N/A	9 mg/m <sup>3</sup>
Carbon tetrachloride	2	11.47	300
Chlorine	0.5	11.48	30
Chlorobenzene	75	9.07	2,400
Chloroethane	1000	N/A	N/A
Chloroform	2	11.42	Carc. 1,000
1,3-Dichlorobenzene	N/A	N/A	N/A
N,N-Dichloro-bis(2,4,6-trichlorophenyl) urea	N/A	N/A	N/A
Dichlorodifluoromethane	1000	11.75	50,000
1,1-Dichloroethane	100	11.06	4,000
1,2-Dichloroethane	10	N/A	N/A
1,1-Dichloroethylene	200	N/A	4,000
trans-1,2-Dichloroethylene	N/A	N/A	9.65
Dichloromethyl hydantoin	N/A	N/A	N/A



**Table 3-1 (Continued)**

Contaminant	Exposure Limit <sup>1</sup> (PEL or TLV)	Ionization Potential (Ev)	IDLH <sup>2</sup>
Dichloromonofluoromethane	10	12.39	50,000
Dichlorotetrafluoroethane	1000	12.20	50,000
2,6-Dinitrotoluene (DNT)	1.5 mg/m <sup>3</sup>	N/A	200 mg/m <sup>3</sup>
Dithiane	N/A	N/A	N/A
Ethylbenzene	100	8.76	2,000
2-Ethylhexanoic acid	N/A	N/A	N/A
Formaldehyde	1	10.88	30
Paraformaldehyde	1	N/A	N/A
Fluorine	0.10	15.70	25
Fluorotrichloromethane	1000 (Ceiling)	11.77	10,000
G-agents (e.g., isopropylmethylphosphonofluoride)	N/A	N/A	N/A
Hydrochloric Acid	7 mg/m <sup>3</sup>	12.74	100
HMX	N/A	N/A	N/A
Isopropanol	400	10.10	12,000
Kerosene	100 mg/m <sup>3</sup> (NIOSH REL)		N/A
Lead	0.10 mg/m <sup>3</sup>	N/A	700 mg/m <sup>3</sup>
Mercury	0.01 mg/m <sup>3</sup>	N/A	10 mg/m <sup>3</sup>
Methylene Chloride	500	11.32	Carc. 5,000
Nickel	1 mg/m <sup>3</sup>	N/A	Carc.
Nitrate	N/A	N/A	N/A
Nitric Acid	5 mg/m <sup>3</sup>	11.95	100
Nitrogen tetroxide	N/A	N/A	N/A
Polyvinyl alcohol	1 mg/m <sup>3</sup>	N/A	N/A
RDX	1.5 mg/m <sup>3</sup> (ACGIH skin)	N/A	N/A



**Table 3-1 (Continued)**

Contaminant	Exposure Limit <sup>1</sup> (PEL or TLV)	Ionization Potential (Ev)	IDLH <sup>1</sup>
Silver (metal)	10 ug/m <sup>3</sup> (PEL) 0.1 mg/m <sup>3</sup> (TLV)	N/A	N/A
Silver (soluble compounds)	10 ug/m <sup>3</sup> (PEL) 0.01 mg/m <sup>3</sup> (TLV)	N/A	N/A
Sodium hydroxide	2 mg/m <sup>3</sup>	N/A	250 mg/m <sup>3</sup>
Sulfuric acid	1 mg/m <sup>3</sup>	N/A	80 mg/m <sup>3</sup>
1,1,2,2-Tetrachloroethane	1	11.10	150
Tetrachloroethylene	25	9.32	Carc. 500
Tetryl	1.5 mg/m <sup>3</sup>	N/A	N/A
Toluene	100	8.82	2,000
1,1,2-Trichloroethane	10	11.00	Carc. 500
Trichloroethylene	50 (PEL) (NIOSH REL)	9.45	Carc. 1,000
1,1,2-Trichloro-1,2,2-trifluoroethane	1,000	11.99	4500
2,4,6-Trinitrotoluene (TNT)	0.5 mg/m <sup>3</sup>	10.59	N/A
Vinyl chloride	1	9.99	Carc.
Zinc (oxide)	5 mg/m <sup>3</sup>	N/A	N/A

<sup>1</sup> Exposure limits expressed in ppm except where noted; refer to Section 3.1.1.1 for an explanation of exposure limits.

N.A. = Not Assigned, Not Available, or Not Applicable.

\* Chemical Agent Degradation product for Mustard

Exposure limits and ionization potential were obtained from the following sources:

- National Institute of Occupational Safety and Health (NIOSH) publications;
- Dangerous Properties of Industrial Chemicals;
- Chemical dictionaries; and
- American Conference of Governmental Industrial Hygienists publications.

**3.1.1.1 Exposure Limits.** Occupational exposure limits are based on experimental and epidemiological studies and are promulgated by organizations such as the Occupational Safety and Health Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH), and the National Institute of Occupational Safety and Health Administration (NIOSH). Each organization assigns a different term to its exposure limit: OSHA establishes permissible exposure limits (PELs), the ACGIH develops threshold limit values (TLVs), and NIOSH publishes recommended exposure limits (RELs). A central concept in the development of exposure limits is the dose-response relationship between a given substance and the health effects associated with exposure to the substance. This relationship is assumed to be gradual, such that an exposure below a certain level will not produce deleterious effects. The exposure limit does not guarantee a discrete, fixed boundary between "safe" and "unhealthful", however. The effect of a given substance may vary with individual differences in susceptibility and environmental conditions such as temperature, humidity, and the presence of other substances.

The PEL, TLV, and REL are not interchangeable or equivalent. Of the three, only the PEL is legally enforceable; the TLV and REL are guides which recommend limits below which the ACGIH and NIOSH believe nearly all workers may be exposed repeatedly, for eight hours per day and forty hours per week without adverse effect. Although the TLV and REL are not law, they frequently become law when they are incorporated into codes, regulations, and standards.

The exposure limits listed in this section are time-weighted averages, based on exposures for eight hours per day and forty hours per week unless otherwise noted. Exposure limits for chemical agents are U.S. Army provisional limits based on experimental data.





**3.1.1.2 Recognition of Symptoms and Signs.** Table 3-2 summarizes the symptoms of exposure for each contaminant identified as a potential health hazard.

### **3.1.2 Hazard Communication Program Procedures**

All field personnel will receive hazard communication training prior to beginning work at Beach Point. The goal of the hazard communication procedure is to provide employees with the knowledge to work safely, to be aware of potential hazards, and to be able to implement appropriate precautions. Training will comply with the OSHA Hazard Communication Standard, 29 CFR 1910.1200, and will include the following topics:

- A review of employee right to know and the location of hazardous material information on-site (e.g., Material Safety Data Sheet (MSDS) and hazard labels);
- A review of how to interpret MSDSs and hazard labels;
- A review of site operations and the hazardous materials associated with each operation;
- A review of safety and health hazards present on the site;
- Methods for detecting hazards;
- Control measures and emergency procedures for employee protection; and
- A review of the site health and safety plan.



**Table 3-2. Symptoms and Effects of Groundwater Contaminants**

Contaminant	Symptoms and Effects
Aluminum	Inhalation may cause pulmonary fibrosis; aerosols of aluminum have been implicated in Alzheimer's disease.
Arsenic	Carcinogen, poisonous through skin absorption, injection, or ingestion. Dermal exposure causes dermatitis and gastrointestinal disturbance. Contact with skin or eyes results in peripheral neuropathy, respiratory irritation. Inhalation may cause ulceration of the nasal septum. Skin may become hyperpigmented from ingestion. Experimental teratogen, tumorigen; mutagenic.
Benzene	Narcotic; euphoria; somnolence; fatigue; nausea; giddiness; headache; mucous membrane irritation; anorexia; bone marrow depressant; carcinogen and human poison by inhalation and possibly skin contact.
Bromine	Lachrymator; dizziness; headache; cough; pulmonary edema; abdominal pain; measles-like eruptions; depression; severe skin, eye, mucous membrane irritant; toxic by ingestion, inhalation and skin contact.
Bromodichloromethane	Sedation; flaccid muscle tone; ataxia; sleepiness; tremors; toxic by inhalation and ingestion; experimental carcinogen.
Butylbenzyl phthalate	Skin, eye, and respiratory system irritant; toxic by ingestion, inhalation, and skin contact.
Cadmium	Poisonous by inhalation and possibly other routes. Experimental poison by inhalation, ingestion, intraperitoneal, subcutaneous, intramuscular, and intravenous routes. Inhalation causes excess of protein in urine. Experimental reproductive hazard, carcinogen, tumorigen, neoplastigen, and teratogen.
Carbon tetrachloride	Nausea; skin and eye irritant; pupillary constriction; coma, tremors; CNS depressant; poison by ingestion; toxic by inhalation; experimental carcinogen, neoplastigen, tumorigen, teratogen.
Chlorine	Strong irritant to eyes, mucous membranes, skin, and respiratory system; pulmonary edema; cough; lachrymator; nausea, dizziness; toxic by inhalation.
Chlorobenzene	Irritant to skin, eyes, respiratory system; drowsiness; incoordination; narcotic; poison by ingestion; experimental teratogen.
Chloroethane	Irritant to skin, eyes and respiratory system; sleepiness; excitement; pulmonary edema; toxic by inhalation, ingestion, and skin contact



**Table 3-2 (Continued)**

Contaminant	Symptoms and Effects
Chlorofluorocarbons	Irritants to eyes, skin, and throat. Inhalation may cause asphyxiation, cardiac arrhythmia, drowsiness and dermatitis. Ingestion may cause cardiac arrest or arrhythmias. Some are carcinogenic.
Chloroform	Hallucinations; nausea; fatigue; disorientation; headache; skin and eye irritant; anesthetic; poison by ingestion and inhalation; suspected carcinogen
1,3-Dichlorobenzene	Eye, skin and respiratory system irritant; systemic effects by ingestion; poison by ingestion; toxic by inhalation; mutagen.
1,1-Dichloroethane	Suspect carcinogen; moderately toxic by ingestion, causing liver and kidney damage; inhalation causes CNS depression and skin irritation; experimental teratogen and tamongen.
1,2-Dichloroethane	Flaccid paralysis; somnolence; cough, jaundice; nausea; hypermotility; diarrhea; stomach ulcers/bleeding; changes in heart rate; cyanosis, coma; poison by ingestion; toxic by inhalation and skin.
1,1-Dichloroethylene	Anesthetic; liver and kidney changes; poison by inhalation and ingestion.
Dichloromethyl hydantoin	To be added
trans-1,2-Dichloroethylene	Irritant to eyes and respiratory system; central nervous system depressant; toxic by ingestion and inhalation.
Dithiane	Irritant to mucous membranes and respiratory system; tremors; ataxia; dyspnea; toxic by inhalation and ingestion.
2,6-Dinitrotoluene	Skin irritant; anoxia; cyanosis; anemia; jaundice; poison by ingestion.
Ethylbenzene	Moderately toxic by ingestion and intraperitoneal route. Mildly toxic by inhalation and skin contact. Inhalation causes irritation of eyes and mucous membranes; eye, sleepy, and pulmonary changes; ingestion may cause headache, dermatitis, narcosis, and coma. Mutagenic.
2-Ethylhexanoic acid	Skin and severe eye irritant; toxic by skin and ingestion.
Formaldehyde	Suspected carcinogen and experiment reproductive hazard; poisonous by ingestion; irritant to eyes, nose, and throat when inhaled; absorption through eyes or skin may cause bronchial spasms, pulmonary irritation, and dermatitis; ingestion may cause lachrymation, burning nose, and inducing cough. Experimental carcinogen, tumorigen, teratogen, and human mutagen.
Paraformaldehyde	See formaldehyde.



**Table 3-2 (Continued)**

Contaminant	Symptoms and Effects
Fluorine	Severe irritant to skin, eyes and mucous membranes; pulmonary edema; laryngeal and bronchial spasms; poison gas; toxic by inhalation.
G-agents (e.g., isopropylmethylphosphonofluoridate)	Moderate inhalation exposure may cause dimming of vision from severe pupil constriction (miosis), runny nose (rhinorrhea), and tightness in the chest. Moderate skin contact exposure mimics inhalation and includes localized sweating and muscle reaction at the exposure site. More acute exposures may result in nausea, convulsions, and respiratory arrest.
HMX	May be irritating.
Hydrochloric acid	Highly corrosive irritant to skin, eyes, and mucous membranes; poison; toxic by inhalation and ingestion.
Kerosene	Poisonous intravenously; moderately toxic by ingestion; somnolence, hallucination, distorted perceptions, coughing, nausea or vomiting, and fever may result from ingestion or exposure through intravenous route.
Lead	Loss of appetite; anemia; malaise; insomnia; gingival lead line; eye irritant; headache; irritability; constipation; muscle/joint pains; tremors; flaccid paralysis without anesthesia; hallucinations; hypotension; distorted perceptions; muscle weakness; gastritis; liver damage; cerebral edema; poison by ingestion; toxic by inhalation; suspected carcinogen.
Methylene Chloride	Inhalation causes fatigue, weaknesses, sleepiness; ingestion causes light headedness, numbing of limbs; skin contact or eye contact may cause tingling, nausea, eye and skin irritation; suspect carcinogen.
Mercury	Poisonous by inhalation, corrosive to skin and mucous membranes; inhalation may result in ataxia, dysarthria, paresthesia; absorption through skin may cause vision and hearing distortion; exposure; skin or eye contact may cause salivation, lachrymation, nausea, vomiting, diarrhea, constipation, skin burns and emotional disturbance; inhalation may result in wakefulness, muscle weakness, anorexia, headache, ringing in ears, hypomotility, diarrhea, dermatitis, and fever. Experimental tumorigen.
N,N-dichloro-bis(2,4,6-trichlorophenyl) urea	To be added



**Table 3-2 (Continued)**

Contaminant	Symptoms and Effects
Nickel	Poison by ingestion, intravenous, subcutaneous, intratracheal and intraperitoneal routes. Ingestion of nickel salts causes nausea, vomiting and diarrhea. Can cause hypersensitivity, including allergic contact dermatitis, pulmonary asthma, conjunctivitis, and inflammatory reactions. Contact with skin and eyes may include substernal pain, cough, hyperpnea, cyanosis, weakness, delirium, convulsion, leukocytosis, and pneumonitis. Inhalation causes headache, vertigo, nausea, and vomiting. Experimental reproductive hazard, carcinogen, neoplastigen, tumeragen and teratogen.
Nitrate	Dizziness, abdominal cramps, vomiting, bloody diarrhea, weakness, convulsions and collapse. Low chronic exposure may cause weakness, general depression, headache and mental impairment. Ingestion of large amounts may have serious or fatal effects. May increase risk of cancer.
Nitric acid	Corrosive to skin, eyes, mucous membranes and teeth; delayed pulmonary edema; pneumonitis and bronchitis; poison by ingestion; toxic by inhalation and skin contact.
Nitrogen Tetroxide	Poison, moderately toxic by inhalation.
Polyvinyl alcohol	Experimental carcinogen and tumerigen, possible human carcinogen.
RDX	Corrosive to skin, eyes, and mucous membranes; central nervous system stimulant; muscle twitching; seizures; poison by ingestion; toxic by inhalation and skin contact.
Silver	Inhalation of metal dusts may cause argyrosis; contact with skin and eyes may cause ulceration and gastrointestinal disturbances; ingestion may irritate nasal septum, throat, and skin. Experimental tumorigen.
Sodium hydroxide	Corrosive to eyes, skin, mucous membranes; pneumonitis; temporary loss of hair; toxic by ingestion and inhalation;
Sulfuric acid	Corrosive to eyes, skin, mucous membranes and teeth; throat irritant; pulmonary edema and bronchitis; tracheobronchitis; conjunctivitis; emphysema; poison by ingestion and toxic by inhalation.
1,1,2,2-Tetrachloroethane	Carcinogen; inhalation may induce nausea, vomiting, abdominal pain; symptoms of skin absorption are finger tremors, jaundice; ingestion may cause an enlarged, tender liver, dermatitis; skin contact may result in monocytosis, kidney damage. Severely irritating to skin and eyes.
Tetrachloroethylene	Irritant to eyes, nose, throat; nausea, vertigo; dizziness; incoherence; headache; somnolence; skin erythema, flushed face and neck; toxic by inhalation.



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Table 3-2 (Continued)

Contaminant	Symptoms and Effects
Tetryl	Dizziness, abdominal cramps, vomiting, bloody diarrhea, weakness, convulsions, and collapse. Small, repeated doses may lead to weakness, general depression, headache and mental impairment. Ingestion of large amounts may have serious or fatal effects.
1,1,2-Trichloroethane	Irritant to eyes, nose, skin, and lungs; central nervous system depressant; narcotic; poison by ingestion; toxic by inhalation and skin contact; experimental carcinogen.
Trichloroethylene	Headache; vertigo; disturbed vision; tremors; jaundice; hallucinations; somnolence; nausea; eye and skin irritant; cardiac arrhythmia; narcotic and anesthetic; paresthesia; toxic by ingestion, skin contact, and inhalation; experimental carcinogen.
Toluene	Narcosis, fatigue, confusion, headache, nausea, dizziness, skin irritation, scaling, cracking and dermatitis, eye pain, tearing and corneal burns.
2,4,6-Trinitrotoluene	Jaundice; cyanosis; sneezing; sore throat; peripheral neuropathy; muscle pain; dermal sensitizer; anemia; leukocytosis; cardiac irregularities; toxic by ingestion, inhalation, and skin contact.
Vinyl Chloride	Severe irritant to skin, eyes, and mucous membranes; weakness; abdominal pain; gastrointestinal bleeding; hepatomegaly; cyanosis; anesthetic; poison by inhalation and toxic by ingestion and skin contact; experimental carcinogen.
Zinc (oxides)	Sweet, metallic taste in mouth; dry throat; cough, chills, fever, tight chest, dyspnea, rales, reduced pulmonary function, headache, blurred vision, muscular cramps, low back pain, nausea, vomiting, fatigue, lassitude, and malaise.
<b>Agent<sup>1</sup></b>	
Nerve agents, e.g., Tabun (GA), Sarin (GB), Soman (GD), and VX	Moderate inhalation exposure causes dimming of vision due to severe constriction of the pupils (miosis), runny nose (rhinorrhea), and tightness in the chest; exposures of moderate skin contact mimic inhalation and also include localized sweating and muscle reaction at the site of exposure. The symptoms associated with severe inhalation or skin contact exposure include nausea, convulsions, and respiratory arrest.
Blood agents, e.g., Hydrogen cyanide (AC) and cyanogen chloride (CK)	Moderate exposure: vertigo, nausea, and headache, followed by convulsions and/or coma. At high concentrations: deep, rapid breathing, violent convulsions after 15 to 20 seconds, cessation of regular breathing within 1 minute, and termination of heart action shortly thereafter.



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Table 3-2 (Continued)

Contaminant	Symptoms and Effects
Choking agents, e.g., Phosgene (CG)	The symptoms of exposure to choking agents include coughing, choking, tightness in the chest, nausea, occasional vomiting, headache, lacrimation, followed by pulmonary edema, rapid shallow breathing, and painful cough and cyanosis. Symptoms may be delayed or they may occur and then disappear for up to 24 hours, and then recur as pulmonary edema develops. Seeking medical treatment as soon as possible is essential.
Incapacitating agents, e.g., BZ	Rapid heartbeat, dizziness, vomiting, extremely dry mouth, blurred vision. Hallucinogenic, produce mental confusion and lack of coordination, similar to alcoholic intoxication. Symptoms may occur up to several hours after exposure.
Irritant or riot control agents, e.g., tear gas, CS, CN	Irritant to eyes and upper respiratory tract. Primary symptom of exposure is tearing; secondary exposure causes nausea and vomiting.
Vomiting agents, e.g., DM, DA, DC	Primary symptom is tearing; secondary symptoms at high concentrations is nausea and vomiting.
Blistering agent, e.g., mustard, HD, H, HT, L	Cell damage upon contact; skin contact can cause reddening to severe blistering; eye exposure causes reddening and gritty sensation; long exposure to low concentrations or exposures to high concentrations can result in permanent eye damage; inhalation causes upper respiratory tract damage and respiratory distress similar to a chest cold. Severe exposure can cause secondary infection such as bronchial pneumonia.

<sup>1</sup> Although agent has not been identified as a contaminant at Beach Point, the symptoms and effects of exposure are provided in the event that agent is encountered.



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Based on the activities planned for Beach Point, training shall also discuss:

- Calibration and operation of field surveying instruments;
- Hearing conservation;
- Respiratory protection;
- Specific chemicals (e.g., benzene) regulated by OSHA under 29 CFR 1910 "Part Z".

Each field team member shall be provided a copy of this HASP and shall agree to abide by it by signing the form in Section 11. Training shall also be documented on each employee's Individual Field Training Record (JEG Form 3-6), Attachment 4. Copies of these forms will be maintained on site.

JEG's Hazard Communication Program is documented in the Corporate Health and Safety Manual for Environmental Field Programs. A copy of this plan is maintained at APG-EA with the Installation Safety Division. In addition to the requirements of this plan, project personnel are required to review the safety data associated with the chemicals anticipated at the project site. MSDSs or equivalent data for possible chemicals released to the environment in the project area (i.e., decontamination chemicals and sample preservatives) will be maintained by the SHSC and will be available for review by all project personnel.

### **3.1.3 Summary**

The following table summarizes the primary hazards for field tasks, levels of PPE required, and action levels.

Task	Metals	VOCs	UXO	Agent	PPE Level	Action/Response Level
Existing Well Sampling	•	•			C/D	> 5 ppm
Surface Soil Sampling		•	•	•	D	> 5 ppm
Soil Borings		•	•	•	C/D	> 5 ppm





### 3.2 PHYSICAL HAZARDS

Table 3-3 summarizes potential physical hazards and engineering or administrative controls for each.

**Table 3-3. Potential Physical Hazards and Administrative Controls**

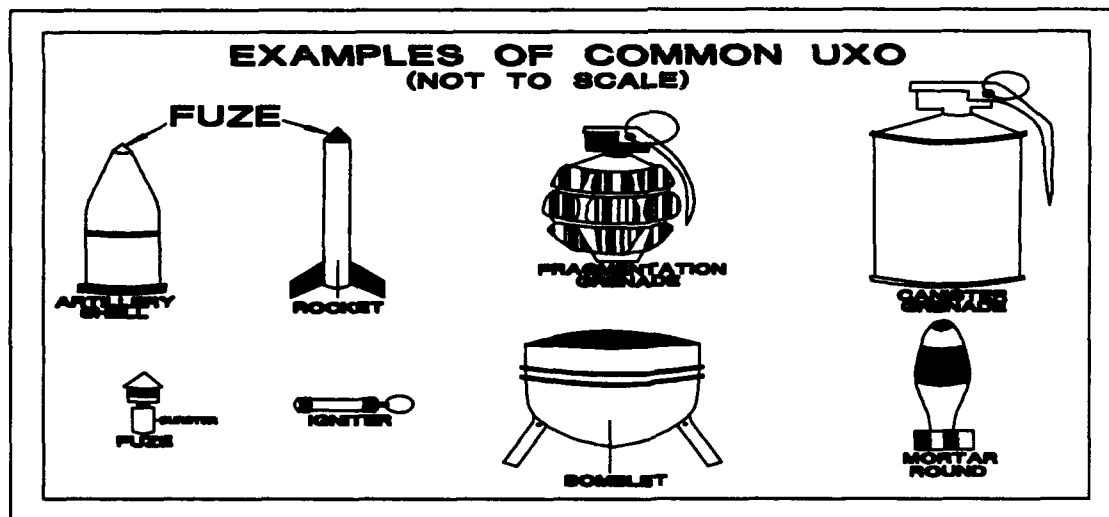
<b>Hazard</b>	<b>Engineering or Administrative Controls</b>
Flying debris/objects	Provide shielding and personal protective equipment.
Noise > 85 dBA	Noise protection and monitoring required.
Steep terrain/unstable surface	Brace and shore equipment.
Build-up of explosive gases	Provide 20-lb ABC fire extinguisher, ventilation and monitoring.
Build-up of static electricity	No spark sources within 50 feet of an excavation, heavy equipment or UST removal. Ground as appropriate.
Gas cylinders	Make certain gas cylinders are properly anchored and chained.
High pressure hose rupture	Check that fittings and pressurized lines are in good repair before using. Secure all lines to prevent whipping.
Electric Shock	Make certain equipment is properly grounded. Do not modify electrical wiring unless qualified to do so.
Suspended loads	Work not permitted under suspended loads.
Moving vehicles	Backup alarm required for heavy equipment. Observer remains in contact with operator and signals safe backup. Personnel to wear high visibility vests and remain outside of turning radius.
Overhead electrical wires	Heavy equipment to remain at least 15 feet from overhead powerline for powerlines of 50 kV or less. For each kV > 50 kV increase distance by 1/2 foot.
Muddy work areas	Use wood pallets or similar devices in muddy work areas.
Back injury	Use proper lifting techniques or mechanical lifting aids.
Protruding objects	Flag and/or pad visible objects.



### 3.2.1 Unexploded Ordnance

Unexploded ordnance (UXO) is a potential hazard during soil boring activities. Sampling sites will be screened for UXO before field activities begin by a subcontractor meeting APG-EA requirements. The UXO screen consists of a usual survey for surface UXO and a subsurface survey using a magnetometer capable of detecting both ferrous and nonferrous materials to a depth of four feet. During drilling operations, screening will be conducted at two foot intervals. The excavation permit will determine the depth required for screening; typically screening may continue to ten or fourteen feet. If suspected UXO are encountered, the area will be evacuated and the emergency procedures described in Section 9.1.3 will be implemented. Figure 3-1 presents examples of common UXO. The selected UXO subcontractor's screening procedures and HAPS (including key personnel, qualifications, instrument capabilities, and PPE) are provided in Appendix C.

Figure 3-1. Examples of Common UXO



### **3.2.2 Equipment**

Heavy equipment, such as the drill rig, used on-site is under the direct control of the subcontractor performing the work. The subcontractor is responsible for maintaining the equipment in good working order and operating it safely. All heavy equipment must have audible back-up alarms in working condition. JEG personnel shall not work near equipment that they judge to be unsafe because of deterioration, missing parts, obvious defects or improper operation. JEG personnel shall report these conditions to the SHSC. It will be the responsibility of the SHSC to ensure that the subcontractor corrects reported problems.

The subcontractor will be responsible for making provisions to ensure the safety of the equipment operator and other personnel in the areas having steep embankments or unstable ground. Operation of heavy equipment in such areas will be avoided whenever possible.

The activities of core or well drilling for the purposes of soil and water sampling involve a number of hazards including, but not limited to, the following: injuries from flying debris, being caught in machinery, hydraulic failures, unguarded points of operation, airborne particulates, equipment rollover and other hazards associated with the transportation and use of drill rigs. The following procedures will be followed:

- The supplier of the drill rig shall ensure equipment is well maintained, meets existing safety requirements and is inspected regularly and before being released to new projects.
- The rig shall be operated by a person fully qualified to operate the equipment, identify pending failures, and supervise the other people on the project.
- The transporting of the rig to the work site shall be made by a person with the proper commercial license.
- To the extent possible, the terrain should be level and the condition of the ground such that unexpected movement of the rig will be unlikely. Tugger and anchor lines shall be used to secure the rig if the slope is hazardous.



- All power transmission equipment, prime movers, and machine parts of rotary drilling equipment must be guarded. Chains and sprockets shall be enclosed to prevent accidental contact.
- Employees involved in the operation shall wear appropriate personal protective equipment (PPE), including steel-toed and steel-shanked footwear. Employees shall not wear any hanging jewelry, loose or sloppy fitting clothing or long hair, which could get caught in any exposed moving machinery.
- If any air or hydraulic lines are visible and uncovered they shall be secured in such a way that a failure would not allow them to whip around.
- Dust suppression shall be used to control emissions.
- Emergency stop devices are required for the prime movers on drilling rigs to allow the operator or others to quickly respond to an emergency and prevent an accident or at least limit the injury.
- Emergency stops must be manually reset before restarting prime movers.
- The area shall be roped off, marked or personnel posted to keep the area clear of pedestrian traffic or spectators.
- A 20 pound ABC fire extinguisher shall be readily available for use.

### **3.2.3 Illumination**

All field activities will be performed in daylight. No sources of intense light (e.g., infrared or ultraviolet) other than natural light are associated with planned activities. If adequate light is not available (e.g., at least 30 foot-candles), activities will not continue until adequate light is available.

### **3.2.4 Confined Space Entry**

Planned field activities do not include entry into areas which could be considered confined spaces, however, atmospheric testing will be conducted before any activities are initiated. Testing will be conducted using a combustible gas monitor to ensure that the atmosphere is free of the following hazards:

- Oxygen deficiency (the atmosphere must contain 19.5% oxygen; the monitor will alarm if the atmosphere contains less than 19.5% oxygen); and



- Flammable vapors in concentrations approaching or exceeding their lower explosive limits (the monitor will alarm at 25% of the LEL). Only personnel trained in confined space entry are authorized to enter confined spaces. (Refer to the JEG Corporate Health and Safety Manual for Environmental Field Programs.)

### **3.2.5 Electrical**

Above ground utility lines may pose a hazard to team members during field activities, especially during excavation or drilling operations. A safe distance (at least 15 feet) from overhead utility lines must be maintained at all times. Below ground utility lines should not pose a hazard as long as the excavation permit process described in section 2.1.6 is followed.

If temporary or permanent electrical wiring is not protected by a Ground Fault Circuit Interrupter (GFCI) between the panel box and any extension cord or receptacle that any employee may plug into, the following precautions must be followed:

- Each day, employees will visually check each piece of electrical equipment for external damage or defects before using it.
- Before any electrically powered tool is used for the first time, it will be checked to see that the cord and plug are in good condition, that all three prongs are intact (unless UL listed double insulated), and that there are no exposed wires at plug or cord end.
- The switch must work and shut off the motor when released. If there is a lock-on button on the tool, it must be removed before issue.
- Male and female ends of a cord must fit tightly without exposed wires. There should be no break in the insulation.

### **3.2.6 Noise**

Direct sources of noise will be produced by the drill rig, vehicles, and electric generators. Personnel operating the drill rig shall wear appropriate hearing protection if noise levels exceed the permissible exposure limit. Hearing protection will also be necessary in the vicinity of the drill rig as drilling machinery may be very noisy and may project potentially harmful noise levels into the surrounding work area.



A useful rule of thumb for knowing when hearing protection is required is if people three feet apart must raise their voices to be heard in normal conversation. The permissible exposure limit for noise is 85 dBA (85 decibels on the A-weighted scale). A type II sound level meter will be used to measure noise on site to verify sound levels, to establish safe working distances from noise producing equipment, and to identify the need for hearing protection.

### **3.2.7 Excavations**

An excavation is a man-made depression or cavity in the earth. A trench is a man-made excavation, that is deeper than it is wide, but is generally no wider than 15 feet.

Excavations that are 4 feet or deeper, or where personnel may be exposed to unstable earth are required to be shored, sloped, sheeted, braced, or otherwise supported. Prior to excavating, a permit must be obtained from the APG Directorate of Public Works (DPW) (see also section 2.1.7).

Excavation cave-ins develop very suddenly and without warning. Given a maximum expected survival time without breathing of 3 minutes, there is not much time to locate, dig out, and resuscitate a buried worker. Workers should never enter an unprotected trench. The earth may be disturbed by the mere action of jumping into the excavation.

A number of basic guidelines must be followed while working near or in an excavation.

- Determine the location of underground utilities by complying with the DEH's permit process.
- Inspect the area for hazards from moving ground.
- Silts, loams, nonhomogeneous soils or previously disturbed (backfilled) soils are classified as Type C soils per OSHA regulations. As such, a ratio of 1 to 1½ slope is the minimum required.
- Inspect the excavation after every rainstorm, earthquake or other hazard-increasing occurrence.
- Locate spoils at least 2 feet from the edge of the excavation.



- Inspect the face, banks, and top daily when workers are exposed to falling or rolling material.
- Shoring plans must be designed and approved by a civil engineer registered in Maryland, when excavations are 20-feet deep or greater or when alternative means of shoring are proposed.
- In trenches 4 feet deep or more, provide quick exit facilities every 25 feet or at least two exits for shorter length trenches.
- Install crossings with standard guard rails and toeboards when placed over excavations.
- Use additional bracing when vibration from vehicular traffic or heavy equipment or external loads are a hazard.
- Erect barriers around excavations in remote work locations. Cover all wells, pits, shafts and caissons. Backfill temporary wells, pits, and shafts when work is completed.
- Do not excavate beneath the level of adjacent foundations, retaining walls, or other structures until a qualified person has determined that the work will not be hazardous. Support undermined sidewalks.
- Shore, brace, or underpin structures when their stability is threatened. Inspect the structures daily.
- Shafts over 4 feet square must be guarded by a lagging system made from proportionally larger materials as determined by a registered safety engineer.

### **3.2.8 Dust Control**

Dust suppression efforts will be monitored using a respirable aerosol monitor, such as an MIE Mini-RAM. Based on calculations made from the available soil contamination analytical data, normal wetting methods will keep airborne concentrations well below established exposure limits.

### **3.2.9 Heat and Cold Stress**

Heat and cold stress are anticipated hazards for the work performed at Beach Point, depending on the season that activities are occurring. Heat and cold stress are discussed with emphasis on hazard recognition and abatement.



**3.2.9.1 Heat Stress.** Heat stress is the aggregate of environmental and physical work factors that make up the total heat load imposed on the body. The environmental factors of heat stress include air temperature, humidity, radiant heat exchange, wind, and water vapor pressure (this last factor is related to humidity). Physical work contributes to the total heat stress by producing metabolic heat in the body, proportional to the intensity of work. Heavy physical labor can greatly increase the likelihood of heat fatigue, heat exhaustion, and heat stroke. The most common type of heat-related hazard that affects field personnel is heat stress. Under this condition, the body's physiological processes fail to maintain a normal body temperature because of excessive heat (Table 3-4 outlines a work-rest regimen for workers). A number of physical reactions can occur from this condition ranging from mild reaction such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement, to a severe reaction which may be fatal. The following are examples of heat-related stress that may be encountered.

**Heat Rash:** caused by continuous exposure to heat and humid air and aggravated by chaffing clothes. Symptoms include a decreased ability to tolerate heat.

**Heat Cramps:** caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially electrolytes). Signs: muscle spasms and pain in the extremities and abdomen.

**Heat Exhaustion:** caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

**Heat Stroke:** life threatening; the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin, no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma. If an individual exhibits the above heat-related symptoms, immediately call military 17 or commercial (410) 676-0960 and treat for heat stress as indicated below.





**Table 3-4. Work — Rest Regimen<sup>1</sup>**

<b>WBGT* Temperature in Which Various Work Loads are Performed [F°(C°)]</b>			
<b>Work-Rest Regimen</b>	<b>Light<sup>2</sup></b>	<b>Moderate<sup>3</sup></b>	<b>Heavy<sup>4</sup></b>
Continuous work permitted	86.0 (30.0)	80.1 (26.7)	77.0 (25.0)
75% work 25% rest, each hour	87.1 (30.6)	82.4 (28.0)	78.6 (25.9)
50% work 50% rest, each hour	88.5 (31.4)	84.9 (29.4)	82.2 (27.9)
25% work 75% rest each hour	90.0 (32.2)	88.0 (31.1)	86.0 (30.0)

\* Wet Bulb Globe Temperature

<sup>1</sup> Adapted from "Permissible Heat Exposure Threshold Limit Values" in **Threshold Limit Values and Biological Exposure Indices for 1990–1991**, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1990, p. 69.

<sup>2</sup> Light work (up to 200 Kcal/hr or 800 Btu/hr): e.g., walking about with light lifting and pushing, etc.

<sup>3</sup> Moderate work (200-300 Kcal/hr or 800-1400 btu/hr): e.g., walking about with moderate lifting and pushing, etc.

<sup>4</sup> Heavy work (350-500 Kcal/hr or 1400-2000 Btu/hr): e.g., sampling work, pick and shovel work, etc.



#### **Heat Stress Avoidance Procedures:**

Below are the preventive measures that will be followed to avoid heat stress related illnesses.

- Workers will be encouraged to drink 18 ounces of water before beginning work, such as in the morning or after lunch. Provide disposable, 4-ounce cups, and water that is maintained at 50-60° F. Urge workers to drink 1-2 of these cups of water every 20 minutes for a total of 1-2 gallons per day. Provide a cool, preferably air conditioned area for rest breaks. Since alcohol and coffee are diuretics, the use of alcohol in non-working hours will be discouraged as will the intake of coffee during working hours.
- Workers will be monitored for signs of heat stress.
- Workers will be acclimated to site work conditions by slowly increasing workloads, i.e., do not begin site work activities with extremely demanding activities.
- To the extent possible, in hot weather, field activities will be conducted in the early morning or evening.
- Adequate shelter will be available to protect personnel against heat, as well as rain, cold, or snow, all of which can decrease physical efficiency and increase the probability of both heat and cold stress.
- Good personal hygiene standards will be maintained by frequent changes of clothing and showering. Clothing will be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

#### **Heat Stress Monitoring**

Heat stress monitoring will be initiated when the ambient air temperature reaches 70° F and work activities require the use of impermeable personal protective equipment. Heat stress monitoring for personnel who are not wearing personal protective equipment will commence when the ambient temperature is 80°F. Workers who are acclimatized to hot conditions, or who are engaged in less physically strenuous tasks may be less susceptible to heat related stresses. As a precaution, all workers will be routinely monitored for heat stress (Table 3-5 relates monitoring frequency and adjusted air temperature). The frequency of monitoring will increase as the ambient temperature and/or the intensity of work rises. (For a more detailed discussion of heat stress monitoring requirements, refer to SOP 7.1 in the JEG Corporate Health and Safety Manual.)



**TABLE 3-5. Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers<sup>1</sup>**

<b>Adjusted Temperature<sup>2</sup></b>	<b>Normal Work Ensemble<sup>3</sup></b>	<b>Impermeable Ensemble</b>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° –90°F (30.8° –32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° –87.5°F (28.1° –30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° –82.5°F (25.3° –28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° –77.5°F (22.5° –25.3°C)	After each 150 minutes of work	After each 120 minutes of work
SOURCE: NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985, p. 8-22.		

<sup>1</sup> For work levels of 250 kilocalories/hour.

<sup>2</sup> Calculate the adjusted air temperature (ta adj) by using this equation:  $ta\ adj\ ^\circ F = ta\ ^\circ F + (13 \times \% \text{ sunshine})$ . Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

<sup>3</sup> A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.



Heat Stress monitoring will be initiated by the SHSC in the following way:

- Obtain **body temperature** using an *oral thermometer*. Temperatures should be taken at each break before individual drinks any fluid or when heat-related symptoms are noticed or suspected. The thermometer should be placed under the tongue for 3 minutes (digital thermometers may require less than 3 minutes).

If the oral temperature exceeds 99.6° F, reduce the next work cycle by 1/3 without changing the length of the rest period.

If the oral temperature exceeds 99.6° F at the beginning of the next rest period, decrease the time in the following work cycle by 1/3.

**Do not permit** a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6° F.

- Obtain **heart rate** by counting the carotid or radial pulse during a 30-second or 1-minute period as early as possible in the rest period.

If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the time of the next work cycle by 1/3 without changing the rest period.

If the heart rate still exceeds 100 beats per minute at the beginning of the next rest period, shorten the time of the next work cycle by 1/3.

- Obtain a rough estimate of **body water loss** by weighing individuals on a scale accurate to +/- 0.25 pound at the beginning and end of each work day to see if sufficient fluids are being taken in to prevent dehydration. Weights should be taken while the individuals wear similar clothing. The body water loss should not exceed 1.5 percent of total body weight loss during the work day.

#### **First Aid For Heat Stress**

First Aid procedures for heat cramps and heat exhaustion include:

- Get person out of heat and into a cooler place;
- Put victim in the shock position and remove or loosen clothing; treat for shock, if necessary;
- If the victim is fully conscious and can tolerate it, give the victim one-half glass of water to drink every 15 minutes;
- Call commercial (410) 676-0960.



*Heat stroke is a life-threatening situation. First aid is to get the person out of the heat, call Military 17 or commercial (410) 676-0960, immerse the victim in a cool bath, and treat for shock.*

**3.2.9.2 Cold Stress.** Personnel working outdoors in low temperatures, especially at or below freezing, are subject to cold stress. Exposure to extreme cold for a short period of time can cause severe injury to the surface of the body (i.e., frostbite), or result in profound generalized cooling (i.e., hypothermia), potentially causing death.

Cold injury is enhanced by two factors: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 miles per hour (mph) increases to 10 mph. (Table 3-6 provides wind chill temperatures for various actual temperatures and wind speeds.)

JEG personnel will be instructed on the signs and symptoms of cold stress and on the methods of preventing cold-related disorders. (Table 3-7 outlines a work/warm-up schedule based on air temperature.) The two major cold-related disorders are frostbite and hypothermia. The general symptoms are indicated below:

**Frostbite:** Sudden blanching of the skin progressing to skin with a waxy or white appearance which is firm to the touch, but the tissue beneath the skin is resilient.

**Hypothermia:** The symptoms of systemic hypothermia are usually exhibited in five stages as follows:



Table 3-6. Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature  
(Under Calm Conditions)

Estimated Wind Speed (in mph)	Actual Temperature Reading (F)*											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F)*											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-56	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

Trenchfoot and immersion foot may occur at any point on this chart.

Source: American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1987-1988, Cincinnati, Ohio, 1987.



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Table 3-7. Threshold Limit Values Work/Warm-Up Schedule for Four-Hour Shift

Air Temperature Sunny Sky	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	No. of Breaks
1. -26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm. Breaks)	1	75 min.	2	55 min.	3	40 min.
2. -29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min.	2	55 min.	3	40 min.	4	30 min.
3. -32° to -34°	-25° to -29°	75 min	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease
4. -35° to -37°	-30° to -34°	55 min	3	40 min.	4	30 min.	5	Non-emergency work should cease		
5. -38° to -39°	-35° to -39°	40 min	4	30 min.	5	Non-emergency work should cease				
6. -40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease						
7. -43° & below	-45° & below	Non-emergency work should cease								

NOTES:

- Schedule applies to moderate work activity with warm-up breaks of ten (10) minutes in a warm location. For light-to-moderate work (limited physical movement): apply the schedule one step lower. For example, at -30°F with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.



1. Shivering;
2. Apathy, listlessness, drowsiness, and (sometimes) rapid cooling of the body to less than 95° F;
3. Unconsciousness, glassy stare, slow pulse, and slow respiratory rate;
4. Freezing of the extremities; and
5. Death.

JEG personnel will watch for signs of frostbite and hypothermia in themselves and other field team members. If temperatures drop below 20° F, as measured by the wind chill index, field personnel will be required to wear thermal clothing. Field activities will be curtailed if the equivalent wind chill temperature, as shown on the Wind Chill Chart (Table 3-6), is below 0° F, unless the activity is of an emergency nature.

#### **3.2.10 Ultraviolet Radiation**

The sun emits ultraviolet radiation (UV) as heat and light. The skin's natural defense mechanisms attempt to reject the UV radiation by distributing melanin pigmentation where needed. However, overexposure to direct sunlight can cause inflammation or blistering of the skin (sunburn). The use of sunscreen barrier creams, long sleeve shirts, and wide-brimmed hats can help prevent sunburn. Chronic exposure to UV radiation is known to cause skin cancer. In case of sunburn, do not apply burn ointment, cold cream or butter, to relieve pain. Use a dry dressing and get medical attention for severe, blistered, extensive burns.

### **3.3 BIOLOGICAL HAZARDS**

#### **3.3.1 Poisonous Plants**

**3.3.1.1 Poisonous Plant Avoidance Procedures.** Poison ivy, poison oak, and poison sumac are identified by three or five leaves radiating from a stem. Poison ivy is a vine, while oak and sumac are bush-like. The plant tissues have an oleoresin which is active in live, dead and dried parts. The oleoresin may be carried via smoke, dust, contaminated clothing, and animal hair.





**3.3.1.2 First Aid For Poisonous Plants.** Signs and symptoms include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24 hours. Crusting and scaling occurs within a few days. In the absence of complications, healing is complete in about ten days. Wash any exposed skin with a mild soap and water, but do not scrub the area.

### **3.3.2 Insects and Ticks**

**3.3.2.1 Ants, Bees, Wasps and Hornets.** Stings of these insects are responsible for more deaths in the United States than bites and stings of all other venomous creatures. This is due to sensitization by the victim to the venom from repeated stings, which can result in anaphylactic reactions. The stinger may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should contact their physicians to obtain a sting kit containing an antihistamine and epinephrine.

### **3.3.2.2 Ticks and Tickborne Diseases.**

#### **Lyme Disease and Rocky Mountain Spotted Fever:**

Lyme disease is an illness caused by a bacterium which may be transmitted by the bite of the tick *Ixodes dammini*, commonly referred to as the deer tick. Not all ticks are infected with the bacterium<sup>4</sup>; however, when an infected tick bites, the bacterium is passed into the bloodstream of the host where it multiplies. The deer tick is very small (much smaller than a wood tick or dog tick), and in its immature stage is no larger than the period on a printed page. Besides its size, the deer tick can be distinguished from the wood tick by its coloring. The deer tick has a brown body and a reddish-brown head. The ticks cling to

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<sup>4</sup>The reported rate of infection at APG is 25%; as many as one in four deer ticks carries the bacteria.



vegetation and are most numerous in a brushy, wooded, or grassy habitat. The deer tick is commonly found on-site living in grassy and wooded areas feeding on mammals such as mice, shrews, raccoons, opossums, deer, birds, and humans.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash that develops in a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage, treatment by a physician usually is effective. If left alone, these early symptoms may disappear, but more serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems which may occur include meningitis, neurological abnormalities, and cardiac abnormalities. It is important to note that some people do not get the characteristic rash and may have diminished progress to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

Rocky Mountain spotted fever disease is transmitted by the infected dog tick, *Dermacentor variabilis* and is common in the eastern and southern United States. It is important to note that the dog tick is significantly larger than the deer tick, previously discussed. Nearly all cases of rocky mountain spotted fever occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt, often with high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash, which usually starts at the hands and feet and gradually extends to most of the body.

#### **Tick Avoidance Procedures:**

When in an area suspected of harboring ticks (grass, bushes, woodland) the following precautions can minimize the chances of being bitten by a tick:



- Wear TYVEX suits with taped cuffs and sleeves; at a minimum, tape pants legs to boots,
- Wear light colored clothing so ticks can be easily spotted.
- Spray insect repellent (containing DEET or permethrin) on pants, socks, and boots.
- Inspect clothing frequently while in tick habitat.
- After being outdoors, remove, wash, and dry clothing at high temperature.
- Added protection is provided by wearing a hat and a long-sleeved shirt.

**First Aid For Tick Bites:**

Inspect your head and body thoroughly when you return from the field. Removal of ticks is best accomplished using small tweezers. Wear gloves to prevent bacteria transmission to your fingertips. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but firmly, until it releases its hold on the skin. If possible, save the tick in alcohol. Label the container with the date, body location of the bite, and the place where it may have been acquired.

Wipe the bite thoroughly with an antiseptic and seek medical attention as soon as possible. The various stages and symptoms of both diseases are well recognized and if detected, can be treated with antibiotics. Early detection and treatment with antibiotics significantly reduces the severity of both Lyme disease and Rocky Mountain spotted fever.

**3.3.2.3 Spiders.** Almost all of the 30,000 species of spiders are venomous, but only a relatively small number have fangs long and strong enough to penetrate the human skin. Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, in protective casings of monitoring wells, pump housings, buildings, portable toilets, and manhole covers.

The black widow spider ranges in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. Although both



male and female are venomous, only the latter has fangs large and strong enough to penetrate the human skin. Mature females range in body length from 10 to 18 mm. The person bitten may recall receiving a sharp, pinprick-like bite, but in some cases the bite is so minor that it goes unnoticed. Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating and weakness are common, as well as varying degrees of headache and dizziness. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the lower back, thighs, or abdomen. There is no effective first-aid treatment. Treat for shock and transport to the nearest medical facility.

The brown recluse or violin spider has an abdomen which ranges in color from grayish through orange and reddish-brown to dark brown. The back shell of the "violin" is brown to blackish and distinct from the pale yellow to reddish-brown background of the head and chest. This spider has 6 eyes grouped in 3 diads. Both male and female are venomous. They average 6 to 12 mm in body length. The bite of this spider produces about the same degree of pain as the sting of an ant, but sometimes the person is completely unaware of the bite. In most cases, a localized burning sensation develops which may last for 30 to 60 minutes. The area often itches, becomes red and warm, with a small blanched area around the immediate bite site. The reddened area enlarges and becomes purplish during the subsequent one to eight hours. A small blister forms at the bite site, increases in size and subsequently ruptures. The whole area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. All first aid measures should be avoided as the natural appearance of the bite is most important in determining the diagnosis. A cube of ice may be placed on the wound. Transport to the nearest medical facility.



### **First Aid For Spider Bites**

First Aid for spider bites includes applying ice to the bitten area and keeping that area below the heart level to slow circulation of the venom. The individual should seek medical advice. If the situation appears to be life threatening (onset of anaphylactic reaction), Call military 17 or commercial 676-0960 and observe victim for shock.

### **3.3.3 Poisonous Snakes**

**3.3.3.1 Snake Avoidance Procedure.** The best avoidance procedure is to be familiar with snake habitat, and observant in the field. Snakes can be found under debris, manhole covers, or overgrown vegetation. All field personnel will exercise caution and maintain alertness to this hazard when in the field.

**3.3.3.2 First Aid For Snake Bites.** All reactions from snakebites are aggravated by acute fear and anxiety. The severity of local and general reaction from poisonous snakebite depends upon the amount of venom injected and the speed of absorption of venom into the victim's circulation, the size of the victim, the protection from clothing, including shoes and gloves, the speed at which antivenom therapy can be provided, and the location of the bite.

The extremely painful characteristics of a pit viper bite (e.g., rattlesnake, copperhead) include rapid swelling that can be identified by one or more puncture wounds created by the fangs. The skin is usually marked with general discoloration. Symptoms may include general weaknesses, rapid pulse, nausea and vomiting, shortness of breath, dimness of vision, and shock.

There are three objectives in the administration of first aid for snake bites. The first is to reduce the circulation of blood through the bite area, the second is to delay the absorption of the venom, and the third is to prevent aggravation of the local wound and to sustain respiration.



The most important first aid step is to get the snakebite victim to medical assistance quickly. Meanwhile:

- **Keep the victim still and as calm as possible, preferably in a prone position.**
- **Immobilize the bitten extremity and keep it at or below heart level.** Transport the victim to the hospital. If the victim can reach medical assistance before symptoms develop (usually 4-5 hours), no further first aid measures need be applied.
- **If mild-to-moderate symptoms develop before a hospital can be reached, apply a constricting band 2 to 4 inches above the bite, but not around the head, neck or trunk.** The band should be 3/4 to 1/2 inches wide, not thin like a rubber band. The band should be snug but loose enough for a finger to be slipped underneath. Watch for swelling. Loosen the band if it becomes too tight, but do not remove it. Periodically check the pulse in the extremity beyond the bite to insure that the blood flow has not stopped.
- **If moderate to severe symptoms develop while still on the facility, consider the situation life-threatening and call military 17 or commercial 676-0960 for medical assistance.**

Several other factors must be considered in cases of snakebite:

- **Shock.** Keep the victim lying down and comfortable, and maintain his/her body temperature.
- **Breathing and heartbeat.** If breathing stops, give mouth-to-mouth resuscitation. If breathing stops and there is no pulse, perform CPR as you have been trained to do.
- **Identify the snake.** If you can kill the snake without risk or delay, bring it to the hospital for identification, but exercise extreme caution in handling the snake.
- **Cleaning the bitten area.** You may wash the bitten area with soap and water and blot it dry with sterile gauze. You may apply dressings and bandages, but only for a short period of time.
- **Medicine to relieve pain.** Do not give the victim alcohol, sedatives, aspirin, or any medicine containing aspirin. Some painkillers, however, may be given. Consult a doctor or other medical personnel for specific medications that may be used.
- **Snakebite kits.** Keep a kit accessible for all outings in primitive areas or areas known or suspected to be snake infested.



It is not recommended that cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy be used in the first aid treatment of snakebite.

#### **3.3.4 Other Animals**

Wildlife found on the site (e.g., raccoons, skunks, foxes) usually avoid people. Unhealthy or threatened wildlife may be aggressive. Potential hazards due to animal bites are best controlled by cautiously entering new areas and avoiding animals whenever they are spotted. If bitten, the victim should be transported immediately to receive proper medical attention. The condition and behavior of the animal should be noted and reported to the physician.

### **3.4 OTHER HAZARDS**

#### **3.4.1 Lightning**

Electrical storms commonly occur in the APG-EA region during spring, summer and fall. The resulting lightning poses a safety hazard to field personnel. Since the storms are often fast moving, field personnel should watch for indications of electrical storms (forecasts should be covered in daily health and safety meeting). The distance to an electrical storm can be estimated by observing the interval between the lightning flash and the sound of thunder. Since sound travels approximately 1,100 feet per second, an interval of 5 seconds corresponds to a storm distance of approximately 1 mile. If an electrical storm is observed within 3 miles of the site, field personnel should cease outside activities and proceed to the site office for further instructions. If caught in the open by an electrical storm, all personnel will immediately seek shelter in their vehicle and proceed as above. In the event that their vehicle is inaccessible, they will move to a topographically low area away from tall objects and conductors (e.g., transformers, power lines, metal sheds) and wait for the storm to leave the area.



### **3.4.2 Water Safety**

Sediment sampling may be performed near or in bodies of water. To reduce the potential water safety hazards, sediment sampling will be conducted at low tide, when the water is shallowest. The following requirements will be followed during sediment sampling activities:

- The latest local weather and marine condition report will be obtained before commencing work.
- At least one person with current American Red Cross first aid and CPR training will be readily available on site.
- A U.S. Coast Guard approved 30 inch life ring with not less than 90 feet of 600 pound capacity line will be readily accessible.

### **3.4.3 Terrain**

**3.4.3.1 Walking and Working in Open Terrain.** Field personnel shall become familiar with the general terrain of the site and potential physical hazards (storm water management ponds, uneven terrain) which would be associated with accidental slips, trips, and/or falls.

- The immediate period after medium and heavy rain fall is particularly susceptible to earth movement and slides; greater caution is prudent during these periods.
- Be attentive where you walk since wells, pits, holes, or similar hazards may be partially covered or visually obstructed.
- Be cautious around soil or terrain which recently may have been disturbed, relocated, or otherwise made less stable.
- Avoid the top edges of drop-off areas whether they have been disturbed or not.
- Travel in open terrain in the company of another person.

**3.4.3.2 Slips, Trips and Falls.** In the case of bleeding injuries such as abrasions, incisions, punctures, lacerations, or avulsions, don gloves and splash resistant goggles, move the victim to a clean area and apply direct pressure to control bleeding. If bleeding





does not stop elevate the wound above the heart and continue applying direct pressure. Transport the individual to the appropriate facility for medical treatment. In situations that are not life-threatening, transport the individual to the off-post Edgewood Health Clinic. In life-threatening situation, call military 17 or commercial 676-0960 for medical assistance.

In the case of fractures, dislocations or sprains, control bleeding, treat for shock, and monitor airway circulation and breathing. Transport the individual for medical treatment. In life-threatening situations, call military 17 (dial "17" from a government phone) or commercial phone number (410) 676-0960 for medical assistance.

**3.4.3.3 Precariously Positioned Objects.** Field personnel shall become familiar with the general area and the potential physical hazards which would be associated with debris or objects (e.g., drums, pallets, boards) that may be piled or scattered around the sampling sites. If objects are stacked in an unsafe manner, the SHSC shall notify the APG point-of-contact (POC). Field activities shall not begin until APG personnel remove or restack the objects in a safe manner.



By establishing work zones where different types of operations will occur, the potential of workers spreading contamination from more contaminated areas to less contaminated areas may be minimized. Clearly delineated work zones also help ensure that site personnel are adequately protected from existing hazards, that specific activities and hazards are confined to the appropriate areas, and that personnel may be accurately and quickly located and evacuated during an emergency. Using the information in this section, a site control strategy for Beach Point will be established before phase I activities commence. The strategy will be based on information obtained during early site assessments and, if necessary, will be revised as new information becomes available. Three basic work zones will be established:

- the exclusion zone.
- the contamination reduction zone, and
- the support zone.

Figure 4-1 illustrates the configuration of these three work zones. The exclusion zone may constitute an entire area (such as Beach Point) or a major portion of the area where monitoring locations are found, depending on site access availability, work activity requirements, and weather conditions. A contamination reduction zone shall be established between areas where direct contact with site contaminants is probable, and areas where direct contact is to be avoided.

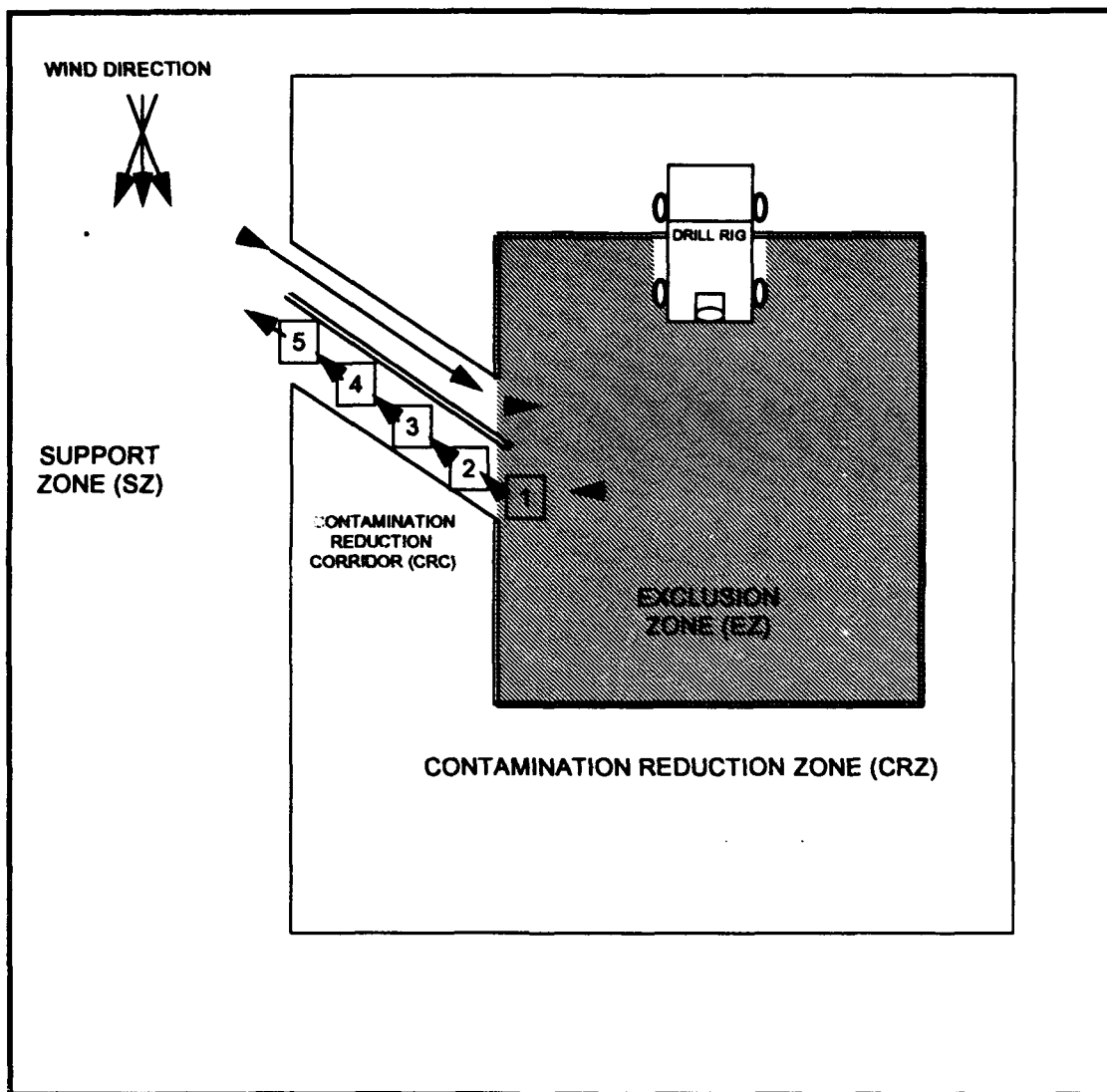
**4.1 CONTROL AT THE SITE**

Site control measures for reducing the possibility of employee exposure to potential hazards and for reducing the transport of contaminants include:

- Limit access to the sampling location(s) and post appropriate warning signs.
- Prepare the site for subsequent activities.
- Maintain a copy of this HASP so that it is readily available to employees who may be exposed during this site work.



FIGURE 4-1  
TYPICAL SITE  
CONTROL LAYOUT



- Establish on-site communications, consisting of:
  - line of sight/hand signals,
  - horn, or
  - two-way radio or cellular phone.
- Establish offsite communications.
- Set a wind indicator to readily determine wind direction.
- Establish and delineate contiguous work zones (exclusion [EZ], contamination reduction [CRZ], and support [SZ]). The latter 2 zones should be upwind of the EZ unless obstacles prevent that.
- Establish decontamination and waste disposal procedures, and ensure that activities strictly adhere to the procedures.
- Enforce safe work practices.

#### **4.1.1 Command Post**

The command post, located within the support zone (see section 5.2.3), contains:

- Supervisory field operations and field teams;
- Communications, including emergency communication lines;
- Records such as accident reports, chain-of-custody reports, logbooks, medical records, personnel training records, a copy of this HASP, site inventories, and a site safety map;
- Reference material such as current health and safety plans and manuals;
- Contacts with the public, medical personnel, and clients;
- Weather monitoring and work schedules;
- Site security; and
- Sanitary facilities.

#### **4.1.2 Buddy System**

Personnel in contaminated or hazardous areas will work with a buddy who is capable of:

- Assisting his or her partner,
- Monitoring the partner for signs of chemical or other exposures (e.g., heat or cold),
- Periodically verifying the integrity of the partner's personal protective equipment,
- Notifying the command post if emergency help is needed.



As personnel enter the exclusion zone through the access control point, the field team leader will ensure that each individual employee will be working with a buddy.

#### **4.1.3 Site Logs/Records**

The site entry log (see Attachment 3) shall document which personnel are on site and shall accurately reflect site staffing at all times. Signing in when entering the site and signing out when leaving the site will be strictly enforced. The site entry log will be maintained in the command post. Other records maintained on site will include training certification, accident records, and equipment calibration records.

#### **4.1.4 Security**

Site security is essential in preventing the exposure of unauthorized, unprotected people to site hazards, in preventing theft and vandalism, and in protecting established safe working procedures. Site security will be maintained by:

- Limiting access at control points to authorized personnel;
- Assigning the responsibility for enforcing exit and entry requirements;
- Limiting the work area to essential personnel and giving the field team leader the authority to approve all visitors to the site.

## **4.2 DESIGNATION OF WORK ZONES**

Specific work zone locations will be designated based on site reconnaissance activities, including:

- Evaluation of potential routes and concentrations of contaminant dispersion
- Sampling and monitoring results;
- Minimizing the movement of personnel and equipment between the zones.



#### **4.2.1 Exclusion Zones**

The exclusion zone is the innermost work zone, and the zone where contamination does or may occur. Anyone entering the exclusion zone must wear prescribed levels of protection. An entry and exit check point must be established at the periphery of the exclusion zone to regulate the flow of personnel and equipment into and out of the zone and to verify that the entrance and exit procedures are followed.

The outer boundary of this zone, the hotline, is initially established by visually surveying the immediate environs of the site and determining where the potential hazards are located; where any drainage, leachate, or spilled material is; and whether any discolorations are visible. Guidance in determining the boundaries is also provided by data from an initial site survey indicating the presence of organic or inorganic vapor/gases or particulates in air, combustible gases, and radiation, or the results of water and soil sampling. Additional factors that must be considered include the distance necessary for preventing fire or explosion from affecting personnel outside the zone, the physical area needed to conduct site operations, and the potential for contaminants to be blown from the area. Once the hotline has been determined, it should be well marked or well defined by landmarks. During subsequent site operations, the boundary may be modified and adjusted as more information becomes available.

Exclusion zone boundaries will be established according to sampling activity. The hotline will be marked with caution tape, flags, or cones. The following boundaries are minimum distances. These distances will be increased if necessary to prevent exposure of unprotected personnel observing site activities from the boundary markers.

<b>MEDIA SAMPLES</b>	<b>EXCLUSION ZONE BOUNDARY</b>
Surface Water	water's boundary
Groundwater	10 feet around well
Soil	10 feet around sampling site
Sludge	10-20 feet around sump
Sediment	water's boundary



Required personal protective gear will be designated based on site-specific conditions, including the type of work to be done and the hazards that might be encountered. Different levels of protection may be justified within the exclusion zone. In this case, sub areas will be defined and the level of required protection (A, B, C, or D) conspicuously marked.

Different levels of protection in the exclusion zone might also be designated by job assignment. For example, Level C protection might be required for walk-through ambient air monitoring while monitoring results may demonstrate that Level D protection is sufficient for sample collection. The assignment of different levels of protection within the exclusion zone permits a more flexible, effective, and less costly operation, while still maintaining a high degree of safety.

#### **4.2.2 Contamination Reduction Zone (CRZ)**

The contamination reduction zone lies between the exclusion zone and the support zone, providing a transition between contamination and clean zones. This zone serves as a buffer to further reduce the probability of the clean zone becoming contaminated or being affected by other existing hazards. It further limits the physical transfer of contaminating substances on people, on equipment, or in the air through a combination of decontamination, distance between exclusion and support zones, air dilution, zone restrictions, and work functions.

Initially, the contamination reduction zone is considered a non-contaminated area. At the boundary between the exclusion and contamination reduction zones, decontamination stations are established, one for personnel, and one for heavy equipment. Exit from the exclusion zone is through a decontamination station.

As the operations proceed, the area around the decontamination station may become contaminated, but to a much lesser degree than the exclusion zone. On a relative basis, the amount of contaminants should decrease from the hotline to the support zone due to the distance involved and the decontamination procedures used.



The boundary between the support zone and the contamination reduction zone, the contamination control line, separates the possibly low contamination area from the clean support zone. Access to the contamination reduction zone from the support zone is through a control point. Personnel entering the control point would wear the prescribed personal protective equipment, as required, for working in the contamination reduction zone.

#### **4.2.3 Support Zone**

The support zone, the outermost part of the site, is considered a non-contaminated or clean area. Support equipment is located in the zone and traffic is restricted to authorized response personnel. Since normal work clothes are appropriate within this zone, potentially contaminated personnel clothing, equipment, and samples are not permitted, but are left in the contamination reduction zone until they are decontaminated.

The location of the command post and other support facilities in the support zone depends on a number of factors, including:

- Accessibility: topography, open space available; locations of highways, railroad tracks, or other limitations.
- Wind direction: preferably the support facilities should be located upwind of the exclusion zone. however, shifts in wind direction and other conditions may be such that an ideal location based on wind direction alone does not exist.
- Resources: adequate roads, power lines, water, and shelter.

#### **4.2.4 Identification/Marking**

Signs, tags, barricades, and permits effectively identify hazards when used in conjunction with employee education and training that describes the types of hazard warnings and their definitions. The following kinds of barricade tape are warning tools which will be used for site control:





- **Yellow-Black Barricade Tape**
  - Designates an area of "CAUTION" (e.g., excavation, hot work overhead).
  - Employees shall be allowed to move through an area marked "CAUTION", but only with knowledge of why the area is marked and only with the approval of whoever erected the barricade.
  - Designed to alert employees to a potential exposure hazard.
- **Red Barricade Tape**
  - Designates an area of "DANGER" (e.g., high noise, hydro-testing).
  - Only authorized personnel shall access a designated "DANGER" area. All others shall go around.
  - Designed to alert employees to a high hazard or dangerous area.

#### **4.2.5 Map of Work Site and Zones**

Figure 4-1 represents a typical site control layout for drilling configurations for specific work sites at Beach Point will be developed based on early site reconnaissance activities.



**5.1 LEVELS OF PPE AUTHORIZED FOR THIS SITE**

Level D PPE will be worn unless site condition indicate the need for a higher level of protection. PID readings will be taken at the well head and in the breathing zone. If a sustained reading above background is obtained in the breathing zone during sampling, the sampling team will back out until the reading drops to background levels. If the readings do not drop to background levels, the level of protection will be upgraded to accomplish sampling. The SHSC will determine whether to upgrade to Level C or to Level B respiratory protection. The determination will be based on the known contaminants at that specific site. Air monitoring results (e.g., using colorimetric tubes and when feasible, personal air monitoring) will be used to determine the level of protection. Colorimetric tubes will only be used as tools to supplement readings obtained using the PID, the FID, or other continuous air sampling equipment. Results from colorimetric tube sampling will not be used as the primary basis for determining the level of protection, appropriate actions, or associated responses. If breathing zone or PID readings are not above background levels or if identified vapor levels are less than the action level, the Site Health and Safety Coordinator may recommend that the level of protection be downgraded to Level D. Use of Level B respiratory protection is not anticipated during this phase of the site investigation.

Since previous studies indicate low levels of sediment and soil contaminants, Level D personal protective equipment will be worn for soil and sediment sampling. If PID or monitoring indicates vapor levels equal to or exceeding the action level, Level C PPE will be donned. Table 5-1 summarizes PPE considerations.

Noise levels are not expected to exceed the PEL of 85 dBA during sampling activities. However, if direct sources of noise (e.g., generators, vehicles) produce noise levels above 85 dBA, protection (e.g., ear plugs, muffs) will be worn. Since hearing protection may absorb chemical contaminants, all hearing protection used shall be inspected for contamination.



### **5.1.1 Description of Each Level**

Table 5-1 summarizes the PPE for each level of protection and the type of respirator identified for site activities. The level of protection selected for each task will be based on the type of sampling being performed, specific site conditions, and monitoring results obtained on site. Military (M-17) masks and Mark 1 chemical agent antidote kits provided by APG-EA will not be required in areas previously cleared for UXO and chemical agent. (Each antidote kit contains a small autoinjector of atropine and a large autoinjector of 2-PAM chloride.) The cluster-specific HASPs will detail specific locations at which the M-17 masks and antidote kits must be used.

Since the groundwater sampling procedure calls for low flow rates, the probability of being splashed by purge water is low. The PPE for groundwater sampling emphasizes splash protection for the sampler's torso, hands, and face.

### **5.2 PROCEDURE/JUSTIFICATION FOR UP/DOWNGRADING OF PPE**

The rationale for up or downgrading PPE is provided in Table 5-2.



Table 5-1. PPE Considerations

Task	Level	Body	Foot (ANSI Z 41-1)	Head (ANSI Z 89-1)	Eye (ANSI Z 87)	Hand	Respirator (ANSI Z 88.2)	Limitations
Maximum for field work	D	• Uncoated Tyvek (optional)	• Steel toe/shank safety shoes/boots	• Hardhats (will only be required if overhead falling hazards exist)	• Safety glasses (only required if eye impact hazards are present)	• None required	• None required	• Contaminant concentrations must be less than action levels • Oxygen concentration must be at least 19.5%
Groundwater Sampling	Modified D	Splash Apron	Steel toe/shank safety shoes/boots	Hardhats (will only be required if overhead falling hazards exist)	Face shield	• Inner gloves: N-Dex, latex rubber or nitrile • Outer gloves: Nitrile	• None required	• Contaminant concentrations must be less than action levels • Oxygen concentration must be at least 19.5%
All Other Sampling	Modified D	• Disposable coated Tyvek coveralls resistant to permeation by contaminated media	• Steel toe/shank safety shoes/boots with neoprene or nitrile shoe/boot covers OR neoprene or nitrile boots with steel toe/shank	• Hardhats (will only be required if overhead falling hazards exist)	• Safety glasses or goggles or face shields	• Inner gloves: N-Dex, latex rubber or nitrile • Outer gloves: Nitrile	• None required	• Contaminant concentrations must be less than action levels • Oxygen concentration must be at least 19.5%
Sampling	C	• Same as Level D or modified Level D as specified by SHSC	• Steel toe/shank leather safety shoes/boots with neoprene or nitrile shoe/boot OR nitrile boots with steel toe/shank	• Hardhats (will only be required if overhead falling hazards exist)	• Not necessary with full-face respirator	• Inner gloves: N-Dex, latex rubber or nitrile • Outer Gloves: Nitrile	• Full face air purifying respirator, MSA Ultratwin or equivalent, equipped with GMC-H cartridges for protection against organic vapors, acid gases, dusts, fumes, and mists • (Optional) Full face Powered Air Purifying Respirator (PAPR) with cartridges equivalent to above	• Contaminant concentrations must be less than IDLH levels • Oxygen concentration must be at least 19.5%

**Table 5-2. Reasons to Upgrade or Downgrade Level F Protection**

<b>Upgrade</b>	<b>Downgrade</b>
<ul style="list-style-type: none"><li>• Request of individual performing task.</li><li>• Change in work task that will increase contact or potential contact with hazardous materials.</li><li>• Occurrence or likely occurrence of gas or vapor emission.</li><li>• Known or suspected presence of dermal hazards.</li><li>• Personnel air monitoring results exceed action level for the level of protection currently in use.</li></ul>	<ul style="list-style-type: none"><li>• New information indicating that situation is less hazardous than originally thought.</li><li>• Change in site conditions that decreases the hazard.</li><li>• Change in work task that will reduce contact with hazardous materials.</li></ul>

**6.1 FIELD MONITORING EQUIPMENT**

Table 6-1 lists the field equipment and summarizes the tasks for which it will be used and monitoring frequency of use and calibration. I-CADs will be used by the UXO subcontractor prior to sediment sampling. Each cluster-specific Health and Safety Plan will identify whether or not I-CADs will be used.

**6.1.1 Action Levels and Associated Response**

Table 6-2 outlines action levels for planned field monitoring activities. The Photoionization Defector (PID) or the Flame Ionization Detector (FID) will be used for continuous monitoring during sampling activities. Background measurements will be obtained upwind of the sampling site in a location such as the decontamination area. If a sustained reading above background is obtained in the breathing zone during sampling, the sampling team will back out until the reading drops to background levels. If the readings do not drop to background levels, the level of protection will be upgraded to accomplish sampling. The SHSC will determine whether to upgrade to Level C or to Level B respiratory protection. The determination will be based on the known contaminants at that specific site. Air monitoring results (e.g., using colorimetric tubes and when feasible, personal air monitoring) will be used to determine the level of protection. Colorimetric tubes will only be used as tools to supplement readings obtained using the PID, the FID, or other continuous air sampling equipment. Results from colorimetric tube sampling will not be used as the primary basis for determining the level of protection, appropriate actions, or associated responses.



Table 6-1. Instrument Use, Calibration, and Maintenance

Instrument	Tasks	Frequency	Calibration	Maintenance
Dust Monitor: Mini Ram	All Dust Producing Tasks, except perimeter, or off site activities	When visible dust is present in worker's breathing zone, and at 15 minute intervals while elevated readings are sustained.	Zero Daily Pre and Post-Use	Perform routine maintenance as described in the manual.
Sound Level Meter:	All Tasks	Initial measurement and additional when operations change and noise levels increase above 85 dBA.	Daily - Pre and Post Use.	Perform routine maintenance as described in the manual.
Photoionization Detector (PID): Photovac Microtip IS-3000 with 10.6 or 11.7 eV light source	All Tasks	In the employee breathing zone at the beginning of operations and at intervals during sampling activities. The intervals will be determined by the sampling team or when odors are noticed.	Daily - Pre and Post Use.	Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories.
Flame Ionization Detector (FID): OVA-128 or equivalent.	All Tasks	In the employee breathing zone at the beginning of operations and at intervals during sampling activities. The intervals will be determined by the sampling team or when odors are noticed.	Daily - Pre and Post Use.	Recharge or replace battery. Monitor fuel and/or combustion air gauges. Perform routine maintenance as described in the manual. Check for leaks.
Colorimetric Tubes: e.g., methylene chloride, 1,1,2,2-tetrachloroethane	All Tasks	When HNU or OVA readings exceed 5.0 ppm in the breathing zone and every 15 minutes while readings are sustained.	Pump Calibration: Daily Pre and Post Use.	Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate prior to use to maintain shelf life of about 2 years. Check expiration date of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Combustible Gas Indicator	All Tasks	While working in a landfill whenever OVA readings exceed 5.0 ppm in the breathing zone and every 15 minutes while readings are sustained.	Daily - Pre and Post Use.	Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to expiration of the specified interval. If the ambient air is more than 0.5% CO <sub>2</sub> , replace or rejuvenate the O <sub>2</sub> detector cell frequently.

**Table 6-2. Action Levels and Associated Response**

Instrument	Tasks	Action Levels
Dust Monitor: Mini Ram	All Dust Producing Tasks, except penmeter, or off site activities	<div> <div>0-1.0 mg/m<sup>3</sup><sup>ab</sup></div> <div>&gt;1.0-8.4 mg/m<sup>3</sup><sup>ab</sup></div> <div>&gt;8.4 mg/m<sup>3</sup><sup>ab</sup></div> </div> <div> <div>Level D</div> <div>Level C</div> <div>Stop work, re-evaluate</div> </div>
Sound Level Meter	All Tasks	Noise measurements are required when voice must be raised to communicate at a distance of three feet or less.
Photoionization Detector (PID): Photovac Microtip IS-300 (10.6 eV light source)	All Tasks	<div>Measurements taken in the breathing zone</div> <div> <div>Background (BG) &lt;5.0 ppm<sup>ab</sup></div> <div>&gt;5.0-50.0 ppm<sup>ab</sup></div> <div>&gt;50.0 ppm<sup>ab</sup></div> </div> <div> <div>Level D</div> <div>Level C</div> <div>Level B: use colorimetric tubes to identify contaminants, re-evaluate and either downgrade, stop work, or continue sampling in Level B.</div> </div>
Flame Ionization Detector (FID): OVA-128 or equivalent	All Tasks	<div>Measurements taken in the breathing zone</div> <div> <div>&lt;Background (BG)</div> <div>&gt;Background (BG)</div> </div> <div> <div>Level D</div> <div>Back out of site. If reading is not sustained, resume sampling in Level D</div> <div>If reading is sustained, the SHSC will determine whether Level C or Level B respiratory protection is appropriate.</div> </div>
Colorimetric Tubes: e.g., methylene chloride, methane, 1,1,2,2-tetrachloroethane	All Tasks	<div> <div>0-12.0 ppm<sup>ab</sup></div> <div>&gt;12-25 ppm<sup>ab</sup></div> <div>&gt;25-100 ppm<sup>ab</sup></div> <div>&gt;100 ppm<sup>ab</sup></div> </div> <div> <div>Level D</div> <div>Level C</div> <div>Level B</div> <div>Stop work, re-evaluate</div> </div>
Colorimetric Tubes: Toluene and Xylene	All Tasks	<div> <div>0-50 ppm<sup>ab</sup></div> <div>&gt;50-500 ppm<sup>ab</sup></div> <div>500-1000 ppm<sup>ab</sup></div> <div>&gt;1000 ppm<sup>ab</sup></div> </div> <div> <div>Level D</div> <div>Level C</div> <div>Level B</div> <div>Stop work, re-evaluate</div> </div>
Combustible Gas Indicator	All Tasks	<div> <div>0-10% expl</div> <div>&gt;10-20% expl</div> <div>&gt;20% expl</div> </div> <div> <div>Level D</div> <div>Level C</div> <div>Stop work, re-evaluate</div> </div>

ab = above background

expl = explosive limit

\* This HASP must be revised and approved prior to implementation of Level C work.



MD-A277 417

BEACH POINT TEST SITE ABERDEEN PROVING GROUND EDGEWOOD  
AREA MARYLAND FOCUSED FEASIBILITY STUDY PLAN FINAL  
HEALTH AND SAFETY PLAN(U) ABERDEEN PROVING GROUND MD  
ENVIRONMENTAL MANAGEMENT PROGRAM OCT 93

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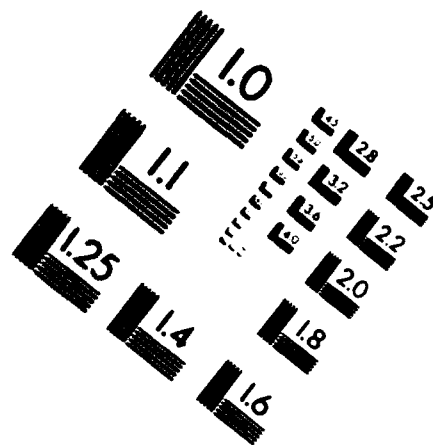
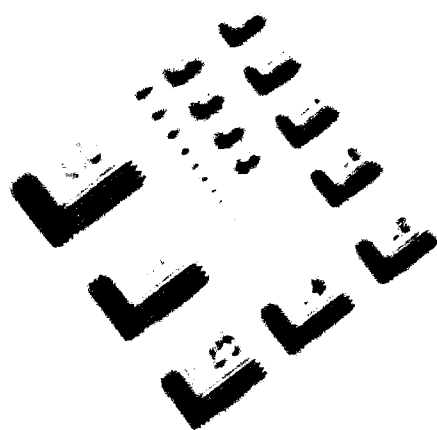
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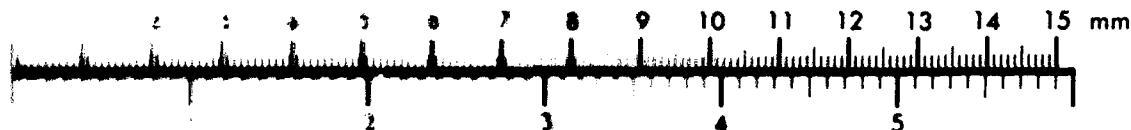
Resolution Test Chart and Image Management

100 Magnification Chart  
100x Magnification Chart

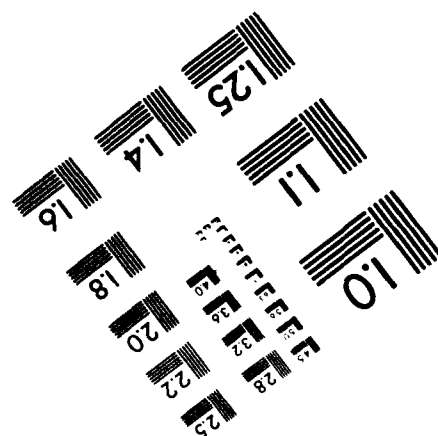
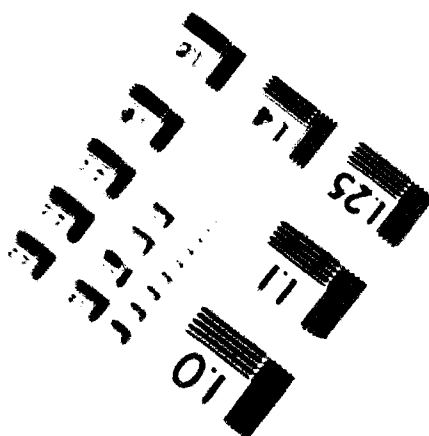
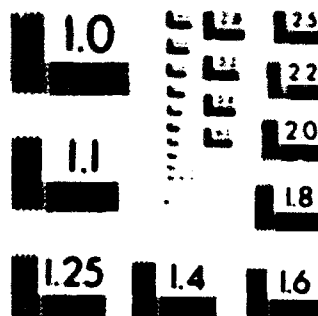
100x Magnification Chart



Centimeter



Inches



MANUFACTURED TO AIM STANDARDS  
BY APPLIED IMAGE, INC.

This section described two kinds of decontamination: personnel and equipment. Decontamination protects field workers from hazardous materials that may accumulate on and eventually permeate the protective equipment, tools, vehicles, and other equipment used on site. It protects other site personnel by preventing contamination of clean areas, and it prevents mixing of incompatible materials. At Beach Point, site workers and their equipment may become contaminated from:

- Contacting vapors, gases, mists, or particulates in the air;
- Being splashed by contaminated materials while sampling; or
- Walking on contaminated soil.

Effective decontamination is not simply removing contamination; it begins with preventing contamination. Personal protective equipment prevents the wearer from becoming contaminated, and good work practices reduce contamination of protective clothing, instruments, and equipment. Some basic examples of effective contamination prevention are:

- Adhering to work practices that minimize contact with hazardous substances.
- Using remote sampling techniques, and
- Enclosing monitoring and sampling instruments in plastic, leaving openings for sampling ports and sensors.

Even with these safeguards, contamination may occur. Decontamination methods either physically remove contaminants, inactivate contaminants by chemical neutralization, or remove contaminants through a combination of physical and chemical methods. The decontamination process is located in an area within the contamination reduction zone (CRZ), designated as the contamination reduction corridor (CRC). The CRC controls access into and out of the exclusion zone and confines personnel decontamination activities to a limited area. Since the activities planned for Beach Point will be performed in level D or C protection, only level D and C decontamination procedures will be discussed.



## **7.1 PERSONNEL DECONTAMINATION PROCEDURES**

Level D personnel decontamination consists of three steps:

- Wash and rinse gloves and boots with nonphosphate detergent and water.
- Remove and dispose of gloves and coveralls.
- Wash hands and face with soap and water.

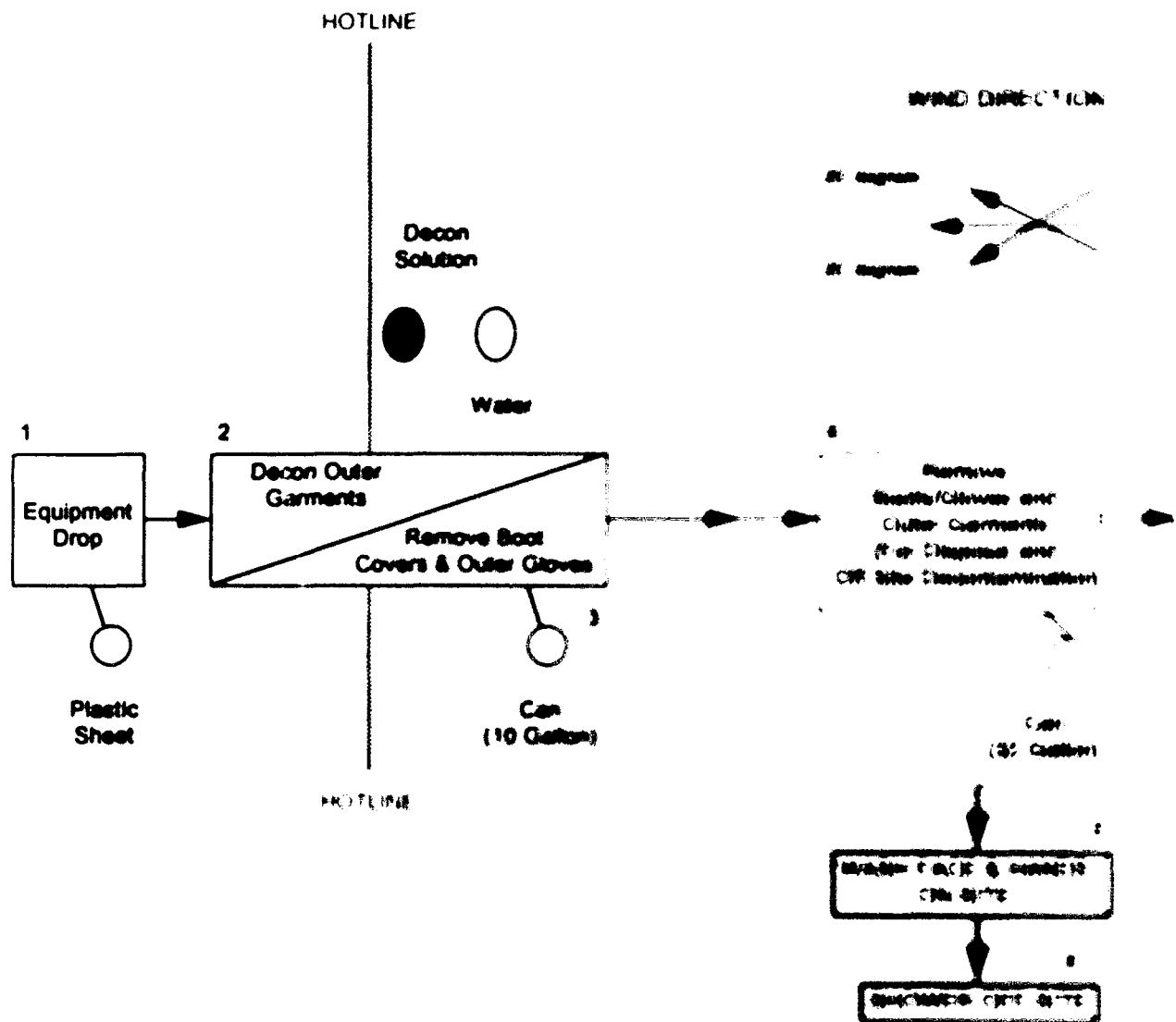
Figure 7-1 outlines the layout of Level D personnel decontamination. Table 7-1 describes each step of the personnel decontamination process; the layout for Level C is provided in Figure 7-2.

Equipment required for decontamination of personnel and personal protective equipment (PPE) includes:

- Drop clothes (plastic or other suitable material) on which PPE and other equipment may be deposited.
- Collection containers, such as drums or lined trash cans, for storing discarded disposable clothing, PPE, or equipment.
- Boxes or containers lined with absorbent for wiping off gross contamination and liquid contamination.
- Large galvanized tubs, stock tanks, or children's wading pools to hold wash and rinse solutions, and at a minimum large enough to hold a worker's booted foot.
- Aqueous wash solutions of nonphosphate detergent.
- Rinse solutions.
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Paper or cloth towels for drying protective clothing and equipment.
- Lockers or cabinets for storing decontaminated equipment and PPE.
- Metal or plastic drums or cans for storing contaminated wash and rinse solutions.
- Plastic sheeting or other appropriate material for containing and collecting contaminated wash and rinse solutions spilled during decontamination.



**FIGURE 7-1  
MINIMUM DECONTAMINATION LAYOUT  
LEVEL D PROTECTION**



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ATTORNEY GENERAL  
STATE OF NEW YORK  
ALBANY

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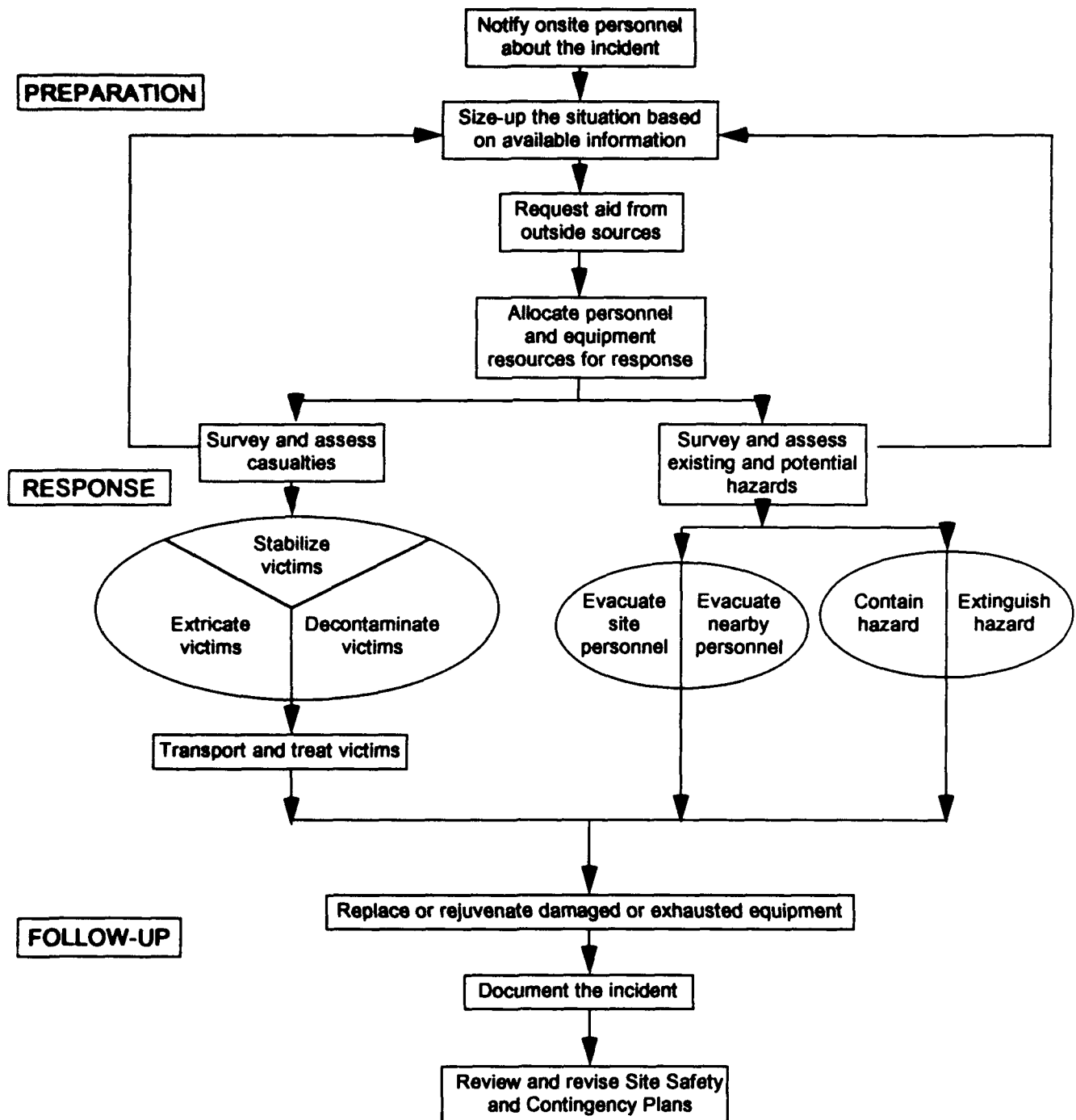


### Excluded Categories

GENERAL INFORMATION		CONTACT INFORMATION	
NAME	DATE	PHONE	ADDRESS
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**FIGURE 8-1**  
**EMERGENCY RESPONSE OPERATIONS**



- Make certain injured person is accompanied to emergency room by at least one field team member with the same employer.
- An Authorization for Medical Treatment Form (see Attachment 4) must be taken with the injured employee to the medical facility; the top portion of the form must be completed.
- Provide hospital emergency personnel with a copy of the HASP.
- For nonagent and non-life threatening emergencies, the injured person shall be taken to:  
Fallston General Hospital  
200 Milton Avenue  
Fallston, MD 21047
  - Directions: Exit the installation at the Main Gate on Route 24. Follow Route 24 to Route 1. turn left on Route 1. Proceed through approximately three lights, passing Harford Mall. Follow Route 1 as it bears left by the Police Barracks. follow signs to hospital, turning right on Milton Street.
  - Travel Time: Approximately 25 minutes
  - Distance: Approximately 15 miles
- For life-threatening emergencies, the injured person will be treated by:  
Edgewood U.S. Army Health Clinic (Edgewood)  
Building E-4110

**8.1.1.2 Notification.** The SHSC shall be notified immediately following a worker injury.  
The following information shall be provided:

- The exact location of the incident;
- Name and employer of victim(s);
- Nature and extent of injuries; and
- Whether victim(s) transported offsite for medical treatment.

The SHSC shall notify the following personnel as soon as possible:

- John Wrobel, COR  
Phone: (410) 671-4840
- Bob Crouse, Installation Safety Division  
Phone: (410) 671-3157



- The Service
- The Service's Mission
- The Service's Structure
- The Service's Personnel
- The Service's Equipment
- The Service's Budget
- The Service's History
- The Service's Future

The Service's Mission

- The Service's Mission
- The Service's Structure
- The Service's Personnel
- The Service's Equipment
- The Service's Budget
- The Service's History
- The Service's Future

## 2.1.2. Organization

- The Service's Mission
- The Service's Structure
- The Service's Personnel
- The Service's Equipment
- The Service's Budget
- The Service's History
- The Service's Future



American Engineering Council  
Washington, D.C.

procedures established to respond upon activation are discussed in Section 6.1.3. For other needed activities to respond, the written decontamination procedure should be sufficient.

#### 6.1.4 Decontamination

Procedures are to cover the emergency location and decontamination of designated assembly point upon activating the emergency signal for decontamination.

A decontamination station includes decontamination of personnel (NRP) the local contact of emergency facility.

A designated station, and a facility are to receive different emergency location after activation has been established to ensure local responsibility and address them of the station and location of the incident.

Station, a designated station is situated in local emergency location of the assembly point.

Station, a designated station is situated in local emergency location of the assembly point.

Decontamination Station and Emergency Facility will be designated and documented by the SHSC during the emergency health and safety meeting.

#### 6.1.5 Fire Emergency Procedures

The decontamination procedure in section 6.1 shall be followed in the event of a fire.

6.1.6 Fire Emergency Station The fire responder must evaluate available information about the fire and its emergency response to determine:

After response:

- Location of fire.
- Potential involvement in fire, location of fire personnel with respect to fire and
- After use of fire in fire, if the extinguishers are capable of abating fire.



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HEALTH AND SAFETY PLAN

Order 1982

**8.1.2.2 Notification.** The APG EOC must be immediately contacted by dialing "17" from an on-post government phone, or by phoning (410) 676-0960 from a commercial telephone.

As soon as possible after the APG EOC is alerted, the following personnel shall be contacted:

- John Wrobel, COR  
Phone: (410) 671-4840
- Francine Gordon, JEG Project Manager  
Phone: (202) 789-7290
- Wayne Mandell, JEG Task Manager  
Phone: (202) 789-7290  
(410) 515-2195/6 (Bel Air)
- Sheldon Meyers, JEG Washington Operations Manager  
Phone: (202) 789-7290
- Dr. Terry Briggs, JEG Corporate Health and Safety Director  
Phone: (303)595-8855  
Pager: (800) 759-7243 PIN 20386

**8.1.2.3 Evacuation.** The evacuation procedures described in section 9.1.1.4 shall be followed.

### **8.1.3 Explosive/Chemical Hazard**

The procedure described in section 9.0 shall be followed.

There is potential that during the field survey, military chemical agents may be encountered. These agents include nerve agents, blood agents, choking agents, incapacitating agents, irritant or riot control agents, vomiting agents, and blistering agents. A core of JEG personnel working at APG-EA have undergone the training provided by APG personnel concerning military chemical agents (e.g., Toxic Aid Briefing) and are capable of recognizing agent symptoms and performing the required first aid/self aid





procedures. Training records are maintained by the CHSD and at the home offices of the project personnel. Should JEG personnel find containers suspected of containing chemical agents, these areas will be evacuated immediately and reported to EOC.

**8.1.3.1 First Responder Actions.** The first responder must evaluate available information about the incident:

- What happened;
- Casualties (if any);
- Potential outcomes (e.g., location of site personnel with respect to chemical or explosion); and
- What can be done.

In the event of chemical agent exposure, first aid must be administered immediately, and further medical assistance quickly obtained. The speed with which medical assistance is obtained is crucial. All agent exposures shall be treated at the Kirk U.S. Army Clinic, Building E-4110. Although the most likely chemical agent exposure at Beach Point would be to G agents (nerve agents), first aid procedures for other substances are included in the following description (see section 4.1.1.2 for a description of symptoms).

**Nerve Agents [e.g., Tabun (GA), Sarin (GB), Soman (GD), and VX]:**

- Don mask immediately.
- Move victim to clean area.
- Request medical assistance (dial military 17 or commercial (410) 676-0960).
- Remove contaminated clothing and thoroughly wash skin, using nominal 5% sodium hypochlorite (household bleach).
- Monitor victim while awaiting medical support. Upon appearance of symptoms beyond miosis, administer the two injectors from the Nerve Agent Antidote Kit, Mark I (atropine, small autoinjector first), holding the injector against the thigh for at least 10 seconds. Follow immediately with the second injector (2-PAM CL, large autoinjector) and inject in the thigh, holding the injector against the thigh for at least 10 seconds. Administer the antidote kit every 5 to 20 minutes, if symptoms persist or recur, with a maximum of 3 sets. No more injections will be administered unless advised by medical personnel. Save spent injectors as a positive means of determining number of autoinjectors used. Used injectors should be clipped to victim's shirt.



- Administer CPR, if indicated. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. If facial contamination exists, do not use mouth-to-mouth resuscitation.

**Blood Agents (e.g., hydrogen cyanide (AC), and cyanogen chloride (DK)):**

Speed in getting medical assistance is extremely important.

- Don mask immediately.
- Move victim to clean area.
- Request medical assistance (dial military 17 or commercial (410) 676-0960).
- Administer CPR, if indicated. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. If facial contamination exists, do not use mouth-to-mouth resuscitation.

**Choking Agents (e.g., phosgene, or CG):**

Speed in getting medical assistance is extremely important.

- Don mask immediately.
- Move victim to clean area and remove mask.
- Request medical assistance (dial military 17 or commercial (410) 676-0960).
- Observe victim.
- Provide drainage from victim's mouth to prevent aspiration.
- Administer CPR, if indicated. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are unavailable. If facial contamination exists, do not use mouth-to-mouth resuscitation.

**Incapacitation Agents (hallucinogens, such as BZ):**

- Don mask immediately.
- Move victim to clean area and remove mask.
- Keep victim calm. Restrain if needed.
- Request medical assistance (dial military 17 or commercial 696-0960).
- Observe victim and provide ventilation.
- Keep body temperature down.



#### Irritant or Riot Control Agents (e.g., tear agents such as CS and CN)

- Don mask and evacuate area.
- Once in fresh air, remove mask and flush eyes with clean water.
- Dial military 17 or commercial (410) 676-0888 for medical assistance.

#### Vomiting Agents (e.g., DM, DA, DC)

- Don mask immediately. If mask from face briefly if vomiting is possible immediately to drain saliva from face.
- Remove victim from area.
- Dial military 17 or commercial (410) 676-0888 for medical assistance.

#### Blistering Agents (mustard, HD, H, HT, L)

- Don mask immediately and remove victim from area.
- Cell damage from blistering occurs within 2 minutes if exposure. If a victim is exposed, to decontaminate the exposed area immediately with soap and water and follow with nominal 5% household bleach solution within 2 minutes.
- If eye is exposed, flush with water only.
- Dial military 17 or commercial (410) 676-0888 for medical assistance.

**8.1.2 Notification** The notification procedure described in section 2.1.1 shall be followed. The EOC will contact the JMC National Command Unit (NCU) if that command is required.

**8.1.3 Evacuation** The evacuation procedure described in section 2.1.2 shall be followed.

#### 8.1.4 Communication Procedures (Internal and External to Site)

Internal communication systems shall personnel to manage, convey, quality, information, and maintain site control. The systems shall include radio communications, voice, and video signals. Personnel shall be trained in the handling of such signals and the signals shall be practiced regularly.



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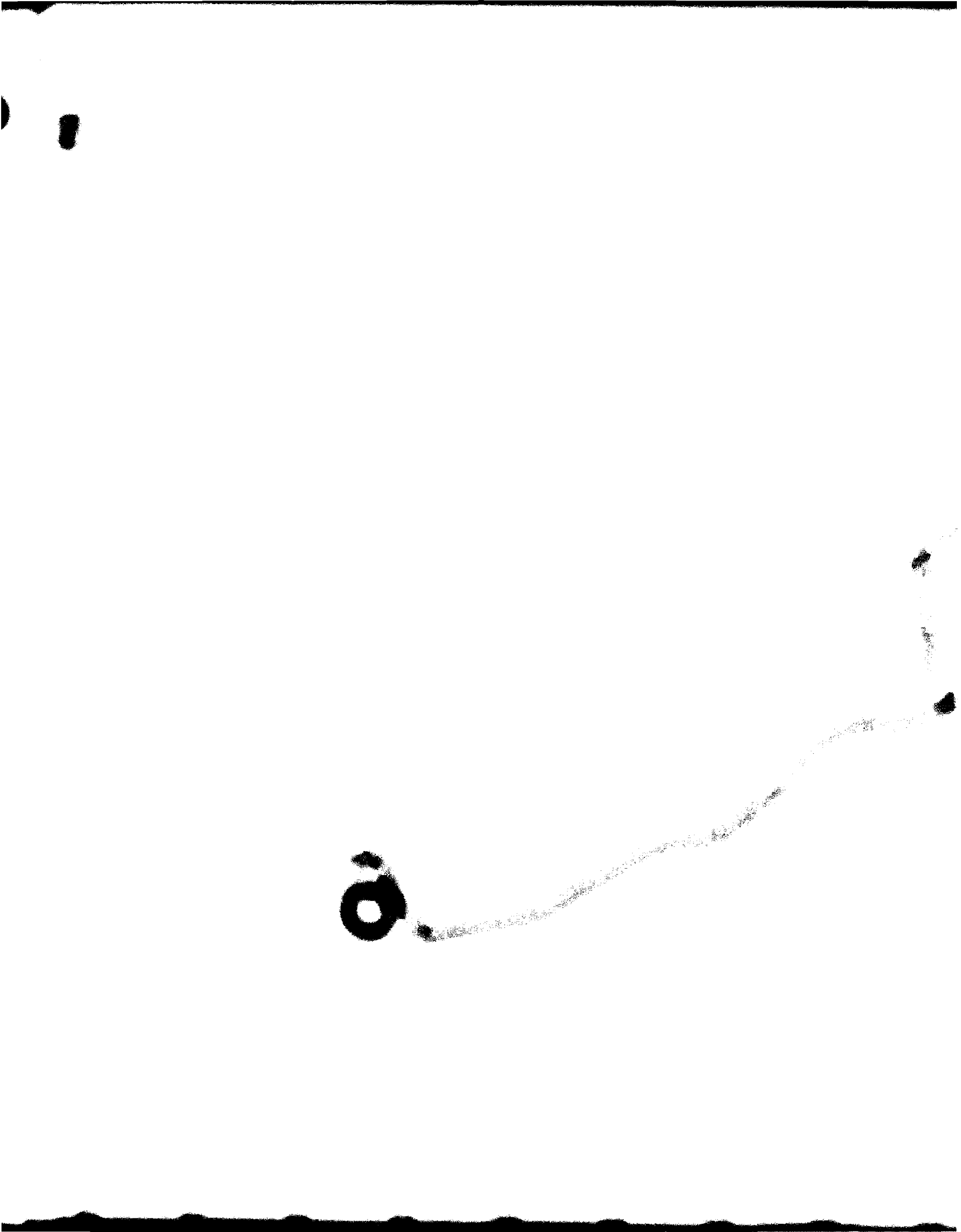
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## 2.1.6 Emergency Equipment

- (2) Personal AED: Two configurations (or equivalent)
  - Automated: Two out of six, including:
    - on speech,
    - on language,
    - on emergency symptoms,
    - on:
    - reference book containing basic first aid procedures and information on treatment of specific traumatic injuries.
- Stretcher and blanket.
- Two-way radio(s) or cellular phone.
- First Aid Kit/First Aid Kit.
- Oxygen Administerer.
- First Aid Kit/First Aid Kit (one-way breathing barrier) for certified personnel.

Free movement shall be available in the support zone and in the exclusion zone.

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As a result of the SHSC's review of a long term accident, the SHSC will notify the Battelle Environmental Operations point of contact, and the APG Installation Safety Office point of contact.

ADDENDUM TO NOTICE: The OIGAC must notify the victim's Human Resources Department of:

- Name, social security number, office location and job title of individual injured;
- Date and location of accident or incident;
- Description of accident or incident;
- Description of injury;

be given an immediate review in the event of a major accident/incident (e.g. a life-threatening accident or a significant release of radioactive material).

- Potential for lost time from work;
- Clarification of whether or not medical attention and/or first aid was sought and administered.

**8.1.7.2 Written.** As soon as possible, an Employee Exposure/Injury Report, JEG Form 1-3 (see Attachment 7), shall be completed and returned to the JEG Corporate Health and Safety Director (CHSD). The APG Installation Safety Office shall be provided a written report of any lost time accident.

Within 24 hours of the medical visit, an Employer's Report of Occupational Injury or Disease (see Attachment 8) must be completed and returned to the JEG safety department.

Within 48 hours following the accident or incident, the SHSC must complete and submit an Auto Accident Report (see Attachment 9) to the Project Manager and the CHSD.

Within six days of the injury, the case shall be recorded on the OSHA 200 Log (see Attachment 10), and the log shall be posted at the job site.

All doctor cases and first aid injuries shall be recorded on the First Aid Register (see Attachment 11).



## **9.0 GENERAL HEALTH AND SAFETY ISSUES** *Beach Point Test Site, APG-EA, Maryland*

*Focused Feasibility Study*

### **9.1 SAFE WORK PRACTICES**

- In the event that any unforeseen hazards become apparent in the field necessitating greater precautions than what is specified in this HASP, the SHSC shall suspend field operations until this HASP has been revised and approved accordingly.
- A "buddy system" in which a minimum of two workers are close enough to provide immediate aid in an emergency, will be maintained for all field sampling activities.
- Personnel shall position themselves upwind of sampling locations.
- Personnel shall avoid visibly contaminated areas as much as possible.
- All field activities shall be restricted to daylight hours.
- Fire extinguishers will be on site for use on equipment or small fires only.
- An adequately stocked first aid kit will be on-site at all times.
- A wind indicator shall be established to readily determine wind direction.

### **9.2 MATERIAL HANDLING**

Hazardous substances brought on site (e.g., analytical reagents) shall be labeled according to OSHA 29 CFR 1910.1200, Hazard Communication Standard, and stored in appropriate containers. Storage locations will be selected to provide adequate ventilation and to minimize the potential for spills.

Adequate handling equipment shall be provided for moving and lifting heavy equipment; personnel shall not lift or carry heavy equipment such as steam generators.

### **9.3 TRANSPORTATION**

Maps of evacuation routes, routes to hospitals and clinics shall be available in all vehicles used on site. Vehicle keys shall be left in the ignition when not in use.

Shipment of hazardous materials shall comply with the IATA Dangerous Goods Regulations, Department of Transportation Regulations (e.g., 49 CFR Parts 100-177, 178-199), and JEG SOP Number 10.0 in the JEG Corporate Health and Safety Manual.



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Washington Operations

**HEALTH AND SAFETY PLAN**

October 1993

in the event of a possible accident. As the accident was not followed.

## 9.4 SANITATION

#### 2.4.1. Management of the River

Nonpotable water used only in 1950 in 1950-1951.

### 9.4.2 Potential Risks

Potable water and sewage effluent are distributed to the water and sewerage dispensers which are designed to be capable of being removed, and the

### 9.4.3 Vector Functions

Adequate toilet facilities shall be provided at all construction sites.  
1910.141 The facilities must be outdoor - located near work area  
be equipped to be isolated from the outside - doors closed  
separate compartment with a floor drain - separate ventilation system  
one toilet facility shall be permitted for every 15 employees  
to field sampling activities in reasonably unpopulated areas  
shall have transportation arrangements available - no public vehicles

CFR 1910.141

9.4.4 ~~SECRET~~ ~~XXXXXXXXXXXXXXXXXXXX~~

Eating, drinking, chewing gum or tobacco, defecating, or urinating, or any of these activities, which could facilitate transmission of hepatitis B virus, and the exclusion or termination of persons from the premises.

#### **9.4.5 Washing Facilities**

Adequate washing facilities shall be provided in the support zone which comply with 29 CFR 1910.141. A suitable cleansing agent, hand towels of cloth or paper, warm air blowers, or clean individual sections of continuous toweling shall be provided at all washing facilities.

#### **9.4.6 Showers and Change Rooms**

At the end of the work day, all personnel who worked in the exclusion zone will shower. For level D and C work, the shower may be taken on site or in the individual's hotel room or residence.

### **9.5 ADVERSE WEATHER CONDITIONS/MISSION RESTRAINTS**

In the event of rain, snow, or other inclement weather, conditions will be assessed on site to determine if field operations can proceed safely. If it is determined that the weather poses a significant additional hazard, site operations will be stopped and rescheduled. To determine if work should continue, the following items should be considered:

- Potential for heat stress and heat-related injuries.
- Potential for cold-weather injuries.
- Treacherous weather-related working conditions.
- Limited visibility.
- Potential for electrical storms, and
- Tornado watch or warning.

### **9.6 FORMS AND POSTINGS**

The following forms and postings must be available on the site:

#### **Job Site Forms:**

- First Aid Register (see Attachment 10)
- Emergency Contacts

**OSHA Forms and Postings:**

- OSHA 200 Log (See Attachment 11).
- OSHA Safety and Health Poster (or equivalent).
- Access to Medical and Exposure Records.

**Human Resources Postings:**

- Notice of Worker's Compensation Insurance Provider.
- Payroll Date Notification.
- Equal Employment Opportunity is the Law.
- Industrial Welfare Commission Order Regulating Wages.
- Notice to Employees: Unemployment and Disability Insurance Poster.
- Discrimination in Employment is Prohibited by Law.
- Notice - Employee Polygraph Protection Act.
- Notice to Employees - Time off to Vote.



**10.1 SPILL CONTROL**

Spill control is required for both materials (e.g., gasoline) and waste (e.g., purged groundwater).

Since only seven (7) groundwater samples will be taken during the first phase of this project, the volume of purged groundwater stored will be relatively small. Purged groundwater will be stored while a determination is made whether it may be handled by APG-EA's wastewater treatment facility. Materials such as gasoline and generator engine oil will be stored in small volumes. Both materials will be stored in sealed containers on the pick-up trucks used in the field. The containers will be secured to reduce the potential for a spill.

**10.1.1 Procedures**

Special precautions will be taken to prevent spills during all phases of this project. Collected samples will be handled carefully to avoid container breakage, and wrapped in cushioning material as soon as practicable after collection and before packing into coolers. Drums or containers filled with purged groundwater shall be stored in a secondary containment capable of holding 10% of the volume of the stored drum(s). In the event of a spill or release of material other than military chemical agents, action shall be taken to control or stop the spread of contamination if possible.

**10.1.2 Equipment**

Spill response equipment for cleanup of small scale releases, including absorbent material and containers will be in place at the site.



### **10.1.3 Reporting/Notification**

Any spills that can not be contained or controlled or that impacts a body of water or the environment shall be immediately reported to APG by dialing military 17 from an on-post government phone line or (410) 676-0969 from a commercial telephone. If a significant release has occurred, the DSHE and the Installation Safety Division will also be notified as soon as the situation permits. Please refer to Table 8-1 for points of contact. The point of contact at the Installation Safety Office is Mr. Bob Crouse at (410) 671-3157. APG personnel will alert other response teams as necessary. Following these emergency phone calls, the reporting individual shall also notify the Field Team Leader and the SHSC.

## **10.2 WASTE STREAM/DISPOSAL**

### **10.2.1 PPE and Disposable Sampling Equipment**

It is unlikely that PPE and disposable sampling equipment will constitute a hazardous waste. Good environmental practice dictates that it be responsibly handled and disposed of properly. Every effort will be made to keep the volume of this material to a minimum. All disposable sampling equipment (used groundwater filters, tubing, hoses, etc.) and PPE will be sealed in plastic bags and temporarily stored in labeled steel drums. Sealed bags of spent equipment and PPE will be transported to a dumpster approved by APG-DSHE for disposal.

### **10.2.2 Procedures for contaminated waste**

Groundwater shall be containerized in a dedicated tank truck or in separate 55-gallon drums. Soils and sediments must also be transferred to appropriately sized containers. The container(s) shall be labeled and moved to the temporary staging area specified by the APG point-of-contact (POC). Containers may not be transported offsite for disposal until analytical results of collected samples have been received and the container contents have been classified accordingly. Hazardous waste containers shall be transported by a







1. The first part of the document is a list of the names of the persons who were present at the meeting.

2. The second part of the document is a list of the names of the persons who were absent from the meeting.

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**Figure 1**

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1. The first part of the report is a general introduction to the project. It describes the purpose of the study, the objectives, and the scope of the work. It also provides a brief overview of the methodology used in the research.

2. The second part of the report is a detailed description of the data collection process. It explains how the data was gathered, the sources of the information, and the methods used to ensure its accuracy and reliability.

3. The third part of the report presents the results of the study. It includes a summary of the findings, a discussion of the implications of the results, and a comparison of the findings with previous research in the field.

4. The fourth part of the report is a conclusion and a list of references. The conclusion summarizes the main points of the study and provides recommendations for future research. The references list the sources of information used in the study.

#### 5. Appendix A: Data Collection Instruments

1. The first instrument is a questionnaire designed to collect data on the demographic characteristics of the participants. It includes questions about age, gender, education, and occupation.

2. The second instrument is a series of interviews designed to explore the participants' experiences and perceptions of the phenomenon being studied. The interviews are structured to allow the participants to provide detailed responses to specific questions.

3. The third instrument is a set of focus group discussions designed to explore the participants' views on the topic in more depth. The focus groups are facilitated by a trained researcher and are designed to encourage the participants to share their thoughts and feelings about the topic.

4. The fourth instrument is a series of observations designed to collect data on the participants' behavior in the context of the phenomenon being studied. The observations are conducted by a trained researcher and are designed to provide a detailed account of the participants' actions and interactions.

1. The first instrument is a series of questionnaires designed to collect data on the participants' attitudes and beliefs about the phenomenon being studied. The questionnaires are designed to measure the participants' level of agreement or disagreement with various statements related to the topic.

2. The second instrument is a series of interviews designed to explore the participants' experiences and perceptions of the phenomenon being studied. The interviews are structured to allow the participants to provide detailed responses to specific questions.

3. The third instrument is a set of focus group discussions designed to explore the participants' views on the topic in more depth. The focus groups are facilitated by a trained researcher and are designed to encourage the participants to share their thoughts and feelings about the topic.

4. The fourth instrument is a series of observations designed to collect data on the participants' behavior in the context of the phenomenon being studied. The observations are conducted by a trained researcher and are designed to provide a detailed account of the participants' actions and interactions.

#### 6. Appendix B: Data Analysis Procedures

1. The first procedure is a series of statistical tests designed to analyze the data collected from the questionnaires. The tests are designed to measure the level of agreement or disagreement with various statements related to the topic.

2. The second procedure is a series of interviews designed to explore the participants' experiences and perceptions of the phenomenon being studied. The interviews are structured to allow the participants to provide detailed responses to specific questions.

3. The third procedure is a set of focus group discussions designed to explore the participants' views on the topic in more depth. The focus groups are facilitated by a trained researcher and are designed to encourage the participants to share their thoughts and feelings about the topic.

4. The fourth procedure is a series of observations designed to collect data on the participants' behavior in the context of the phenomenon being studied. The observations are conducted by a trained researcher and are designed to provide a detailed account of the participants' actions and interactions.

Some of the more common chlorinated solvent wastes include: carbon tetrachloride\*, chloroform\*, methylene chloride\*, methyl chloroform (1,1-trichloroethane), tetrachloroethylene\* (perchloroethylene), and trichloroethylene. Substances followed by an asterisk (\*) are probable human carcinogens.

Primary routes of entry into the body are inhalation, dermal absorption, and ingestion. Symptoms of acute exposure include eye, skin, and upper respiratory irritation; flush face, and neck, vertigo, headache, lassitude, dizziness, fatigue, nausea, vomiting, disorientation, confusion, and poor equilibrium. High level or chronic exposures can cause damage to the skin, eyes, liver, kidneys, central nervous system, respiratory system, and heart.

#### **SOLVENTS (NONHALOGENATED) AND PAINTS**

Some of the more common constituents of nonhalogenated solvent and paint wastes include: acetone, methyl ethyl ketone (MEK), toluene, xylenes; and alkyl acetates, esters, and alcohols. These substances are slightly to highly volatile and are moderately to highly flammable.

Primary routes of entry into the body are via inhalation, ingestion, and dermal adsorption. Symptoms of exposure include irritation of the eyes, skin, or upper respiratory system, headaches, drowsiness, dermatitis, dizziness, confusion, giddiness, and euphoria. Higher levels of exposure can cause narcosis and damage to the kidneys and blood.



**APPENDIX B**  
**MATERIAL SAFETY DATA SHEETS (MSDSs)**

1. **Methanol**
2. **Sodium Hydroxide**
3. **Nitric Acid**
4. **Sulfuric Acid**



DATE: 03/31/93  
INDEX: N/A

ACCT: 000001-01  
CAT NO: SC951

PG NBR: N/A

PAGE: 1

MATERIAL SAFETY DATA SHEET

\*\*\*METHANOL\*\*\*  
\*\*\*METHANOL\*\*\*  
\*\*\*METHANOL\*\*\*

FISHER SCIENTIFIC  
CHEMICAL DIVISION  
10000 WILSON AVENUE  
FAIR LAWN, NJ 07410  
(201) 796 7100

EMERGENCY NUMBER: (201) 796 7100  
CHEMTREC ASSISTANCE (800) 424 9300

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SUBSTANCE IDENTIFICATION

SUBSTANCE \*\*METHANOL\*\*  
CAS NUMBER 67 56 1

TRADE NAMES/SYNONYMS  
METHYL ALCOHOL, WOOD ALCOHOL, METHYL HYDROXIDE, CARBINOL, MONOHYDROXYMETHANE, WOOD SPIRIT, WOOD NAPHTHA, METHYL COLONIAL SPIRIT, COLUMBIAN SPIRIT, PHOTOLIC SPIRIT, COULOMATIC, (H) CONDITIONER SOLUTION, 4454 A452, 4016 A406, 4047 A407, 4011 A411, 4433P SW2, SC95 A452SK, A408SK, A417P, A424, A412SK, A450, A433S, CH40, ACCI4280

CHEMICAL FAMILY  
HYDROXYL ALIPHATIC

MOLECULAR FORMULA C H3 O H

MOLECULAR WEIGHT 32.04

CERCLA RATINGS (SCALE 0-3) HEALTH 3 FIRE 3 REACTIVITY 0 PERSISTENCE 0  
HHPA RATINGS (SCALE 0-4) HEALTH 1 FIRE 3 REACTIVITY 0

COMPONENTS AND CONTAMINANTS  
COMPONENT METHYL ALCOHOL (METHANOL)  
CAS# 67 56 1 PERCENT 100

OTHER CONTAMINANTS NONE

EXPOSURE LIMITS  
METHYL ALCOHOL (METHANOL)  
200 PPM (262 MG/M3) OSHA TWA (SKIN), 250 PPM (328 MG/M3) OSHA STEEL  
200 PPM (262 MG/M3) ACGIH TWA (SKIN), 250 PPM (328 MG/M3) ACGIH STEEL  
200 PPM (262 MG/M3) NIOSH REL (SKIN), 250 PPM (328 MG/M3) NIOSH REL  
200 PPM (262 MG/M3) DFG MAX TWA (SKIN), 250 PPM (328 MG/M3) DFG MAX  
400 PPM (524 MG/M3) DFG MAX 30 MINUTE PEAK AVERAGE VALUE 4 TIMES/SHIFT

MEASUREMENT METHOD: SILICA GEL TUBE, WATER, GAS CHROMATOGRAPHY WITH FLAME  
IONIZATION DETECTION (NIOSH VOL III # 2000 METHANOL)

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY  
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING  
\*\*\*OSHA LIMITS ADOPTED JANUARY 19, 1988 ARE SUBJECT TO THE DECISION OF THE  
11TH CIRCUIT COURT OF APPEALS (AFL-CIO V OSHA) AS OF JULY 7, 1992\*\*

PHYSICAL DATA

DESCRIPTION CLEAR COLORLESS LIQUID WITH A CHARACTERISTIC ALCOHOLIC ODOR

BOILING POINT 149 F (65 C) MELTING POINT 137 F (4 C)

SPECIFIC GRAVITY 0.7914 VAPOR PRESSURE 97.25 MMHG @ 20 C

EVAPORATION RATE (BUTYL ACETATE 1) 4.6 SOLUBILITY IN WATER VERY SOLUBLE

ODOR THRESHOLD 100 PPM VAPOR DENSITY 1.11

SOLVENT SOLUBILITY ETHER BENZENE ALCOHOL ACETONE CHLOROFORM ETHANOL

VISCOSITY 0.59 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD

DATE: 01/31/93  
INDEX: N/A

ACCT: 000001-01  
CAT NO: SC951

PG NBR: N/A

PAGE: 2

MATERIAL SAFETY DATA SHEET

\*\*\*METHANOL\*\*\*  
\*\*\*METHANOL\*\*\*  
\*\*\*METHANOL\*\*\*

FISHER SCIENTIFIC  
CHEMICAL DIVISION  
10000 WILSON AVENUE  
FAIR LAWN, NJ 07410  
(201) 796 7100

EMERGENCY NUMBER: (201) 796 7100  
CHEMTREC ASSISTANCE (800) 424 9300

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SUBSTANCE IDENTIFICATION

SUBSTANCE \*\*METHANOL\*\*  
CAS NUMBER 67 56 1

TRADE NAMES/SYNONYMS  
METHYL ALCOHOL, WOOD ALCOHOL, METHYL HYDROXIDE, CARBINOL, MONOHYDROXYMETHANE, WOOD SPIRIT, WOOD NAPHTHA, METHYL COLONIAL SPIRIT, COLUMBIAN SPIRIT, PHOTOLIC SPIRIT, COULOMATIC, (H) CONDITIONER SOLUTION, 4454 A452, 4016 A406, 4047 A407, 4011 A411, 4433P SW2, SC95 A452SK, A408SK, A417P, A424, A412SK, A450, A433S, CH40, ACCI4280

CHEMICAL FAMILY  
HYDROXYL ALIPHATIC

MOLECULAR FORMULA C H3 O H

MOLECULAR WEIGHT 32.04

CERCLA RATINGS (SCALE 0-3) HEALTH 3 FIRE 3 REACTIVITY 0 PERSISTENCE 0  
HHPA RATINGS (SCALE 0-4) HEALTH 1 FIRE 3 REACTIVITY 0

COMPONENTS AND CONTAMINANTS  
COMPONENT METHYL ALCOHOL (METHANOL)  
CAS# 67 56 1 PERCENT 100

OTHER CONTAMINANTS NONE

EXPOSURE LIMITS  
METHYL ALCOHOL (METHANOL)  
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200 PPM (262 MG/M3) ACGIH TWA (SKIN), 250 PPM (328 MG/M3) ACGIH STEEL  
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200 PPM (262 MG/M3) DFG MAX TWA (SKIN), 250 PPM (328 MG/M3) DFG MAX  
400 PPM (524 MG/M3) DFG MAX 30 MINUTE PEAK AVERAGE VALUE 4 TIMES/SHIFT

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SOLVENT SOLUBILITY ETHER BENZENE ALCOHOL ACETONE CHLOROFORM ETHANOL

VISCOSITY 0.59 CPS @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD







DATE: 03/31/93	ACCT: 000001-01	PAGE: 3
INDEX: N/A	CAT NO: 5310500	PO NBR: N/A

FIRST AID: WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE. OCCASIONALLY FLUSH EYES AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION

SODIUM HYDROSULFITE

ACTIVE EXPOSURE MAY CAUSE ABDOMINAL PAIN AND NAUSEA. AN ALLERGIC REACTION MAY OCCUR IN SOME INDIVIDUALS WITH FLUSHING, ANGIOEDEMA, ITCHES, TATINGEAL SWELLING, RASHES, AND SHORTNESS OF BREATH. IN SEVERE CASES, ANAPHYLAXIS WITH RESPIRATORY ARREST AND LOSS OF CONSCIOUSNESS MAY OCCUR.

CHRONIC EXPOSURE: NO DATA AVAILABLE

FIRST AID: THAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY IF VOMITING OCCURS. KEEP HEAD LOWER THAN TIPS TO PREVENT ASPIRATION.

ANTIDOTE: NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

SPONTANEOUSLY HEATS ON CONTACT WITH AIR AND MOISTURE. THIS HEAT MAY BE SUFFICIENT TO IGNITE SURROUNDING COMBUSTIBLE MATERIALS. UNDER PROLONGED EXPOSURE TO FIRE OR HEAT, CONTAINERS OF THIS MATERIAL MAY VIOLENTLY RUPTURE. CONTACT WITH WATER MAY CAUSE A VIGOROUS EXOTHERMIC REACTION AND IGNITION.

INCOMPATIBILITIES

SODIUM HYDROSULFITE

ACIDS, FORM SULFUR OXIDES

SODIUM CHLORIDE VIOLENT REACTION

DECOMPOSITION

THERMAL DECOMPOSITION PRODUCTS INCLUDE TOXIC AND/OR HAZARDOUS FUMES OF OXIDES OF SULFUR AND SODIUM OXIDE. RELEASES TOXIC HYDROGEN SULFIDE ON CONTACT WITH ACIDS.

POLYMERIZATION

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

\*\*STORAGE\*\*

\*\*DISPOSAL\*\*

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE. 40 CFR 262 EPA HAZARDOUS WASTE NUMBER D011 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY IGNITE ITSELF IF EXPOSED TO AIR AND MAY RE-IGNITE AFTER FIRE IS EXTINGUISHED. MAY BURN RAPIDLY WITH FLARE BURNING EFFECT. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

SPIII AND LEAK PROCEDURES

OCCUPATIONAL SPILL

DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. DO NOT ENTER CONTAMINATED AREA UNTIL IT IS PROPERLY DECONTAMINATED. FLOODING AMOUNTS OF WATER FOR LARGER SPILLS. THEN SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION

PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

RESPIRATION

THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE HAZARDOUS IN

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INDEX: N/A	CAT NO: 5310500	PO NBR: N/A

ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLANTS. THE RESPIRATOR ON THE SALES ORDER MUST BE APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (MOSH/MSHA).

ANY DUST AND MIST RESPIRATOR

ANY AIR PURIFYING RESPIRATOR WITH A HIGH EFFICIENCY PARTICULATE FILTER

ANY POWERED AIR PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER

ANY POWERED AIR PURIFYING RESPIRATOR WITH A HIGH EFFICIENCY PARTICULATE FILTER

ANY TYPE C SUPPLIED AIR RESPIRATOR OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE OR CONTINUOUS FLOW MODE

ANY SELF-CONTAINED BREATHING APPARATUS

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS

ANY SELF-CONTAINED BREATHING APPARATUS THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE

ANY SUPPLIED AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AIR PURIFYING APPARATUS OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE

CLOTHING

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE

GLOVES

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE

EYE PROTECTION

EMPLOYEE MUST WEAR SPLASH PROOF OR DUST RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE

EMERGENCY EYE WASH

WHERE THERE IS ANY POSSIBILITY OF EYE CONTACT WITH THIS SUBSTANCE, EMPLOYEES MUST WEAR AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED: FISHER SCIENTIFIC, INC.

CREATION DATE: 12/18/84

REVISION DATE: 12/28/92

ADDITIONAL INFORMATION

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TO: SAC, NEW YORK  
FROM: SAC, NEW YORK  
SUBJECT: [Illegible]

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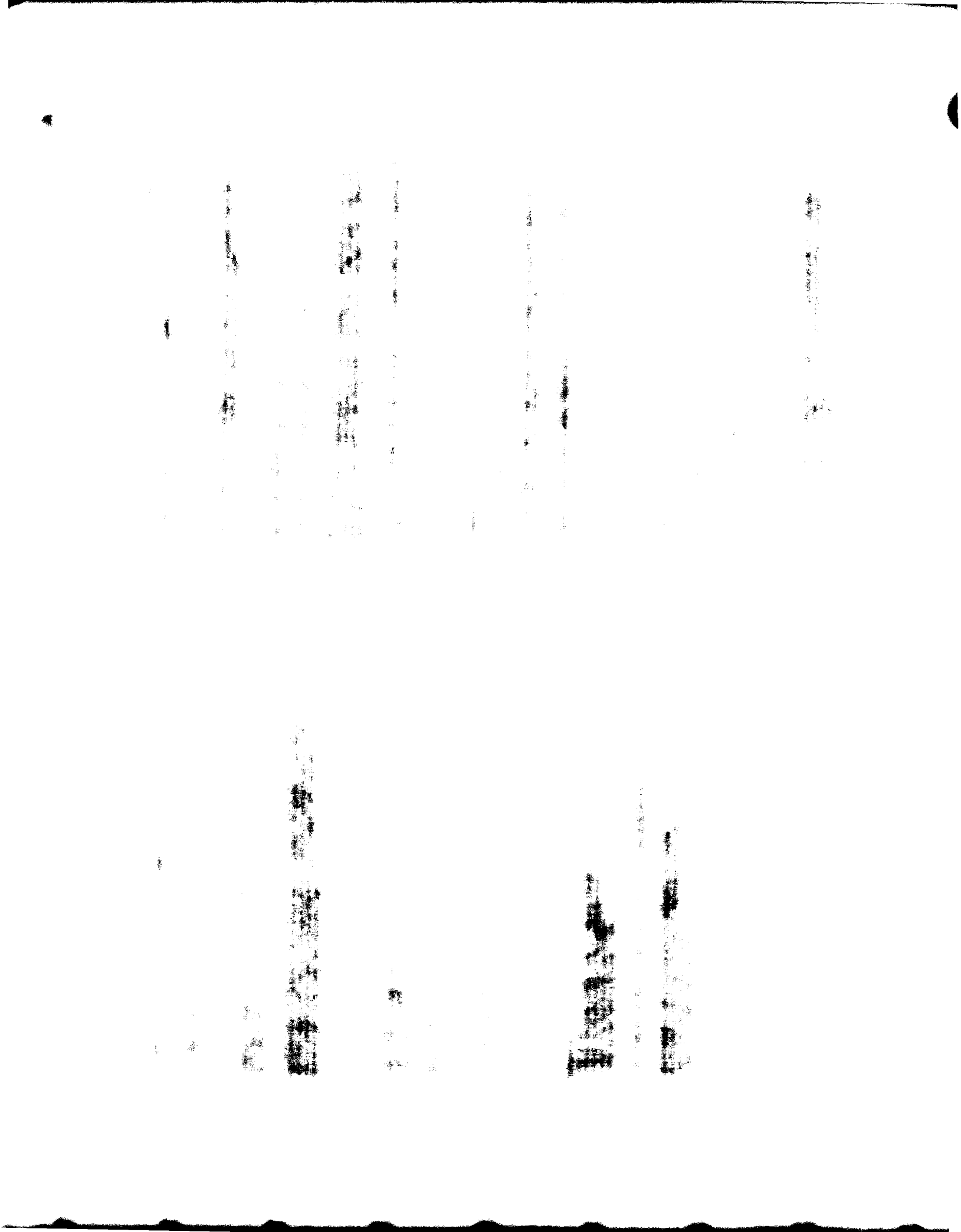
TO: SAC, NEW YORK  
FROM: SAC, NEW YORK  
SUBJECT: [Illegible]

[Illegible text block]

THE  
FEDERAL  
BUREAU OF  
INVESTIGATION  
UNITED STATES DEPARTMENT OF JUSTICE  
WASHINGTON, D. C. 20535

TO : DIRECTOR, FBI  
FROM : SAC, NEW YORK  
SUBJECT: [Illegible]  
RE: [Illegible]





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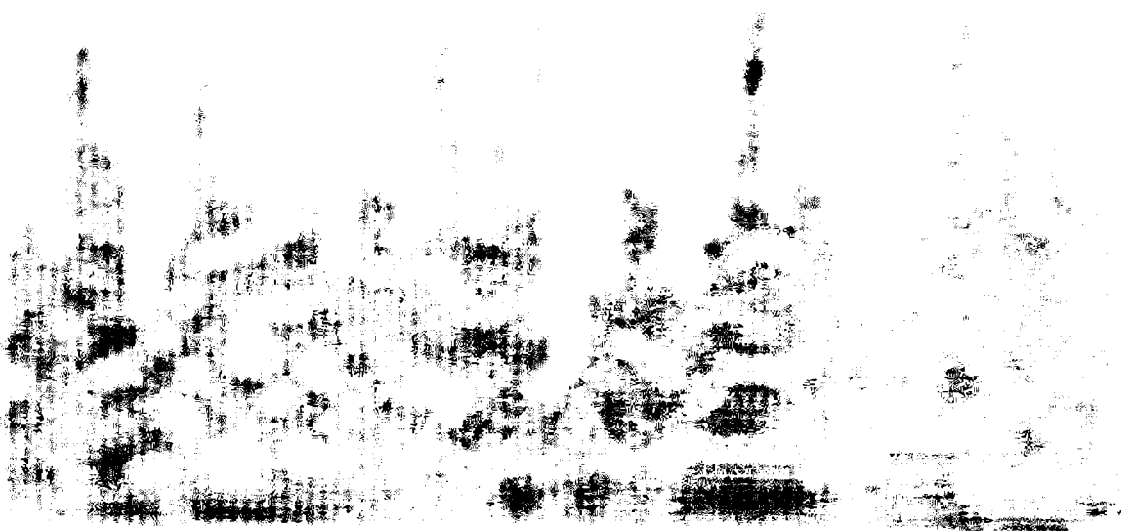
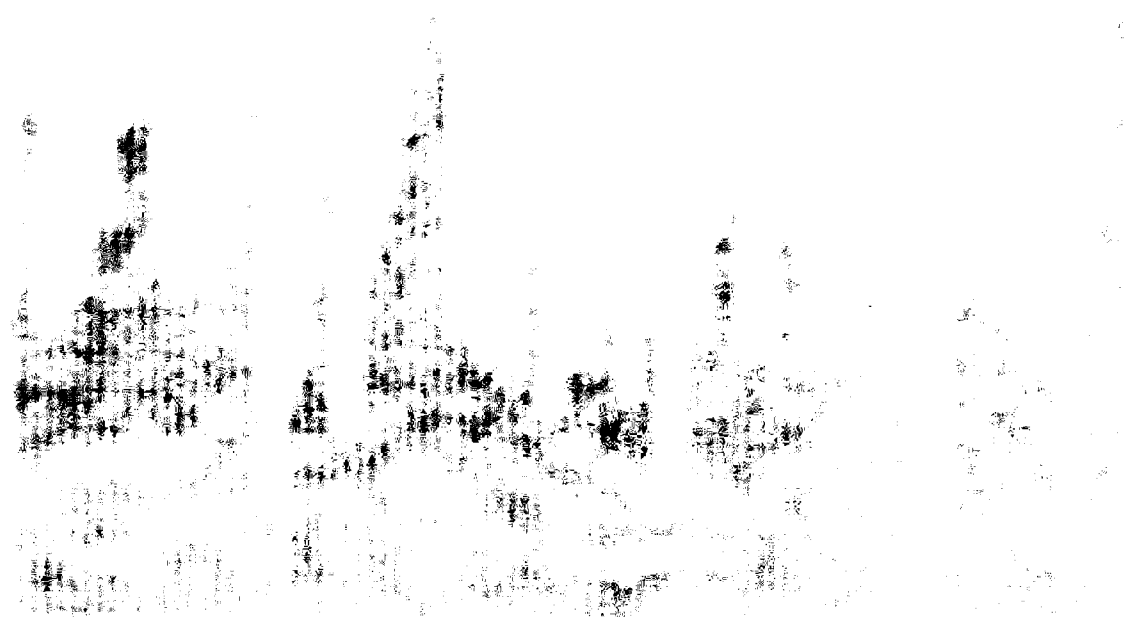
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DATE 08-29-2007 BY 60322 UCBAW/SJS

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八月廿四日 晴 九月 廿四日 晴

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84

**Abstract**

**THE UNIVERSITY OF CHICAGO**

**THE UNIVERSITY OF CHICAGO**

\_\_\_\_\_

CHRONIC EXPOSURE: REPEATED EXPOSURE TO THE MIST MAY CAUSE INFLAMMATION OF THE UPPER RESPIRATORY TRACT. CHRONIC BRONCHITIS AND ETCHING OF THE DENTAL ENAMEL. THE CENTRAL AND LATERAL INCISORS ARE PRIMARILY AFFECTED. REPEATED EXCESSIVE EXPOSURE OVER LONG PERIODS OF TIME HAVE RESULTED IN BRONCHITIC SYMPTOMS, RHINORRHEA, FREQUENT RESPIRATORY TRACT INFECTIONS, EMPHYSEMA, STOMATITIS AND DIGESTIVE DISTURBANCES. CHRONIC INHALATION MAY CAUSE ALKALINE DEPLETION OF THE BODY PRODUCING AN ACIDOSIS WHICH AFFECTS THE NERVOUS SYSTEM AND PRODUCES AGITATION, HESITANT GAIT AND GENERALIZED WEAKNESS. AN EPIDEMIOLOGICAL STUDY OF WORKERS AT A REFINERY AND CHEMICAL PLANT SUGGESTS AN INCREASED RISK OF LARYNGEAL CANCER FROM EXPOSURE TO HIGH CONCENTRATIONS OF SULFURIC ACID. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID: REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

**SKIN CONTACT**  
**SULFURIC ACID**  
**CORROSIVE**

ACUTE EXPOSURE: CONTACT WITH CONCENTRATED SULFURIC ACID MAY CAUSE SEVERE SECOND AND THIRD DEGREE SKIN BURNS WITH NECROSIS DUE TO ITS AFFINITY FOR WATER AND SUBSEQUENT SEVERE DEHYDRATING ACTION, AND ITS EXOTHERMIC REACTION WITH MOISTURE. POSSIBLE CHARRING MAY OCCUR LEADING TO SHOCK AND COLLAPSE DEPENDING ON THE AMOUNT OF TISSUE INVOLVED. THE RESULTING WOUNDS MAY BE LONG IN HEALING AND MAY CAUSE EXTENSIVE SCARRING THAT MAY RESULT IN FUNCTIONAL IMPAIRMENT. CONTACT WITH DILUTE SOLUTIONS MAY CAUSE SKIN IRRITATION.

CHRONIC EXPOSURE: REPEATED CONTACT WITH LOW CONCENTRATIONS MAY CAUSE SKIN DESICCATION AND ULCERATION OF THE HANDS, AND PARONYCHIA OR CHRONIC PURULENT INFLAMMATION AROUND THE NAILS. REPEATED CONTACT WITH DILUTE SOLUTIONS MAY CAUSE DERMATITIS.

FIRST AID: REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

**EYE CONTACT**  
**SULFURIC ACID**  
**CORROSIVE**

ACUTE EXPOSURE: EXPOSURE TO THE VAPORS MAY CAUSE A BURNING OR STINGING SENSATION IN THE EYES WITH LACRIMATION, BLURRED VISION AND CONJUNCTIVAL CONGESTION. SPLASHES OF ACID IN THE EYES MAY PRODUCE DEEP CORNEAL ULCERATION, KERATO-CONJUNCTIVITIS AND PALPEBRAL LESIONS WITH SEVERE SEQUELAE. IRREPARABLE CORNEAL DAMAGE AND BLINDNESS AS WELL AS SCARRING OF THE EYELIDS MAY OCCUR. SEVERE SULFURIC ACID EYE BURNS HAVE INCLUDED GLAUCOMA AND CATARACT AS COMPLICATIONS IN THE MOST SEVERE CASES. CONTACT WITH DILUTED ACID MAY PRODUCE MORE TRANSIENT EFFECTS FROM WHICH RECOVERY MAY BE COMPLETE.

CHRONIC EXPOSURE: REPEATED EXPOSURE MAY RESULT IN LACRIMATION AND CHRONIC CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER. OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

SULFURIC ACID:

CORROSIVE:

ACUTE EXPOSURE- INGESTION MAY CAUSE BURNING PAIN IN THE MOUTH, THROAT, ESOPHAGUS AND ABDOMEN, A SOUR TASTE AND NAUSEA FOLLOWED BY VOMITING AND DIARRHEA OF CHARRED BLACK STOMACH CONTENTS. DEHYDRATION AND CARBONIZATION OF TISSUE MAY OCCUR WITH ESCHARS ON THE LIPS AND MOUTH. BROWNISH OR YELLOWISH STAINS MAY BE FOUND AROUND THE MOUTH, INTENSE THIRST, DIFFICULT SWALLOWING, ACIDEMIA, STOMATITIS, RAPID AND WEAK PULSE, SHALLOW BREATHING, SHOCK AND POSSIBLE CONVULSIONS MAY OCCUR. ALBUMIN, BLOOD AND CASTS IN URINE, ANURIA, ESOPHAGEAL AND DELAYED GASTRIC STENOSIS HAS BEEN REPORTED. POSSIBLE PERFORATION OF THE GASTROINTESTINAL TRACT MAY RESULT IN PERITONITIS.

CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK IF VOMITING PERSISTS. ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

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REACTIVITY SECTION

REACTIVITY:

SULFURIC ACID:

VIOLENT EXOTHERMIC REACTION WITH WATER.

INCOMPATIBILITIES:

SULFURIC ACID:

ACETALDEHYDE: VIOLENTLY POLYMERIZED BY CONCENTRATED ACID.

ACETIC ANHYDRIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ACETONE + NITRIC ACID: VIOLENT DECOMPOSITION.

ACETONE + POTASSIUM DICHROMATE: IGNITION.

ACETONE CYANHYDRIN: PRESSURE INCREASE WITH POSSIBLE EXPLOSIVE RUPTURE OF VESSEL.

ACETONITRILE: VIOLENT EXOTHERM ON HEATING; SULFUR TRIOXIDE REDUCES INITIATION TEMPERATURE.

ACROLEIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ACRYLONITRILE: VIGOROUS EXOTHERMIC POLYMERIZATION.

ALCOHOL: EXOTHERMIC REACTION AND CONTRACTION OF VOLUME.

ALCOHOLS AND HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.

ALLYL ALCOHOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ALLYL CHLORIDE: VIOLENT POLYMERIZATION.

ALKYL NITRATES: MAY CAUSE VIOLENT REACTION.

2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

#### PHYSICAL DATA

DESCRIPTION: ODOORLESS, CLEAR, COLORLESS, DENSE HYGROSCOPIC OILY LIQUID WITH A MARKED ACID TASTE WHEN PURE

BOILING POINT: 559 F (290 C)      MELTING POINT: 50 F (10 C)

SPECIFIC GRAVITY: 1.84      SOLUBILITY IN WATER: SOLUBLE

VAPOR DENSITY: 3.4      VAPOR PRESSURE: <0.001 @ 20 C

PH: <3      ODOR THRESHOLD: >1 MG/M3 (MIST)

OTHER SOLVENTS (SOLVENT - SOLUBILITY):  
DECOMPOSES IN ETHYL ALCOHOL

OTHER PHYSICAL DATA  
@ 340 C IT DECOMPOSES INTO SULFUR TRIOXIDE AND WATER

#### FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD  
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:  
DRY CHEMICAL, CARBON DIOXIDE OR HALON  
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE  
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:  
DO NOT GET SOLID STREAM OF WATER ON SPILLED MATERIAL. MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. KEEP AWAY FROM STORAGE TANK ENDS (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4 GUIDE PAGE 39).

USE AGENT SUITABLE FOR TYPE OF FIRE; USE FLOODING AMOUNTS OF WATER AS A FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.

## TRANSPORTATION

DEPARTMENT OF TRANSPORTATION REGULATIONS SUBPART E  
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION REGULATIONS SUBPART E  
SUBPART E  
CORROSIVE

DEPARTMENT OF TRANSPORTATION REGULATIONS SUBPART E  
EXCEPTIONS 49 CFR 172.200

## TOXICITY

### SULFURIC ACID

IRRITATION DATA 1380 UG EYE IRRITANT 100% (100% IRRITANT) (100% IRRITANT)

#### SEVERE

TOXICITY DATA 3 MOLE/24 HOURS (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

INHALATION-RAT LC50 285 MG/KG (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

INHALATION-GUINEA PIG LC50 2.1 MG/KG (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

UNREPORTED MAN (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

(ALEPAS 1200) 384 GM

CARCINOGEN STATUS NONE

LOCAL EFFECTS CORROSIVE (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

ACUTE TOXICITY LEVEL (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

#### INGESTION

TARGET EFFECTS POISONING (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

THE NERVOUS SYSTEM

## HEALTH (225.172 AND 172.200)

### INHALATION

#### SULFURIC ACID

CORROSIVE-HIGHLY TOXIC (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

ACUTE EXPOSURE INHALATION OF VAPORS (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

PRINCIPALLY AFFECTING THE RESPIRATORY TRACT (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

CONCENTRATIONS 3.25% (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

RESISTANCE AND SUBSEQUENT SWELLING AND OTHER VAPOR (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

CONCENTRATED VAPORS MAY CAUSE (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

DAMAGE TO LUNG TISSUE (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

BURNING OR TICKLING SENSATION IN THE (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

REGION FOLLOWED BY COUGH (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

CHEMICAL PNEUMONITIS AND (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

CONCENTRATIONS MAY PRODUCE (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

GASTRITIS AND PULMONARY (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

LARYNGEAL TRACHEOBRONCHITIS (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

IN THE FACE WITH SULFURIC ACID (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

PULMONARY FIBROSIS (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)

VAPORS FROM DILUTE SOLUTIONS (100% IRRITANT) (100% IRRITANT) (100% IRRITANT)



AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER  
AMMONIUM IRON(III) SULFATE DODECAHYDRATE: VIOLENT, EXOTHERMIC REACTION ON HEATING.

AMMONIUM TRIPERCHROMATE: FIRE OR EXPLOSION HAZARD.

ANILINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

BASES: VIOLENT REACTION.

BENZYL ALCOHOL: MAY DECOMPOSE EXPLOSIVELY AT ABOUT 180 C.

BROMATES + METALS: POSSIBLE IGNITION.

BROMINE PENTAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.

TERT-BUTYL M-XYLENE: VIOLENT EXOTHERMIC REACTION WITHOUT AGITATION.

N-BUTYRALDEHYDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

CARBIDES: HAZARDOUS MIXTURE.

CESIUM ACETYLIDE: IGNITION ON CONTACT.

4-CHLORONITROBENZENE AND SULFUR TRIOXIDE: POSSIBLE EXPLOSIVE REACTION.

CHLORATES: ALL CHLORATES, WHEN BROUGHT IN CONTACT WITH SULFURIC ACID, MAY GIVE OFF EXPLOSIVE CHLORINE DIOXIDE GAS. A VIOLENT EXPLOSION IS USUAL.

CHLORATES + METALS: POSSIBLE IGNITION.

CHLORINE TRIFLUORIDE: VIOLENT REACTION.

CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

CHROMATES: FIRE AND EXPLOSION HAZARD.

COATINGS: ATTACKED.

COMBUSTIBLE MATERIALS (FINELY DIVIDED) MAY IGNITE.

COPPER: EVOLUTION OF SULFUR DIOXIDE.

CUPROUS NITRIDE: VIOLENT REACTION.

2-CYANO-4-NITROBENZENE DIAZONIUM HYDROGEN SULFATE: EXOTHERMIC REACTION.

2-CYANO-2-PROPANOL: VIOLENT REACTION WITH INCREASE IN PRESSURE.

CYCLOPENTADIENE: VIOLENT OR EXPLOSIVE REACTION.

CYCLOPENTANONE OXIME: VIOLENT REACTION.

1,3-DIAZOCYCLOHEXENE: IGNITION FOLLOWED BY EXPLOSIVE REACTION.

DIETHYLAMINE: EXOTHERMIC REACTION.

DIISOBUTYLENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

DIMETHYLBENZYL CARBINOL + HYDROGEN PEROXIDE: EXPLODES.

DIMETHOXYANTHRACEN-9(10H)-ONE: EXOTHERMIC REACTION ABOVE 150 C.

2,5-DINITRO-3-METHYLBENZOIC ACID + SODIUM AZIDE: EXPLOSIVE REACTION.

1,5-DINITRONAPHTHALENE + SULFUR: EXOTHERMIC REACTION.

EPICHLOROHYDRIN: VIOLENT REACTION.

ETHOXYLATED NONYLPHENOL: POSSIBLE IGNITION.

ETHANOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.

ETHYLENE DIAMINE: VIOLENT REACTION.

ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ETHYLENE GLYCOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ETHYLENIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

FULMINATES: EXTREMELY HAZARDOUS MIXTURE.

HEXATHIUM DISULFIDE: INCANDESCENT REACTION.

HYDROCHLORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

HYDROGEN PEROXIDE (>50%) : EXPLOSIVE REACTION AFTER EVAPORATION.

HYDROFLUORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ISCANE + NITRIC ACID: POSSIBLE EXPLOSION.

ICONE HEPTAFLUORIDE: THE ACID BECOMES EFFERVESCENT.

IRON: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.

ISOPRENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

LITHIUM SULFIDE: INCANDESCENT REACTION.

MERCURY NITRIDE: EXPLOSION ON CONTACT.

MESITYL OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

METALS: MAY LIBERATE FLAMMABLE HYDROGEN GAS.

METALS (POWDERED): EXTREMELY HAZARDOUS MIXTURE.

METAL ACETYLIDES: IGNITION REACTION.

METAL CHLORATES: VIOLENT EXPLOSION UNLESS PROPERLY COOLED.

METAL PERCHLORATES: FORMATION OF EXPLOSIVE PERCHLORIC ACID.

4-METHYLPYRIDINE: EXOTHERMIC REACTION.  
 NITRAMIDE: MAY DECOMPOSE EXPLOSIVELY ON CONTACT.  
 NITRATES: INCOMPATIBLE.  
 NITRIC ACID + GLYCERIDES: EXPLOSION.  
 NITRIC ACID + ORGANIC MATERIAL: MAY CAUSE VIOLENT REACTION.  
 NITRIC ACID + TOLUENE: POSSIBLE VIOLENT REACTION OR EXPLOSION.  
 NITROARYL BASES AND DERIVATIVES: MAY CAUSE VIOLENT REACTION OR EXPLOSION.  
 NITROBENZENE: EXOTHERMIC REACTION AT ELEVATED TEMPERATURES.  
 3-NITROBENZENESULFONIC ACID: EXOTHERMIC REACTION.  
 NITROMETHANE: FORMATION OF EXPLOSIVE MIXTURE.  
 N-NITROMETHYLAMINE: EXPLOSIVE DECOMPOSITION.  
 4-NITROTOLUENE: EXPLOSIVE AT 80 C.  
 ORGANICS: VIOLENT EXOTHERMIC REACTION.  
 PENTASILVER TRIHYDROXYDIAMIDOPHOSPHATE: EXPLOSION ON CONTACT.  
 PERCHLORATES: POSSIBLE EXPLOSION.  
 PERCHLORIC ACID: FORMATION OF DANGEROUS, ANHYDROUS PERCHLORIC ACID.  
 PERMANGANATES: FORMATION OF PERMANGANIC ACID.  
 PERMANGANATES + BENZENE: POSSIBLE EXPLOSION.  
 1-PHENYL-2-METHYL-PROPYL ALCOHOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.  
 PHOSPHORUS (WHITE OR YELLOW): IGNITION IN CONTACT WITH BOILING ACID.  
 PHOSPHORUS ISOCYANATE: VIOLENT REACTION.  
 PHOSPHORUS TRIOXIDE: VIOLENT OXIDATION WITH POSSIBLE IGNITION.  
 PICRATES: EXTREMELY HAZARDOUS MIXTURE.  
 PLASTICS: ATTACKED.  
 POLYSILOLENE: EXPLOSION ON CONTACT.  
 POTASSIUM: EXPLOSIVE INTERACTION.  
 POTASSIUM TERT-BUTOXIDE: IGNITION.  
 POTASSIUM CHLORATE: POSSIBLE FIRE AND EXPLOSION.  
 POTASSIUM PERMANGANATE: POSSIBLE EXPLOSION IN THE PRESENCE OF MOISTURE.  
 POTASSIUM PERMANGANATE + POTASSIUM CHLORIDE: VIOLENT EXPLOSION.  
 PROPIOLACTONE (BETA): TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 3-PROPYNOL: POSSIBLE EXPLOSION UNLESS ADEQUATELY COOLED.  
 PYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 REDUCING AGENTS: REACTS.  
 RUBBER: ATTACKED.  
 RUBIDIUM ACETYLIDE: IGNITION ON CONTACT.  
 SILVER PERMANGANATE (MOIST): EXPLOSIVE REACTION.  
 SILVER PERCHROMATE: EXPLOSIVE REACTION.  
 SODIUM: EXPLOSIVE REACTION WITH AQUEOUS ACID.  
 SODIUM CARBONATE: VIOLENT REACTION.  
 SODIUM CHLORATE: POSSIBLE FIRE OR EXPLOSION.  
 SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 SODIUM TETRAHYDROBORATE: VIOLENT, EXOTHERMIC REACTION.  
 SODIUM THIOCYANATE: VIOLENT EXOTHERMIC WITH EVOLUTION OF CARBONYL SULFIDE.  
 STEEL: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.  
 STYRENE MONOMER: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 TETRAMETHYLBENZENES: VIOLENT REACTION IN CLOSED CONTAINERS.  
 1,2,4,5-TETRAZINE: VIOLENT DECOMPOSITION ON CONTACT.  
 THALLIUM(I) AZODITHIOCARBONATE: MAY EXPLODE ON CONTACT.  
 1,3,5-TRINITROSCHEXAHYDRO-1,3,5-TRIAZINE: EXPLOSIVE DECOMPOSITION ON CONTACT.  
 VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ZINC CHLORATE: LIKELY TO CAUSE FIRES AND EXPLOSIONS.  
 ZINC IODIDE: VIOLENT INTERACTION.

**DECOMPOSITION:**

THEMAL DECOMPOSITION MAY RELEASE TOXIC OXIDES OF SULFUR

**POLYMERIZATION:**

HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

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**STORAGE-DISPOSAL**

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

**\*\*STORAGE\*\***

PROTECT AGAINST PHYSICAL DAMAGE AND WATER. SEPARATE FROM CARBIDES, CHLORATES, FULMINATES, NITRATES, PICRATES, POWDERED METALS, AND COMBUSTIBLE MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

**THRESHOLD PLANNING QUANTITY (TPQ):**

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

**\*\*DISPOSAL\*\***

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262, EPA HAZARDOUS WASTE NUMBER D002, 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

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**CONDITIONS TO AVOID**

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). VIOLENT REACTION WITH WATER. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN CONFINED SPACES. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

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## SPILLS AND LEAKS

### SOIL RELEASE:

DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

### AIR RELEASE:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

### WATER SPILL:

NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

### OCCUPATIONAL SPILL:

KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. DO NOT GET WATER INSIDE CONTAINER. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT PUT WATER ON LEAK OR SPILL AREA. CLEAN UP ONLY UNDER THE SUPERVISION OF AN EXPERT. DIKE SPILL FOR LATER DISPOSAL. DO NOT APPLY WATER UNLESS DIRECTED TO DO SO. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 1000 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 365.401). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2673 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

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## PROTECTIVE EQUIPMENT SECTION

### VENTILATION:

PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

### RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES' NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE. MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH/MSHA).

5000

25 WGLAS AND BROWARD AIRPORTS RESERVATION OFFICE ON JULY ONE LAST INFORMED A  
BUS COMPANY A NEWSPAPER COMPANY AND A TRAVEL AGENCY  
AND STATED THE RESERVATION OFFICES ON A PREVIOUS DATE

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED  
DATE 08-09-2001 BY 60322 UCBAW/STP

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OTHERWISE BY A NOTE AT THE BOTTOM OF THIS PAGE

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1. 凡在本行开立存款账户的客户，均可向本行申请开立定期存款账户。

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4. 凡在本行開辦之各項業務，均應遵守本行所訂之各項規章，並應遵守下列各項規定：

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Department of Public Safety  
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**ATTACHMENT 3**  
**TOXIC AGENT BRIEFING**  
**(Appendix D of CRDEC Regulation 385-1)**

## Appendix D

### Toxic Agent Briefing

1. Background. This briefing is for newly assigned personnel and for those who were not able to attend the scheduled semi-annual Toxic Agent Briefing. This is not to be used in lieu of attending the required annual briefing, but as a means to cover all personnel who are working with chemical agents or other hazardous chemicals, until the next scheduled briefing. Personnel are required to attend the formal briefing at least annually, and will sign SMCCR Form 1012, Toxic Aid Briefing Attendance.

This briefing will discuss the symptoms, first aid/self-aid procedures and how to handle an emergency for chemical agents commonly used at CROEC and Product Assurance Directorate.

#### 2. Symptoms and first aid procedures for toxic chemicals.

##### a. Nerve agents.

(1) Some nerve agents are Tabun (GA), Sarin (GB), Soman (GD) and VX. These act by inhibiting cholinesterase enzymes throughout the body. Effects of these agents vary, depending upon the form of agent, method of exposure, and degree of concentration. Means of exposure can be by inhalation or skin absorption.

##### (2) Symptoms of inhalation.

##### (a) Moderate.

1 Miosis - dimming of vision due to severe constriction of pupils.

2 Rhinorrhea - runny nose.

3 Tightness in chest.

##### (b) Symptoms of skin contact.

1 Symptoms copy those of inhalation.

2 Localized sweating and muscle reaction at site of exposure - skin contact.

##### (c) Severe symptoms - either type of exposure.

1 Nausea.

2 Convulsions.

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3 Respiratory arrest.

(3) First aid procedures.

(a) Remove victim to clean area.

(b) Request medical assistance (dial 17).

(c) Remove contaminated clothing and thoroughly wash skin, using 5 percent sodium hypochlorite (household bleach) and shower thoroughly.

(d) Monitor victim while awaiting medical support. Upon appearance of symptoms beyond miosis, administer two injectors from the Nerve Agent Antidote Kit, Mark I (atropine, small autoinjector first), hold the injector against the thigh for at least 10 seconds. Follow immediately with the second injector (2-PAM CL, large autoinjector) and inject in the thigh, holding the injector against the thigh for at least 10 seconds. Administer Nerve Agent Antidote Kit, Mark I, every 10 to 15 minutes, if symptoms persist or recur, with a maximum of 3 sets. Save spent injectors as a positive means of determining number of auto injectors used. SMCCR Form 1035, Mark I Shot Record, will be used to record number of injections.

(e) Provide mouth-to-mouth resuscitation and CPR when necessary.

b. Blood agents.

(1) Some of the blood agents are Hydrogen cyanide (AC) and Cyanogen chloride (CK). Primary site of action is the central nervous system, particularly the respiratory functions by inhibiting cytochrome oxidase and interfering with cell utilization of oxygen. Inhalation is the usual route of entry.

(2) Symptoms - depend upon concentration and duration of exposure.

(a) Moderate exposure.

1 Vertigo.

2 Nausea.

3 Headache.

4 Followed by convulsions and/or coma.

(b) High concentrations.

1 Deep, rapid breathing.

2 Violent convulsions after 15 to 20 seconds.

3 Cessation of regular breathing - 1 minute.

4 Termination of heart action shortly thereafter.

(3) First aid - speed in getting medical assistance is necessary.

- (a) Don mask immediately.
- (b) Move victim to clean area.
- (c) Call "17" for medical assistance.
- (d) Provide artificial respiration.

c. Choking agents.

(1) Phosgene (CG) is the best known choking agent. It attacks the upper respiratory tract, damaging the air passages and causing them to fill with fluid.

- (2) Symptoms.
  - (a) Coughing.
  - (b) Choking.
  - (c) Tightness in chest.
  - (d) Nausea.
  - (e) Occasional vomiting.
  - (f) Headache.
  - (g) Lacrimation.

(h) Followed by pulmonary edema, rapid shallow breathing, cough and cyanosis.

NOTE: Symptoms may be delayed or they may occur and then disappear for up to 24 hours; and then recur as pulmonary edema develops. Treatment as soon as possible is essential.

- (3) First aid.
  - (a) Don mask.
  - (b) Remove victim to fresh air. If area is clean, expect victims to be recovered.
  - (c) Call "17" for medical assistance.
  - (d) Observe victim.

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(e) Provide drainage from victim's mouth to prevent aspiration.

(f) Administer artificial respiration.

d. Incapacitating agents.

(1) Any hallucinogen (i.e., BZ), producing mental confusion and lack of coordination would be an incapacitating agent.

(2) Symptoms.

(a) Rapid heartbeat.

(b) Dizziness.

(c) Vomiting.

(d) Extremely dry mouth.

(e) Blurred vision.

NOTE: Absorbed by inhalation or ingestion. Symptoms are similar to alcoholic intoxication; therefore, medical identification bracelet or card should be worn/carried to prevent misdiagnosis. Symptoms may not occur for up to several hours after exposure.

(3) First aid.

(a) Don mask.

(b) Evacuate area.

(c) Decon skin with soap and water.

(d) Keep victim calm; restrain if needed.

(e) Call "17" for medical assistance.

(f) Observe and provide ventilation.

(g) Keep body temperature down.

e. Irritant or riot control agents.

(1) These produce a temporary effect with no long-term damage. These are the "tear agents," such as CS and CN. Their effect is localized, irritating the eyes and upper respiratory tract.

(2) Symptoms.

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- (a) Primary - tearing.
- (b) Secondary - nausea and vomiting.
- (3) First aid/self-aid.
- (a) Don gas mask and evacuate area.
- (b) Dial "17" for assistance.
- (c) Remove victim to fresh air.
- (d) Remove mask and flush eyes with clear water.
- (e) Shower with soap and water.
- (f) Transport victim to USAMC-EA.

f. Vomiting agents.

- (1) Examples are DM, DA and DC.
- (2) Symptoms.
- (a) Primary - tearing.
- (b) Secondary (high concentrations) - nausea and vomiting.
- (3) Self-aid.
- (a) Don mask - lift mask from face briefly if necessary to permit vomiting or to drain saliva from the face.
- (b) Report to USAMC-EA.

g. Blister agents.

(1) These (HD, H, HT, L) cause cell damage to any part of the body they come in contact with. Skin contact can cause effects ranging from reddening to severe blistering. The eye is most vulnerable to mustard - either by liquid or vapor contact. Long exposures to low concentrations or exposures to high concentrations can result in permanent eye damage. Upper respiratory tract damage is caused by inhalation of vapors or aerosol. Severe exposure can cause secondary infection such as bronchial pneumonia.

(2) Symptoms may not appear for several hours after exposure. Vapor exposure may cause eye irritation, localized reddening and gritty feeling in the eye, and respiratory distress similar to a chest cold.



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(3) First aid. Decontaminate exposed area immediately with soap and water and follow with 5 percent bleach solution. NOTE: If eye exposure, flush only with water.

3. Emergency procedures.

a. In case of an emergency, dial "17" and explain the situation, stating location, type of injury/exposure, hazardous material involved, and the number of people affected.

b. In case of agent exposure, do not transport victim to health clinic. Wait for the ambulance and provide the first aid procedures as previously explained.

**ATTACHMENT 4**  
**INDIVIDUAL FIELD TRAINING RECORD**  
**(JEG FORM 3-3)**

**GENERAL  
FIELD TRAINING RECORD**

Name \_\_\_\_\_

Basic Training # \_\_\_\_\_

Date of Employment \_\_\_\_\_

Present Job Function \_\_\_\_\_

Performance No. \_\_\_\_\_

**LEVEL 1**

|      |          |            |      |         |
|------|----------|------------|------|---------|
| Site | Activity | Supervisor | Date | Remarks |
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**LEVEL 2**

|      |          |            |      |         |
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| Site | Activity | Supervisor | Date | Remarks |
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**LEVEL 3**

|      |          |            |      |         |
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FEDERAL BUREAU OF INVESTIGATION

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

CHICAGO, ILL.

1954

1954

THE UNIVERSITY OF CHICAGO



1. 關於本會之組織及職權

## 第一章 總則

2. 關於本會之經費及會計

3. 關於本會之附屬機構

## 第二章 附屬機構

4. 關於本會之附屬機構

## 第三章 附屬機構之組織及職權

5. 關於本會之附屬機構

6. 關於本會之附屬機構

7. 關於本會之附屬機構

## 第四章 附屬機構之經費及會計

8. 關於本會之附屬機構

9. 關於本會之附屬機構

10. 關於本會之附屬機構

11. 關於本會之附屬機構

12. 關於本會之附屬機構

13. 關於本會之附屬機構

14. 關於本會之附屬機構

## 第五章 附屬機構之附屬機構



**ATTACHMENT 7**  
**EMPLOYEE EXPOSURE/INJURY REPORT**

**JACOBS ENGINEERING GROUP INC.**  
**FORM 9-1**  
**EMPLOYEE EXPOSURE/INJURY REPORT**

Date: \_\_\_\_\_

Employee's Name: \_\_\_\_\_

SSN: \_\_\_\_\_

Sex: M ☐ F ☐ Age: \_\_\_\_\_

Region: \_\_\_\_\_ Location: \_\_\_\_\_

Project: \_\_\_\_\_ Project Title: \_\_\_\_\_

Incident:

Type: Possible Exposure \_\_\_\_\_ Exposure \_\_\_\_\_ Physical Injury \_\_\_\_\_

Location: \_\_\_\_\_

Date of Incident: \_\_\_\_\_ Time of Incident: \_\_\_\_\_

List amount of time lost from work (if any) \_\_\_\_\_

Date of Reporting Incident: \_\_\_\_\_

Person to Whom Incident Was Reported: \_\_\_\_\_

Weather Condition During Incident: Temperature \_\_\_\_\_

Wind Speed & Direction \_\_\_\_\_ Humidity \_\_\_\_\_

Cloud Cover \_\_\_\_\_ Clear \_\_\_\_\_ Precipitation \_\_\_\_\_

**Materials Potentially Encountered:**

Chemical (Give chemical name or description - liquid, solid, gas, vapor fume, mist):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Radiological: \_\_\_\_\_

Other: \_\_\_\_\_  
\_\_\_\_\_

**JACOBS ENGINEERING GROUP INC.**  
**FORM 9-1**  
**EMPLOYEE EXPOSURE/INJURY REPORT**

Nature of the Exposure/Injury:

State the nature of the exposure/injury in detail and list the parts of the body affected.

(Attach extra sheets if needed.)

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Was medical care received? Yes ☐ No ☐

If so, when? \_\_\_\_\_

Where? On-Site \_\_\_\_\_ Off-Site \_\_\_\_\_

By Whom? Name of Paramedic: \_\_\_\_\_

Name of Physician: \_\_\_\_\_

Other: \_\_\_\_\_

If "Off-Site", name facility (hospital, clinic, etc.): \_\_\_\_\_

Length of stay at the facility? \_\_\_\_\_

Was the Health and Safety Manager contacted? Yes ☐ No ☐ When \_\_\_\_\_

Was the Medical Consultant contacted? Yes ☐ No ☐

If so, who was the contact? \_\_\_\_\_

Did the exposure/injury result in permanent disability? Yes ☐ No ☐

If so, explain:

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JACOBS ENGINEERING GROUP INC.  
FORM 9-1  
EMPLOYEE EXPOSURE/INJURY REPORT

Has the employee returned to work? Yes ☐ No ☐

If so, give date: \_\_\_\_\_

List the names of other persons affected during this incident:

\_\_\_\_\_

List the names of persons who witnessed the exposure/injury incident

\_\_\_\_\_

\_\_\_\_\_

Possible cause of the exposure/injury:

What was the name and title of the field team leader or immediate supervisor at the time of the incident?

\_\_\_\_\_

Was the operation being conducted under an established Safety Plan?

Yes ☐ No ☐ if yes, attach a copy. In no, explain.

\_\_\_\_\_

Describe protective equipment and clothing used by the employee.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Other information, comments (Attach relative data if necessary):

\_\_\_\_\_

\_\_\_\_\_

JACOBS ENGINEERING GROUP INC.  
FORM 9-1  
EMPLOYEE EXPOSURE/INJURY REPORT

Did any limitations in safety equipment or protective clothing contribute to affect exposure?

If so, explain:

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What was the employee doing when the exposure/injury occurred? (Describe briefly as "Site Reconnaissance", "Site Categorization", "Sampling", etc.)

How did the exposure/injury occur? (Describe fully what factors led up to and or contributed to the incident.)

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Name of person(s) initiating report, job title, phone number

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Employee's Name (Print or type)

\_\_\_\_\_  
Employee's Signature

\_\_\_\_\_  
Date

JACOBS ENGINEERING GROUP INC.  
FORM 9-1  
EMPLOYEE EXPOSURE/INJURY REPORT

What corrective action(s) or change to the Site Safety Plan, if any, have been or will be taken to avoid recurrence of the exposure or accident?

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Additional Comments

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Project Manager/Field Team Leader's Name  
(Print or type)

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Project Manager/Field Team Leader's  
Signature

Date \_\_\_\_\_

**ATTACHMENT 8**  
**EMPLOYER'S REPORT OF OCCUPATIONAL INJURY OR DISEASE**





# NOTICE

This form is NOT a claim for compensation. Failure to file a claim within 2 years of the date of accidental injury may bar an employee's claim for compensation. Employees may obtain claim forms from the Workers Compensation Commission.

**EMPLOYER:**

COMPLETE WITH LOSS OF TWO ARMS AND LEGS + ANTERIORLY 7.

**WORKERS COMPENSATION COMMISSION**

6 NORTH LIBERTY STREET CALIFORNIA, MOORELAND 2-294 J-700

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4. Copy of the form shall be made by the Director of Health and Safety at the time the information is received or as soon thereafter as practicable and shall be retained by the Director until such time as the information is no longer needed for the purposes of the Act. The Director may also make copies of the information for other purposes if he deems it appropriate.

## REPORT OF WAGE INFORMATION

Page 10 of 10

DATE OF BIRTH: 12/15/45

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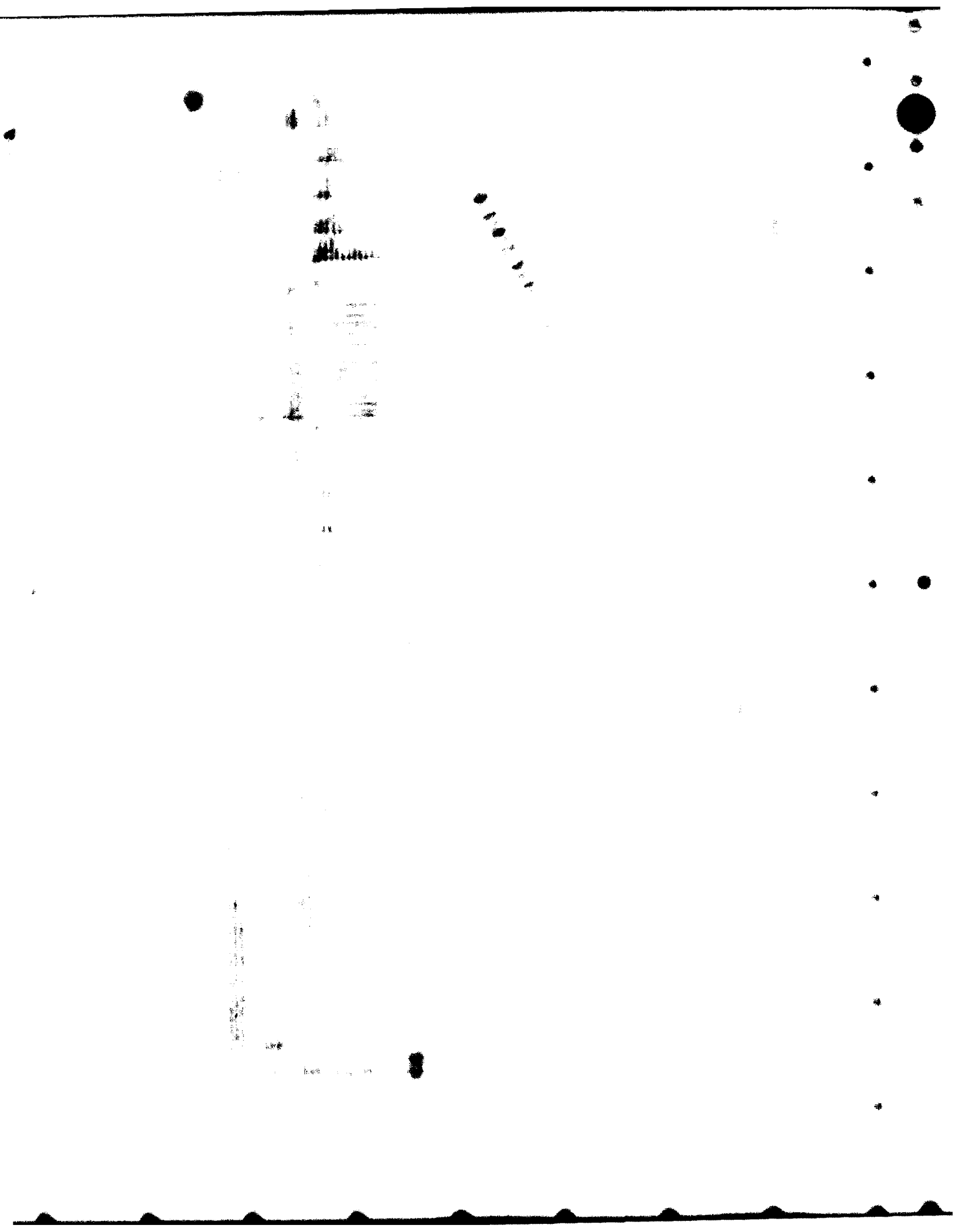
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**ATTACHMENT 12**  
**UXO SUBCONTRACTOR WORK PLAN**  
**AND SITE SAFETY PLAN**

TO BE ADDED  
WHEN UXO SUBCONTRACTOR  
IS OBTAINED