

Southwest Division  
Naval Facilities Engineering Command  
Contracts Department  
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San Diego, California 92132-5187

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**COMPREHENSIVE LONG-TERM ENVIRONMENTAL  
ACTION NAVY  
CLEAN**

**PROGRAM SAFETY AND  
HEALTH PLAN**

**Revision 2**

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## NAVY CLEAN PROGRAM, STATEMENT OF SAFETY AND HEALTH POLICY

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The Comprehensive Long-Term Environmental Action Navy (CLEAN) Program is dedicated to the concept that all accidents are preventable. Bechtel National, Inc. (BNI), is committed to achieving and sustaining "Zero Accident Tolerance" through continuous improvement practices.

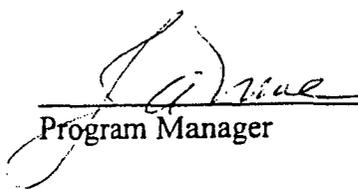
### OWNERSHIP

Program Management is committed to the "Zero Accident Tolerance" program and directs that safety and health be a first priority in planning and executing work. Management continually reaffirms that no job is so important or no request so urgent that we cannot take time to perform the work safely. BNI employees are empowered to implement the safety and health program and must consistently strive for the "Zero Accident Tolerance" goal. The CLEAN Program Safety and Health Services is responsible for the development of safety and health policy and the program, and will coordinate supporting services in partnership with operations.

**The objective of CLEAN Program Safety and Health Policy is the following.**

- Strive to eliminate all injuries and illnesses.
- Promote safety as the first priority in design, planning, training, and the execution of work.
- Spread the ownership of the Safety and Health Program effectiveness throughout the CLEAN Program organization.
- Enhance employee awareness, involvement, and empowerment in the safety and health program implementation.
- Increase employees' consistent utilization of safe practices in their daily activities.
- Optimize the use of continuous improvement practices as the basis for "Zero Accident Tolerance" initiatives.
- Demonstrate to the Navy that BNI is dedicated to safety excellence.
- Select subcontractors who are committed to a "Zero Accident Tolerance" program.

Each of us will embrace these commitments to loss prevention, regulatory compliance, and safety and health excellence as a way of life, both on and off the program.

  
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Program Manager

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## SUMMARY

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This Program Safety and Health Plan (PSHP) has been prepared for use by Bechtel National, Inc. (BNI), in support of Program management and technical environmental services for the Southwest Division Naval Facilities Engineering Command (SWDIV) execution of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program.

This PSHP replaces the program Health and Safety Plan (January 7, 1994) and the Site Health and Safety Plan, Revision 1 (July 18, 1994)

This PSHP describes how BNI will implement the Safety and Health policies contained in Bechtel Corporate Policy 111, "Safety and Health," the applicable Occupational Safety and Health Administration regulations, and SWDIV requirements. The PSHP also describes how site-specific requirements are implemented at various facilities. Supplemental documents to this Program are the site-specific Safety and Health Plan Supplements (written for individual contract task orders) and the Safety and Health Program Procedures.

This PSHP has been reviewed and approved by the CLEAN Program Manager, Operations Manager, Safety and Health Manager, and SWDIV.

This plan provides the framework, philosophy, policy, Program requirements, and regulatory basis for the comprehensive Safety and Health Program for tasks presently anticipated within the scope of the CLEAN Program. This PSHP shall be incorporated by reference into appropriate Program documents that pertain to Program activity that may affect Safety and Health. ~~This PSHP will also serve as the Injury and Illness Prevention Plan.~~

Use of the term "Team" subcontractors refers to Brown and Caldwell and Kleinfelder employees. The term "Other Subcontractors" refers to subcontractors of BNI.

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## ACRONYMS/ABBREVIATIONS

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ACGIH	American Conference of Governmental Industrial Hygienists
APR	air-purifying respirator
BNI	Bechtel National, Inc.
CCR	<i>California Code of Regulations</i>
CFR	<i>Code of Federal Regulations</i>
CLEAN	Comprehensive Long-Term Environmental Action Navy
COE	United States Army Corps of Engineers
CRZ	contamination reduction zone
CTO	Contract Task Order
dB	decibel
ERT	Emergency Response Team
°F	degrees Fahrenheit
FID	flame ionization detector
GC	gas chromatograph
H <sub>2</sub> S	hydrogen sulfide
HEPA	high-efficiency particulate air
HWP	hazardous waste permit
IARC	International Agency for the Research on Cancer
IDLH	immediately dangerous to life or health
LEL	lower explosive limit
Lpm	liters per minute
MCE	mixed cellulose ester
mg/m <sup>3</sup>	milligram per cubic meter
mm	millimeter
mR/hour	milliroentgens per hour
MSDS	Material Safety Data Sheet
NA	not applicable
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration

## ACRONYMS/ABBREVIATIONS (continued)

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OV	organic vapor
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEO	Project Execution Office
PGM	(CLEAN) Program Manager
PID	photoionization detector
PMO	Program Management Office
POC	point of contact
PP	Program Procedure
PPE	personal protective equipment
ppm	parts per million
PSHP	Program Safety and Health Plan
PVC	polyvinyl chloride
ROICC	Resident Officer in Charge of Construction
SCBA	self-contained breathing apparatus
SHM	Safety and Health Manager
SHS	Safety and Health Supervisor
SSHP	Site-Specific Safety and Health Plan Supplement
SSHR	Site Safety and Health Representative
SWDIV	Southwest Division Naval Facilities Engineering Command
TLV	threshold limit value
TPH	total petroleum hydrocarbons
UL	Underwriters' Laboratory
U.S. EPA	United States Environmental Protection Agency
v/v	volume per volume

## ACRONYMS/ABBREVIATIONS (continued)

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## Section 1

# SITE-SPECIFIC SAFETY AND HEALTH PLAN

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### 1.1 INTRODUCTION

This Program Safety and Health Plan (PSHP) has been prepared in accordance with the requirements of Bechtel National, Inc. (BNI), the Southwest Division Naval Facilities Engineering Command (SWDIV), and applicable federal or state Occupational Safety and Health Administration (OSHA) requirements to support a work environment that does not compromise the safety or health of Comprehensive Long-Term Environmental Action Navy (CLEAN) Program personnel, host facility personnel, subcontractors, vendors, or site visitors during execution of the SWDIV CLEAN Program activities. This plan will also include measures to minimize impact off-site from project operations.

### 1.2 SPECIFIC REQUIREMENTS

This plan has been prepared in order to meet the specific requirements of OSHA, SWDIV, and the Navy that are contained in the following documents:

- Safety and Health Requirements Manual, EM 385-1-1, Rev. 1992, United States Army Corps of Engineers (COE);
- Navy/Marine Corps Installation Restoration Manual, February 1992;
- General Industry Safety Orders, Title 8, Article 5192, Hazardous Waste Operations and Emergency Response,
- *Code of Federal Regulations* (CFR), Title 29 Part 1910.120, Hazardous Waste Operations and Emergency Response, and
- Bechtel Environmental, Safety and Health Core Processes – BSII.

### 1.3 PURPOSE OF PLAN

This plan provides the following functions:

- identifies the project, scope of work, project locations;
- identifies the potential hazards;
- identifies personnel protection requirements and safe working procedures;
- identifies reference documents that form the complete safety program;
- establishes the monitoring and site control programs; and
- establishes a contingency plan and interface to the site contingency plan.

This Plan will be supported by a Site-Specific (Contract Task Order [CTO]) Safety and Health Plan supplement (SSHP) which will include the site history, the work tasks and hazard analysis, responsible personnel, and emergency response notifications for each group of work tasks at a given base or site.

## 1.4 REFERENCE DOCUMENTS

This plan is not complete without the following reference documents on-site during work execution:

- applicable site-specific safety and health plan supplements and changes;
- the applicable work plans; and
- the CLEAN Program Safety and Health Program Procedures (PPs) referenced in this plan.

## 1.5 INSTALLATION REQUIREMENTS

Each activity, installation, or base has established specific requirements for on-site work. The CLEAN point of contact (POC) for activity-specific requirements is the Resident Officer in Charge of Construction (ROICC) or an activity-designated installation safety coordinator. The Program will consider activity-specific requirements in planning field activities and will incorporate applicable requirements into site-specific documents.

## Section 2 SITE DESCRIPTION

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### 2.1 GENERAL

Refer to the SSHP and work plan for location maps. Many sites are operating military installations containing a variety of hazards associated with both Program work and ongoing military installation operations. Therefore, the special procedures set forth in this plan are essential for the protection of life, health, and property.

### 2.2 WORK AREAS

Refer to the CTO-specific work plan and/or SSHP for specific work locations.

### 2.3 SITE DESCRIPTION AND HISTORY

Refer to the CTO-specific work plan and/or SSHP.

### 2.4 SITE TOPOGRAPHY AND CLIMATE

Refer to the CTO-specific work plan and and/or SSHP.

### 2.5 KNOWN WASTE CHARACTERISTICS

Refer to the CTO-specific work plan and and/or SSHP.

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## Section 3 SCOPE OF WORK

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### 3.1 WORK PLAN SUMMARY

The work plan and the SSHP describe work to be performed at the site.

The sampling and analysis plan or the work plan for the site contains detailed descriptions of the field sampling methods and other field activities.

### 3.2 TASK SUMMARY

The work plan and the SSHP describe the site-specific tasks.

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## Section 4

# ORGANIZATION AND RESPONSIBILITIES

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Program management and supervisory staff responsibility with respect to safety and health are described in this section.

## 4.1 PROGRAM AND TASK MANAGEMENT PERSONNEL

Each level of management is responsible for the safety performance of subordinates. Each manager will include safety performance as a criterion in performance evaluations. The SHM will provide summary safety performance information and guidance in evaluating safety performance to managers.

## 4.2 BNI CLEAN PROGRAM MANAGER

The BNI CLEAN Program Manager (PGM) has the authority to provide and is ultimately responsible for a Safety and Health Program that meets the level of effort necessary to support CLEAN activities. The PGM is ultimately responsible to Bechtel senior management for CLEAN Program safety performance and will hold Program personnel responsible for the safety performance of personnel at each level who ultimately report to him.

### 4.2.1 BNI CLEAN Managers and Supervisors

The CLEAN managers and supervisors are responsible for assuring that the established Safety and Health Program is implemented in the planning and execution stages of all Program work. Every project manager, CTO leader and all supervisors are responsible for implementing the PSHP during activities for which they are responsible. Each manager and supervisor is responsible for the safety performance of their assigned projects. Each manager and supervisor is responsible for communication of safety performance expectations to subordinate employees. Each manager and supervisor will consider safety performance in the evaluation of subordinate employees.

## 4.3 SAFETY AND HEALTH STAFF QUALIFICATION AND TRAINING REQUIREMENTS

The safety and health staff shall meet minimum training and experience requirements. These requirements are set forth below.

### 4.3.1 Program Safety and Health Manager

The Program Safety and Health Manager (SHM) is responsible for administration, technical support, and oversight of the CLEAN Safety and Health Program. The SHM will be a safety and health professional with a bachelor's or master's degree in physical sciences or engineering, advanced training in industrial hygiene, and 10 years of professional experience in the field, at least two of which are in a field hazardous-waste-operations environment. The SHM will also be Certified in the Comprehensive Practice of Industrial Hygiene.

The SHM is independent of Program operations and reports directly to the PGM. The SHM reports functionally through the Corporate Health Services Manager to the Bechtel Safety and Health Services Manager

All Program safety and health staff report functionally through the SHM.

#### **4.3.2 BNI CLEAN Safety and Health Supervisor**

The BNI CLEAN Program will be executed from the Project Execution Office (PEO) in San Diego. The Safety and Health Supervisor (SHS) will be responsible for providing operational field support and technical assistance to CTOs.

The SHS will be a safety and health professional with a bachelor's or master's degree in physical sciences or engineering, advanced training in industrial hygiene, and seven years of professional experience in the field, at least two of which are in a field hazardous-waste-operations environment.

#### **4.3.3 Site Safety and Health Representative**

The SHM will assign a Site Safety and Health Representative (SSHR) to each field task. The SSHR will be responsible for assuring that all Program personnel and subcontractors follow safety and health requirements and that the SHSP is implemented. The SSHR will perform routine air quality monitoring during field operations. The SSHR will be responsible for maintaining all required documentation and filing reports with the SHS.

The SSHR is typically an engineer or environmental specialist (e.g., geologist, hydrologist, environmental scientist, sampling specialist) with an interest in and qualifications for providing safety and health support, or an intermediate-level safety and health professional with collateral task responsibilities (e.g., waste management, water sampling). The individual designated as SSHR will consider the safety and health function primary while field-assigned. An approved list of qualified SSHRs will be maintained by the SHM. Collateral-duty SSHRs will be required to participate in an ongoing qualification and training Program in addition to the basic required hazardous waste training and supervisor training. The SHM will determine whether proposed personnel are appropriate for a particular task and may require job coverage by Health Services staff based upon consideration of the potential hazard.

## Section 5 **HAZARD IDENTIFICATION**

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### **5.1 HAZARD ASSESSMENT**

The work plan for each CTO field activity is reviewed in accordance with CLEAN Program Procedure (PP) SH 5.1.2 Safe Work Operation Process, Job-Hazard Analysis, to identify the hazards that are likely to be present during the task. This review identifies those hazards that require control measures. If additional hazards that were not identified at the time of initial plan preparation are discovered, the SHS shall prepare a supplemental hazard assessment.

### **5.2 SIGNIFICANT HAZARDS**

The CTO-specific SSHP identifies those task hazards considered significant because of probability of occurrence or serious effects. Section 6 of this plan discusses in detail those hazards considered to be well known or routinely experienced at military installations and during environmental investigation. The SSHP describes hazards unique to work at specific sites.

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## Section 6 HAZARD ANALYSIS

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### 6.1 GENERAL

This section presents a hazard analysis and more detailed discussion of generic hazards experienced at typical program sites during field activities. Table 6-1, Physical and Industrial Hazards at CLEAN Program Sites, provides general hazard analysis of industrial hazards encountered at typical field sites.

### 6.2 RISK ANALYSIS

In addition to the safety hazards on-site that result from industrial and military operations and the hazards associated with equipment used to perform the task, a potential health hazard arises from exposure to organic and inorganic chemicals, physical agents, and biological agents that are unearthed or released during the work. The toxicological properties of chemicals suspected to be present at program sites are discussed in Section 6.7.

The exposure incident determined most likely to occur as a result of project activities at sites is contact with contaminated groundwater. The next most likely incident is the spilling of or contact with a subsurface product layer encountered in the investigation.

Incidents not associated with Program activities that may occur at the site include fire events, chemical releases, or explosions associated with military operations. Section 16 of this document describes emergency actions as a result of incidents associated with Program operations or host facility operations.

Based on the preliminary site investigation and the project description, many potential hazards associated with the Program scope of work have been identified including physical, radiation, vibration, industrial, chemical, landfill decomposition gases, and biological. Each of these classes of hazard is discussed in the sections that follow.

### 6.3 PHYSICAL HAZARDS

The physical hazards associated with CTO projects may include noise; energized and rotating equipment; heavy equipment; steam-cleaning equipment; falling, slipping, and tripping; manual lifting; heat stress; working over or near water; and general physical hazards. These physical hazards are discussed in the following sections.

#### 6.3.1 Noise

Working near a drill rig, near operating aircraft, or a number of other site activities, can subject workers to noise exposures in excess of allowable limits. Nonessential personnel who do not need to be next to loud equipment should stay as far away as possible to lower the risk of noise-induced hearing loss. Personnel who operate or must work

**Table 6-1  
Industrial Hazards at CLEAN Program Sites**

Industrial Hazards	Methods to Assure Worker Safety
Excessive noise from operating drill rigs	If noise levels exceed 85 dB <sup>a</sup> , affected workers must don hearing protection.
Injuries caused by tripping or falling	Job site walkover to identify hazards. Employees will be trained in housekeeping, and areas will be monitored daily by the SSHR <sup>b</sup> . Immovable trip hazards will be marked or guarded.
Accidents involving power equipment or sharp objects, etc.	Power equipment will have guards or shields, and workers operating equipment will wear face shields or safety goggles, as prescribed by the SSHR. Power equipment must have UL <sup>c</sup> -approved tags. Sharp objects will be kept out of the work areas unless needed for the task. If possible, sharp corners or edges will be wrapped with high-visibility tape.
Electrical shock	All electrical equipment will be grounded. All power supplies for portable electrical tools and hand lighting shall be protected by installed or portable Ground Fault Circuit Interrupt Protection. Lock-out tag-out procedures will be employed before work on electrical equipment begins.
Fires	Fire extinguishers will be maintained on each vehicle and in regular work areas. Workers will be trained in fire extinguisher use and in proper fire notification procedures. Smoking will be permitted only in a designated area at the site.
Explosions	During drilling activities where potential hazards exist, explosive gas meters will be used to monitor the area.
Injuries from drill-rig pinch points	The SSHR will inspect all drilling equipment before use. Hazard areas that cannot be guarded will be discussed with the workers prior to the start of work.
Chemical releases, fires, or other disturbances at site	The SSHR will maintain contact with personnel at any potential source of toxic gas release. Hydrogen sulfide monitors or other appropriate monitoring equipment will be maintained on-site.
Skin and eye irritation from contact with chemicals	Workers will not be allowed to work with chemicals without proper PPE <sup>d</sup> . The SSHR will determine the correct PPE needed for the task and will assure the worker has been trained and is aware of the material safety data sheet provisions.
Stinging insects, such as wasps and bees	During the prework walkover of outside task locations, the SSHR will identify any areas that could subject workers to stinging insects. The SSHR will determine the actions needed to rectify the problem. Workers will not be allowed to work near insects where an unreasonable risk is presented.
Lifting, manual labor	The Safety and Health Supervisor or SSHR will identify ergonomic factors and will develop ameliorative measures to prevent untoward effects. Back protection, lifting techniques, and warm-up will be used prior to strenuous tasks. Special hand protection will be required if indicated.
Ionizing radiation	Dosimetry, radiation surveys, contamination surveys.
Nonionizing radiation	Establishment of safe work areas, monitoring.

(table continues)

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Table 6-1 (continued)

Industrial Hazards	Methods to Assure Worker Safety
Solar radiation	Protective clothing or sunblock.
Vibration	Limitations on intensity and duration of exposure.
Vermin	Site screening, traps, protective boots.
Wild animals	Site screening, fencing, traps.
Poison plants	Site screening, protective clothing, removal, skin creams.
Snakes	Site screening, protective clothing, first-aid kits on-site.
Manual material handling	Proper lifting technique; using a helper when lifting heavy objects; training.
Slip, trips, and falls	Good housekeeping practices.
Cuts, contusions, and electrocutions	Lockout/tagout practices, use of machine guarding, use of safe operating practices.
Falling from vessel, drowning	Personal flotation devices will be worn in vessels without guardrails. Divers will be certified and trained for the specific diving activity. A written dive plan will be submitted and followed for all diving operations. A standby diver will be available at all times.
Cold stress	Any personnel that fall into the water will be required to don clean, dry clothing as soon as possible.
Traffic (auto and boat)	Traffic control is required on or at edge of roadways. Crossing of taxiways and/or runways requires prior clearance from the base. A "chase boat" (small motorized boat) shall be in the water and manned during underwater diving operations. Proper flags and/or day shapes are required during underwater work.

Notes:

- <sup>a</sup> dB – decibel
- <sup>b</sup> SSHR – Site Safety and Health Officer
- <sup>c</sup> UL – Underwriter's Laboratory
- <sup>d</sup> PPE – personal protective equipment

next to drill rigs shall be required to wear hearing protection (ear plugs or muffs) to reduce their exposure to excessive noise. Persons who enter areas in excess of 85 decibels (dB) will be required to wear hearing protection. CLEAN PP SH 3.3, Hearing Conservation, describes the methods used to comply with OSHA hearing conservation requirements.

Subcontractor personnel shall implement equivalent effective hearing conservation programs in accordance with Program requirements.

### 6.3.2 Energized and Rotating Equipment

In all cases, heavy equipment with rotating shafts or gears shall be guarded to prevent accidental contact. Only experienced operators are allowed to work around rotating parts that cannot be adequately guarded. Personnel who must work around rotating equipment shall not wear loose-fitting clothes that could get caught. Special precautions should be

observed during drilling operations involving casing removal to avoid potential accidents due to equipment failure or breakage.

Program personnel will not operate or handle drilling equipment or heavy equipment owned by subcontractors. The drilling subcontractors will maintain and implement safety procedures according to their safety and health plan. Only qualified subcontractor personnel shall operate heavy equipment during field activities. Subcontractors shall maintain in operating condition all appropriate safety devices on all machinery and rotating equipment (e.g., backup alarms, emergency stops, guards) at all times. Subcontractors shall implement effective safety programs for use of this type of equipment.

### 6.3.3 Vehicle and Heavy Equipment Operation

Vehicles shall only be operated in authorized areas. When moving equipment, caution should be exercised in order not to damage equipment or cause injury. When backing up heavy vehicles (larger than pickup trucks), passenger vehicles, or pickups with obscured rear vision, a guide shall be used to direct the vehicle. Extra caution shall be exercised during vehicle operation on dike roads, industrial areas, and other close spaces. Personnel directing traffic shall wear orange vests. Each vehicle shall be equipped with a minimum of one fire extinguisher rated 3A:40B:40C. Refer to ~~PP-SH-5.1.7~~, Vehicle and Heavy Equipment Safety, for vehicle inspection and documentation requirements.

PP SH 5.1.1

### 6.3.4 Subcontractor-Furnished Equipment

The subcontractor is responsible for proper and safe operation of all the equipment they bring to the site. Program employees will not operate subcontractor-furnished equipment unless that equipment is expressly provided for use of Program personnel. This section does not prohibit use of power from subcontractor-provided generators or the handling of drilling tool components such as samplers.

### 6.3.5 Steam-Cleaning Equipment

Eye and face protection shall be used by steam cleaner operators. Only qualified personnel trained in the safe operation and maintenance of steam cleaners shall be authorized to use them. Subcontractors operating such equipment shall include safety precautions in their code of safe practices.

### 6.3.6 Falling, Slipping, and Tripping

Work zone surfaces shall be maintained in a neat and orderly state. Foot traffic shall avoid areas where materials are stored on the ground. Tools and materials shall not be left randomly on surfaces where not in direct use. The drilling crew supervisor shall assure that the work area around each drilling operation is maintained in a neat and orderly state. Hoses and cables shall be grouped, routed to minimize hazards, and

## Section 6 Hazard Analysis

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covered with a ramp or bridge or clearly marked with hazard tape or flags if such material will remain in place for more than one shift.

### 6.3.7 Manual Lifting Techniques

During any manual material-handling tasks, personnel shall be trained to lift with the force of the load suspended on their legs and not on their backs. An adequate number of personnel or an appropriate mechanical device must be used to safely lift or handle heavy equipment. When heavy objects must be lifted manually, workers shall keep the load close to the body and shall avoid any twisting or turning motions to minimize stress on the lower back. The SSHR can provide a lifting orientation and specific back stretching and warm-up exercises to help minimize the potential for back injuries. Use of these exercises by all field personnel at the start of each shift will be encouraged by the SSHR.

### 6.3.8 Extreme Heat and Heat Stress

Heat stress is an important health consideration on Program sites. Weather conditions, characterized by high temperatures and low humidity, in conjunction with wearing personal protective clothing, may aggravate heat-stress problems. Standard measures, including designating a shaded rest area, taking frequent rest breaks, and performing heat-stress monitoring of workers, shall be used to minimize heat-stress-related problems. A readily available supply of liquids, such as water and fluids containing electrolytes, will be available at the work site to replenish body fluids. Visual observation of workers by the SSHR for heat-stress-related signs and symptoms, and body core temperature monitoring will be performed when outside temperatures exceed 70 degrees Fahrenheit (°F) and impermeable clothing is being worn, when outside temperatures exceed 90°F in street clothes, or whenever other conditions warrant. Signs and symptoms of heat stress include profuse sweating, headache, skin flushing, dizziness, confusion, and rapid heart rate. Workers exhibiting a body core temperature of 100.4°F or greater (measured at the ear drum) will be removed to a cooler area or activity until body core temperature returns to below 99°F.

If persons exhibiting heat-stress symptoms are left untreated, the condition can elevate to heat stroke. Heat stroke is typically manifested by hot, dry skin with a body core temperature of 104°F or greater. Heat stroke can be fatal if treatment is delayed. Therefore, persons exhibiting heat-stroke symptoms need to have their core temperature reduced immediately by use of cold packs, cold water wipes, or immersion. Heat-stroke victims need to be transported to a professional medical facility immediately after the victim's core temperature has been reduced or while the victim's core temperature is being reduced.

### 6.3.9 Work Over or Near Water

Work over or near water where there is a potential for employees to fall in and drown will be conducted in accordance with the requirements of applicable OSHA standards and

COE EM 385-1-1. Work within 15 feet of unobstructed access to water shall be deemed to be within the requirements of this section. Except where employees are protected by continuous guardrails, safety belts, or nets, the requirements in Section 18.5 shall be met by all personnel.

### **6.3.10 General Physical Hazards**

The site may include ditches, areas that are poorly drained, rough or uneven terrain, depressed areas (that may present oxygen deficiency or flammable gas collection areas), protruding objects, and impalement hazards. The SSHR shall assure that a careful prework walkover is made of all work areas and potential access or egress routes. Unsafe areas may be flagged or taped by the SSHR and will be identified to all personnel.

## **6.4 RADIATION HAZARDS**

Program workers may be exposed to a variety of radiation hazards when working in the military site environment. Radiation hazards that may be associated with CTO projects are discussed in the following sections: ionizing radiation, nonionizing radiation, and solar radiation. These radiation hazards will be evaluated and controlled in accordance with PP SH 6.2, Field Radiation Surveys.

### **6.4.1 Ionizing Radiation**

Ionizing radiation arises from nuclear isotopic sources such as radiography cameras and radium devices (buttons, plaques, needles) and from energized sources such as X-ray machines, accelerators, and high-voltage equipment. Some burial sites may have contamination with ionizing radiation sources. Where review of site history reveals the potential for ionizing radiation, the SHS shall consult with the Program Health Physicist to develop a radiological control evaluation plan.

### **6.4.2 Nonionizing Radiation**

Nonionizing radiation arises from military communication, radar, and other sensing devices. Particularly intense fields may be experienced around some operational equipment such as antennas, operational aircraft, and vessels. Where the potential for nonionizing radiation fields in the work area are identified, the SHS will consult with the Program Health Physicist to evaluate the hazard to Program personnel.

### **6.4.3 Solar Radiation**

The SSHR will encourage Program personnel working out of doors to utilize covering or sunblock preparations to minimize the harmful effects of the sun's rays on the skin.

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### 6.5 VIBRATION

Vibration-induced damage may occur when equipment operators handle vibrating equipment or tools for long periods of time. Where use of vibrating equipment is identified, the SHS shall be consulted for an evaluation.

### 6.6 INDUSTRIAL HAZARDS

Program activities at field sites may expose personnel to various industrial hazards. Table 6-1 and the following sections present a summary of the common industrial hazards expected and general methods that will be utilized by the Program to assure worker safety. A task-by-task analysis of industrial hazards for work to be conducted at a site during a specific task will be provided in the SSHP for that work.

The SSHR or designee will observe all operations, particularly drill rig operations, to oversee industrial safety hazards such as pinch-points (areas on the drill rigs where limbs or extremities may become caught, mutilated, or dismembered).

To prevent injuries from industrial hazards, engineering controls, administrative procedures (e.g., lockout-tagout procedures), and equipment-guarding techniques will be implemented. In addition, personal protective equipment (PPE) will be used when engineering controls alone cannot reduce the risk of exposure to hazards to acceptable limits.

The overall risks posed by industrial activities associated with cleaning, decontamination, excavation, vehicle operation, and earth-drilling activities are considered greater than the risks posed by potential exposure to chemicals that are the subject of investigation when proper PPE practices are followed; therefore, compliance with safety rules and procedures is of equal or greater importance than compliance with health rules.

#### 6.6.1 Underground Cables

Because buried underground cables may be present at this site. An underground utility check will be performed before drilling. In addition, where records are inadequate or questionable, a utility search using specialized cable-detection equipment will be performed. Hand boring will be utilized to locate cables when their presence is suspected. PP SH 5.1, Field Safety Program, and site activity safety requirements set forth the detailed requirements for obtaining clearance to excavate, drill, or otherwise perform soil-intrusive activities at the site.

#### 6.6.2 Oxygen Deficiency

Oxygen deficiency can occur in confined spaces, open test pits, or low-lying areas as a result of displacement by another gas (marsh gas, chemical decomposition, or leaking gas cylinders) or by the consumption of oxygen by chemical reaction (rust). The SSHR shall monitor all suspect areas prior to initial entry into test pits, depressions, or low-lying areas. The SSHP will specify the frequency of monitoring during subsequent entry.

### 6.6.3 Low-Lying Areas

In some instances, large depressed areas must be entered where a case-by-case site hazard evaluation has determined that the potential for toxic or oxygen-displacing gas buildup exists and monitoring cannot be performed prior to entry to the area. In some instances, the entry team shall carry an oxygen/lower explosive limit (LEL)/hydrogen sulfide (H<sub>2</sub>S) detector and photoionization detector (PID) gas detector. A backup rescue team equipped with self-contained breathing apparatus (SCBA) equipment shall be on standby for those sites where the potential for hazardous atmosphere is considered present.

### 6.6.4 Chemical Handling

Chemicals brought into the field by Program personnel or activity support personnel may be used for activities such as surface and equipment decontamination, weed or pest control, and waste treatment and/or encapsulation. Hazards associated with these chemicals may include the following:

- possible oxygen deficiency if used in areas with poor ventilation;
- chemical burns or irritations;
- toxic exposures; and
- fires/explosions.

The SHM shall evaluate the need for special chemical-handling procedures during the chemical-use review process.

### 6.6.5 Drum Excavation/ Sampling

Buried containers may exist on Program work sites. The discovery of unanticipated buried drums shall be considered an unusual event requiring temporary work stoppage and evaluation. These containers may be encountered during drilling operations and/or excavation tasks when operating over old landfills or dump sites.

Potential hazards of handling buried containers of unknown content include the following:

- fire/explosion;
- exposure of workers or general public to toxic, corrosive, and/or flammable chemicals; and
- spillage of materials with risk of migration to uncontrolled areas.

The activity POC established for environmental matters will be contacted by the SSHR or field team leader. The ROICC will also be contacted.

Typically, buried drums will be evaluated, stabilized (when necessary), and eventually sampled prior to handling and disposal. A specialty subcontractor will be utilized to

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perform these activities. Drum handling shall be in accordance with COE EM 385-1-1 Section 28.H, Handling Drums and Containers.

### 6.6.6 Soil Excavation/Trenching

Excavation of contaminated soil presents multiple hazards to workers including chemical exposure, fire and explosion hazards, and exposure to hazards of contacting unidentified energized utilities.

PP SH 5.1, Field Safety Program, and site activity safety requirements described in the SSHP set forth the detailed requirements for obtaining clearance to excavate at the site.

### 6.6.7 Confined Space Entry

Confined spaces, including but not limited to trenches, ditches, holes, culverts, structures, and tanks, present multiple hazards including oxygen deficiency, toxic agent exposure, heat stress, engulfment, and other hazards.

Confined space entry is not generally authorized for Program personnel. Confined space entries will be made in accordance with a specific confined space entry permit approved by the SHS. A designated OSHA-competent person for confined space work shall be on-site during all confined space entry activities.

Detailed confined space entry procedures are set forth in PP SH 5.1.3, Confined Space Entry.

### 6.6.8 Overhead Electrical Hazards

Overhead cables may be present on sites. Refer to PP SH 5.1, Field Safety Program, for details. A detailed hazard analysis shall be prepared by the subcontractor in accordance with PP SH 5.1.2, Safe Work Operation Process, prior to operating heavy equipment (drilling rigs, excavators, cranes) underneath or within 20 feet of the maximum reach of the equipment. The analysis will consider equipment failure of overhead electrical hazards or switch gear.

### 6.6.9 Fire and Explosion Hazards

The potential for development of high total petroleum hydrocarbons (TPH) concentrations or flammable concentrations of other materials where soil-intrusive work is occurring may exist. Care shall be taken to assure that explosive mixture monitoring is performed in an adequate manner and that ignition sources are controlled or eliminated in accordance with the ROICC or designated installation safety coordinator requirements.

### 6.6.10 Pipelines

Overhead and buried pipelines containing natural gas and petroleum fuels are common on military installations. These pipelines present another source of a potential fire and

explosion hazard. All work areas will be cleared by the ROICC or designated installation safety coordinator or operating area safety coordinator prior to soil-intrusive work or movement of heavy equipment into or through utility corridors. Project personnel will obtain written clearances in accordance with PP SH 5.1, Field Safety Program, and site activity safety requirements that set forth the detailed requirements for obtaining clearance to excavate at the site. In addition, when locations of buried lines are uncertain, excavation shall always be performed by hand until the utility is located or the area is cleared. The responsible installation operations or maintenance department will review the location of emergency shutoff valves with project personnel at the prejob meeting or tool box safety meeting prior to working in an area of concern.

#### **6.6.11 High-Pressure Hoses**

High-pressure hose ends may whip if the fitting becomes disconnected. All hose ends shall be secured to minimize whipping, and connections should be secured to prevent accidental disconnects.

#### **6.6.12 Suspended Loads**

Work is not permitted under suspended loads during lifts. Accessible areas under suspended loads shall be barricaded where feasible.

#### **6.6.13 Static Electricity**

Static electricity may build up from pouring of fluids or other activities. Personnel shall be informed of potential sources of static buildup. Grounding shall be used during fuel transfer and other potential static-producing activities in the vicinity of potentially hazardous environments.

#### **6.6.14 Unstable or Steep Terrain**

Extreme caution shall be used when moving heavy equipment over steep terrain. The advice of a soils engineer should be obtained before working or crossing potentially unstable terrain.

#### **6.6.15 Work Near Roadways**

Traffic control shall be implemented in accordance with installation requirements or the Manual of Traffic Controls for Construction and Maintenance Work Zones. Employees performing traffic control shall wear orange garments in the daytime and reflectorized garments after dusk. Work near roadways will be halted during periods of heavy rainfall.

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### **6.6.16 Welding and Torch Cutting**

Welding shall not be conducted without permit or approval of the ROICC or designated installation safety coordinator. Welding shall not be conducted over a borehole without a special procedure approved by the SHS.

### **6.6.17 Work from Elevated Platforms**

Work from elevations greater than 6 feet shall require fall-protection devices.

## **6.7 CHEMICAL HAZARDS**

This section describes the toxicological (health) hazards associated with exposure to organic and inorganic chemicals and metals during the project (Table 6-2). A tabulation of chemicals and metals typical of military installation environments and suspected to be present at the site is provided in the SSHP.

Particular chemicals commonly encountered are discussed in the following sections.

In dry, arid desert conditions, exposure may occur principally by inhalation of contaminated particulates. Exposure to vapors can occur if trapped volatiles are exposed to the high heat conditions once the material is exposed to the atmosphere.

### **6.7.1 Benzene**

Benzene is a common constituent of motor fuels, aviation gasoline, and some industrial solvents. A known human carcinogen, benzene is the principal concern and the basis for establishing the action levels for continuous monitoring equipment in the vicinity of gasoline and other light distillate products. Continuous organic vapor monitoring will not detect benzene specifically; therefore, the action level is based upon the conservative assumption that the benzene content of the volatile mixture is less than 20 percent. The action level for respiratory protection may be revised once the airborne contaminant environment is fully characterized. The use of benzene-specific detector tubes or portable gas chromatography may be used to quantify benzene concentrations.

In the event that the presence of benzene is confirmed to be above the OSHA action level, guidelines set forth in the OSHA document, Benzene Regulated Areas, will be implemented.

### **6.7.2 Flammability**

The possibility of flammable vapors from high concentrations of volatile petroleum hydrocarbons in groundwater or from a layer of free product exists at field sites. Accordingly, monitoring will be conducted in accordance with PP SH 4.4, Hazard Monitoring Program, to identify locations where flammable vapors may ignite from sparks generated by equipment.

**Table 6-2**  
**Toxicological Properties of Chemical Compounds Suspected to Be Present**

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
<b>Volatile Organic Compounds</b>					
Acetone	AL <sup>a</sup> : NE <sup>b</sup> PEL <sup>c</sup> : 1,000 ppm <sup>d</sup> STEL <sup>e</sup> : 1,000 ppm TLV <sup>f</sup> : 750 ppm IDLH <sup>g</sup> : 2,500 ppm	Eyes, skin, respiratory system, CNS <sup>h</sup>	Irritated eyes, nose, throat; headache, dizziness, CNS depression; dermatitis	Charcoal tube	Inhalation, ingestion, contact
Aviation gasoline	AL: NE PEL: 5 ppm STEL: NE TLV: 5 ppm IDLH: 250 ppm	Eyes, skin, respiratory system, CNS, lungs, kidneys, CVS <sup>i</sup> , pancreas	Irritated eyes, mucus membrane; skin burns; confusion; depression; dermatitis	XAD-2 tube	Inhalation, skin absorption, ingestion
Benzene	AL: 0.5 ppm PEL: 1 ppm STEL: 5 ppm TLV: 10 ppm IDLH: 500 ppm	Blood, CNS, skin, bone marrow, eyes, respiratory system, carcinogen	Irritation of eyes, skin, respiratory system; giddiness; headache; nausea; staggering gait; fatigue; anorexia; lassitude; dermatitis; bone marrow depressant	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Bromoform	AL: NE PEL: 0.5 ppm STEL: NE TLV: 0.5 ppm IDLH: 850 ppm	Respiratory system, eyes, CNS, skin, liver, kidneys	Irritated eyes, skin, respiratory system; CNS depression; liver, kidney damage	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Carbon tetrachloride	AL: NE PEL: 10 ppm STEL: 10 ppm TLV: 5 ppm IDLH: 200 ppm	Lungs, liver, kidneys, eyes, CNS, skin, liver cancer in animals	Irritated eyes, skin; CNS depression; nausea, vomiting; liver, kidney damage; drowsiness, dizziness, incoordination	Charcoal tube	Inhalation, ingestion, contact

## 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
Chlorine	AL: NE PEL: 1 ppm C <sup>d</sup> STEL: 1 ppm TLV: 0.5 ppm IDLH: 10 ppm	Eyes, skin, respiratory system	Burning eyes, nose, and mouth; lacrimation, rhinorrhea; coughing, choking, substernal pain; nausea, vomiting, headache, dizziness; syncope; pulmonary edema; pneumonia; hypoxemia; dermatitis	Detector tube Direct-reading instrument	Inhalation, contact
Chloroform	AL: NE PEL: 50 ppm C STEL: NE TLV: 10 ppm IDLH: 500 ppm	Liver, kidneys, heart, eyes, skin, CNS	Irritated eyes, skin; CNS depression; mental dullness; anesthesia; fatigue; nausea; liver, kidney damage	Charcoal tube	Inhalation, ingestion, contact
1,2-dichloroethane (1,2-DCA) (ethylene dichloride)	AL: NE PEL: 50 ppm STEL: 100 ppm C TLV: 10 ppm IDLH: 50 ppm	Eyes, skin, kidneys, liver, CNS, CVS; NIOSH <sup>h</sup> considers a carcinogen; forestomach, mammary gland, and circulatory system cancer in animals	Irritated eyes, corneal opacity; CNS depression; nausea; vomiting; dermatitis; liver, kidney and cardiovascular damage	Charcoal tube	Inhalation, skin absorption, ingestion, contact
1,2-dichloroethene (1,2-DCE)	AL: NE PEL: 200 ppm STEL: NE TLV: 200 ppm IDLH: 1,000 ppm	Eyes, respiratory system, NIOSH considers a carcinogen	Irritated eyes, respiratory system; CNS depression	Charcoal tube	Inhalation, skin absorption, ingestion, contact
1,3-dichloropropene	AL: NE PEL: NE STEL: NE TLV: 1.0 ppm IDLH: NE	Eyes, skin, respiratory system, CNS, liver, kidneys; bladder, liver, lung, and forestomach cancer in animals	Irritated eyes, skin, respiratory system; eye and skin burns; lacrimation; headache; dizziness (liver, kidney damage in animals)	None available	Inhalation, skin absorption, ingestion, contact
Diesel fuel/kerosene	AL: NE PEL: NE STEL: NE TLV: 14 ppm IDLH: NE	Eyes, skin, respiratory system, CNS	Irritated eyes, skin, nose, throat; burning sensation in chest; confusion; dermatitis; chemical pneumonia from aspirated liquid	Charcoal tube	Inhalation, skin absorption, ingestion, contact

Table 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
Ethylbenzene	AL: NE PEL: 100 ppm STEL: 125 ppm TLV: 100 ppm IDLH: 800 ppm	CNS, skin, eyes, respiratory system	Irritated eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Charcoal tube	Inhalation, ingestion, contact
n-hexane	AL: NE PEL: 500 ppm STEL: NE TLV: 50 ppm IDLH: 1,100 ppm	Respiratory system, eyes, CNS, skin, PNS <sup>1</sup>	Irritated eyes, nose; light-headedness; nausea, headaches; dermatitis; peripheral neuropathy; numbness of extremities, muscle weakness; giddiness; chemical pneumonia	Charcoal tube	Inhalation, ingestion, contact
Mercury (except [organo] alkyls)	AL: NE PEL: 0.1 mg/m <sup>3m</sup> C STEL: 0.03 mg/m <sup>3</sup> TLV: 0.01 mg/m <sup>3</sup> IDLH: 10 mg/m <sup>3</sup>	Eyes, skin, respiratory system, CNS, kidneys	Irritated eyes, skin; cough, chest pain, dyspnea, bronchitis, pneumonitis; tremors, insomnia, irritability, headache, fatigue, weakness, stomatitis, salivation; GI <sup>n</sup> disturbance, anorexia; proteinuria	Direct reading instrument, detector tube, HYDRAR <sup>®</sup> sorbent tube	Inhalation, ingestion, contact
1,1,2,2-tetrachloroethane	AL: NE PEL: 5 ppm STEL: 1 ppm TLV: 1 ppm IDLH: 100 ppm	Skin, liver, kidneys, CNS, GI tract, NIOSH considers a carcinogen; liver tumors in animals	Nausea, vomiting, abdominal pain; jaundice, hepatitis, tremor fingers; liver tenderness; dermatitis; monocytosis; kidney damage	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Tetrachloroethene (PCE)	AL: NE PEL: 100 ppm STEL: 150 ppm TLV: 25 ppm IDLH: 150 ppm	CNS, liver, kidneys, eyes, skin, respiratory system. NIOSH considers a carcinogen; liver tumors in animals	Irritated eyes, nose, throat; nausea; flushed face, neck; vertigo, dizziness, incoordination; headache, somnolence; skin erythema; liver damage	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Toluene	AL: NE PEL: 200 ppm STEL: 150 ppm TLV: 50 ppm IDLH: 500 ppm	CNS, liver, kidneys, skin, eyes, respiratory system	Irritated eyes, nose, throat; fatigue, weak, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation, nervousness, muscle fatigue, insomnia, paresthesia, dermatitis; liver, kidney damage	Charcoal tube	Inhalation, skin absorption, ingestion, contact
1,1,1-trichloroethane (TCA) (methyl chloroform)	AL: NE PEL: 350 ppm STEL: 450 ppm TLV: 350 ppm IDLH: 700 ppm	Eyes, skin, CNS, CVS, liver	Irritated eyes, skin; headache, lassitude, CNS depression, poor equilibrium; dermatitis; cardiac arrhythmia; liver damage	Charcoal tube	Inhalation, ingestion, contact

Table 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
1,1,2-trichloroethane	AL: NE PEL: 10 ppm STEL: NE TLV: 10 ppm IDLH: 100 ppm	Eyes, respiratory system, CNS, liver, kidneys; liver cancer in animals	Irritated eyes, nose, throat; CNS depression; liver, kidney damage; dermatitis	Charcoal tube	Inhalation, ingestion, contact
Trichloroethene (TCE)	AL: NE PEL: 50 ppm STEL: 200 ppm C TLV: 50 ppm IDLH: 1000 ppm	Eyes, respiratory system, liver, heart, CNS, skin; liver and kidney cancer in animals	Irritated eyes, skin; headaches; vertigo; vision disturbances; fatigue, giddiness, tremors, somnolence, nausea, vomiting; dermatitis; cardiac arrhythmia, paresthesia; liver injury	Charcoal tube	Inhalation, skin absorption, ingestion, contact
Vinyl chloride	AL: NE PEL: 1 ppm STEL: 5 ppm C TLV: 5 ppm IDLH: NE	Respiratory system, liver, lymphatic system, CNS, blood, (liver cancer)	Weakness; abdominal pain, GI bleeding, enlarged liver, liver cancer, pallor, or cyanosis extremities, frostbite (liquid)	Charcoal tube	Inhalation, ingestion, contact
Xylene(s)	AL: NE PEL: 100 ppm STEL: 150 ppm TLV: 100 ppm IDLH: 900 ppm	CNS, liver, kidneys, skin, eyes, respiratory system, GI tract, blood	Irritated eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination; staggering gait; corneal vacuolation; anorexia, nausea, vomiting, abdominal pain; dermatitis	Charcoal tube	Inhalation, skin absorption, ingestion, contact
<b>Semivolatile Organic Compounds</b>					
Anthracene (coal tar pitch volatiles)	AL: NE PEL: 0.2 mg/m <sup>3</sup> STEL: NE TLV: 0.2 mg/m <sup>3</sup> IDLH: 80 mg/m <sup>3</sup>	Respiratory system, skin, bladder, kidneys (lung, kidney, and skin cancer)	Dermatitis; bronchitis	Filter	Inhalation, contact
Aroclor 1242 (polychlorinated biphenyl [42% chlorine])	AL: PEL: 1.0 mg/m <sup>3</sup> STEL: none TLV: 1.0 mg/m <sup>3</sup> IDLH: 5.0 mg/m <sup>3</sup>	Skin, eyes, liver, reproductive system; tumors of the pituitary gland and liver, and leukemia in animals	Irritated eyes, chloracne, liver damage; reproductive effects	Florisil filter, Hexane GC <sup>o</sup> /ECD <sup>p</sup>	Inhalation, skin contact, ingestion

Table 6-2 (continued)

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Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
Aroclor 1254 (polychlorinated biphenyl {54% chlorine})	AL: PEL: 0.5 mg/m <sup>3</sup> STEL: none TLV: 0.5 mg/m <sup>3</sup> IDLH: 5.0 mg/m <sup>3</sup>	Skin, eyes, liver, reproductive system, tumors of the pituitary gland and liver, and leukemia in animals	Irritated eyes, chloracne, liver damage; reproductive effects	Florisil filter, Hexane GC/ECD	Inhalation, skin contact, ingestion
Benzo(a)pyrene (coal tar pitch volatiles)	AL: NE PEL: 0.2 mg/m <sup>3</sup> STEL: NE TLV: 0.2 mg/m <sup>3</sup> IDLH: 80 mg/m <sup>3</sup>	Respiratory system, skin, bladder, kidneys (lung, kidney, and skin cancer)	Dermatitis, bronchitis	Filter	Inhalation, contact
Chlordane	AL: NE PEL: 0.5 mg/m <sup>3</sup> STEL: TLV: 0.5 mg/m <sup>3</sup> IDLH: 100 mg/m <sup>3</sup>	CNS, eyes, lungs, liver, kidneys; liver cancer in animals	Blurred vision, confusion; ataxia, delirium, coughing, abdominal pain, nausea, vomiting, diarrhea; irritability, tremors, convulsions; anuria; liver, kidney damage in animals	Filter/ Chromosorb tube	Inhalation, skin absorption, ingestion, contact
Dalapon (2,2-dichloropropionic acid)	AL: NE PEL: NE STEL: NE TLV: 1.0 ppm IDLH: NE	Eyes, skin, respiratory system, GI tract, CNS	Irritated eyes, skin; upper respiratory system, eye, skin burns; lassitude, loss of appetite, diarrhea, vomiting, slowing of pulse; CNS depression	None available	Inhalation, ingestion, contact
Dichlorodiphenyl-trichloroethane (DDT)	AL: NE PEL: 1 mg/m <sup>3</sup> STEL: TLV: 1 mg/m <sup>3</sup> IDLH: 500 mg/m <sup>3</sup>	Eyes, skin, CNS, kidneys, liver, PNS; liver, lung, and lymphatic tumors in animals	Irritated eyes and skin; paresthesia tongue, lips, face; tremors; apprehension, dizziness, confusion, malaise, headache, fatigue; convulsions; paresis hands; vomiting; carcinogen	Particulate filter	Inhalation, skin absorption, ingestion, contact
2,4-dichlorophenoxyacetic acid	AL: NE PEL: 10 mg/m <sup>3</sup> STEL: NE TLV: 10 mg/m <sup>3</sup> IDLH: 100 mg/m <sup>3</sup>	Skin, CNS, liver, kidneys	Weakness, stupor, hyporeflexia, muscle twitching, convulsions; dermatitis; liver, kidney damage in animals	Particulate filter	Inhalation, ingestion, skin contact, skin absorption
2,4-dichlorophenoxy butanoic acid (2,4-DB)	AL: NE PEL: NE STEL: NE TLV: NE IDLH: NE	Not reported	Not reported	Not reported	Ingestion, skin contact

Table 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
1,3-dichloropropene	AL: NE PEL: NE STEL: NE TLV: 1.0 ppm IDLH: NE	Eyes, skin, respiratory system, CNS, liver, kidneys; cancer of the bladder, liver, lung, and forestomach in animals	Irritated eyes, skin, respiratory system, eye and skin burns, lacrimation, headache, dizziness	None available	Inhalation, skin absorption, ingestion, contact
Dioxin	AL: NE PEL: NE STEL: NE TLV: NE IDLH: NE	Eyes, skin, liver, kidneys, reproductive system; tumor at many sites in animals	Irritated eyes; allergic dermatitis, chloracne; porphyria; GI disturbance; possible reproductive, teratogenic effects; (liver, kidney damage; hemorrhage; cancer in animals)	None available	Inhalation, skin absorption, ingestion, contact
Endosulfan	AL: NE PEL: NE STEL: NE TLV: 0.1 mg/m <sup>3</sup> IDLH: NE	Skin, CNS, liver, kidneys, reproductive system	Irritated skin, nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache; kidney, liver injury, decreased testis weight in animals	None available	Inhalation, skin absorption, ingestion, contact
2-methylnaphthalene	AL: NE PEL: NE STEL: NE TLV: NE IDLH: NE	Not reported	Not reported	Not reported	
Naphthalene	AL: NE PEL: 10 ppm STEL: 15 ppm TLV: 10 ppm IDLH: 250 ppm	Eyes, skin, blood, liver, kidneys, CNS	Irritated eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritated bladder; profuse sweating, jaundice; hematuria, hemoglobinuria, renal shutdown; dermatitis; optical neuritis, corneal damage	Charcoal filter	Inhalation, skin absorption, ingestion, contact
Phthalic anhydride (PAN)	AL: NE PEL: 2 mg/m <sup>3</sup> STEL: NE TLV: NE IDLH: 60 mg/m <sup>3</sup>	Eyes, skin, respiratory system, liver, kidney	Irritated eyes, skin, upper respiratory system; conjunctivitis; nasal ulceration bleeding; bronchitis, bronchial asthma; dermatitis; liver, kidney damage in animals	Filter	Inhalation, ingestion, contact

Table 6-2 (continued)

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Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
Waste oil	AL: NE PEL: NE STEL: NE TLV: NE IDLH: NE	Eyes, skin, respiratory system, CNS	Irritated eyes, nose and throat; dizziness; drowsiness; headache	Chromosorb tube (charcoal)	Inhalation, ingestion, contact
<b>Metals</b>					
Arsenic	AL: NE PEL: 2 µg/m <sup>3</sup> <sub>a</sub> STEL: NE TLV: 10 µg/m <sup>3</sup> IDLH: 5 mg/m <sup>3</sup>	Liver, kidneys, skin, lungs, lymphatic system, cancer	Ulceration of the nasal septum, dermatitis, GI disturbances, respiratory irritation; peripheral neuropathy; hyperpigmentation of the skin	0.8-micron MCEF <sup>c</sup> filter	Inhalation, ingestion, skin contact
Beryllium	AL: NE PEL: 2 µg/m <sup>3</sup> STEL: 5 µg/m <sup>3</sup> <sub>C</sub> TLV: 2 µg/m <sup>3</sup> IDLH: 4 mg/m <sup>3</sup>	Eyes, skin, respiratory system (lung cancer)	Chronic exposure will cause lung fibrosis, chest pains, cough, clubbing of fingers, anorexia, cyanosis, irritated eyes, dermatitis	0.8-micron MCEF filter	Inhalation, ingestion, contact
Chromium (III)	AL: NE PEL: 0.5 mg/m <sup>3</sup> STEL: NE TLV: 0.5 mg/m <sup>3</sup> IDLH: 25 mg/m <sup>3</sup>	Eyes, skin	Irritated skin, sensitization dermatitis	Filter	Inhalation, ingestion, contact
Chromium (VI)	AL: NE PEL: 0.1 mg/m <sup>3</sup> STEL: NE TLV: 0.05 mg/m <sup>3</sup> IDLH: 15 mg/m <sup>3</sup>	Blood, respiratory system, liver, kidneys, eyes, skin (lung cancer)	Irritated respiratory system, nasal septum perforation; liver, kidney damage; leukocytosis, leukopenia, monocytosis, eosinophilia; eye injury; conjunctivitis; skin ulcers; sensitization dermatitis	Filter	Inhalation, ingestion, contact
Cyanides	AL: NE PEL: 5 mg/m <sup>3</sup> STEL: TLV: 5 mg/m <sup>3</sup> IDLH: 25 mg/m <sup>3</sup>	Eyes, CNS, CVS, thyroid, blood	Irritated eyes, skin; headache, weakness, confusion, nausea, vomiting; thyroid; blood changes	0.8-micron MCEF filter	Inhalation, ingestion, contact

Table 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
Lead	AL: 30 $\mu\text{g}/\text{m}^3$ PEL: 50 $\mu\text{g}/\text{m}^3$ STEL: NE TLV: 50 $\mu\text{g}/\text{m}^3$ IDLH: 100 $\text{mg}/\text{m}^3$	Eyes, GI tract, CNS, kidneys, blood, gingival tissue	Irritated eyes, weakness, lassitude, insomnia, facial pallor, pale eyes; anorexia, malnutrition, low weight; abdominal pain, anemia, tremors; gingival lead line; paralysis wrist, ankles; encephalopathy; kidney disease; hypertension	0.8-micron MCEF filter	Inhalation, ingestion, contact
Magnesium	AL: NE PEL: 15 $\text{mg}/\text{m}^3$ STEL: NE TLV: 10 $\text{mg}/\text{m}^3$ IDLH: 750 $\text{mg}/\text{m}^3$	Eyes, respiratory system	Irritated eyes, nose; metal fume fever; cough, dust pain, flu-like fever	0.8-micron MCEF filter	Inhalation, ingestion
Manganese	AL: NE PEL: 5.0 $\text{mg}/\text{m}^3$ C STEL: 3.0 $\text{mg}/\text{m}^3$ TLV: 5 $\text{mg}/\text{m}^3$ IDLH: 500 $\text{mg}/\text{m}^3$	Respiratory system, CNS, blood, kidneys	Parkinson's disease; asthenia, insomnia, mental confusion; metal fume fever; dry throat, coughing, chest tight, dyspnea, rales, flu-like fever; low-back pain; vomiting; malaise; fatigue; kidney damage	Filter	Inhalation, ingestion
Nickel	AL: NE PEL: 1 $\text{mg}/\text{m}^3$ STEL: NE TLV: 1 $\text{mg}/\text{m}^3$ IDLH: 10 $\text{mg}/\text{m}^3$	Nasal cavities, lungs, skin (lung and nasal cancer)	Allergic asthma, sensitization dermatitis, pneumonitis	0.8-micron MCEF filter	Inhalation, ingestion, contact
Organotin	AL: NE PEL: 0.1 $\text{mg}/\text{m}^3$ STEL: NE TLV: 0.1 $\text{mg}/\text{m}^3$ IDLH: 25 $\text{mg}/\text{m}^3$	Eyes, skin, respiratory system, CNS, liver, kidney, urinary tract, blood	Irritated eyes, skin; respiratory system, headache, vertigo; sore throat, cough; psychoneurologic disturbance; abdominal pain, vomiting; urine retention; focal anesthesia; skin burns; hemolysis, hepatic necrosis, kidney damage in animals	Filter/XAD-2; HPLC <sup>2</sup> AAS <sup>1</sup>	Inhalation, liquid and vapors, skin absorption

Table 6-2 (continued)

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Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
<b>Mineral</b>					
Asbestos	AL: NE PEL: 0.1 fiber/cc <sup>a</sup> STEL: 1.0 fiber/cc TLV: 0.2 fiber/cc IDLH: NE	Respiratory system, eyes, lung cancer	Chronic exposure will cause asbestosis, dyspnea, intestinal fibrosis, restricted pulmonary function, finger clubbing	Filter, PCM <sup>b</sup> (7,400 fibers, 7,402 TEM <sup>b</sup> )	Inhalation, ingestion, contact
<b>Chemical Asphyxiants</b>					
Carbon monoxide	AL: NE PEL: 50 ppm STEL: NE TLV: 25 ppm IDLH: 1,200 ppm	CVS, lungs, blood, CNS	Headache, tachypnea, nausea, weakness, dizziness, confusion, hallucinations; cyanosis; angina, syncope	Direct-reading instrument, detector tubes	Inhalation
Hydrogen sulfide	AL: NE PEL: 200 ppm C STEL: 15 ppm TLV: 10 ppm IDLH: 100 ppm	Eyes, respiratory system, CNS	Irritated eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation, photophobia corneal vesiculation; dizziness; headache, fatigue, irritability, insomnia, GI disturbance	Direct-reading instrument, detector tubes, charcoal	Inhalation, contact

Table 6-2 (continued)

Chemical	Exposure Limits	Target Organs	Symptoms	Sampling Method and/or Media	Exposure Routes
<b>Common Simple Asphyxiants (flammable gases, may be flammable in large concentrations)</b>					
Hydrogen	LEL <sup>x</sup> : 4.1% UEL <sup>y</sup> : 74.2% FP <sup>z</sup> : -498°F lighter than air		Simple asphyxiants – “inert” gases or vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The minimal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, pO <sub>2</sub> of 135 torr). Atmospheres deficient in O <sub>2</sub> do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants present an explosion hazard. This factor should be taken into account in limiting the concentration of the asphyxiant.	Combustible gas meter/oxygen meter	Inhalation
Methane	LEL: 5.3% UEL: 15% FP: -306°F lighter than air			Combustible gas meter/oxygen meter	Inhalation
<b>Simple Asphyxiants</b>					
Argon Nitrogen Helium			Simple asphyxiants – “inert” gases or vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The minimal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, pO <sub>2</sub> of 135 torr). Atmospheres deficient in O <sub>2</sub> do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants present an explosion hazard. This factor should be taken into account in limiting the concentration of the asphyxiant.	Oxygen meter	Inhalation

**Table 6-2 (continued)**

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**Sources:**

Action Levels, Permissible Exposure Limits, 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, General Industry Safety Orders, Title 8, Article 5155  
Short-Term Exposure Limits, Immediate Danger to Life and Health, Harmful Effects, Symptoms, Method of Analysis and Routes of Exposure, National Institute for Occupational Safety and Health, Pocket Guide to Chemical Hazards  
Threshold Limit Values, American Conference of Governmental Industrial Hygienists

**Notes:**

- <sup>a</sup> AL – action level
- <sup>b</sup> NE – not established
- <sup>c</sup> PEL – permissible exposure limit
- <sup>d</sup> ppm – parts per million
- <sup>e</sup> STEL – short-term exposure limit
- <sup>f</sup> TLV – threshold limit value
- <sup>g</sup> IDLH – immediate danger to life and health
- <sup>h</sup> CNS – central nervous system
- <sup>i</sup> CVS – cardiovascular system
- <sup>j</sup> C – ceiling limit
- <sup>k</sup> NIOSH – National Institute for Occupational Safety and Health
- <sup>l</sup> PNS – peripheral nervous system
- <sup>m</sup> mg/m<sup>3</sup> – milligrams per cubic meter
- <sup>n</sup> GI – gastrointestinal
- <sup>o</sup> GC – gas chromatography
- <sup>p</sup> ECD – electron capture detector
- <sup>q</sup> µg/m<sup>3</sup> – micrograms per cubic meter
- <sup>r</sup> MCEF – mixed cellular ester fiber
- <sup>s</sup> HPLC – high-pressure liquid chromatography
- <sup>t</sup> AAS – atomic absorption spectroscopy
- <sup>u</sup> fiber/cc – fibers per cubic centimeter
- <sup>v</sup> PCM – phase content microscopy
- <sup>w</sup> TEM – transmission electron microscopy
- <sup>x</sup> LEL – lower explosive limit
- <sup>y</sup> UEL – upper explosive limit
- <sup>z</sup> FP – flash point

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### 6.7.3 Unidentified Chemicals

Chemicals That have not been identified or considered may be present at field locations. Until initial sampling, analysis, and atmospheric characterization are complete, site work shall be conducted in Level B protection if the action level for uncharacterized mixtures is exceeded. A conservative action level based upon total organic vapor monitoring will be utilized during fieldwork. Prior to starting site work, the SHS will attempt to determine what hazardous chemicals and other hazardous materials have affected the subsurface environment in the vicinity of the site work.

### 6.7.4 Hydrogen Sulfide

Hydrogen sulfide is a colorless, heavier-than-air gas with a characteristic odor. Hydrogen sulfide can be toxic or fatal if inhaled in high concentrations. Processing of crude oil results in the collection of H<sub>2</sub>S in process equipment. A process upset or equipment failure can result in the release of high concentrations of H<sub>2</sub>S to the environment. For this reason, when work is conducted in the vicinity of operations (refineries, petroleum extraction wells, or other processes) that have potential for significant H<sub>2</sub>S releases, site safety and health personnel should establish a method of communication with the operator of the source. An H<sub>2</sub>S monitor may be maintained at the fieldwork location, if the potential for a significant release is present. Monitoring equipment or detector tubes shall be utilized if a H<sub>2</sub>S release is suspected.

### 6.7.5 Lead

Lead may be encountered as a contaminant of soil in locations near tanks and other process equipment as a result of painting operations. Lead may also be encountered as a result of spills or leakage of lead additives to motor fuels. Lead is a toxic heavy metal and a suspected carcinogen that may be encountered in inorganic or organic forms.

Where lead is identified as present in sufficiently high concentrations, work will be conducted in accordance with the applicable OSHA standards.

### 6.7.6 Mercury

Mercury may be encountered as a contaminant of soil in locations near process equipment, tanks, and lines. Mercury was extensively used as a gauge fluid. Breakage of gauges may have resulted in spillage of mercury and soil contamination. Mercury is a toxic heavy metal.

Mercury is volatile at room temperature and may present an inhalation hazard even if no soil disturbance is occurring. Areas suspected of mercury contamination will be screened before work begins, either by chemical sampling or with a mercury vapor meter. Respiratory protection appropriate for the level of mercury present will be utilized.

### **6.7.7 Asbestos**

Asbestos may be a contaminant of soil in locations near overhead pipe racks, process areas, former process areas, or where fill has been imported. Asbestos occurs in soil as a result of deterioration of insulation that contained asbestos. Asbestos occurs as a common constituent of many manufactured products. Often the presence of asbestos cannot be ascertained by visual inspection. Among the products that contain asbestos are pipe, bricks, flooring, friction products, coatings, insulation, plastics, and textiles.

Asbestos is regulated as a carcinogen in accordance with OSHA. Work in areas where asbestos is present shall be evaluated by the SHS, and as applicable, OSHA regulatory requirements will apply to the work.

### **6.7.8 Arsenic**

Inorganic arsenic may be found in areas where certain industrial residue may have contaminated soils. Arsenic may also be found in areas where arsenic was used as an herbicide. Some arsenic compounds may release a toxic gas when in an acidic environment. Arsenic is a toxic heavy metal. Inorganic arsenic is regulated by OSHA as a carcinogen.

### **6.7.9 Polynuclear Aromatic Hydrocarbons**

Polynuclear aromatic hydrocarbons (PAHs) are produced from coal tar and other sources and are used in a variety of industrial products. PAH is a recognized human carcinogen. Exposure by any route to PAH and other recognized human carcinogens shall be maintained at the absolute practicable minimum level.

### **6.7.10 Polychlorinated Biphenyls**

Polychlorinated biphenyls (PCBs), also referred to as Aroclors, are synthetic industrial products that have been commonly used as cooling fluid and for electrical insulation. PCBs are common contaminants of oily type waste and are found around railroad tracks and in industrial areas and dumps. PCBs are recognized environmental pollutants and suspected human carcinogens. Work involving exposure to PCBs above the atmospheric action level or in contact materials exceeding 100 micrograms per gram may require special medical evaluation and approval of the Program SHM.

### **6.7.11 Other Heavy Metals**

A variety of heavy metals are encountered as contaminants at industrial military sites. Some heavy metals are highly toxic; others are also recognized human carcinogens. Because these materials are not volatile unless highly heated, control by proper use of PPE and personnel hygiene practices will prevent significant exposure to heavy metals.

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### 6.7.12 Chlorinated Solvents

Chlorinated solvents have been widely used at industrial and military sites in large quantities and may exist in free-product layers at some sites. Chlorinated solvents present a wide range of toxic modalities, with certain compounds being highly toxic and others being essentially inert. Chlorinated solvents are often identified by a familiar characteristic odor. The PID or flame ionization detector (FID) used for field monitoring has reduced sensitivity (response factor) for some chlorinated hydrocarbons. Detector tubes, halide monitors, or other methods may be used for detection. Sensing of the characteristic odor indicates the need to upgrade respiratory protection and to initiate personnel monitoring.

### 6.7.13 Dioxins

Dioxins are produced in industrial processes as contaminants in production of herbicides and as by-products of combustion of chlorinated hydrocarbons, particularly PCBs and trichlorobenzene. Dioxins are considered highly toxic and are suspected carcinogens, even in trace quantities. Sites where dioxin is potentially present include waste dumps used to dispose pesticides, areas of ground that have experienced fires, and areas of electrical equipment or electrical maintenance shops that have experienced fires. Project work where dioxins are present requires approval of the Program SHM.

### 6.7.14 Carcinogens

Carcinogens are any chemicals or products capable of causing or inducing cancer or leukemia in humans. For Program purposes, carcinogens are classified, based upon OSHA, American Conference of Governmental Industrial Hygienists (ACGIH), International Agency for the Research on Cancer (IARC) or National Toxicology Program (NTP) classifications, into recognized or confirmed human carcinogens (Class I), suspect human carcinogens (Class II), questionable carcinogens (Class III), or not recognized as carcinogenic. If recognized or suspect carcinogens (Class I or Class II) have been identified in work areas, they are identified as such in the SSHP. Exposure by any route to recognized human carcinogens without published exposure limits shall be maintained at the absolute practicable minimum level.

### 6.7.15 Nonaromatic Hydrocarbons

The category of nonaromatic hydrocarbons refers to a variety of volatile and semivolatile compounds, including simple hydrocarbons such as propane, pentane, and octane. These unspecified compounds are present in petroleum hydrocarbon mixtures and may exist as gas, vapor, liquid, or some combination. The compounds are generally of low toxicity; however, they produce a narcotic effect at moderate concentrations. Exposure to nonaromatic hydrocarbons at moderate concentrations may affect the operator's ability to operate machinery. The low toxicity of these materials is not a basis for allowing exposures in excess of established limits.

### **6.7.16 Simple Asphyxiants**

Work in the presence of large quantities of these materials (compressed or liquefied) shall be conducted with great care. These materials include low-toxicity hydrocarbon fuels (methane, ethane, propane, butane), welding cover gases (argon, helium, carbon dioxide), and nitrogen. These materials displace oxygen and, if present in large quantities or in confined spaces, produce unconsciousness, asphyxiation, and death.

Helium and hydrogen are simple asphyxiants that may also affect the reading of some explosive limit instruments due to high thermal conductivity. Excess nitrogen may similarly effect the reading of explosive-limit monitoring instruments by reducing the oxygen present for combustion.

### **6.7.17 Chlorine Gas**

Chlorine gas cylinders are common around industrial and military sites, particularly in water treatment plant areas. Chlorine is highly toxic, and even exposure to low concentrations may result in permanent lung damage. Entry into or work near chlorine gas storage areas requires special procedures, including the use of emergency escape respirators.

### **6.7.18 Pesticides**

Pesticides potentially used or disposed at Program sites range from relatively low-toxicity products to highly poisonous compounds. Exposure to extremely small quantities of some pesticides may result in serious bodily harm, even death. Identification of pesticide containers during field activity requires evaluation by the SHS before work can proceed. Pesticide dumping at a site requires that protective clothing protocols be implemented during all intrusive activity. Presence of only residue following normal application may permit a reduced level of PPE.

### **6.7.19 Photographic Chemicals**

Photographic chemicals include a broad range of products, including heavy metals, cyanide, skin sensitizers, irritants, and carcinogenic materials. Cyanide compounds can release toxic hydrogen cyanide gas in acidic environments. Accordingly, extreme caution should be exercised when using acid to preserve samples where cyanide may be present. Protective measures are the same as for sites that present a mixture of wastes. Where photographic chemicals may be present, the types and formulations should be determined, if possible, prior to field activity.

## **6.8 LANDFILL DECOMPOSITION GASES**

Decomposition of organic materials results in the production of several gases that may present a safety and health concern.

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### 6.8.1 Vinyl Chloride

Vinyl chloride results from the decomposition of chlorinated materials such as plastics and solvents. Vinyl chloride is a recognized human carcinogen. The OSHA standard for vinyl chloride established an exposure limit of 1 parts per million (ppm) as a time-weighted average and 5 ppm as a short term exposure limit (15 minutes). Where measured concentrations may exceed 10 ppm, only a Type C air line or SCBA unit may be used for respiratory protection. When negative-pressure air-filtering respirators are utilized, the air filter cartridges shall be replaced daily.

### 6.8.2 Methane Gas

Methane gas may be encountered as a result of biological processes in soil during excavation activities. Methane is an explosive hazard and can displace oxygen in confined space entry work. Methane will be monitored as an explosive gas. PIDs do not detect methane; therefore, either a FID or explosimeter will be used where a potential for methane gas is identified.

### 6.8.3 Hydrogen Sulfide

Hydrogen sulfide is a colorless, heavier-than-air gas with a characteristic odor. Hydrogen sulfide is commonly found at landfills. It can be toxic or fatal if inhaled in high concentrations. Monitoring equipment or detector tubes shall be available for confined space or trench entry and if H<sub>2</sub>S is suspected. This chemical has the property of numbing the olfactory senses after a brief exposure, which limits the usability of air-purifying respirators (APRs). APR protection shall only be used if monitoring equipment is continuously available. Where H<sub>2</sub>S is experienced above 10 ppm, personnel shall carry either industrial gas masks or escape respirators, and alarm monitors.

## 6.9 BIOLOGICAL HAZARDS

The SSHR shall screen the area for biological hazards during the initial site visit and shall discuss any problems with installation personnel during the prework review. Multiple biological hazards are present at the site. The most common hazards anticipated are discussed below.

### 6.9.1 Rattlesnakes

Personnel should be extremely careful when walking through tall grass, rocks, or debris. If a rattlesnake is encountered, slowly and quietly back away from the snake. Inform all personnel at the site of its location. Do not attempt to move or kill a snake because certain species of rattlesnake are protected under state and federal laws. In the event of a snakebite, immediately summon emergency medical services and notify the SSHR. Do not try to move the affected limb; instead, immobilize the injured area, keeping it lower than the heart if possible, and wait for transportation. Do not apply ice, Do not cut the

wound, do not apply a tourniquet. The venom should be wiped off the skin since venom will attack intact skin. If you know the victim cannot receive medical care within 30 minutes, consider suctioning the wound using a snakebite kit.

### 6.9.2 Insects

Bees, wasps, yellow jackets, black widow spiders, scorpions, and brown recluse spiders present a potential hazard on this project, especially so for those individuals sensitized to those bites or stings. Prior to initial assignment on this project, personnel with known allergic responses to insect stings will be identified and field supervisors made aware of this condition. These personnel shall also carry an antidote kit if so advised by their physician. The BNI SSHR will confirm that the antidote kit is accessible and notify the emergency medical service providers in the event of any incident.

In all cases, a victim suspected of being bitten by either a black widow or brown recluse spider, or stung by a scorpion shall receive medical attention. The venom from the brown recluse spider is capable of causing coma and kidney failure in its victim.

Protection methods against insects may be employed, such as the use of protective clothing or insect repellents, as well as extermination measures, and training in recognition and identification of harmful insects.

### 6.9.3 Ticks

Ticks transmit many diverse etiologic agents. Diseases transmitted by tick include Lyme disease, Rocky Mountain spotted fever, and other viral and rickettsial diseases.

Lyme disease is a spirochete-type bacterial infection that is transmitted to humans and some animals by two species of tick. The deer tick is probably the more prevalent. The female is approximately 1/4 inch long and black and red in color. Symptoms of Lyme disease include chills, fever, headache, fatigue, stiff neck, and bone ache. Lyme disease presents itself as a rash with a small welt in the center.

Symptoms of Rocky Mountain spotted fever include chills, fever, headache, fatigue, stiff neck, and bone ache. Spotted fever presents itself as red spots under the skin.

Ticks are normally found in wooded and bushy areas. When walking through tall brush areas, periodically check yourself and your coworkers for presence of any ticks. Because ticks burrow into the skin. It is essential to remove the entire tick as soon as it is found. If the head cannot be removed, medical treatment should be obtained. Should severe signs of infection or fever develop, the patient should seek prompt medical care.

### 6.9.4 Poisonous Plants

Poisonous plants may be present at the site. Poison ivy, poison oak, and poison sumac are identified by three leaves or five leaves emanating from a stem. The plants contain a resin that causes a delayed allergic hypersensitivity reaction on contact. The resin is

## Section 6 Hazard Analysis

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active in live, dead, dry, and burned plant parts; and it may be carried through the air. Signs and symptoms are usually evident within 24 to 48 hours after exposure. These include burning, stinging, and blisters. Notify the SSHR if these plants are observed. If exposure or contact occurs, wash the affected area, but do not spread the resin to uncontacted areas.

### 6.9.5 Vermin

Rats, mice, squirrels, and rabbits are carriers of disease. Where vermin are identified in work areas, the SSHR shall be immediately notified. Bites shall be immediately reported and medical care obtained.

Infections associated with rodent-borne disease are present in the southwestern United States. Infections may occur in humans associated with activities that bring humans into contact with rodents, rodent saliva, or rodent excreta. Activities that may bring humans into contact with the etiologic agents causing infection include the following situations:

- working in areas of field crops;
- occupying previously vacant cabins, buildings, or outhouses;
- cleaning outbuildings;
- disturbing rodent-infested areas;
- visiting areas where rodent populations have increased; and
- entering crawl spaces or other potential rodent-infested areas.

Transmission of disease may occur through broken skin, contact with conjunctivae, ingestion of contaminated food or water, or inhalation of aerosols. Prevention is through environmental hygiene practices that deter rodents from colonizing the work environment.

Cleanup of rodent-contaminated areas or areas meeting the above criteria shall be performed wearing Level C protective equipment, including full-face respirator and head covering. Vacuuming or dry sweeping should not be used since this may generate aerosols. Surfaces should be disinfected by spraying with a detergent, water, and disinfectant mixture. Reusable protective clothing shall be decontaminated and disinfected daily. Where rodent infestation is positively identified, all waste shall be disposed in double-bagged containers and shall be marked as infectious.

### 6.9.6 Hantavirus

Rodent-borne diseases include hantavirus, which results in severe respiratory distress, plague, and sometimes death. Workers shall be advised of the hazard and risks of the work. Workers shall be further advised that if a fever or respiratory illness develops within 45 days of the potential exposure, they should seek medical attention and inform the physician of potential hantavirus exposure.

### **6.9.7 Marine Life**

Work in shallow bays may expose personnel to a variety of marine hazards. Project personnel shall not wade barefoot while performing project work. Appropriate foot gear includes boots or waders. Free swimming is prohibited. A very limited number of CLEAN Program activities may necessitate the handling of marine animals captured in nets or by other means. These animals may be transferred live into sorting boxes and/or sampling coolers. Many marine animals have defense mechanisms including stinging, puncturing, biting, slashing, or shocking. Of particular concern is the numerous variety of rockfish indigenous to the area that possess poisonous dorsal spines. Heavy leather or rubber gloves will be worn by all personnel during animal handling. Some marine creatures, such as stingrays, may not be safe to handle even with PPE. A marine biologist will be present during marine animal sampling to identify and assess hazards from these creatures. Tools will be implemented to segregate and remove any creatures that present a threat to personnel safety.

### **6.9.8 Wild (Feral) Dogs**

Wild dogs, which could carry rabies, may attack. The presence of wild dogs shall be promptly reported to the SSHR.

### **6.9.9 Viral, Bacterial, and Other Diseases**

Personnel working at field sites may be exposed to other etiologic agents carried by insects. Therefore, such personnel shall be informed of preventative and prophylactic measures for protection.

### **6.9.10 Histoplasmosis**

Histoplasmosis is a systemic fungal infection that is most often found associated with bird or bat excreta, but can also be present in soil. The organism is almost always acquired by the respiratory route. A variety of clinical manifestations may result, ranging from overwhelming acute pneumonia to chronic, progressive pulmonary disease, or disseminated disease involving many organ systems. Wetting the material before disturbing it, especially with a 10 percent bleach solution, may prevent airborne dissemination. Respirators with HEPA filters, should be used during cleanup.

### **6.9.11 Valley Fever**

An unlikely but potential biohazard in dusty, southern California environments is Coccidioidomycosis, which causes a condition known as Valley Fever. This disease is caused by a fungus that lives in soil. Consequently, Valley Fever could be a significant health hazard for those persons who work with the soil, including workers involved with drilling operations. The fungus is usually inhaled, and produces flu-like symptoms,

Section 6 Hazard Analysis

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including fever, chills, cough, and chest pain. Although this disease can be effectively treated with medication, it can be fatal.

Dusty operations will be avoided or controlled by the use of engineering controls such as wetting areas before dust-producing activities. Respirators equipped with high-efficiency particulate air (HEPA) cartridges may be employed.

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## Section 7 SITE CONTROL

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### 7.1 GENERAL REQUIREMENTS

A site-control program shall be established for work conducted at field sites. The program will be conducted in accordance with PP SH 5.1, Field Safety Program, and PP SH 5.1.2, Safe Work Operation Process, based on site-specific characteristics.

### 7.2 SITE WORK AUTHORIZATION

Site access and work controlled by the CLEAN Program shall be authorized by either a hazardous work permit or a site-specific safety and health plan. All hazardous work permits (HWPs) shall be obtained in accordance with PP SH 5.1.2. HWPs will be generated and implemented before work begins for each task. The HWP is generated on-site by the SSHR, who is most familiar with site conditions. The initial HWP for any task shall be prepared by the organization requesting work and approved by the SHS. HWP revisions shall be approved by the field-assigned SSHR and the SHS or SHM in accordance with PP SH 5.1.2.

### 7.3 CONTROLLED AREA DESIGNATION

The plan for controlled area designation is provided in the SSHP. Typically, drilling activities use a site-control plan that provides a single barrier to delineate the clean, uncontrolled areas from the exclusion zone. The exclusion zone also includes a small decontamination area. Trenching activities and drilling activities in heavily contaminated sites will utilize the standard three-zone system of site control as described in PP SH 5.1.2.

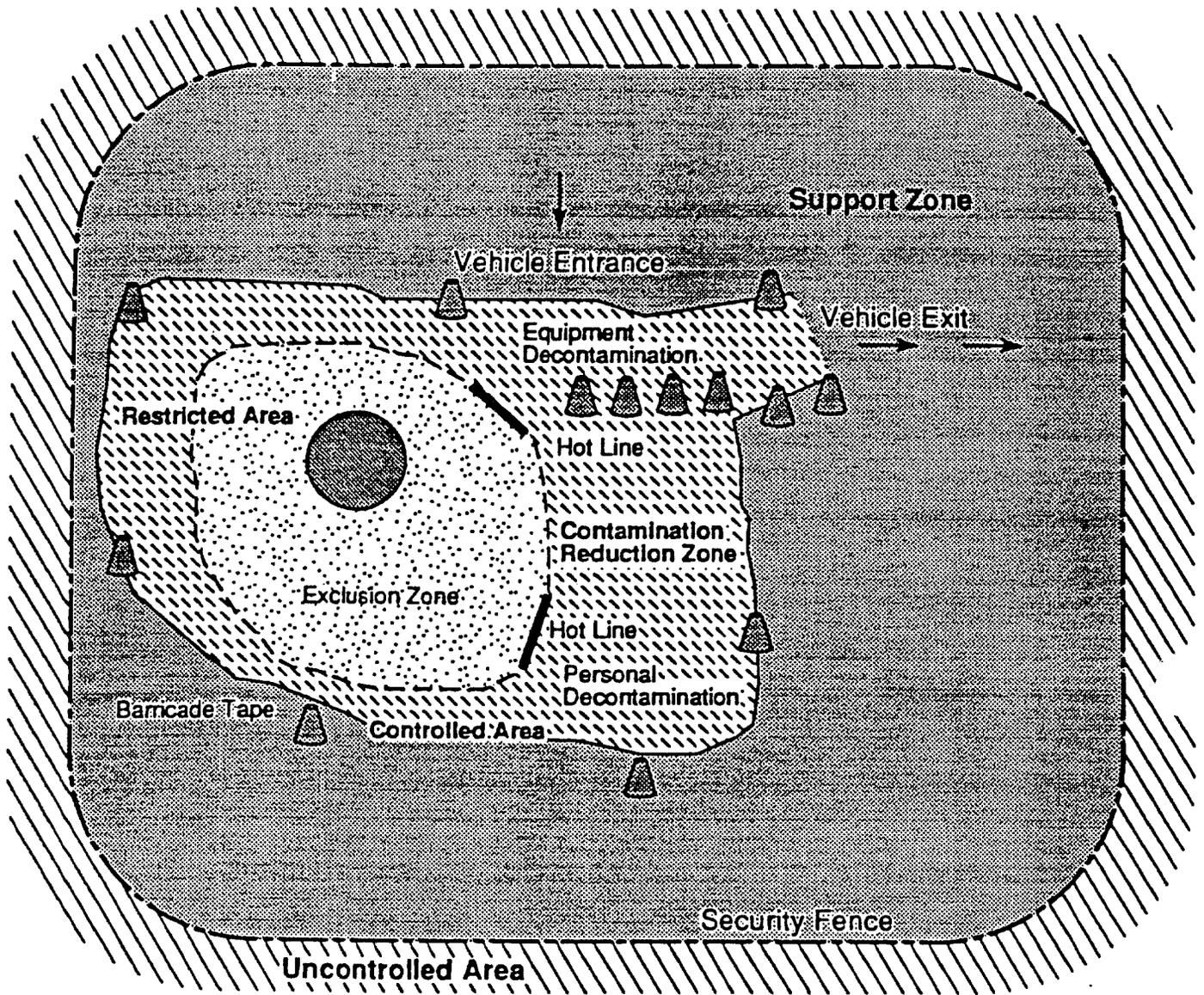
A separate vehicle entrance will not normally be established for field investigation work. A decontamination station for personnel will be established at the entrance to the work site. Additional stations may be established at each access-control point. Figure 7-1 shows a typical access-control arrangement for field investigations. The SSHR will establish the layout and arrangement of field facilities during mobilization.

### 7.4 ACCESS CONTROL

Access to controlled areas is accomplished through a program that controls the activities and movements of people and equipment at the project site. Included in this program are controls for chemical, biological, and industrial safety hazards.

The SSHP establishes the access-control requirements for each site. The following are typical access-control requirements that may be implemented at investigation sites. The SSHR shall monitor implementation of these requirements.

Figure 7-1  
 Site Access Control Arrangements



EXPLANATION	
→	Traffic Direction
▲	Traffic Cones
—	Barricade Tape
- - -	Security Fence
—	Hot Line
■	Restricted Area
●	Exclusion Zone
▨	Contamination Reduction Zone
▩	Support Zone
▧	Uncontrolled Area

## Section 7 Site Control

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- The SSHR shall maintain an authorized personnel list.
- An access-control register will be maintained at the controlled area boundary to record the number and identity of individuals in the area.
- All personnel will sign the access-control log before entering the controlled areas and each time upon leaving.
- Personnel or equipment entering or leaving the site will do so through the site access-control point.
- Personnel decontamination stations are provided and maintained where contact with removable contamination is possible.

Where site conditions warrant, an exclusion zone shall be established around each work area prior to the start of soil-intrusive work. The exclusion zones may be posted and physically barricaded at the SSHR's discretion based upon site conditions. The site access-control points are typically posted as follows:

**DANGER**  
**Controlled Area**  
**Authorized Personnel Only**

**[Organic Solvent-, Polynuclear Aromatic Hydrocarbon-, Oil-, PCB-, Pesticide-]**

**Waste Contaminated Soils May Be Present**

(identify the major contaminants present)

**Investigation in Progress** (as needed)

**Level {B/C/D} Protection Required** (if applicable)

### 7.5 INSTALLATION ACCESS

The SSHP presents the specific requirements for installation access. The following information is typically required for access to most military installations:

- full name,
- social security number,
- employee's company ID number,
- company affiliation, and
- driver's license number (state where issued and expiration date).

For each vehicle (including heavy equipment, drilling rigs) requiring site access, the following information should be available:

- vehicle make and model,
- vehicle license number (state where registered and registration date),
- primary operator,
- responsible company affiliation of operator, and
- proof of vehicle insurance.

An Authorized Personnel Roster will be prepared and forwarded to the appropriate activity contact when required by the activity.

All personnel shall check in at the base or activity gate before accessing any field sites. Security will determine the need for temporary- or full-pass status. After clearing security, personnel may proceed to the site.

## Section 8 DECONTAMINATION

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### 8.1 GENERAL

Decontamination facilities shall be established at each work site. The facilities and decontamination protocol established will vary with the nature and extent of hazards present. The Program will use standard protocols as established in PP SH 4.3, Personnel and Equipment Decontamination, for most sites. Where necessary, special protocols will be established. Figure 8-1 illustrates the standard order of removal of personal protective clothing. Figure 8-2 describes a standard decontamination facility arrangement for personnel. The SSHP contains superseding diagrams, if a different decontamination scheme is to be utilized.

### 8.2 PERSONNEL DECONTAMINATION

Personnel decontamination will be performed in accordance with PP SH 4.3, Personnel and Equipment Decontamination. A three-station decontamination system will typically be established for personnel exiting from exclusion zones.

Personnel shall always wash hand areas and any other exposed skin areas after removing protective clothing or leaving controlled work areas.

Visitors shall be provided with written decontamination instructions prior to being permitted on-site.

### 8.3 VEHICLE AND EQUIPMENT DECONTAMINATION

Specific procedures for vehicle and equipment decontamination may be established in SSHPs for vehicle and equipment decontamination. Standard practices that will be followed on-site are listed below.

- Decontamination of small equipment will be performed at the site using the three-wash system. Gross contamination will be scraped or wiped off equipment before beginning the wash cycle.
- A steam cleaner or pressure washer will be set up on the site for heavy equipment decontamination.
- A vehicle decontamination pad may be constructed to contain and collect all decontamination solutions, where required.
- Large equipment items will be wrapped prior to transport to the decontamination area specified in the supplement for decontamination.
- Vehicles will be cleaned of gross contamination and loose dirt before leaving the exclusion zone. Vehicles will then pass through the vehicle exit and into the vehicle contamination reduction zone (CRZ) for decontamination.

**Figure 8-1**  
**Personal Protective Equipment Decontamination Flowchart**

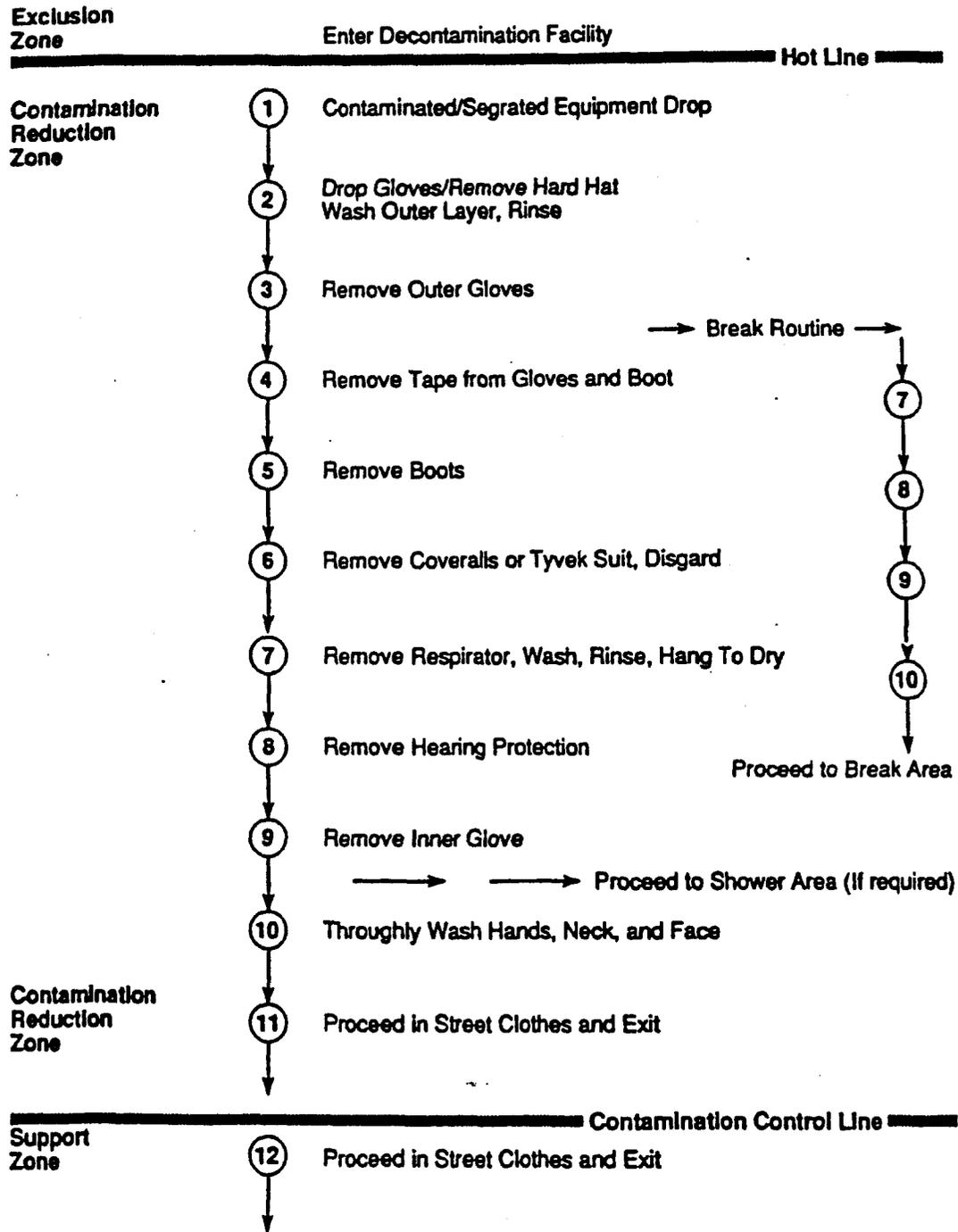
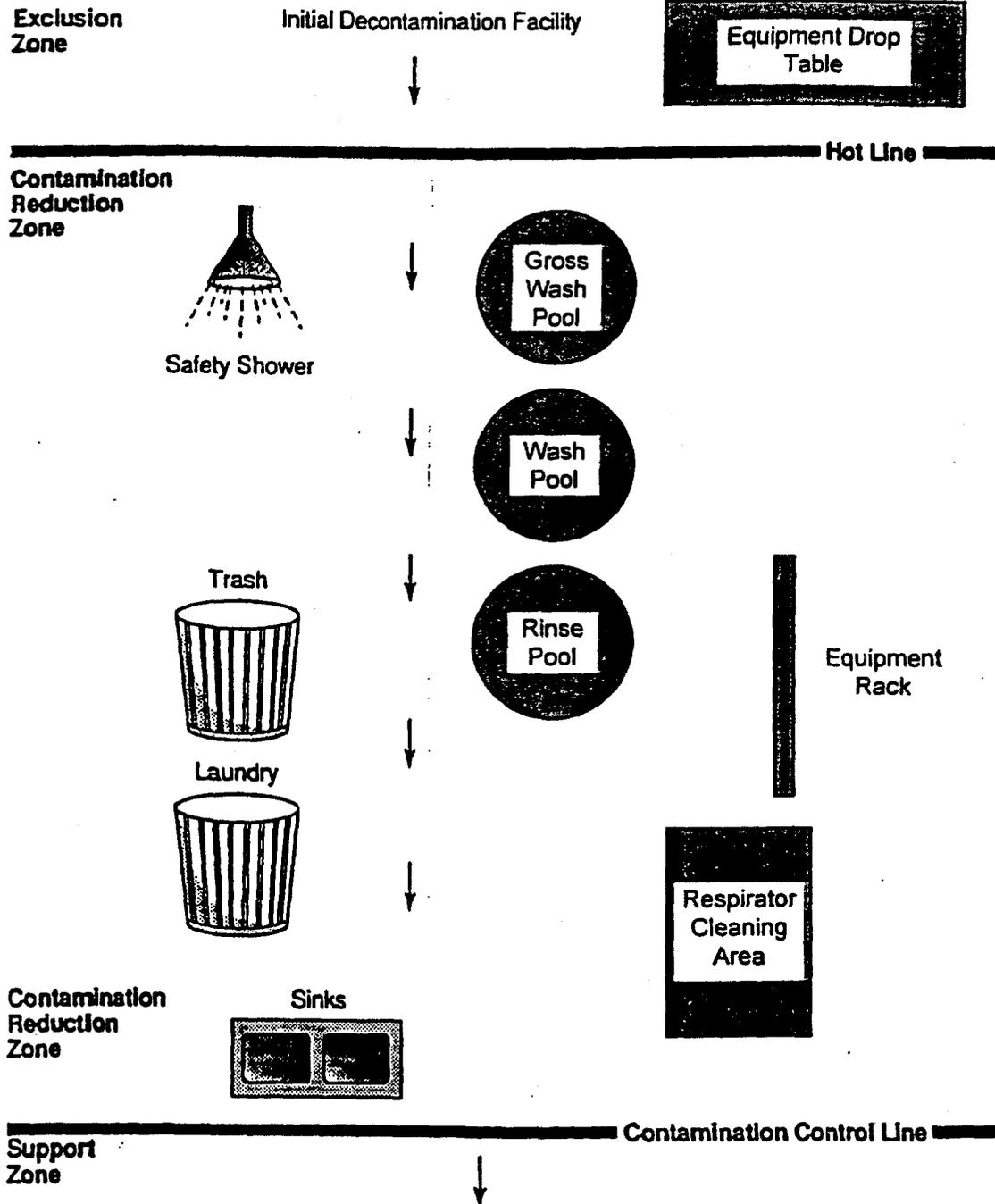


Figure 8-2  
Decontamination Area Facility Arrangement



## **8.4 APPAREL DECONTAMINATION**

Specific procedures may be established in SSHPs or PPs for apparel decontamination. The remainder of this paragraph describes the standard practices that will be followed on-site. The SSHR will establish a minimum of one safety apparel decontamination station at the site (where applicable). At a minimum, where apparel decontamination is required, soap or detergent, rinse water, towels, wash pans, and brushes for scrubbing boots will be available. Any wastes generated from decontamination will be properly disposed in accordance with the Investigation-Derived Waste Management Plan. After daily fieldwork has been completed, outer protective clothing, where required, will be removed and may either be placed in plastic bags for disposal or retained for future use, depending on the contamination potential.

## **8.5 SHOWER FACILITY**

Personnel shall be required to shower on-site before donning personal clothing at those sites where showering is deemed necessary due to the nature of the contaminants and potential associated toxicity. A shower facility will be established where personnel can don protective clothing before proceeding to the work area, and upon returning from the work area, don personal clothing prior to eating, drinking, or smoking. Shower facilities shall meet applicable OSHA requirements.

## **8.6 HAZARDOUS WASTE MINIMIZATION PRACTICES**

Personnel entering controlled areas shall minimize the generation of potentially hazardous waste. Disposable materials, wrapping, and packaging shall not be brought into controlled areas unless they are required to prevent cross-contamination. Separate waste containers shall be set up for trash, nonhazardous waste, and potentially hazardous waste.

## **8.7 TESTING REQUIREMENTS FOLLOWING DECONTAMINATION**

All items and equipment leaving controlled areas shall be inspected by the SSHR for proper decontamination prior to the material leaving the site. Generally, visual inspection of items used within controlled areas will be sufficient to establish adequate decontamination; therefore, items will not be tested for chemical contamination. Testing may be conducted by the SSHR when there is a high probability of contamination that cannot be readily removed by standard decontamination techniques. The SSHP shall specify where testing is required.

A record of inspection following decontamination shall be maintained for heavy equipment based upon visual inspection. Equipment belonging to team subcontractors, other subcontractors, or rental organizations shall be inspected. Equipment that leaves any facility (government property) boundary shall be deemed to be leaving the custody of the Program, unless it is tagged as not decontaminated and is returned to a Program

## Section 8 Decontamination

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organization that will take responsibility for the decontamination. Such transfers shall be approved by the SHS.

### **8.8 CERTIFICATION OF DECONTAMINATION**

The SSHR shall be responsible for preparing a certificate of decontamination when government-furnished equipment or material used on a site is returned to the custody of the government. This includes the storage location at the San Diego Program office or other locations not prepared to handle contaminated equipment. Forms are available from the SHM for this purpose.

### **8.9 SUBCONTRACTOR REQUIREMENTS**

Each subcontractor shall decontaminate equipment as necessary to meet technical requirements. Equipment includes vehicles, trucks, drill rigs, trailers, and accessories. Upon completion of final decontamination prior to equipment leaving any facility, the subcontractor shall request an inspection from the SSHR and the preparation of a record of decontamination. Subcontractors are responsible for decontamination to the satisfaction of the SSHR.

#### **8.9.1 Visitor Requirements**

Visitors shall follow the directions of the SSHR regarding decontamination of equipment brought inside controlled areas. Equipment shall be wrapped and taped to the maximum practicable extent, as directed by the SSHR, to minimize the need for decontamination.

### **8.10 DECONTAMINATION AREA ARRANGEMENTS**

A base area shall be established for waste storage, vehicle and equipment decontamination, emergency supplies, and other necessary equipment. These sites need not be contiguous, although this configuration may be convenient. The SSHR shall specify the arrangement of the base decontamination facility.

#### **8.10.1 Waste Storage and Decontamination Area**

A waste storage area shall be established for temporary storage of spoils, cuttings, other investigation-derived waste, decontamination solutions, etc. This area shall be posted as a waste storage area.

#### **8.10.2 Decontamination Pad**

A decontamination pad may be constructed on the site for the decontamination of excavators, drill rigs, augers, and associated equipment. The standard decontamination pad shall be large enough to contain any single piece of equipment with a 3-foot border on all sides. The pad may be sloped or provided with a movable entry section to contain liquid, if the pad is built on level ground. A sloped pad with a liquid-collection sump is recommended. The pad shall be constructed of three layers of lapped and taped

Section 8 Decontamination

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heavy-duty vinyl or polyethylene (12-mil minimum) covered with a sand or fine gravel layer for protection. The pad shall be operated so that all washwater can be contained and collected within the pad. Alternate construction providing equivalent protection is acceptable.

The pad is not required at sites where washwater is allowed to return to the ground or to a storm sewer discharge. This determination will be made by the activity Environmental Division.

## Section 9 MEDICAL SURVEILLANCE

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### 9.1 GENERAL

All CLEAN Program personnel will be required to participate in their employer's medical surveillance program before being permitted to work on Program field sites. The medical surveillance program for BNI employees is described in PP SH 1.3, Medical Surveillance, and subordinate SOPs. The Brown and Caldwell and Kleinfelder medical surveillance programs are described in respective company documents. Subcontractors will be required to demonstrate, by document submittal, their maintenance of OSHA-compliant programs and to maintain records as required by the applicable contract. Specific exceptions to the medical surveillance requirements shall be identified in the site-specific supplement for site access by specialty subcontractors performing nonintrusive activity.

### 9.2 PROGRAM PERSONNEL

Official copies of all medical surveillance documentation for BNI personnel will be maintained at the Program office in order to provide central management and to maintain confidentiality. Medical surveillance records of BNI employees performing fieldwork that is not assigned to the CLEAN Program shall be maintained by the regional office Health Services Supervisor and accessed via the Occupational Health Records Management System (OHRMS) or an equivalent tracking and management system. Medical records of a confidential nature will be maintained by the medical provider or by the employer. The Program Management Office (PMO) will provide status reports indicating status and special restrictions for each employee.

### 9.3 SUBCONTRACTOR RECORDS

Subcontractor medical surveillance records are maintained by the subcontractor. Copies of records or a record summary will be maintained by each subcontractor at the work location.

#### 9.3.1 Medical Restrictions

All project employees shall immediately inform the SSHR of any medical restrictions or any use of prescription drugs. If the employee desires confidentiality, this information may be forwarded directly to the Program SHM. Any physical limitations based upon a medical condition or prescription drug use will be evaluated by the Program medical consultant. Other work restrictions will be evaluated on a case-by-case basis by the SHM and the employer's safety office.

### 9.4 SPECIAL MONITORING PROTOCOL

Special monitoring protocols for specific contaminants shall be specified in the SSHP.

## 9.5 MEDICAL SURVEILLANCE SUBMITTALS

### 9.5.1 Subcontractors

Subcontractors shall certify in writing that personnel have been medically qualified in accordance with OSHA standards. Subcontractors shall maintain on-site proof of medical qualification expiration dates, work limitations, and respirator-use approval by keeping copies of records or a records summary.

## Section 10

# HAZARD MONITORING PROGRAM

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## 10.1 GENERAL

Hazard monitoring will be conducted on this project at each field location. Hazard monitoring is conducted as part of a comprehensive industrial hygiene evaluation. Hazard monitoring provides for:

- identification of work areas and activities that require the use of engineering or work technique controls or that require the use of PPE;
- data to confirm that levels of protection afforded by the assigned PPE and engineering or work technique controls are adequate to protect the workers;
- data to document employee exposures (or lack thereof);
- data to assure that all necessary controls and precautions are being taken to protect the public and the environment as well as site personnel; and
- data used to determine the need to implement emergency control measures and contingency plans.

## 10.2 RESPONSIBILITY FOR MONITORING

The SSHR will perform or oversee all monitoring performed at field locations for safety and health purposes. The SSHP shall specify the minimum type and frequency of monitoring to be performed based upon the potential hazards present. A monitoring log will be maintained, by location, to document the results of hazard monitoring.

The SSHR will provide results of monitoring to all site personnel on a regular basis and whenever monitoring results indicate that a protective action is required.

### 10.2.1 Responsibilities of Subcontractors

Subcontractors are required to perform monitoring as necessary to demonstrate compliance with applicable regulations governing exposure to hazardous substances or physical agents. Subcontractors are responsible for providing all their monitoring data to the CLEAN Program SHM. Subcontractors are required to notify the CLEAN Program SHM of any overexposure to hazardous substances or physical agents.

## 10.3 CHEMICAL AGENT MONITORING

Atmospheric concentrations of chemical agents shall be routinely monitored at all field sites. Chemical agent monitoring includes monitoring for all toxic air contaminants, explosive mixtures, and oxygen deficiency.

Table 10-1, Chemical Monitoring Plan, describes the instrumentation and sampling apparatus that will be used for monitoring chemical agents. Monitoring methods and

**Table 10-1  
 Chemical Monitoring Plan**

Chemical	Type of Monitoring	Typical Instrument (and options)	Calibration Frequency	Calibration Method
Total organic vapor	direct reading	PID <sup>a</sup> or FID <sup>b</sup>	daily	prepared standard
Explosive mixtures and methane	direct reading	Explosimeter	daily	prepared standard
Toxic gases	direct reading	PID/FID <sup>c</sup> colorimetric indicator tube	daily NA <sup>d</sup>	prepared standard NA
Benzene	direct reading	Colorimetric indicator tube or portable GC <sup>e</sup>	NA 2/day	NA prepared standard
Heavy metal	sampling	37-mm <sup>f</sup> filter	daily (pump)	flowmeter
Mercury	direct reading	Jerome analyzer	annual	manufacturer
Hydrogen sulfide	direct reading	Gastech, handheld colorimetric indicator tube	weekly not required	prepared standard NA
Vinyl chloride	direct reading	Colorimetric indicator tube	not required	NA

**Notes:**

- <sup>a</sup> PID – photoionization detector
- <sup>b</sup> FID – flame ionization detector
- <sup>c</sup> Use of both PID and FID may be required
- <sup>d</sup> NA – not applicable
- <sup>e</sup> GC – gas chromatograph
- <sup>f</sup> mm – millimeter

action levels are set forth in Tables 10-2a, b, and c. The SSHP specifies which table(s) are appropriate for a given field site. Sampling techniques and analytical methods are set forth in PPs. Monitoring instrument use, calibrations, and maintenance are described in applicable PPs.

## 10.4 SPECIAL INSTRUMENT REQUIREMENTS

The presence of certain contaminants may facilitate the need for special monitoring equipment at various Program sites. The SSHP will delineate this need when required.

## 10.5 ENVIRONMENTAL MONITORING

Environmental monitoring consists of sampling and monitoring measurements performed at the site boundary or other locations for the purpose of establishing off-site or public exposure related to field operations. Environmental monitoring includes specialized

Section 10 Hazard Monitoring Program

**Table 10-2(a)**  
**Monitoring Methods and Action Levels for Uncharacterized<sup>a</sup> Mixtures**  
**Using Screening Survey Instruments**

Hazard	Method	Action Level <sup>b</sup>	Protection Action
Total organic vapor	PID <sup>c</sup> or FID <sup>d</sup>	Background to 2 ppm <sup>e</sup> above background	No action required
		> 2 ppm	Air-purifying respirator, full face, Level C protection with appropriate cartridges
		> 5 ppm	Air-purifying respirator, full face, Level C protection; personnel monitoring required to I.D. contaminants
		> 10 ppm > 50 ppm	Supplied air protection, Level B STOP WORK
Combustible gas	Explosimeter or FID	< 10% LEL <sup>f</sup>	No action required
		10% to 20% LEL	Start continuous monitoring; permit only classified electrical equipment and nonsparking tools
		> 20% LEL	STOP WORK; ascertain source of gas
Oxygen concentration	Oxygen analyzer	< 19.5% v/v <sup>g</sup>	Leave area; evaluate reason for deficiency; monitor again remotely or with IDLH <sup>h</sup> entry program
		19.5 to 20.5 v/v	Slight deficiency; continue continuous monitoring
		20.5 to 21.0% v/v	Normal range
		> 22.0% v/v	Elevated reading; check calibration; investigate cause; STOP any potential spark-producing activity

Notes:

- <sup>a</sup> carcinogenic and highly toxic materials not verified absent from atmosphere
- <sup>b</sup> all action levels are readings observed above background; verify absence of highly toxic compounds as necessary (e.g. vinyl chloride, methylene chloride, benzene)
- <sup>c</sup> PID – photoionization detector
- <sup>d</sup> FID – flame ionization detector
- <sup>e</sup> ppm – parts per million
- <sup>f</sup> LEL – lower explosive limit
- <sup>g</sup> v/v – volume per volume
- <sup>h</sup> IDLH – immediately dangerous to life or health

**Table 10-2(b)**  
**Monitoring Methods and Action Levels for Petroleum Hydrocarbon-Only<sup>a</sup> Sites**  
**Using Screening Survey Instruments**

Hazard	Method	Action Level <sup>b</sup>	Protection Action
Total organic vapor (benzene suspected)	PID <sup>c</sup> or FID <sup>d</sup>	Background to 5 ppm <sup>e</sup> above background	No action required
		> 5 ppm	Air-purifying respirator, full face, Level C protection with organic vapor cartridges
		> 50 ppm > 100 ppm	Supplied-air protection, Level B STOP WORK
Total organic vapor (benzene absent <sup>f</sup> )	PID or FID	Background to 25 ppm above background	No action required
		> 25 ppm	Air-purifying respirator, full face, Level C protection with organic vapor cartridges
		> 200 ppm > 500 ppm	Supplied air protection, Level B STOP WORK
Combustible gas	Explosimeter or FID	< 10% LEL <sup>g</sup>	No action required
		10% to 20% LEL	Start continuous monitoring; permit only classified electrical equipment and nonsparking tools
		> 20% LEL	STOP WORK; ascertain source of gas
Oxygen concentration	Oxygen analyzer	< 19.5% v/v <sup>h</sup>	Leave area; evaluate reason for deficiency; monitor again remotely or with IDLH <sup>i</sup> entry program
		19.5 to 20.5 v/v	Slight deficiency; continue continuous monitoring
		20.5 to 21.0% v/v	Normal range
		> 22.0% v/v	Elevated reading; check calibration; investigate cause; STOP any potential spark-producing activity

**Notes:**

- <sup>a</sup> action levels based on gasoline, aviation gasoline, and diesel contaminants only; a conservative 20 percent benzene is assumed if benzene is not verified absent from atmosphere; action levels should be reestablished based on periodic analysis of atmosphere
- <sup>b</sup> all action levels are readings observed above background
- <sup>c</sup> PID – photoionization detector
- <sup>d</sup> FID – flame ionization detector
- <sup>e</sup> ppm – parts per million
- <sup>f</sup> confirm benzene is less than 1 ppm with chromatography or colorimetric indicator tube specific for benzene in the presence of petroleum hydrocarbons (Dräger, benzene 0.05, #CH24801 or equivalent)
- <sup>g</sup> LEL – lower explosive limit
- <sup>h</sup> v/v – volume per volume
- <sup>i</sup> IDLH – immediately dangerous to life or health

Section 10 Hazard Monitoring Program

**Table 10-2(c)  
Monitoring Methods and Action Levels for Characterized<sup>a</sup> Mixtures  
Using Screening Survey Instruments**

Hazard	Method	Action Level <sup>b</sup>	Protection Action
Total organic vapor	PID <sup>c</sup> or FID <sup>d</sup>	Background to 5 ppm <sup>e</sup> above background	No action required
		> 5 ppm	Air-purifying respirator, full face, Level C protection with appropriate cartridges
		> 10 ppm	Air-purifying respirator, full face, Level C protection; personnel monitoring required to I.D. contaminants
		> 50 ppm > 100 ppm	Supplied-air protection, Level B STOP WORK
Combustible gas	Explosimeter or FID	< 10% LEL <sup>f</sup>	No action
		10% to 20% LEL	Start continuous monitoring; permit only classified electrical equipment and nonsparking tools
		> 20% LEL	STOP WORK; ascertain source of gas
Oxygen concentration	Oxygen analyzer	< 19.5% v/v <sup>g</sup>	Leave area; evaluate reason for deficiency; monitor again remotely or with IDLH <sup>h</sup> entry program
		19.5 to 20.5 v/v	Slight deficiency; continue continuous monitoring
		20.5 to 21.0% v/v	Normal range
		> 22.0% v/v	Elevated reading; check calibration; investigate cause; STOP any potential spark-producing activity

Notes:

- <sup>a</sup> carcinogenic and highly toxic materials verified absent from atmosphere
- <sup>b</sup> all action levels are readings observed above background
- <sup>c</sup> PID – photoionization detector
- <sup>d</sup> FID – flame ionization detector
- <sup>e</sup> ppm – parts per million
- <sup>f</sup> LEL – lower explosive limit
- <sup>g</sup> v/v – volume per volume
- <sup>h</sup> IDLH – immediately dangerous to life or health

techniques and methods used to provide high sensitivity and specificity for assessment of environmental concentrations of contaminants. Environmental monitoring programs, where required, are described in the SSHP.

Environmental monitoring is not typically performed during investigation activities when the potential for significant atmospheric emission is minimal. If the screening measurements performed (described below) indicate potential releases of contaminants beyond the controlled area and if facility personnel potentially may be exposed, the SSHP will prescribe measures to control releases. Such measures may include expansion of the controlled area, environmental monitoring to assess conditions, or use of engineering or administrative controls. Environmental monitoring is performed at or beyond the controlled-area boundary.

## 10.6 AREA MONITORING

Area monitoring consists of monitoring performed with respect to a work location without specific reference to any individual's presence in the area. Area monitoring is performed to identify the general potential for individual exposure and to establish the protective equipment requirements for personnel who may enter that area. Area monitoring is conducted to identify exposures above OSHA or ACGIH limits for industrial exposure or United States Environmental Protection Agency (U.S. EPA) guidelines for hazardous waste site activities. Action levels for use of PPE and respiratory protection are based upon area monitoring using standard monitoring instrumentation. Action levels may vary, depending on the degree of characterization of the site and the presence or absence of particular constituents. Generally, on Program sites, either Table 10-2 (a), (b), or (c) will be utilized at a particular location. The SSHP specifies which table is to be used at each site. Action levels are levels above the ambient background, as determined by levels measured off-site or upwind of the site. Area monitoring is performed with field survey screening instrumentation within the controlled area.

### 10.6.1 Dust Monitoring

Dust exposure may be monitored as specified in the SSHP. Dust exposure is monitored with a forward-scattering, pulsed-light-emitting-diode sensing configuration. This system measures total dust or respirable dust; however, individual toxic constituents are not determined. Action levels for toxic dusts are established based upon assumed or estimated airborne concentrations of various constituents. Action levels may be modified as detailed analytical information becomes available. Table 10-3, Action Levels for Dusts, provides baseline action levels for total dust and various toxic metals. Dust monitoring is performed at sites where a potential for exposure to toxic metal dusts or toxic nonvolatile or semivolatile compounds exists.

Section 10 Hazard Monitoring Program

**Table 10-3  
Action Levels for Dusts**

Hazard	Method	Action Level <sup>a</sup>	Protection Action
<b>Heavy Metals</b>			
as Total Dust (no toxic constituents)	Dust-monitoring Mini-RAM	< 1 mg/m <sup>3b</sup>	No action required
		> 1 mg/m <sup>3</sup>	Air-purifying respirator
as Total Dust (toxic constituents present)	Dust-monitoring Mini-RAM	> 0.5 mg/m <sup>3</sup>	Air-purifying respirator
as Metal <sup>f</sup>	Personal monitoring		
Chromium		> 0.5 mg/m <sup>3</sup>	Air-purifying respirator
Chromium (VI)		> 0.05 mg/m <sup>3</sup>	Air-purifying respirator
Nickel (sol)		> 0.1 mg/m <sup>3</sup>	Air-purifying respirator
Nickel (insol)		> 1.0 mg/m <sup>3</sup>	Air-purifying respirator
Mercury (alkyl)		> 0.01 mg/m <sup>3</sup>	Air-purifying respirator
Zinc		> 1.0 mg/m <sup>3</sup>	Air-purifying respirator
Vanadium		> 0.05 mg/m <sup>3</sup>	Air-purifying respirator
Lead		> 0.05 mg/m <sup>3</sup>	Air-purifying respirator
Cobalt		> 0.05 mg/m <sup>3</sup>	Air-purifying respirator
Copper		> 0.2 mg/m <sup>3</sup>	Air-purifying respirator
Cadmium		> 0.05 mg/m <sup>3</sup>	Air-purifying respirator
Selenium		> 0.2 mg/m <sup>3</sup>	Air-purifying respirator
Arsenic		> 0.01 mg/m <sup>3</sup>	Air-purifying respirator

Notes:

- <sup>a</sup> above background
- <sup>b</sup> mg/m<sup>3</sup> – milligrams per cubic meter
- <sup>c</sup> based on American Conference of Governmental Industrial Hygienists threshold limit value

### 10.6.2 Noise Monitoring

Noise exposure will be controlled to within the OSHA limits. Generally, this will be accomplished by issuing hearing protection to workers who are required to either operate or remain near heavy equipment, or who are otherwise exposed to high noise levels. If there is a question as to whether an area requires noise protection, a noise survey will be performed. For workers whose daily duties require movement between areas of variable noise exposure, noise dosimeters will be utilized. For fixed locations or installations (e.g., machinery areas, pump rooms), a noise survey will be performed to determine if a hearing-protection warning sign must be posted. Areas identified as potential noise-hazard areas will be evaluated for compliance with the OSHA noise standard for general industry.

Noise monitoring will be conducted in accordance with PP SH 3.3, Hearing Conservation.

### 10.6.3 Ionizing Radiation

The SHS or other qualified individual shall perform a walkover gamma radiation survey at sites where the potential for ionizing radiation or radioactive material contamination exists. These sites may include disposal sites that accepted military industrial waste, ship disposal areas, former defense surplus material storage areas, and similar facilities. The SSHR shall regularly monitor samples and equipment used for soil-intrusive activity at these sites for alpha- and beta-gamma-emitting contamination. Table 10-4 provides basic action levels for radionuclides. The SSHP describes the monitoring required.

**Table 10-4**  
**Action Levels for Radionuclides at the Site**

Type Measurement	Action Level	Action
External Gamma	> 0.1 milliroentgens per hour (mR/hour)	Contact Safety and Health Manager
Beta-Gamma Contamination	> 2 × area background level	Contact Safety and Health Manager
Alpha Contamination	> 2 × area background level	Contact Safety and Health Manager

### 10.6.4 Other Physical Agents

Monitoring for other physical agents will be performed as required based on the hazard analysis.

#### 10.6.4.1 SOLAR RADIATION

Monitoring will not be performed; however, the SSHR will emphasize the importance of sunblock and clothing to minimize the effects of solar radiation on the skin.

#### 10.6.4.2 NONIONIZING RADIATION

The need for nonionizing radiation surveys will be identified in the preliminary site visit and are included in the SSHP. The need for nonionizing radiation surveys is expected to be limited.

### 10.6.5 Heat Stress

Wearing PPE puts a hazardous waste worker at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the

## Section 10 Hazard Monitoring Program

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worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

SSHRs will be continually aware of changing field conditions and signs/symptoms of heat stress in site workers. Body core temperature monitoring will be performed when conditions warrant. Workers exhibiting a body core temperature of 100.4°F or greater (measured at the eardrum) will be removed to a cooler area or activity until body core temperature returns to below 99°F. Heat stress action levels can be found in Table 10-5.

**Table 10-5**  
**Action Levels for Heat Stress**

Type Measurement	Action Level	Action
Ear insertable core temperature	100.4°F* or greater	Remove from work
Ear insertable core temperature	< 99°F	Return to work

Note:  
\* °F – degrees Fahrenheit

### 10.7 PERSONNEL MONITORING

Personnel monitoring will be initiated if the action levels for screening survey instruments as described in this plan or the SSHP are exceeded. The SSHR is responsible for performing personnel monitoring of Program employees only. Subcontractors are responsible for any required OSHA-compliance monitoring of their personnel; however, the SSHR may perform monitoring of any personnel, including those of other subcontractors as necessary. Table 10-6 identifies typical sampling and analytical methods that may be used.

### 10.8 BIOLOGICAL AGENTS

Biological agent atmospheric monitoring will not be performed as a routine measure. The SSHR will monitor for hazardous biological agents and will make sure all site workers are appropriately aware of identified agents and vectors.

**Table 10-6**  
**Personal Sampling and Analytical Methods for Air Contaminants**

Compound	Method <sup>a</sup>	Sample Media	Flow Rate (Lpm) <sup>b</sup>	Sample Preservation Sample Collection Notes
Nuisance dust	NIOSH <sup>c</sup> 0500	PVC <sup>d</sup>	1.5 – 3	Preweight filter <sup>e</sup>
Respirable dust	NIOSH 0600	PVC	1.7 <sup>f</sup>	Preweight filter Use 10-mm <sup>g</sup> nylon Cyclone sampler
Pesticides	U.S. EPA <sup>h</sup> 7010	Polyurethane foam	consult method	Area samples
Pesticides	NIOSH 5519	MCE <sup>i</sup> filter and	consult method	
Organochlorine	NIOSH 5510	Chromosorb 102		
Pesticides	NIOSH 5012	Glass fiber, 37 mm	1.0 – 2.0	Transfer filters to sample vial, preserve with isooctane
Organophosphorous				
Pesticides	NIOSH 5006	Glass fiber Type A, 37 mm	0.2 – 0.5	
Carbamate				
Aldrin	NIOSH 5502	Glass fiber, Type A/E and impinger	0.2 – 0.5	Refer to method
Metals	NIOSH 7300	Mixed cellulose	2.0 – 3.0	Specify specific metal for analysis

Notes:

- <sup>a</sup> check with laboratory before finalizing method
- <sup>b</sup> Lpm – liters per minute
- <sup>c</sup> NIOSH – National Institute for Occupational Safety and Health
- <sup>d</sup> PVC – polyvinyl chloride
- <sup>e</sup> laboratory performing analysis shall preweigh filter
- <sup>f</sup> exactly
- <sup>g</sup> mm – millimeter
- <sup>h</sup> U.S. EPA – United States Environmental Protection Agency
- <sup>i</sup> MCE – mixed cellulose ester

## Section 11

# PERSONAL PROTECTIVE EQUIPMENT PROGRAM

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## 11.1 GENERAL

PPE consists of three components: standard safety equipment required on the site, special PPE (fall protection, water safety), and respiratory protective equipment.

## 11.2 PROJECT POLICY

Standard safety equipment is described in PP SH 5.1, Field Safety Program. Protective equipment for chemical hazards is described in PP SH 3.2, Personal Protective Equipment. All personnel will be expected to come to work with proper safety equipment. In addition, all project and subcontractor personnel entering a site will comply with any activity-specific safety requirements.

## 11.3 ENSEMBLE SELECTION

The various types of PPE and definitions of the standard ensembles available for the CLEAN II Program are discussed in PP SH 3.2.

The level for a particular operation is to be determined by the SSHR at the start of work in consultation with the HSS and the ROICC or designated installation safety coordinator. This level may be altered as conditions change. The SSHR will identify the requirements on an HWP, which will be posted at the job site.

Table 11-1 contains a detailed description of the proposed initial PPE ensemble for tasks **without identified chemical exposure**. The SSHP establishes the proposed initial PPE ensemble for tasks with exposure potential.

The anticipated level of PPE for most of the field activities will be Level D and modified Level D. Modified Level D will be required where chemical contamination is possible but airborne contaminants have not yet exceeded the action levels specified in Section 10 of this plan. Level C PPE will be required at any work site where the levels of airborne contaminants exceed these action levels.

As summarized in Table 11-1, Level D PPE includes:

- hard hat;
- safety glasses; and
- normal work clothes, including long pants and sturdy leather work boots.

In addition to the above-listed items, the SSHP or the SSHR, may make other items mandatory for certain operations or in certain work areas. These items may include chemical-resistant gloves or boots, or hearing protection.

Section 11 Personal Protective Equipment Program

**Table 11-1  
Personal Protective Equipment  
(no identified chemical exposure potential)**

Task	Hazard	Level	Body	Respirator	Skin	Other
Mobilization and setup	Driving, material handling, lifting, pinch points	D	Normal work clothes, long pants	NA <sup>a</sup>	Work gloves optional	Hard hat, safety glasses, hearing protection (opt.)
Site land surveying	Driving, material handling, lifting	D	Normal work clothes, long pants	NA		Hard hat, safety glasses, sturdy leather workshoes
Geophysical surveying	Driving, material handling, lifting	D	Normal work clothes, long pants	NA		Hard hat, safety glasses, sturdy leather workshoes
Soil boring <sup>b</sup> Soil sampling <sup>b</sup> Well development	Operation of drill rig, noise, no identified chemical exposure	D	Normal work clothes, long pants	Full-face with HEPA <sup>c</sup> and OV <sup>d</sup> ready for use	Work gloves or chemical protective gloves	Hard hat, safety glasses, steel-toe boots or overboots, hearing protection

Notes:

- <sup>a</sup> NA – not applicable
- <sup>b</sup> soil boring/sampling in background areas or areas with minimal exposure potential
- <sup>c</sup> HEPA – high-efficiency particulate air filter
- <sup>d</sup> OV – organic vapor filter

Modified Level D PPE includes:

- Tyvek<sup>®</sup> or polyethylene-coated Tyvek suits, taped at the cuffs and at ankles;
- latex, nitrile, butyl rubber (decon operations) or other chemically resistant gloves;
- hard hats;
- safety glasses; and
- overboots (if applicable).

Upgrading to Level C PPE involves modified Level D PPE with the addition of a full-face respirator with appropriate cartridges for the airborne contaminants. Cartridges used on Program CLEAN sites will typically be high-efficiency particulate air (HEPA) and organic vapor (OV) cartridges.

Section 11 Personal Protective Equipment Program

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## 11.4 PPE LEVEL ASSIGNMENT CRITERIA

The protection levels initially shall be assigned based on standard practices and site-specific criteria. The SHM or SHS shall approve all initial PPE selections.

## 11.5 LEVEL CHANGES

As the facility operation progresses, the SSHR may enact changes in the PPE components of any or all of the ensembles D through C based on:

- ongoing surveillance of the PPE Program;
- results derived via the implementation of the Air Monitoring Program; and
- changes in conditions, materials, work techniques, or any other "new" information relevant to employee exposure.

The SSHR may upgrade or downgrade the level of protection for any given work activity after considering PPE selection factors. Changing the ensemble component to a lower degree of protection will require the approval of the SHS or SHM. Upgrades in degree of protection in an ensemble component may be made upon the approval of the SSHR. The HWP system (discussed in PP SH 5.1.2, Safe Work Observation Process) will be used to document changes in the required level of protection.

## 11.6 INSPECTION AND MAINTENANCE

All PPE, disposable or reusable, shall be inspected by the user each time an item of PPE is donned. The SSHR will demonstrate the preuse inspection techniques and criteria during the initial site-specific safety and health training and orientation.

## 11.7 REUSABLE PPE

Reusable eye and respiratory protection will be decontaminated on a daily basis. Other reusable equipment will be decontaminated upon removal from the controlled area. The SHS or SSHR may establish additional requirements.

Section 11 Personal Protective Equipment Program

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## Section 12

# HAZARD COMMUNICATION PROGRAM

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## 12.1 GENERAL

An OSHA-compliant hazard communication program will be implemented at each activity in accordance with PP SH 1.9, Hazard Communication.

## 12.2 MATERIAL SAFETY DATA SHEET AVAILABILITY

The written hazard communication program, including available Material Safety Data Sheets (MSDSs), will be available from the SSHR at each site location. Subcontractors will be required to provide MSDSs for chemicals and materials brought on-site to the SSHR before starting work.

MSDSs shall be made available to any site worker upon request, without regard to employer.

The SSHR shall maintain an index of MSDSs available from each subcontractor at the site.

Information on chemical, physical, and biological agents identified during the investigation will be made available as part of the site informational program. Selected information is presented in this plan as part of the hazard analysis.

## 12.3 TRAINING

Each employer shall conduct hazard communication training for its employees and maintain records thereof.

## 12.4 LABELING

The SSHR shall assure that manufacturer labels are not defaced, altered, or removed; and that hazard information remains legible.

## 12.5 SUBCONTRACTORS

Subcontractors shall implement their own OSHA-compliant hazard communication programs on-site, including a written program and an employee training program.

## 12.6 WORKER INFORMATIONAL PROGRAM

The SSHR shall provide information concerning levels of exposure, site hazards, planned future activity at the site, and other relevant and appropriate information to all site workers associated with the project by written informational bulletins and by participation at least monthly in each subcontractors tool box or tailgate meeting.

## 12.7 EMPLOYEE TRAINING

Employee training will include the following:

- methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area;
- the physical and health hazards of the chemicals in the work area along with the symptoms of exposure;
- the measures employees can take to protect themselves from these hazards; and
- the details of the hazard communication program developed by the employer.

## Section 13 RESPIRATORY PROTECTION PROGRAM

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### 13.1 GENERAL

Use of respiratory protection will be in accordance with applicable regulations and PP SH 3.1, Respiratory Protection Program.

### 13.2 RESPIRATOR SELECTION

Respirators shall be selected from Program-approved devices based upon an assessment of the nature and extent of hazardous atmospheres that are anticipated to be encountered during field activity. The initial respirator assignment for each operation is provided in the SSHP and on the HWP. The assessment will consider whether the following criteria apply:

- the estimated contaminant concentration is in the range requiring respiratory protection;
- the estimated factor by which the contaminant concentration may exceed the contaminant exposure limit and the protection factor of the respirator;
- the contaminant is a gas, vapor, mist, dust, or fume;
- the potential exists for an immediately dangerous to life or health (IDLH) contaminant concentration; and
- the detection of chemical contaminant warning properties (e.g., irritation, odor).

### 13.3 MEDICAL SURVEILLANCE

Program participants who are required to utilize respiratory protection shall be fully qualified by the Program, team subcontractor, or respective subcontractor medical surveillance program. In accordance with PP SH 1.4, Training Program, each user of respiratory protection shall be qualified by:

- physician's statement, which includes a respirator-use certification; and
- fit-test certificate completed within the past 12 months for the model and size of respirator to be used.

### 13.4 RESPIRATORY PROTECTION TRAINING

Training in the use of respiratory protective equipment is the responsibility of each employer. Training in the use of negative-pressure filter respirators is presumed with completion of 40-hour training session. PP SH 1.4, Training Program, outlines the annual training associated with fit testing. Proof of training of each employee in the use of supplied-air equipment will be required.

### **13.5 RESPIRATOR FIT TESTING**

Each employer is responsible for fit testing of its employees. Each individual who must wear a respirator will be required to be clean shaven in the sealing areas of the respirator face piece at the time of fit testing. Each respirator user will be respirator fit-tested at least annually. Upon donning the respirator device or before entering any restricted work area, each respirator wearer will be required to perform a negative- and positive-pressure fit test.

### **13.6 RESPIRATOR CLEANING, INSPECTION, AND MAINTENANCE**

Each Program respirator user shall be issued a respirator for exclusive personal use. Subcontractors will also be encouraged to follow this policy.

If respirators are shared, such as for emergency-use devices, a qualified individual is assigned the responsibility for the care, maintenance, inspection, cleaning, and sanitizing of each respirator at the end of each shift. When respirators are not shared, individuals shall be responsible for cleaning and routine maintenance of their own respirators.

Respirator users shall be instructed to inspect their respirators prior to each use, after each use, and after cleaning in accordance with PP SH 3.1, Respiratory Protection.

### **13.7 RESPIRATOR CLEANING SUPPLIES**

Routine cleaning during fieldwork for which respirators are routinely used will be accomplished at a respirator-cleaning station located adjacent to the access-control point. All necessary supplies will be provided for workers to clean and sanitize their respirators. (Note: Decontamination does not constitute respirator cleaning, but is always performed before respirator cleaning.) Supplies provided by the SSHR for Program personnel and each subcontractor shall include:

- moisture-treated wipes,
- cleaning/sanitizing solution,
- cleaning solution basins,
- soft-bristle scrub brushes,
- rinse basins,
- drying area, and
- clean storage bags (zip-lock type).

### **13.8 SUBCONTRACTORS**

Each subcontractor shall implement an independent respiratory protection program for its personnel. Subcontractors shall maintain current fit-test certificate and medical certification for each employee as specified in their subcontracts. Subcontractors shall provide buddy, standby, and rescue personnel when required for special operations.

Section 13 Respiratory Protection Program

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### 13.9 SPECIAL TRAINING

Special training is required for the use of Type C (air line supplied) and self-contained apparatuses. Personnel shall demonstrate training in the use of Type C respiratory protection as evidenced by a copy of the training outline associated with a 40-hour class, a letter or certificate from their employer stating that they are trained in the use of this equipment, or a training certificate from a supplemental training course for this equipment.

Section 13 Respiratory Protection Program

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## Section 14 **TRAINING ASSIGNMENTS**

### 14.1 BASIC TRAINING REQUIRED

All Program and subcontractor employees involved with intrusive field activities shall have completed a 40-hour safety and health training course or be trained in accordance with the hazardous waste training requirements specified in 29 CFR 1910.120 (8 CCR 5192). Personnel directly supervising employees in the exclusion zone or CRZ shall have received the 8-hour Supervisor's Training for hazardous waste operations. All personnel who must meet the above requirements shall be current with respect to the 8-hour refresher requirements of 29 CFR 1910.120 (8 CCR 5192). Other training that may be required is identified in PPs and the SSHP. Table 14-1 provides a training assignment matrix.

**Table 14-1  
Training Assignment Matrix**

Category	40-Hour Basic	8-Hour Refresher	24-Hour Supervised Experience	8-Hour Supervisor/ Refresher	Site Specific <sup>a</sup>	CLEAN Program Orientation	Special Equipment Use <sup>b</sup>
Team employee	X	X	X	<sup>c</sup>	X	X	X
Supervisor	X	X	X	X	X	X	X
Subcontractor (intrusive work)	X	X	X		X	X	X
Visitor <sup>d</sup>	<sup>e</sup>	<sup>e</sup>	<sup>e</sup>		X		
Vendor <sup>d</sup>	X	X	<sup>e</sup>		X		
Subcontractor (nonintrusive work; e.g., land survey, geophysics)	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	X	X	

**Notes:**

- <sup>a</sup> site-specific and CLEAN Program orientation may be combined for visitors, subcontractors, temporary team personnel, and vendors
- <sup>b</sup> for those employees involved in supplied-air operations
- <sup>c</sup> most Program employees shall take supervisor training in lieu of standard refresher training
- <sup>d</sup> for visitors/vendors requiring controlled-area access or who are working on contaminated equipment
- <sup>e</sup> not required if escorted
- <sup>f</sup> to be determined on a case-by-case basis

### 14.2 PROGRAM TRAINING

All personnel entering controlled areas or performing specified field-support activities will attend a Program safety and health orientation presented by the SSHR or SHS prior

to beginning fieldwork on the project. This is a one-time training session, which may be combined with site-specific training. This training shall address general Program policies, rules and regulations as well as other matters that are common between Program sites.

### **14.3 SITE-SPECIFIC TRAINING**

Prior to commencing work activities, all personnel will be required to attend a safety orientation given by the SSHR. This meeting is required by SWDIV, Program policy, and OSHA. Attendance at the meeting is mandatory for all project personnel and supervisors. A SWDIV representative or installation/activity representative may also be present to answer any questions and review the site requirements. New employees reporting to work after the job starts are also required to attend a safety orientation prior to engaging in any work activities. This orientation will be performed by the SSHR or by the subcontractor Safety and Health Coordinator. Documentation of this orientation shall be maintained by the employer.

### **14.4 SAFETY BRIEFINGS**

The Program and subcontractor supervisors shall conduct Tool Box Safety Meetings on a regular basis to assure that new or important existing information regarding site safety and health is given to all personnel. The SSHR will provide a suggested topic for the weekly meeting and will provide periodic information to be presented to all workers at these meetings. The SSHR may participate in subcontractor safety briefings.

### **14.5 DOCUMENTATION**

Each subcontractor shall provide the SSHR a copy of weekly meeting minutes together with a list of attendees. Required training submittals shall be maintained by the SHM.

### **14.6 SUPERVISED FIELD EXPERIENCE**

In accordance with regulatory requirements, employees without documentation of supervised field experience shall work under close supervision until they complete 24 hours of supervised field experience.

### **14.7 EXCEPTIONS**

Exceptions to training requirements shall be specified in the SSHP. Exceptions may be specified for subcontractors performing nonintrusive work in areas where public/base personnel access is unrestricted.

### **14.8 TRAINING RECORDS**

The SHM will administer the training records management program. The SHM will maintain a system to track field employee training. Copies of training certification documentation for all Team and other subcontractors will be maintained by the SHM.

Section 14 Training Assignments

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## **14.9 PERIODIC SAFETY AND HEALTH TRAINING AND SAFETY SESSIONS**

The Program SHM shall schedule and conduct periodic sessions with PMs, CTO Leaders, and other Field Team Leaders to discuss safety and health information, lessons learned from Program field experiences, and improvement in safety and health procedures execution.

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## Section 15 SUBCONTRACTOR REQUIREMENTS

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### 15.1 COMPANY REQUIREMENTS

The subcontractor representative will provide the documents listed below to BNI in advance of site work. Many of these documents are also required to be available on-site. This requirement is indicated where applicable.

- written designation of the competent person for excavation, trenching, etc., as required;
- written designation of the Safety and Health Coordinator and Alternate Safety and Health Coordinator;
- designation of the company Safety and Health Official or Manager;
- copies of the subcontractor Safety and Health Plan for the site, and SOPs applicable to site work (these documents are also required at the work site; the subcontractor plan must be at least as conservative as the CLEAN SSHP);
- copies of the subcontractor Safety and Health Program, Injury and Illness Prevention Program, Code of Safe Work Practices, as applicable (these documents are also required at the work site);
- a copy of the subcontractor Respiratory Protection Program, Medical Surveillance Program, Employee Exposure Records Maintenance Program, Hazard Communication Program, Emergency Plans, Lockout/Tagout Program, Confined Space Entry Program, and any other OSHA-required Program documents applicable to the work scope (applicable documents are also required at the work site); and
- MSDSs and product names index for all products brought on-site (these documents are also required at the work site).

In addition to the above documents, the following items need to be maintained on-site:

- on-site documentation of inspection and certification by a competent person of equipment safe operating condition for each item of machinery or mechanized equipment;
- on-site manufacturer instructions or operating procedures for each item of machinery or mechanized equipment; and
- personnel documentation as required in Section 15.2.

### 15.2 PERSONNEL DOCUMENTATION REQUIREMENTS

All personnel will be required to either have available on-site the documents listed below or to provide a certified report showing the names and dates when the requirement was last completed if actual copies of certificates can be produced within 24 hours upon request.

Section 15 Subcontractor Requirements

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- physician's statement for hazardous waste site work;
- physician's statement for respirator use, if such use is contemplated;
- respirator fit-test certificate (for each model and size that may be required);
- statement of 3 days' supervised field experience on a hazardous waste site;
- training course certificate, 40 (or 24) hours;
- refresher training course certificate (after one year from initial training);
- supervisor training certificate (8 hours) (for supervisors);
- first aid/CPR training certification, if required, based upon site-specific needs;
- respirator training certificate for special devices; and
- employer's certification that the employee has completed training to a level required by job function and responsibilities.

## Section 16 EMERGENCY RESPONSE PLAN

### 16.1 GENERAL

The SSHR is responsible for establishing the Emergency Response Team (ERT) at the site. The size of the ERT is dependent on the scope of work and the size of the field team. The SSHR will establish the ERT as part of the site mobilization and emergency response training. The makeup of the ERT will be an element of the site-specific training. In many cases the field team will all be part of the ERT. Table 16-1 shows the required emergency telephone numbers that must be included in each SSHP.

**Table 16-1**  
**Emergency Phone Numbers**  
(to be posted by Site Safety and Health Representative at all phone locations)

Emergency	Number	Contact	Notes
Emergency	911	Emergency Operator	
Medical	911	Emergency Operator	
Fire	911	Emergency Operator	
U.S. Coast Guard	VHF* Channel 16		
Duty Officer	Base-specific		
Medical Center	Task-specific	Task-specific	

Note:

- \* VHF – very high frequency (Marine Radio)

### 16.2 EMERGENCY RESPONSE TEAM

The ERT is responsible for rescue, fire fighting, and spill control and response on-site, until activity or off-site emergency response personnel are called in. The ERT will provide initial response only. The SSHR shall designate ERT members in advance of fieldwork who are qualified for the range of anticipated emergency events. ERT members will be first aid-/CPR-qualified. They also shall have completed fire-fighting and emergency spill-control training if the potential for spills of regulated materials is present. ERT members may be Program or subcontractor employees. The SSHR will direct the ERT as required.

### 16.3 THE EMERGENCY FACILITY LOCATION

The emergency facility location, direction, and map will be included in this section in the SSHP for each activity.

## 16.4 EMERGENCY EQUIPMENT

PP SH 2.3, First Aid and Bloodborne Pathogens, defines first aid equipment and other first aid supplies required on-site. These are shown in Table 16-2. The following emergency equipment shall be maintained in ready condition at the central staging area:

- full-face respirators (HEPA/OV) (two each size)\*;
- coveralls, Saranex<sup>®</sup> (four); and
- spill cleanup and control supplies (one kit) (task-specific contents).

\* unless individuals have their own on-site

**Table 16-2**  
**Emergency Facilities Locations**

Facility	Nearest Location	Alternate Location
Safety shower	Generally not required	Not applicable
Portable deluge	Each work area	Support vehicle
Decontamination area	Each group of sites	Support vehicle
Eyewash	Each work area	Support vehicle
First aid kit	Each work area	Support vehicle
Other emergency supplies	Site staging area	Investigative-derived waste storage area
Emergency oxygen	Generally not required	Not applicable
Fire extinguishers	Subcontractor vehicles Each work area	Waste storage area

The emergency equipment list must be reviewed for the CTO scope of work. If contaminants or conditions warrant additional emergency equipment, requirements are specified in the SSHP.

## 16.5 EVACUATION PLAN

The emergency response plan will be activated for any required evacuations. The SSHR will direct all emergency evacuations.

Any evacuation of a field site will continue until normal working conditions have been restored and permission to return to work is granted by authorized personnel (normally, this will include the SHS and ROICC). During an evacuation, all personnel should remain calm and follow prescribed procedures for an orderly exit. If the SSHR determines that only the immediate work area should be evacuated, personnel may be notified verbally. All evacuation routes will follow the direction upwind and/or at right angles to the hazard.

## Section 16 Emergency Response Plan

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When the evacuation notice is issued, all equipment in use will be shut down if time allows. Unless otherwise directed by the SSHR, all personnel will then proceed to the common, predetermined location specified by the SSHR as indicated on maps of the site depicting evacuation routes. These maps will be posted on-site and reviewed with all personnel at the site orientation. During an evacuation, personnel who cannot reach the common evacuation point location must report their individual locations to the SSHR as soon as possible.

Specific evacuation routes from the site will be established before work begins. All personnel will meet at a predesignated point unless otherwise directed by ERT personnel. The SSHR will determine whether any personnel are missing and will activate the ERT if action is necessary to locate personnel. The SSHR shall request assistance from activity/installation personnel for major emergencies. All personnel shall consider the nature of the emergency, wind conditions, and available escape routes when selecting an evacuation route.

### 16.6 SITE COMMUNICATIONS

Site personnel will maintain verbal communications using the following methods:

1. Cellular telephones if land lines are not available.
2. Handheld two-way radios are the normal means of communication. The SSHR shall always have a radio in his/her possession if providing coverage of more than one operation.
3. Emergency hand signals are used when wearing protective gear or walking in high-noise areas. Standard hand signals are listed below.

Signal	Meaning
Hand clutching throat	Out of air, I can't breathe
Waving arms above head	Need assistance
Thumbs up	I am OK/I understand
Thumbs down	No/negative
Closed fist	Stop or hold your position
Pointing with all fingers extended and together (salute configuration)	Leave area immediately or "go that way"

4. Horn signals used at the site shall be in accordance with the installation signal. The installation signal is specified in the SSHP. If the installation does not have a signal system and a cellular telephone or handheld two-way radios cannot be used, the following blast signal is used:

Signal	Meaning
One extended blast	Evacuate to emergency meeting location

## Reporting an Emergency:

When calling for assistance in an emergency situation, the following information should be provided:

- name of the person making the call,
- telephone number at the location of the person making the call,
- name of the injured person (if known),
- nature of incident,
- actions already taken,
- location of the incident, and
- what assistance is needed.

**IMPORTANT! DO NOT HANG UP UNTIL THE OPERATOR HAS ALL THE INFORMATION NEEDED.**

## 16.7 INCIDENT FOLLOW-UP

A detailed investigation of emergency plan activation causes will be conducted in accordance with PP SH 2.2, Emergency Response and Reporting Requirements, jointly by the Project Manager, the SHS, and any additional personnel designated by the Program Manager. Table 16-3 shows the site and Program emergency notification contacts required.

**Table 16-3**  
**Site and Program Emergency Notification Contacts**  
(to be completed by Site Safety and Health Representative prior to field activity)

Contact	Telephone	Alternate
Resident Officer In Charge of Construction	Site-specific	Site-specific
Project Manager	Site-specific	Site-specific
Contract Task Order Leader	Site-specific	Site-specific
Site Safety and Health Supervisor	Site-specific	Site-specific
Site Safety and Health Representative	(mobile phone)	Site-specific
Remedial Project Manager	Site-specific	Site-specific
Bechtel National, Inc., San Diego Office	(619) 687-8700	
Kleinfelder, San Diego Office	(619) 541-1145	
Brown and Caldwell, San Diego Office	(619) 528-9090	
Safety and Health Manager	(619) 687-8751	

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## 16.8 OCCUPATIONAL INJURIES

The following steps shall be taken by on-scene personnel in the event of personnel injury:

- assess the situation quickly and ascertain if it is safe to approach the victim;
- remove injured people from further danger;
- render first aid if trained; if not trained, seek immediate assistance;
- send for help and notify emergency response or medical personnel;
- perform decontamination if required, and if this will not interfere with necessary medical treatment; and
- follow instructions of emergency medical personnel.

Occupational injuries shall be reported as follows.

- the employee's supervisor will be notified promptly;
- the employee's supervisor will notify the company (or subcontractor) safety coordinator;
- the subcontractor safety coordinator will notify the SSHR;
- the subcontractor safety coordinator will provide a written report within 24 hours to the SSHR; and
- the SSHR will notify the Project Manager and the ROICC or designated installation safety coordinator and will forward copies of the written reports to the SHS, SHM, and Operations Manager in accordance with PPs.

## 16.9 FIRE EMERGENCY

Supervisors must be constantly aware of potential fire hazards. Site personnel should use portable extinguishers to quench any small, incipient fires. However, if personnel cannot extinguish the fire, they must evacuate the area immediately and notify first the site emergency fire department. The Emergency Coordinator will interact with fire department personnel when they arrive and will provide all pertinent information, including potential hazards, missing personnel and their last known locations, and the location and description of the fire.

Section 16 Emergency Response Plan

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## Section 17 FIRST AID PLAN

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### 17.1 GENERAL

During fieldwork, at least two people will be on-site who have a valid certificate in basic first aid/CPR from the American Red Cross or equivalent, documented training. The Program SHM may reduce this requirement to one person when on-site facilities are immediately available.

Each subcontractor will be required to provide one first aid/CPR-qualified individual on each shift; however, if a subcontractor is working alone, two qualified personnel shall be available. This requirement may be met if two sites are within one-half mile of each other and communications are in place.

First aid kits will be maintained by each subcontractor. A 5-gallon supply of emergency deluge water shall be available and reserved for emergency use. Each subcontractor shall maintain at each work location at least two eyewash bottles (one-quart capacity each) available for immediate use. The SSHR shall periodically verify that the first aid supplies are available.

Qualified Program personnel may use the first aid kits to administer first aid to any injured workers. The SSHR shall verify daily that first aid-/CPR-qualified personnel are on-site. Unqualified personnel should only use the first aid kits to assist others in an emergency when qualified personnel are not available.

When responding to serious personnel injuries, the SSHR will contact the appropriate authorities (e.g., fire department, a physician, paramedics, or police).

Severely injured personnel will be transported to the hospital by ambulance service. Site personnel will transport injured persons to the hospital only if ambulance service is not readily available.

Treatment of workers injured in an area controlled because of hazardous chemicals or hazardous wastes shall be in accordance with PP SH 2.3, First Aid. Life-saving care shall be provided immediately, without consideration of decontamination requirements. In the presence of strong acid or caustics, caregivers shall don appropriate protection.

### 17.2 BLOODBORNE PATHOGENS EXPOSURE CONTROL

All personnel should be aware of the potential for transmission of disease from contact with bodily fluids. It is assumed that all bodily fluids are potentially infectious, and appropriate precautions should be used. Controls to be considered are as follows:

- use the victim's hand to control initial bleeding;
- use available protective gear (Tyvek<sup>®</sup>, gloves) to prevent contact;
- promptly wash after contact with body fluids; and
- use rescue breather for CPR.

### 17.3 FIRST AID TRAINING

Program employees will be offered an 8-hour first aid/CPR/oxygen administration course every 3 years and a 4-hour CPR refresher course annually. Subcontractors are responsible for training their employees.

## Section 18 **FIELD SAFETY PLAN**

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### **18.1 GENERAL**

The Field Safety Program is defined in PP SH 5.1, "Field Safety Program." Refer to this procedure and the reference documents listed in Section 1.2 for a complete list of safety requirements. Section 18.3 includes an abbreviated list of safety work practices.

### **18.2 INSPECTIONS**

Frequent and regular safety and health inspections shall be conducted at each work site. The SSHR inspects the workplace daily. Each inspection shall be documented in the SSHR daily logs along with corrections of safety violations. This documentation shall be included in the site closeout report.

In addition to the daily inspections performed by the field team, the safety and health staff shall perform frequent inspections of fieldwork sites to assure compliance with Program requirements. Safety and health staff inspections shall similarly be documented and deficiencies tracked until documented closure of site activity.

### **18.3 GENERAL SAFETY RULES**

The following safe-work practices will be enforced at the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be prohibited in any area where the possibility of contamination exists.
- Face and hands will be washed upon leaving a contaminated or suspected contaminated area before eating, drinking, or any other activities transpire.
- Legible and understandable precautionary labels will be affixed to containers of scrap, waste, debris, and contaminated clothing.
- Contaminated protective clothing will not be removed from the controlled area until it has been cleaned or properly packaged and labeled.
- All wastes generated from project activities (e.g., soiled PPE, decontamination waste) will be contained and disposed as specified in the Investigation-Derived Waste Plan.
- Excessive facial hair, which interferes with a satisfactory fit of the mask-to-face seal, will not be permitted.
- Contact with potentially contaminated substances will be avoided. Personnel will not walk through puddles, pools, mud, kneel on the ground, lean or sit on equipment or place monitoring equipment, or tools on contaminated surfaces.
- Personnel will not be permitted to wear contact lenses within a controlled area, except when medically required.

## 18.4 FORBIDDEN PRACTICES

The following practices will be strictly forbidden during any work in controlled access areas.

- horseplay;
- fighting;
- eating;
- drinking, except in authorized break areas;
- smoking;
- chewing gum, tobacco, or any other substances;
- use of facial cosmetics other than prescription medication, sunscreen, or preparations used on the advice of a physician;
- unnecessary sitting or kneeling on contaminated surfaces;
- placing equipment on contaminated surfaces (when practicable);
- climbing on or over obstacles;
- starting or maintaining an open flame of any type unless authorized by the SSHR;
- entering the work site with safety equipment that has not been determined to be in proper working condition immediately prior to entry; and
- entering the work site, under any circumstances, by any employee or visitor without prior approval.

In addition to the forbidden practices, the SSHR may impose other prohibitions that may be required for safe operations.

## 18.5 WORK OVER OR NEAR WATER AND DIVING OPERATIONS

Work over or near water, where there is a potential for employees to fall in and the danger of drowning exists, will be conducted in accordance with the requirements of applicable OSHA standards and COE EM 385-1-1. Work within 15 feet of unobstructed access to water shall be deemed to be within the requirements of this section. Except where employees are protected by continuous guardrails, safety belts, or nets, or work along beaches or similar shorelines, the following requirements shall be met by all personnel.

- Personnel will use the buddy system at all times.
- Swimming shall be prohibited for personnel, except for certified divers in the performance of their duties, unless necessary to prevent injury or loss of life.
- All personnel shall wear a Coast Guard-approved life vest that can support an unconscious person face up (Type 1, 2, or 3).

## Section 18 Field Safety Plan

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- Ring buoys shall be available every 200 feet. Ring buoys shall be Coast Guard-approved with 150 feet of 600-pound-capacity line.
- A lifesaving boat shall be immediately available and ready for emergency use in accordance with applicable regulatory requirements. Lifesaving boats shall be supplied and equipped with the following:
  - oars and oarlocks suitably attached (except on inboard powered boats),
  - boat hook,
  - anchor,
  - ring buoy with 600 feet of line, and
  - two life preservers.

### 18.6 REMOTE LOCATIONS

Remote locations are defined as locations without base medical/first aid facilities available within 5 minutes. Two people per remote site location shall have current basic first aid/CPR training. First aid kits shall be augmented with the following supplies for such work. The SSHR will make these kits available:

- rescue (mylar film) blanket,
- snake bite kit (where medical services may be delayed more than 4 or 5 hours),
- emergency oxygen,
- extra compresses,
- portable stretcher, and
- blanket.

Emergency communications will be in place at all times.

### 18.7 FIRE SAFETY

All site personnel will comply with all applicable fire-safety rules. For a complete list of fire-safety requirements, refer to the safety and health supplement, COE EM 385-1-1, and SH 5.1, Field Safety Program.

All personnel shall be informed of the location of the nearest fire alarm box and the local fire-reporting telephone number.

The following general fire-safety rules should be known and understood by all personnel on the project site.

- Smoking is permitted only in authorized and posted smoking areas.
- Strike-anywhere matches are prohibited on-site.
- A permit is required prior to any spark-producing activity (e.g., welding, cutting, grinding).

- Each vehicle will carry a 3A:40BC-type fire extinguisher.
- Lay-down areas for materials will be approved before use.
- Approval to block roads, park heavy machinery or equipment, or set up drill rigs shall be obtained in advance.
- Oily rags shall be stored in closed metal containers approved for this purpose.
- Flammable and combustible liquids shall be handled only in approved safety cans.
- All personnel shall know the area escape route and alternate route.

## 18.8 EARTH-DRILLING EQUIPMENT

All earth-drilling activities (e.g., boring, sampling, auguring) with powered equipment shall meet the safety requirements set forth in this section. The subcontractor safety coordinator for the drilling subcontractor is responsible for providing crews trained in safe operation of its equipment and for compliance with this section.

### 18.8.1 Special Planning Rules

Earth-drilling equipment shall be operated, inspected, and maintained as specified in the manufacturer's operating manual or employers instructions and code of safe practices. A copy of applicable instructions shall be available at the work site.

A prejob survey shall be conducted by the SSHR prior to bringing earth-drilling equipment to the site to identify overhead electrical hazards, potential subsurface hazards (e.g., unexploded ordnance and buried utilities), or other hazards.

The location of any hazards shall be identified on a site layout map. Such map shall be included within the SSHP before starting fieldwork and shall be reviewed with all earth-drilling equipment operators. Refer to PP SH 5.1.2, Safe Work Operation Process.

### 18.8.2 Training

All earth-drilling crews shall be trained in the safe operation, inspection, and maintenance of the equipment to be used; the safety features and procedures to be used during operation, inspection, and maintenance of the equipment; the hazards of operating the equipment near overhead electrical lines and underground structures; and the job-hazard analysis for the activity.

### 18.8.3 Safety Devices

Each earth-drilling machine shall have two easily accessible emergency-stop devices. One shall be normally accessible to the operator, and one shall be normally accessible to the helper. The SSHR shall require demonstration of the operability of each device before work may begin. Emergency devices shall not be field-modified, altered, or jury-rigged to impair their safety functions.

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### 18.8.4 Electrical Clearance

Drilling equipment shall be posted with signs warning the operator of the potential electrical hazard posed by overhead cables. If equipment is to be moved or operated with the mast raised near an overhead hazard, the equipment operator shall determine that proper clearances can be maintained before moving or operating equipment with raised masts. Clearance shall be monitored by a spotter provided by the subcontractor. The distance (minimum elevation) of overhead lines shall be determined from the ROICC or designated installation safety coordinator, or it shall be measured by electronic ranging equipment or surveyor.

Table 18-1 specifies minimum clearances to be maintained for energized overhead electric lines.

**Table 18-1**  
**Minimum Clearances for Overhead lines**

Nominal System Voltage (kilovolts)	Minimum Required Clearance (feet)
0 to 50	10
51 to 100	12
101 to 200	15
201 to 300	20
301 to 500	25
501 to 750	35
751 to 1,000	45

### 18.8.5 Induced Electrical Current

When work is conducted near electrical transmission towers, a potential exists for induced electrical charge to be present in equipment or materials such as pipe casing. The drilling subcontractor shall take the following precautions to dissipate induced charges.

- All masts or booms shall be electrically grounded to the vehicle or base of the rig.
- The vehicle shall have a well-established ground.
- Crews shall ground metallic objects before handling and shall use insulated gloves.

### 18.8.6 Control of Hazardous Energy (Lockout/Tagout)

Subcontractors shall prepare and implement procedures (Hazardous Energy Control Plan) for the control of hazardous energy. Such procedures shall be submitted to the SSHR prior to any fieldwork under the CLEAN Program. Lockout/Tagout shall be performed

when repairing earth-drilling equipment or other machinery. Subcontractor Hazardous Energy Control Plans shall meet COE EM 385-1-1 standards. Subcontractors without control plans shall not repair equipment where release of kinetic or stored energy may cause injury.

### 18.8.7 Moving Equipment

Earth-drilling equipment may be transported with the mast raised only if the following circumstances are satisfied.

- Movement is over smooth, level terrain;
- The path has been inspected for stability, and the absence of obstacle, ruts, or holes, and overhead electrical hazards.
- The travel distance is limited to short, safe distances.

The SSHR shall be the responsible individual to determine if travel with the mast raised may be permitted.

### 18.8.8 Equipment Setup and Operation

Earth-drilling equipment setup and operation shall meet the requirements listed below in accordance with COE EM 385 1-1.

- Rigs shall be operated only on stable ground and shall be maintained level.
- Rigs having outriggers shall use them in accordance with manufacturer instructions.
- Rigs shall not be operated in confined spaces without authorization of the installation/activity safety coordinator and the SHM.
- The SSHR shall monitor weather conditions. Operations shall be discontinued when electrical storms are occurring or imminent. The subcontractor safety coordinator is responsible for determining when drilling operations shall cease.
- Earth-drilling crew members shall not wear loose clothing or equipment. Protective outer clothing shall be taped to minimize the potential for catching in rotating machinery.
- Auger guides shall be used on hard surfaces.
- The rig operator shall verbally alert employees and visually assure that employees are clear of hazardous parts of the rig before starting or engaging the equipment.
- Water shall be channeled away from the work area to prevent ponding.
- Water containing potentially hazardous constituents shall not be permitted to run onto roadways, thoroughfares, or private property.

## Section 18 Field Safety Plan

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- *Drill rods shall neither be run nor rotated through rod-slipping devices. No more than one foot of drill rod column shall be hoisted above the top of the drill rod mast.*
- *Drill rod tool joints shall not be tightened or loosened while the rod column is supported by a rod-slipping device.*
- *Augers shall be cleaned only when the auger is stopped and the power mechanism is in neutral.*
- *Only long-handled shovels shall be used to move cuttings from the auger.*

### **18.8.9 Dust Control**

The subcontractor shall perform all earth drilling to minimize airborne dust. Dust shall be controlled to less than 0.5 milligrams per cubic meter of air (time-weighted average) as measured by a mini-RAM (or equal) at the controlled-area boundary.

### **18.8.10 Open Boreholes or Excavations**

Unattended open boreholes shall be capped and flagged whenever the hole is unattended. Open excavations shall be barricaded; walkways shall be provided; and personnel are not permitted to cross excavations. Fall protection is required at excavations 6 feet deep or greater where personnel work next to the excavation. Flashing lights shall be used if the excavation will remain open overnight and positive access control is not otherwise maintained.

## **18.9 SANITATION**

### **18.9.1 Potable Water**

The SHSO shall assure that cool, bottled water and disposable cups are available at all remote sites. Electrolyte-replacing fluids may also be required, depending upon the SSHR, SHS, or SHM evaluation. Bottled water shall be provided with a sanitary tap. Garden hoses are not an acceptable source of drinking water. Nonpotable water shall be marked "nonpotable, unfit for drinking, washing, or cooking."

### **18.9.2 Toilets**

Where employees do not have immediate access to available vehicles, temporary toilets shall be provided within a 5-minute walk. During activities in which provision of toilets is not practicable, such as reconnaissance or short-term mobile field activities, this requirement may be waived by the HSM.

### **18.9.3 Washing Facilities**

Washing facilities with hot and cold (or tepid) running potable water shall be provided at each decontamination area. Running water may be provided by either gravity flow, pressure, or manual pump. Soap and disposable towels shall also be provided.

### **18.9.4 Waste Disposal**

Waste receptacles shall be marked for their intended purpose and type of waste. All waste receptacles shall have a tight-fitting cover.

### **18.9.5 Illumination**

Illumination for night work shall meet OSHA standards.

### **18.9.6 Housekeeping**

The SSHR shall inspect all work areas daily for adequate housekeeping, and inspection results shall be recorded on the SSHR daily log. The following housekeeping requirements shall be met at all times.

- All passageways and routes of access shall be kept clear of obstructions, cables, or hoses.
- Empty bags of loose dust-producing material (e.g., cement, bentonite, lime) shall be removed daily.
- Combustible materials shall be properly stored.
- All spills of fuel, oil, solvents, or other flammable, dangerous or toxic material shall be cleaned up immediately and the spoils placed in containers marked as hazardous.
- Brush, long grass, or other materials that may present a fire hazard shall be cleared before motorized equipment is used.
- Excess scrap material and rubbish shall be promptly removed from the work area.
- PPE shall be returned to the designated storage area at the end of the work period or shall be placed in designated disposal receptacles.

## **18.10 EXCAVATION SAFETY RULES**

A partial list of excavation safety rules include PP SH 5.1, Field Safety Program; PP SH 5.1.2, Safe Work Operation Process; and PP SH 5.1.3, Confined Space Entries. Applicable state requirements and COE EM 385-1-1 shall also be consulted for full details. Refer to Section 6 for a discussion of hazards and Section 10 for monitoring requirements.

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The following specific requirements shall be followed for shallow test pits that personnel may enter.

- Entry is limited to pits with a maximum depth of 5 feet at any point.
- All excavations shall be inspected by a person competent in such inspections and the SHSR prior to entry; the competent person shall determine that no potential for cave-in exists and that protective systems are not required for entry.
- A separate HWP shall be prepared for each test pit.
- Excavations that remain open shall be inspected by a competent person daily and as needed following rain or other hazardous activity. Daily inspections shall be documented in writing.
- Spoils shall be kept at least 2 feet back from the edge of the pit.
- Stairs, ramps, or ladders shall be provided for pits greater than 4 feet in maximum depth.
- Pits shall be back-filled immediately after completion of work.
- Perimeter protection shall consist of warning barricades or flagging at least 6 feet from the edge of the excavation at a height of 3 to 4 feet aboveground. Standard exclusion-zone barrier tape is acceptable provided entry signs indicate that excavation is in progress.
- Contact the SSHR for special protection requirements for pits that must remain open overnight.

### 18.11 BURIED DRUM-HANDLING PROCEDURE

Refer to Section 28.H of COE EM 385-1-1 for drum-handling procedures. The SHS or SHM shall prepare special procedures if drums are identified on the site and sampling, handling, or inspection is required.

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## **Section 19**

# **VISITOR ACCESS REQUIREMENTS**

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Site visitors are defined as those who are not employed at the project site, do not routinely enter restricted work areas, and will only be within controlled areas for brief periods. Visitors may or may not be required to meet all aspects of the safety and health program, based upon their duties and potential exposures. Visitors may include government inspectors, vendors, repair personnel, governmental officials, and VIPs. Policies and procedures necessary to protect visitors are discussed in SSHPs.

### **19.1 GENERAL REQUIREMENTS**

The following requirements apply to visitors whose purpose is to observe site conditions or field activities.

- The SSHP will be notified of the nature and duration of the visit before visitors are permitted to enter a restricted work area.
- The visitor's log will be completed, including the individual's name, the date, and the name of the company or agency represented.
- The site visitor will be escorted by a Program representative at all times while in restricted work areas of the site. The SSHP or designee will escort visitors whenever restricted work areas are entered.
- Visitors will comply with specific safety and health requirements described in the following subsections, when applicable.

Table 14-1 shows training requirements.

### **19.2 MEDICAL SURVEILLANCE**

Each visitor will be required to provide proof of participation in an occupational health program if access is necessary into a controlled area where respirator use is required. A visitor who cannot provide a physician's statement or other acceptable documentation stating that he/she is medically qualified to work with hazardous materials and to wear a negative-pressure respirator will be restricted from entry.

### **19.3 TRAINING REQUIREMENTS**

All visitors, even if escorted, must be briefed on the SSHP (e.g., potential hazards and safety procedures) before entering restricted work areas. See Table 14-1 for requirements.

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## Section 20 PERSONNEL REQUIREMENTS

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All personnel assigned to work on this Project are expected to read and be familiar with the SSHP, Program Safety and Health Procedures, and their company safety requirements.

The individual personnel expectations set forth below are included in each SSHP.

- All personnel are expected to fully comply with all rules and regulations set forth in the above documents.
- All personnel are expected to report to work, ready to work, and free from influence of alcohol, illegal or controlled substances, or prescription or nonprescription pharmaceuticals that may affect their ability to work safely.
- All personnel shall report to work, with all safety gear required for anticipated tasks. BNI will not provide or loan hard hats, safety glass, boots, or gloves to subcontractors.
- All personnel are required to report all injuries and incidents, even if considered minor.
- All personnel are required to comply with the buddy system requirements within controlled access areas.
- All personnel are required to follow the direction of the SSHR on safety or health matters, stop-work orders, or emergency evacuations.
- All personnel will be required to sign an acknowledgment of training received on the project and an agreement to follow all rules and regulations.
- Eating, drinking, smoking, chewing, etc., will not be tolerated in controlled areas.

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## Section 21

# SPILL CONTROL AND CONTAINMENT REQUIREMENTS

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## 21.1 SPILL CONTROL AND CONTAINMENT

Chemicals or hazardous substances could be spilled during site tasks as a result of:

- transportation accidents;
- improper packaging practices;
- rupturing of tanks, drums, or other storage containers; or
- improper handling of hazardous materials during off-loading.

The emergency plan will be activated in the event of unplanned spills of hazardous or unknown substances. In the event of any spill at the site, the field team leader and SSHR are to be notified immediately by whoever first witnesses the emergency event.

As soon as a spill is discovered, all nonessential workers should evacuate the immediate area to reduce the likelihood of spreading contamination or being exposed to contamination.

The designated emergency-response personnel will proceed to the spill area with the appropriate equipment. Section 16 of the SSHP lists the spill equipment that will be maintained for that task.

While the ERT is cleaning up the spill, the SSHR will monitor for exposures to chemicals or hazardous substances, will determine the appropriate PPE, and will identify the spill area as restricted. In addition, the SSHR will provide technical guidance to the ERT as needed.

The SSHR will direct the spill response and will stay at the spill area until the area has been cleaned, surveyed, and readied for release. The Project Manager will approve release of the site and will issue a final release report of the area. The SSHR will document the spill on an Incident Report in accordance with PP SH 2.2, which will be forwarded to the SHS or SHM.

## 21.2 EMERGENCY RESPONSE CALL-OUT

In the event of an emergency event, the activity-designated Point of Contact will be notified. Depending upon the activity and nature of the emergency, the following individuals will be notified of events with environmental consequences:

- ROICC,
- Environmental Coordinator,
- Public Works Point of Contact, or
- Command Duty Officer (if the others cannot be reached).

If a contact cannot be reached, the next person will be contacted and informed of prior contacts.

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