Draft

Interim Soil Management Plan for the Upland and Transition Areas

University of California, Berkeley
Richmond Field Station, Richmond, California

February 16, 2007

Prepared for
Office of Environment, Health & Safety
University of California, Berkeley
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ACRONYMS AND ABBREVIATIONS

§	Section
AOC	Area of concern
29 CFR	Title 29 Code of Federal Regulations
COPC	Chemical of potential concern
EH&S	Office of Environment, Health & Safety
EPA	U.S. Environmental Protection Agency
HASP	Health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
JSA	Job Safety Analysis
OSHA	Occupational Safety and Health Administration
PPE	Personal protective equipment
RFS	Richmond Field Station
SAP	Sampling and Analysis Plan
SMP	Soil Management Plan
SVOC	Semivolatile organic compound
SWP	Safe work practice
TTLC	Total threshold limit concentration
UC	University of California

1.0 INTRODUCTION

This Interim Soil Management Plan (SMP) for the Richmond Field Station (RFS) was prepared to provide protocols for managing potentially contaminated soils disturbed by construction and maintenance projects in the upland and transition areas. This report was prepared on behalf of the Regents of the University of California (UC), owner of the RFS property. This interim SMP will be periodically updated as remediation work is completed under the California Environmental Protection Agency, Department of Toxic Substances Control, Site Investigation and Remediation Order, Docket No. ISE-RAO 06/07-004, dated September 15, 2006. Contaminated substances were left on portions of RFS from historical industrial activities prior to UC's purchase of the RFS property in 1950. Much of this former contamination has already been removed during recent site remediation activities; however, small amounts of residual contamination may remain undiscovered in the upland and transition areas. If potentially contaminated materials are encountered during earthwork operations conducted at RFS, this interim SMP provides standard operating procedures for the protection of worker health and safety and for disposal or handling of these materials. UC Berkeley's Office of Environment, Health & Safety (EH&S) will administer and manage the implementation of this interim SMP and shall be contacted at (510) 642-3073.

This interim SMP has been developed to provide UC staff and Contractors with information on existing conditions that could be encountered during excavation of soil and other soil disturbance activities. The interim SMP defines the controls that Contractors and UC staff must use to minimize generation of dust and exposure to soil. It is the responsibility of the Contractors and Subcontractors to develop a task-specific Health and Safety Plan (HASP) and to provide training to its employees on management of soil. Specific recommendations for worker protection will be provided by the Contractor's safety officer or management. For UC staff, a Job Safety Analysis (JSA) and training on the JSA is to be completed by the responsible department as required by the Injury and Illness Prevention Program (UC Berkeley 2006).

This interim SMP is necessary to protect the health of UC and Contractor employees because a potential exists for site soils to contain chemicals that may pose a hazard to workers if not managed appropriately. This interim SMP defines the soil requiring management (Section 2.0), summarizes the scope of activities required to manage soil at the site (Section 3.0), presents the protocols for handling potentially contaminated soils (Section 4.0), and describes the work practices to be implemented at the site (Section 5.0). The interim SMP also includes four appendices that provide additional information and guidance. Appendix A is the "Health and Safety Plan Addendum, University of California, Berkeley, Richmond Field Station, Richmond, California" dated October 31, 2006. Appendix B is the job safety analyses for the RFS. Appendix C provides best management practices for outdoor storage of materials and soils during construction. Appendix D provides the analytical results for samples collected from pyrite cinder-impacted soil encountered at numerous locations in the RFS upland area.

A description of the site and the purpose of this interim SMP are summarized in the following sections.

1.1 SITE DESCRIPTION

The RFS site is located at 1301 South 46th Street in Richmond, California (see Figure 1). The RFS consists mainly of developed upland areas used for academic teaching and research, marsh, and a transition zone of upland fill between the upland areas and marsh. This interim SMP only addresses work performed on the upland and transition areas of the site. The RFS property has been zoned industrial since the early 1900s. In 1950, UC purchased the property from the California Cap Company and, after 1951, acquired additional undeveloped land to the west of and adjacent to the property (URS Corporation 1999). This combined property makes up the current RFS.

RFS was primarily established to support large-scale engineering research for which space or appropriate facilities were not available on UC Berkeley's central campus. Research projects for UC's College of Engineering and the Forest Products Laboratory have been the primary activities at RFS. The site also includes facilities for maintenance activities, the Northern Regional Library Facility, laboratory spaces for academic teaching and research, and the U.S. Environmental Protection Agency's (EPA) Regional Laboratory.

Historic activities at the RFS related to the former California Cap Company and pyrite cinders from the adjacent Zeneca site operations are the two identified primary sources of on-site contamination. From 1870 through the 1940s, the former California Cap Company manufactured blasting caps on the RFS property. The Zeneca site, located to the east and adjacent to the RFS, was the location of chemical production operations, including sulfuric acid production. Mercury stemming from the manufacture of blasting caps and pyrite cinders resulting from the production of sulfuric acid at the Zeneca site are two known contaminant sources at RFS. Pyrite cinders have been found at various locations across the site where they were historically deposited to fill in low-lying areas or used as utility trench backfill. Anecdotal evidence from former RFS employees indicates that pyrite cinders were reportedly used to minimize weeds and other vegetation from growing around building foundations and may still be encountered around structures at the site. Pyrite and associated mixed sulfide minerals contain metals, including arsenic, copper, iron, lead, mercury, and zinc; although typically at levels that do not pose a human health hazard. The known locations of pyrite cinders are illustrated on Figure 2. Additional unknown areas of pyrite cinders may be present across the RFS.

Since the 1980s, numerous field investigations and remediation activities have occurred at RFS. These field investigations focused on evaluating potential source areas and determining the extent of areas that may pose potential risk to human health or the environment. Areas that are known to pose unacceptable risk have been identified as areas of concern (AOC). In the upland areas, all but one of the known AOCs has been excavated and contaminated soil has been disposed of off site at appropriate landfills. The remaining upland area, AOC 7, is planned for remediation in the near future under the RFS Remediation and Restoration Project. Figure 2 shows the location of AOC 7.

1.2 PURPOSE

The purpose of this interim SMP is to specify a protocol for characterization and management of all soils in the upland and transition areas at RFS. This interim SMP provides instructions on the proper management of soil that is disturbed, stockpiled, or transported on and off site.

2.0 DEFINITION OF SOIL REQUIRING MANAGEMENT

For the purposes of this interim plan, soils to be managed at RFS are located in areas designated as "unrestricted access areas." This interim SMP does not address the area that has been designated as a "restricted access area" and identified on Figure 2. The restricted access area, which is fenced off and signed, includes AOC 7, where elevated concentrations of chemicals of concern are known to exist and environmental risk is likely (see Figure 2). Other portions of the restricted access area may be used for storage or stockpiling of soil that may be contaminated. Other areas at RFS could be designated as restricted access if determined to contain residual chemicals at concentrations that require cleanup or management under the supervision of the UC Berkeley EH&S personnel. When areas are determined to be restricted access areas, EH&S will provide fencing and signage or other clear demarcation of the area. Soils in restricted access areas will be addressed and managed as part of remedial activities in other documents and programs. Soil from these areas will be managed as chemically affected and potentially hazardous waste, as necessary, and will be addressed under federal Resource Conservation and Recovery Act and State of California Hazardous Waste Control Law regulations. Soils from restricted areas cannot be stored or managed outside these areas without approval from EH&S.

Risk evaluations by UC Berkeley, the State Department of Health Services, and Contra Costa County Health Services have determined that unrestricted access areas do not pose significant risks to the RFS's occupants (URS 2001; Department of Health Services 2006). However, residual contamination—such as small incidental areas of surficial and subsurface pyrite cinders, mercury, and other chemicals—possibly exists. Figure 2 shows areas where pyrite cinders have been identified in the past, but that have not been removed from the site, and Section 3.1 describes the appearance of pyrite cinders.

3.0 SOIL MANAGEMENT SCOPE OF ACTIVITIES

This interim SMP covers any earthwork, maintenance, and landscaping activities that occur in the upland and transition areas outside of the restricted access area (including AOC 7), as identified on Figure 2. These activities include excavating, backfilling, grading, stockpiling, and transporting soil. Soils from unrestricted access areas can be handled by UC employees who have completed EH&S's hazard communication training on the JSA under the Illness and Injury Prevention Program, as well as Contractor employees who have been trained on the Contractor's task-specific HASP (UC Berkeley 2006). Soil that has been determined by EH&S to exceed total threshold limit concentrations (TTLC) under Title 22 of the California Code of Regulations based on sampling results must be handled by UC or Contractor employees who comply with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and

Emergency Response (HAZWOPER) 40-hour training requirements Title 29 Code of Federal Regulations [29 CFR] Section [§] 1910.120).

If soil is not does not exhibit the signs of contamination described below in Section 3.1 then EH&S will determine if sampling is required. Analytical sampling will be required where signs of potential contamination are identified under the criteria listed in Section 3.1. UC staff or Contractors shall contact EH&S to arrange for sampling. All environmental soil sampling will be performed by 40-hour health and safety trained personnel and as described below in Sections 3.2 and 3.3. Section 3.4 discusses the reuse of soil on site.

3.1 DETERMINATION OF CONTAMINATED MATERIAL

At RFS, the presence of any of the following conditions indicates that soils may be potentially contaminated:

- Purple soils are an indication of soil that may contain pyrite cinders. Pyrite cinders have been found at RFS as a fine sandy, sometimes gravelly, soil.
- Soil that smells of oil, gasoline, chemicals, or decaying matter.
- Soil that contains buried debris.
- Soil that appears to have changed color though staining by oils or chemicals.
- Soil that contains any visible non-soil materials (powders, chemicals, nonaqueous liquids such as beads of mercury, and unknown solid wastes).

Suspected soil contamination found during activities that disturb soil must be reported immediately to EH&S staff. Soil suspected to be contaminated shall not be handled without EH&S approval. If EH&S determines that the soil could pose a hazard to construction workers or to RFS occupants, it will be sampled for characterization under a Sampling and Analysis Plan (SAP) prepared, as described in Section 3.3 and approved by EH&S. Such soils will only be sampled and handled by 40-hour-trained personnel (per 29 CFR § 1910.120), regardless of the volume excavated.

Under this interim SMP, EH&S staff will screen soil sampling results with the risk-based human health site-specific target levels developed during the risk assessment for the construction worker at RFS (URS Corporation 2001). Soil sampling results that exceed the screening criteria shall not be reused as backfill at the site and will require off-site disposal and may require special handling. Nonhazardous soil that is determined to exceed the screening criteria shall only be managed by RFS maintenance employees who have completed EH&S's hazard communication training on the JSA, as well as Contractor employees who have been trained on the Contractor's task-specific HASP. Soil that is determined to exceed TTLC levels may only be handled by personnel that have completed 40-hour HAZWOPER training and are current in their annual 8-hour refresher.

3.2 SAMPLING OF DISTURBED SOIL

A SAP, as described in Section 3.3, will be developed for larger projects as determined by EH&S. Soil samples will be submitted for analyses determined by EH&S staff based on site-specific information for the building or area under consideration.

Samples will be collected, handled, and submitted for analysis to a California State-certified laboratory. The guidance to be used for ensuring representative soil sampling is the EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846,* Chapter 9 (EPA 1986), as updated, or other methods approved by EH&S.

After soil samples are collected and analyzed, the data will be evaluated and compared against the screening criteria. The analytical results and comparison of data with screening criteria shall be performed by EH&S. If the concentrations in the soil samples are less than screening criteria, then the soil may be reused on site under EH&S approval, supervision, and procedures. If the soil sampling results exceed the screening criteria, the soil will be handled as outlined in Section 3.1. Soils exceeding the screening criteria will be segregated from other excavated soils and placed in a soil accumulation area designated by EH&S staff.

3.3 SAMPLING AND ANALYSIS PLAN

A SAP must be prepared by the Contractor or by EH&S for larger projects (such as excavation for a new building foundation or for major utility work), or as determined by EH&S. SAPs prepared by Contractors shall be submitted to and approved by EH&S before representative samples are collected from any location. Additionally, a SAP shall be prepared for projects when suspected contaminated soils are identified or when required by EH&S based on the area to be disturbed and site-specific historical information. Preparation of a SAP is intended to ensure proper consideration of the list of chemicals based on available site history or other considerations.

At a minimum, the SAP must include the following:

- A description of the project activities that necessitated the sampling event.
- The purpose of the project (such as stating why the sampling is being performed).
- A site description, including identification of the area to be sampled.
- Identification of chemicals of potential concern (COPC) based on historic use of the area where soil is or will be disturbed. Approval of the list of COPCs from EH&S is required.

- Sample design, specifying the number and locations where samples will be collected and where random sampling or biased sampling will be implemented. Representative samples will be collected from each type of soil excavated (for example, native material, fill material, and coarse-grained soil).

- Sample collection approach, listing the equipment used to collect the samples and requirements for labeling, sealing, storing, and transporting the samples to the laboratory.

- Specification of sampling location and depth.

- Sample analysis requirements, referencing the certified laboratory that will perform the analysis, the analytical method(s) to be used, the field and laboratory quality requirements, and the data validation necessary.

- Waste characterization sampling of stockpiled soils exceeding screening criteria.

3.4 REUSE OF SOILS ON SITE

Soils that contain chemicals at concentrations less than the screening criteria and that are approved by EH&S staff may be reused on site as backfill for site excavations, landscaping, or other maintenance and grounds-keeping purposes.

4.0 HANDLING PROTOCOL FOR SOILS THAT ARE NOT WITHIN THE RESTRICTED ACCESS AREA

This section addresses the protocol for handling soils that are not within the restricted access area identified in this interim SMP (see Figure 2).

4.1 WORKER TRAINING

Workers will receive training on the potential hazards associated with exposure to suspected contaminated soil for each work task they may need to perform. The California OSHA's Hazard Communication Standard (Cal. Code Regs. tit. 8, § 5194) requires that employers inform employees about potential hazards to which they may be exposed and appropriate control measures for reducing their exposure. The standard is very specific about training for employees who may be exposed to regulated carcinogens, such as arsenic (sometimes found at elevated concentrations in pyrite cinders at RFS). For RFS maintenance employees, all staff performing work that results in the disturbance of soil shall receive training on the JSA for the work activity. This training for existing and new employees will be provided by EH&S or another UC-approved trained staff member. Training has been provided on the JSA for all current workers that perform soil-disturbing activities. New RFS staff will be trained as necessary and prior to performance of any soil-disturbance activities. Training of the Contractor's staff is the responsibility of the Contractor's health and safety officer or management. The training should be of sufficient length to cover the following topics at a minimum:

- What hazards the employee may be exposed to during each work task, including, but not limited to, chemical hazards.
- How to identify pyrite cinders (see Section 3.1).
- How to identify other potential chemical hazards.
- The quantity and locations of hazardous chemicals and pyrite cinders found at RFS, and the specific nature of operations that could result in exposure to chemical hazards.
- The potential health risks associated with chemicals present at RFS.
- Work and hygienic practices to be followed to reduce exposure to chemical hazards, such as engineering controls or other best management practices and use of personal protective equipment (PPE).
- The limitations of PPE.

The above training elements are also required under the California OSHA standard for arsenic (Cal. Code Regs. tit. 8, § 5214).

4.2 SOIL HANDLING

Prior to beginning work that involves disturbance of soil, RFS maintenance staff or the Contractor must:

- Notify EH&S before performing intrusive activities or disturbing soil. EH&S reserves the right to monitor the effectiveness of the protective measures used for soil disturbance activities and stop work when measures in the applicable protocol are not followed.
- For a small project, a SAP is not required unless directed by EH&S or if the area is suspected to have contamination based on visual or historical information. Additional requirements for a large project are described in Section 3.3.
- Demonstrate to EH&S that all workers have completed appropriate training and have the proper PPE for the work. A minimum of hard hat, work gloves, and hearing and eye protection are required.
- Identify and receive concurrence from EH&S staff on the location for a soil accumulation area to temporarily stockpile disturbed soils during and following excavation or on-site transport of backfill material.
- Identify or provide a source of water for dust control.

During intrusive activities, RFS maintenance staff or the Contractor must:

- Perform continuous observation of soil as it is excavated and observe the trench bottom and sidewalls for signs of potential contamination.
- Adequately wet the soil for dust control as it is being excavated or moved.
- Place excavated soils onto visqueen or similar impermeable material if the soil is expected to be contaminated and completely cover the stockpiled soil until sample results are reviewed and evaluated. The visqueen or similar material used to cover the soil must be anchored to the ground and completely cover the stockpiled soil to prevent wind-blown dust from being generated.
- If workers determine that soil appears to be contaminated for any reason, including odors, discoloration, debris, or presence of pyrite cinders, the work will stop immediately and EH&S staff notified immediately.
- The Contractor or UC site worker shall provide a description of visibly contaminated soil, including the color, soil type, odor, discoloration, presence of debris, and the reason soil is suspected to be contaminated.
- Confer with EH&S to determine whether work can continue or whether work must be completed by HAZWOPER-trained personnel when visibly contaminated materials are encountered.
- Perform an evaluation of potential worker exposure to chemicals under their HASP. For RFS site staff, EH&S will evaluate the potential for worker exposure to chemicals and the need to implement additional engineering controls prior to resuming work.
- Perform soil sampling according to the protocols identified in the SAP for projects where a SAP is required.

During stockpiling of contaminated soil as defined in Section 3.1 or of soil exceeding the screening criteria, RFS maintenance staff or the Contractor must ensure that:

- Excavated soils that are suspected to be contaminated are segregated from soils that appear to be clean. Excavated soils may be returned to the trench or moved to an approved stockpile location. This determination will be made by EH&S and not by Contractors or RFS maintenance workers.
- Stockpiled soils that remain at the close of the day's work activity are covered by a weighted tarp or in a container with a lid. Stockpiles shall be covered with plastic tarps or nonpermeable covers.
- Stockpiles are secured adequately to prevent wind and rainfall erosion.

- Barrier cones, safety tape, and/or other markers approved by EH&S are placed around the stockpile to prevent the stockpile from being disturbed.

- Stockpiles of material suspected to be contaminated are clearly marked.

RFS maintenance staff or the Contractor must document the following:

- Soils that were excavated and returned to the same trench will not require documentation tracking unless requested by EH&S. Soils that were determined to be contaminated will not be returned to the trench.

- Soils that are moved from one location and reused in another location will be tracked by the RFS maintenance staff or Contractor. The RFS maintenance staff or Contractor will supply EH&S with the following information:

  - Identification of the source of soil
  - Hazard potential; did observations indicate the soil may be contaminated?
  - Name of EH&S personnel or their representative who performed the soil sampling.
  - Date of transfer to the stockpile location
  - Date of transfer to the reuse location
  - Type and volume of soil transferred
  - Location of the source soil, the stockpile location, and the reuse location on the project site plan

- The location(s) of pyrite cinders or suspected contaminated soil encountered during excavation activities at RFS should be marked on a copy of the project site plan. As-built drawings indicating suspected contaminated soil locations will be promptly supplied to EH&S.

During reuse of soil from excavations, RFS Facilities Maintenance staff or the Contractor must ensure:

- All soil that is designated for reuse must be first approved by EH&S, following receipt of soil tracking information.

- Maintain moist soil conditions at all times to minimize fugitive dust emissions.

5.0 SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work at RFS. These SWPs establish a pattern of general precautions and measures for reducing risks associated with site operations where contaminated materials may be present. This list is not inclusive and may be expanded by EH&S staff, RFS maintenance staff, or the Contractor as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving work area.
- Wear required PPE as outlined in the JSA or HASP.
- Immediately change clothes that have been in contact with suspected hazardous chemicals or pyrite cinders or wear disposal coveralls that are removed prior to riding in personal or work vehicles and leaving the site.
- At locations of suspected contamination, avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Be familiar with and knowledgeable of and adhere to all instructions in the Illness and Injury Prevention Plan, JSA, or in the HASP. At a minimum, a safety meeting will be held at the start of each project to discuss the JSA and/or the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before performing work on site.
- Establish appropriate decontamination procedures for leaving the site in case contamination is suspected.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to appropriate safety personnel.
- Do not bring matches and lighters in the work area.
- Observe coworkers for signs of heat or cold stress.

6.0 REFERENCES

Department of Health Services. 2006. "Provisional Joint Health Statement Summary for the Zeneca and UC Richmond Field Station Sites." Contra Costa County Health Services Department and California Department of Health Services. January 18.

UC Berkeley. 2006. "RFS Illness and Injury Prevention Plan."

URS Corporation. 1999. "Final Field Sampling and Analysis Plan and Tiered Risk Evaluation, University of California, Berkeley, Richmond Field Station." December 10.

URS. 2001. "Human Health and Ecological Tiered Risk Evaluation, University of California, Berkeley, Richmond Field Station/Stege Marsh, Richmond, California." Final Report. November 21.

U.S. Environmental Protection Agency. 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.* "Chapter 9, Sampling Plan." Available Online at: http://www.epa.gov/sw-846/main.htm

FIGURES

TETRA TECH EM INC.

Richmond Field Station
University of California, Berkeley

FIGURE 1
SITE LOCATION MAP

Interim Soil Management Plan

2007-01-05 V:\Misc_GIS\Richmond_Field_Station\Projects\Current_Conditions_Report\Site_Location_Map_szA.mxd TtEMI-SF Aleksandr Zhuk

Estimated Property Boundary

Upland Area

AOC 7

201 EPA Lab

300 0 300

Feet

- AOC 7
- Upland Area
- Transition Area (Including Bulb)
- Marsh and Bay Trail Areas
- Known Pyrite Cinders Area
- Suspect Pyrite Cinders (Presence Not Verified)
- Access Restricted Area
- Property Boundary Based on 2007 Survey
- Building
- Surface Water (Elevation = 0 Feet NGVD 1929)
- Roads and Other Landscape Features
- Biologically Active Permeable Barrier Wall
- Fence
- Former Seawall
- Slurry Wall

Sanitary Sewer Lines

- Exsiting
- Historic (Presence Not Verified)

Storm Drain Lines

- Open Swale
- Underground Culvert
- Underground Culvert, Abandoned (Grouted)

TETRA TECH EM INC.

Richmond Field Station
University of California, Berkeley

FIGURE 2
SITE PLAN MAP

Interim Soil Management Plan

2007-02-15 V:\Misc_GIS\Richmond_Field_Station\Projects\Soil_Mngmnt_Plan\SMP_Access_Restr_Area.mxd TtEMI-SF Aleksandr Zhuk

APPENDIX A
"HEALTH AND SAFETY PLAN ADDENDUM, UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION, RICHMOND, CALIFORNIA", DATED OCTOBER 31, 2006

(Due to size, this appendix is provided on compact disc only.)

HEALTH AND SAFETY PLAN ADDENDUM
UNIVERSITY OF CALIFORNIA, BERKELEY
RICHMOND FIELD STATION
RICHMOND, CALIFORNIA

Prepared for
University of California, Berkeley
Office of Environment, Health & Safety
University of California, Berkeley
317 University Hall #1150
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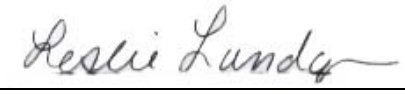
Contract No.	:	19335A
Date Prepared	:	October 31, 2006
Prepared by	:	Tetra Tech EM Inc.
Tetra Tech Project Manager	:	Leslie Lundgren
Telephone No.	:	415-222-8205
Client	:	Greg Haet, Associate Director, Environmental Protection

REVIEWS AND APPROVALS
CLIENT NAME: UNIVERSITY OF CALIFORNIA, BERKELEY
CONTRACT NO.: 19335A
RICHMOND FIELD STATION

We the undersigned have read and approve of the health and safety guidelines presented in this health and safety plan for on-site work activities at the University of California, Berkeley, Richmond Field Station site.

Name	Signature	Date
Jennifer Bailey, CIH Tetra Tech EM Inc. (Tetra Tech) Project Health and Safety Representative		10-31-06
Leslie Lundgren Tetra Tech Project Manager		10-31-06

This certifies that Tetra Tech has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration Title 29 of the *Code of Federal Regulations*, Part 1910.132.

Certified by		
Dave Brown Tetra Tech Technical Reviewer		10-31-06

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FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

DCE	Dichloroethene
EPA	U.S. Environmental Protection Agency
FID	Flame-ionization detector
HASP	Health and safety plan
PCB	Polychlorinated biphenyl
PCE	Perchloroethene (or tetrachloroethene)
PID	Photoionization detector
ppm	Part per million
SWP	Safe Work Practice
TCE	Trichloroethene
Tetra Tech	Tetra Tech EM Inc.
VOC	Volatile organic compound

1.0 INTRODUCTION

This Addendum to the Health and Safety Plan (HASP) for the University of California, Berkeley, Richmond Field Station in Richmond, California has been prepared by Tetra Tech EM Inc. (Tetra Tech) solely for the health and safety of its employees. Subcontractors on site should refer to their HASP for guidance on protection of their health and safety. The original HASP was prepared by URS Corporation in 2002, and this addendum only presents those sections of the original HASP that have been updated. Attachment 1 contains the original HASP prepared by URS Corporation.

This HASP Addendum should be used in conjunction with site-specific work plans and HASPs for all field activities at Richmond Field Station. The original HASP (see Attachment 1) and this HASP Addendum provide a general discussion of site hazards and health and safety precautions to be used for the various field activities that will be performed during the Richmond Field Station Remediation Project. Site- or task-specific HASPs prepared for each phase of remediation or investigation activities will include a discussion of, and controls for, potential hazards during field activities associated with specific activities conducted at the site.

Appendix A contains all Safe Work Practices (SWP) prepared by Tetra Tech for use when performing field work, and Appendix B contains all field forms required as part of the Tetra Tech Health and Safety Program.

1.4 RESPONSIBILITIES AND AUTHORITIES

Table 1 provides the key project personnel identified for work at the Richmond Field Station. Table 1 also includes their responsibilities and authorities relating to health and safety issues. Each subcontractor to Tetra Tech who performs work on site must identify a single point of contact as their subcontractor Site Safety Coordinator. Any comments or concerns about unsatisfactory safety performance of the subcontractor will be directed to the subcontractor's Site Safety Coordinator.

2.0 SITE INFORMATION

This HASP provides an updated summary of the chemicals of primary concern identified for the Richmond Field Station, as well as their action levels. The health hazards for the following chemicals previously summarized in Section 2.3 of the original HASP (see Attachment 1) have been amended by Department of Toxic Substances Control Site Investigation and Remedial Action Order I/SE-RAO 06/07-004.

2.3 CONSTITUENTS OF CONCERN

The chemicals of primary concern at the Richmond Field Station include metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); polychlorinated biphenyls (PCB), and volatile organic compounds (VOC)

(carbon tetrachloride, cis-1,2-dichloroethene [-DCE]), tetrachloroethene [PCE], trichloroethene [TCE], and vinyl chloride). Table 2 presents the employee exposure limits for each chemical and respiratory protection action levels to be followed during field activities.

2.3.1 Metals

The health hazards for only the metals that were amended by DTSC Order I/SE-RAO 06/07-004 are summarized below.

Arsenic: Arsenic is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. It is a confirmed human carcinogen producing liver tumors. It is a poison by subcutaneous, intramuscular, and intraperitoneal routes, and is an experimental teratogen. It causes human systemic skin and gastrointestinal effects by ingestion. Arsenic causes other experimental reproductive effects.

Beryllium: Beryllium is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Beryllium can cause acute beryllium disease by inhalation. Persons also can develop a hypersensitivity or allergy to beryllium, which can lead to chronic beryllium disease. This disease can occur long after exposure (10 to 15 years) to small amounts of either soluble or insoluble forms of beryllium. Both acute and chronic diseases can be fatal. Long periods of exposure to beryllium have been reported to cause cancer in laboratory animals. Some studies of workers reported an increased risk of lung cancer. The U.S. Department of Health and Human Services and the International Agency for Research on Cancer have determined that beryllium and beryllium compounds are human carcinogens. U.S. Environmental Protection Agency (EPA) has determined that beryllium is a probable human carcinogen.

Cadmium: Cadmium is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking water and Toxic Enforcement Act of 1986. Cadmium can cause severe damage to the lungs and death if inhaled at high levels. Ingestion of very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels through inhalation or ingestion can lead to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects are lung damage and fragile bones.

Copper: The carcinogenicity of copper has not been adequately studied. However, it causes experimental teratogenic and reproductive effects, and causes human systemic effects by ingestion including nausea and vomiting.

Lead: Lead is listed as a chemical known to the State to cause cancer and reproductive toxicity pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Short-term exposure to lead can cause fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains, decreased appetite and reversible kidney damage. Chronic lead exposure can lead to irreversible vascular sclerosis, irreversible brain damage, tubular cell atrophy, interstitial fibrosis, and glomerular sclerosis. Prolonged exposure at high concentrations may result in

progressive kidney damage and possibly kidney failure. Anemia is an early sign of lead poisoning. Exposure to lead can produce neurobiological defects in children such as learning disabilities and behavioral problems.

Mercury: Mercury is listed as a chemical known to the State to cause reproductive toxicity pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Highly toxic by skin absorption and inhalation of fume or vapor, absorbed by respiratory and intestinal tracts. Acute effects of exposure to mercury include vomiting, abdominal pain, bloody diarrhea, kidney damage, and death. Chronic effects include inflammation of mouth and gums, excessive salivation, loosening of teeth, kidney damage, muscle tremors, jerky gait, spasms of extremities, personality changes, depression, irritability, and nervousness.

Nickel: Nickel and certain nickel compounds are listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Nickel can cause dermatitis, pulmonary asthma, and conjunctivitis.

2.3.3 Polychlorinated Biphenyls

PCBs are listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. PCBs have been shown to cause a number of health effects in animals, including effects on the immune system, reproductive system, nervous system, and endocrine system. People exposed directly to high levels of PCBs through dermal contact, ingestion or inhalation have experienced irritation of the nose and lungs, skin irritations such as severe acne (chloracne) and rashes, and eye irritation. PCBs can also affect the neurological development of children. EPA has found clear evidence that PCBs have significant toxic effects in animals, including effects on the immune system, the reproductive system, the nervous system and the endocrine system.

2.3.4 Volatile Organic Compounds

The health hazards for each identified VOC are summarized below.

Carbon Tetrachloride: Carbon tetrachloride is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. High exposures via ingestion, inhalation and possibly dermal contact can cause liver, kidney and central nervous system damage. If exposure is very high, the nervous system, including the brain, is affected. Symptoms may include a feeling of intoxication, headaches, dizziness, sleepiness, and nausea and vomiting. These effects may subside if exposure is topped, but in severe cases, coma and death may occur.

cis-1,2-DCE: Cis-1,2-DCE has anesthetic properties at high concentrations. Humans inhaling high concentrations may display symptoms of nausea, vomiting, and cramps, followed by unconsciousness.

PCE (also known has perchloroethene): PCE is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Short-term exposure to PCE through ingestion and inhalation may cause nausea, vomiting, headache, dizziness, drowsiness, and tremors. Skin contact with PCE causes irritation and blistering. Liver and kidney toxicity are long-term effects.

TCE: TCE is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Acute exposure to TCE causes headache, dizziness, vertigo, tremors, irregular heartbeat, fatigue, nausea, vomiting, and blurred vision. TCE vapors may cause irritation of the eyes, nose, and throat. Long-term effects may include liver and kidney damage.

Vinyl Chloride: Vinyl chloride is listed as a chemical known to the State to cause cancer pursuant to the Safe Drinking Water and Toxic Enforcement Act of 1986. Inhalation of vinyl chloride causes headache, dizziness, abdominal pain, numbness, and tingling of the extremities. Vinyl chloride vapors cause eye irritation and may cause skin irritation. Long-term effects of vinyl chloride exposure include liver damage and liver cancer. There is evidence that vinyl chloride causes mutagenicity.

2.5 MARINE SAFETY AND BOAT OPERATIONS

All work related to the marine environment will be performed by Tetra Tech personnel in accordance with SWP 6-05 (see Appendix A of this addendum).

3.0 DESCRIPTION OF WORK

All site activities related to drilling and remediation will be performed by Tetra Tech personnel in accordance with SWPs 6-03 and 6-04 (see Appendix A of this addendum).

4.0 HAZARD ASSESSMENT

The hazards associated with the activities described in Section 3.0 of the original HASP (see Attachment 1) were separated into three groups: chemical, physical, and biological. For this HASP Addendum, only the hazards related to biological exposures have been updated.

4.3 BIOLOGICAL HAZARDS

All site activities where Tetra Tech personnel may come in contact with biological hazards will be performed in accordance with SWP 6-17 (see Appendix A of this addendum).

5.0 HEALTH AND SAFETY REQUIREMENTS

OSHA standards and Tetra Tech's Health and Safety Program contain provisions for medial surveillance, health and safety training, personnel training, and documentation. Only the sections where Tetra Tech's program provisions differed from the provisions provided in the original HASP are provided below (see Attachment 1).

5.1.2.2 Site Health and Safety Coordinator

For the purposes of Tetra Tech performing work at the site, this role will be completed by the Site Safety Coordinator, who is appointed by the Project Manager. The Tetra Tech Site Safety Coordinator will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring the signing of the Daily Tailgate Safety Meeting form (Form HST-2) and the Compliance Agreement (Form HSP-4) (see Appendix B of this addendum) by all personnel working on site. The Site Safety Coordinator will have advanced field work experience and be familiar with health and safety requirements specific to the project. The Site Safety Coordinator will also maintain the Daily Site Log (see Form SSC-1 in Appendix B of this addendum).

5.3.1 Incident/Accident Reporting

All work-related incidents and accidents must be reported in accordance with Tetra Tech's reporting procedures, as:

- Immediately notify a coworker, preferably the Office Health and Safety Representative or Project Manager.
- Verbally notify the Health and Safety Program Director, Rick Ecord in the Atlanta, Georgia, office at (404) 225-5527 or on his mobile phone at (404) 538-8565 as soon as possible (immediate notification).
- For each work-related accident, injury, or illness, complete a "Tetra Tech Incident Report" (see Form IR and appropriate Supplemental Forms IR-A, IR-B, or IR-C in Appendix B of this addendum) within 24 hours and send it to Rick Ecord in the Atlanta office. Information should be entered in all boxes of the form to ensure complete reporting for worker's compensation. The forms must be submitted both in hard copy and by fax. The hard copy must have the Project Manager, Office Health and Safety Representative, and Office Manager's signature on it.
- Incidents that must be reported include near-miss incidents, incidents involving injury or illness, incidents involving property damage/equipment damage/chemical spill or release/fires, and incidents involving auto accidents.

All incidents should be reported in order to:

- Ensure that prompt medical attention is provided
- Ensure payment of medical expenses and lost work time benefits through worker's compensation
- Ensure thorough investigation to identify the cause or causes of the incident
- Implement immediate as well as long-term and ongoing corrective action
- Comply with regulatory requirements

Basic incident management includes the following steps:

- Stop work as needed to ensure that no further harm is done and determine what steps must be taken to ensure work can be continued in a safe manner.
- Remove/rescue injured or exposed employees and ensure appropriate medical treatment is provided.
- Administer first aid using the basic skills learned in training, such as
- Checking the scene
- Calling 911 or the Emergency Medical System
- Rendering care
- Account for all employees on the jobsite or at the incident location.
- Implement measures to identify and address any hazardous conditions.

Tetra Tech stresses incident prevention and trains employees to recognize and minimize existing and potential hazards. However, Tetra Tech recognizes that work-related incidents occur and has provided this information to help its employees manage them. Appendix B to this HASP addendum contains all forms related to incident and accident reporting.

5.6 RESPIRATORY PROTECTION

All work that requires Tetra Tech personnel to upgrade to Level C personal protective equipment (such as respiratory protection) will be performed in accordance with SWPs 6-27, 6-28, and 6-29 (see Appendix A of this addendum). Respiratory protection will be worn by Tetra Tech employees whenever there is a potential for exposure to an air contaminant above the California Occupational Safety and Health Administration (Cal/OSHA) permissible exposure limit for the

contaminant or when air monitoring indicates that the concentrations of chemicals are above the Tetra Tech-established respiratory protection action levels presented in Table 2 (see Section 5.7, Air Monitoring).

When carbon tetrachloride or vinyl chloride are the chemicals of concern at a site, an action level of 0.5 part per million (ppm) above background concentrations, as measured with a photoionization detector (PID) or flame-ionization (FID) detector, will be used as the respiratory protection action level. For all other VOCs of concern, an action level of 5 ppm will be used as the respiratory protection action level.

The Site Safety Coordinator will maintain all documentation of current (less than 1 year old) respirator fit tests for all employees who may be required to wear respirators. The Site Safety Coordinator also will be responsible for selecting the appropriate type of respiratory protection for each field activity where it may be required, including appropriate respirator cartridges for air-purifying respirators.

5.7 AIR MONITORING

The potential for employees to be exposed to airborne contaminants during field activities will be evaluated during preparation of each site- or task-specific HASP. The evaluation will be based on available data about (1) the concentrations of chemicals of concern present in the locations where field activities will be performed and (2) the nature and duration of potential employee contact with any chemicals of concern. If the evaluation indicates employees could be exposed to air contaminants, then air monitoring will be performed using equipment appropriate for each air contaminant to determine the level of employee exposure.

In cases where employees could be exposed to VOCs during field activities, PIDs and FIDs will be used to evaluate the airborne concentration of VOCs. PIDs, when used, will have lamps with an energy output greater than that of the ionization potential of the chemicals being monitored. For air monitoring activities in areas where mercury is present, a Lumex mercury vapor meter should be used.

For sampling locations where the concentrations of metals or PCBs in soil are well characterized and employees could be exposed to these chemicals during field activities, a personal dust monitor will be used to evaluate employee exposure to these chemicals. Airborne dust action levels will be established for each location and activity in the site- or task-specific HASP based on the concentrations of chemicals at each location. If appropriate, and to better evaluate exposure to specific chemicals in air, air samples will be collected on filters and submitted for laboratory analysis to monitor exposure of field personnel to site chemicals of concern in air.

5.11.21 Drill Rig Safety Guidelines

All work performed by Tetra Tech that requires the use of a drill rig will be performed in accordance with SWP 6-03 (see Appendix A of this addendum).

FIGURES

EMERGENCY INFORMATION – POST ON SITE

EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Emergency Contact	**Telephone No.**
U.S. Coast Guard National Response Center	(800) 424-8802
InfoTrac Chemical Monitoring System	(800) 535-5053
WorkCare	(800) 455-6155
Fire Department	911 or (510) 307-8031
Police Department	911 or (510) 620-6655
Tetra Tech EM Inc. Personnel:	
Human Resource Development: Diane Stopa	(703) 390-0636
Health and Safety Program Director: Richard Ecord, CIH	(404) 225-5527
Project Health and Safety Representative: Jennifer Bailey, CIH	(916) 853-4571
Office Health and Safety Coordinator: Aileen Mendoza	(415) 222-8350
Project Manager: Leslie Lundgren	(415) 222-8205
Site Safety Coordinator: Aileen Mendoza	(415) 222-8350
Client Contact:	
Greg Haet, Associate Director, Environmental Protection Office of Environment, Health & Safety	(510) 642-4848
Karl Hans, Senior Environmental Scientist, Office of Environment, Health & Safety	(510) 643-9574
Medical Emergency	
Hospital Name: Kaiser Permanente, Richmond, or	
Hospital Address: 901 Nevin Avenue, Richmond, California	
Hospital Telephone No.:	Emergency – (510) 307-1566/(510) 307-1555 General – (510) 307-1520
Ambulance Telephone No.:	911
Route to Hospital: (see next page hospital route map)	
Turn Right on Erlandson Street, go 0.2 mile Turn Left onto I-580 West toward San Rafael, go 1.1 miles Take Exit #9B/Harbour Way North onto Harbour Way, go 1.2 miles Turn Left on Nevin Avenue, go <0.1 mile Arrive at 901 Nevin Avenue, on the right	

Note: This sheet must be posted on site.

Hospital Route Map (attach or insert):

Hospital maps may be obtained from http://maps.yahoo.com. Enter your site location, search, and then click "Community Services" and select hospitals. The nearest hospitals to the site will be shown.

Map (obtained from Yahoo maps) from Meade Street **(A)** in Richmond

(B) Kaiser Permanente- Richmond
901 Nevin Ave
Richmond, Ca
510-307-1500

THIS PAGE MUST BE POSTED ON SITE

TABLES

TABLE 1: KEY PERSONNEL

Health and Safety Plan Addendum, UC Berkeley Richmond Field Station, Richmond, California

Personnel/Position	Responsibilities	Authorities
Leslie Lundgren, Project Manager	• Ensure the project is performed in a manner consistent with Tetra Tech's Health and Safety Program • Ensure the HASP is prepared, approved, and properly implemented • Ensure adequate funds are allocated to fully implement project health and safety • Coordinate with the Health and Safety Program Director on health and safety matters	• Assign an approved Site Safety Coordinator to the project, and if necessary, assign a suitably qualified replacement • Suspend field activities if health and safety of personnel are endangered, pending further consideration by the Project Health and Safety Representative • Suspend a Tetra Tech individual from field activities for infractions of the HASP, pending an evaluation by the Health and Safety Program Director and Project Health and Safety Representative
Rick Ecord, Health and Safety Program Director	• Administer and audit key aspects of Tetra Tech's Health and Safety Program • Manage the Tetra Tech medical surveillance program • Maintain Tetra Tech health and safety records (including medical surveillance, training, fit testing, chemical exposure, and incidents/accidents) • Maintain working understanding of and track health and safety regulations • Supervise Health and Safety Representatives	• Implement improvements to Tetra Tech's Health and Safety Program • Establish employee training and medical surveillance procedures • Approve or disapprove HASPs • Approve employee health and safety qualifications • Suspend work on any project that jeopardizes personnel health and safety
Jennifer Bailey, Project Health and Safety Representative	• Direct the implementation and coordination of the Health and Safety Program with Site Safety Coordinators • Maintain a working understanding of health and safety regulations and Tetra Tech health and safety policies • Provide Tetra Tech employee health and safety training • Supervise Site Safety Coordinators • Review HASPs • Monitor implementation of HASPs • Investigate reports of incidents or accidents and report to Health and Safety Program Director • Determine if an accidental exposure or injury merits a change in the affected individual's work assignments and if changes in work practices are required	• Direct Site Safety Coordinator or designee to prepare HASPs • Approve or disapprove HASPs • Access and review Tetra Tech project files • Suspend work on any project that jeopardizes the health and safety of personnel involved • Direct changes in personnel and work practices to improve employee health and safety • Remove individuals from project if their conduct jeopardizes their health and safety or that of coworkers

TABLE 1: KEY PERSONNEL (CONTINUED)
Health and Safety Plan Addendum, UC Berkeley Richmond Field Station, Richmond, California

Personnel/Position	Responsibilities	Authorities
Aileen Mendoza, Site Safety Coordinator	• Direct health and safety activities on site • Immediately report all safety-related incidents or accidents to the Health and Safety Program Director • Assist project managers in implementing HASPs • Conduct periodic safety review sessions for the drilling crew and other on-site personnel • Ensure safety equipment is properly maintained or disposed of • Ensure that air monitoring is conducted if required • Ensure Tetra Tech field team correctly select and use personnel protective equipment and apply safety practices that are appropriate to the site-specific conditions • If respirators will be used by the Tetra Tech field team, ensure field team has current fit-test • Maintain health and safety equipment on site • Ensure that HASP is on site • Implement emergency procedures, as required • Review certification/medial surveillance status of all site personnel, including fit-tests when applicable • Conduct daily tailgate health and safety meetings • Ensure proper completion of health and safety forms during field activities	• Temporarily suspend field activities if health and safety of personnel is endangered, pending further consideration by the Project Health and Safety Representative • Temporarily suspend a Tetra Tech individual from field activities for infractions of the HASP, pending an evaluation by the Project Health and Safety Representative

TABLE 1: KEY PERSONNEL (CONTINUED)
Health and Safety Plan Addendum, UC Berkeley Richmond Field Station, Richmond, California

Personnel/Position	Responsibilities	Authorities
Sara Woolley, Field Team Lead	• Coordinate field activities with subcontractor staff on a regular basis • Locate the support facilities in an uncontaminated area • Ensure that HASP is on site • Maintain health and safety equipment on site • Conduct daily tailgate health and safety meetings • Ensure proper completion of health and safety forms during field activities	• Temporarily suspend activities if health and safety of personnel is endangered, pending further consideration by the Site Safety Coordinator
Field Team	• Read and understand the HASP; all Tetra Tech field personnel must sign the Health and Safety Compliance Agreement form (see Appendix B) • Perform safely • Report any unsafe conditions or other health and safety concerns to the Site Safety Coordinator and Field Team Lead • Suggest improved work practices or safety procedures to be practiced in the field to the Project Manager, Site Safety Coordinator, and Field Team Lead • Be aware of and alert for signs and symptoms of exposure to site contaminants and heat or cold stress in themselves and others	• Temporarily suspend activities if health and safety of personnel is endangered, pending further consideration by the Site Safety Coordinator and Field Team Lead

TABLE 2: EMPLOYEE EXPOSURE LIMITS AND RESPIRATORY PROTECTION ACTION LEVELS
Health and Safety Plan Addendum, UC Berkeley Richmond Field Station, Richmond, California

	Regulatory Exposure Limits		Recommended Exposure Limit	
Chemical of Concern	**Cal/OSHA PEL[a]**	**Cal/OSHA STEL[b]**	**NIOSH REL**	**Tetra Tech Respiratory Protection Action Level**
Antimony	0.5 mg/m^3	0.05 mg/m^3	0.5 mg/m^3	0.25 mg/m^3
Arsenic	0.01 mg/m^3	0.01 mg/m^3	Ca: 0.002 mg/m^3	0.002 mg/m^3
Beryllium	0.0002 mg/m^3	0.025 mg/m^3 (ceiling limit)[c]	Ca: 0.0005 mg/m^3	0.0005 mg/m^3
Cadmium	0.005 mg/m^3	0.005 mg/m^3	Ca	0.00025 mg/m^3
Chromium	0.5 mg/m^3	1 mg/m^3	0.5 mg/m^3	0.25 mg/m^3
Copper	1 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	0.05 mg/m^3
Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	0.025 mg/m^3
Mercury	0.025 mg/m^3	0.1 mg/m^3	0.05 mg/m^3	0.0125 mg/m^3
Nickel	1 mg/m^3	1 mg/m^3	0.015 mg/m^3	0.015 mg/m^3
Selenium	0.2 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	0.1 mg/m^3
Silver	0.01 mg/m^3	0.01 mg/m^3	0.01 mg/m^3	0.005 mg/m^3
Thallium	0.1 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	0.05 mg/m^3
Zinc	5 mg/m^3 (as respirable dust)	none	none	5 mg/m^3
PCBs	0.5 mg/m^3	0.5 mg/m^3	Ca: 0.001 mg/m^3	0.001 mg/m^3
Carbon Tetrachloride	2 ppm	10 ppm	Ca	1 ppm
cis-1,2-Dichloroethene	200 ppm	None	200 ppm	100 ppm
Tetrachloroethene (or Perchloroethene)	25 ppm	100 ppm	Ca	12.5 ppm
Trichloroethene	25 ppm	100 ppm	Ca	12.5 ppm
Vinyl Chloride	1 ppm	None	Ca	0.5 ppm

Notes: Substances with the designation "Ca" in the NIOSH REL column are considered potential carcinogens by NIOSH. Occupational exposures to carcinogens should be reduced as much as reasonably possible.

a PELs are based on 8-hour time-weighted average exposures.
b STELs are based on 15-minute time-weighted average exposures.
c Ceiling limits are concentrations that are not to be exceeded at any time.

Ca Potential carcinogen according to NIOSH
Cal/OSHA California Occupational Safety and Health Administration
mg/m^3 Milligram per cubic meter
NIOSH National Institute of Occupational Safety and Health
STEL Short-term exposure limit
PEL Permissible exposure limit
ppm Part per million
REL Recommended exposure limit

APPENDIX A
SAFE WORK PRACTICES

- SWP No. 6-1, General Safe Work Practices
- SWP No. 6-3, Safe Drilling Procedures
- SWP No. 6-4, Excavation Practices
- SWP No. 6-5, Working Over or Near Water
- SWP No. 6-11, Drum and Container Handling Practices
- SWP No. 6-17, Biohazards
- SWP No. 6-24, Non-Permit-Required Confined Space Entry Practices
- SWP No. 6-26, Use of Heavy Equipment
- SWP No. 6-27, Respirator Cleaning Procedures
- SWP No. 6-28, Safe Work Practices for Use of Air Purifying Respirators
- SWP No. 6-29, Respirator Qualitative Fit Testing Procedures

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HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1

ISSUE DATE: JULY 1998

REVISION NO.: 1

GENERAL SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interfere with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.
- Use the “buddy system” whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.

- Establish appropriate support, contamination reduction, and exclusion zones.

- Establish appropriate decontamination procedures for leaving the site.

- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).

- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.

- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.

- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.

- Observe coworkers for signs of toxic exposure and heat or cold stress.

- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

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SAFE WORK PRACTICES (SWP)

SAFE DRILLING PRACTICES

SWP NO.: 6-3

ISSUE DATE: JULY 1998

REVISION NO.: 1

SAFE DRILLING PRACTICES

This document establishes safe work practices (SWP) to follow during drilling operations. These SWPs are based on suggested safety procedures provided in the National Drilling Association's "Drilling Safety Guide." Procedures to follow before, during, and after drilling are listed below.

Before beginning any drill operation, each employee must be aware of the following:

- Wear a hard hat, safety glasses or goggles, steel-toed work boots, a shirt and full-length pants when working with or near the drill rig. Shirts must be tucked in at the belt.
- Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working with rotating equipment.
- Do not eat, drink, or smoke near the drill rig.
- Identify all underground utility and buried structure locations before drilling.
- Ensure that the drill rig and any other machinery used is inspected daily by competent, qualified individuals. The site safety coordinator (SSC) will ensure compliance with this precaution.
- Drill rig operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC.
- Establish hand-signal communications for use when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators.

While the drill rig is operating, employees should be aware of the following:

- Wear appropriate respiratory and personal protective equipment (PPE) when conditions warrant their use.
- Avoid direct contact with known or suspected contaminated surfaces.
- Move tools, materials, cords, hoses, and debris to prevent tripping hazards and contact with moving drill rig parts.
- Adequately secure tools, materials, and equipment subject to displacement or falling.
- Store flammable materials away from ignition sources and in approved containers.

- Maintain adequate clearance of the drill rig and mast from overhead transmission lines. The minimum clearance is 25 feet unless special permission is granted by the utility company. Call the local utility company for proper clearance.

- Only qualified and licensed personnel should operate drill rigs.

- Workers should not assume that the drill rig operator is keeping track of their exact location. Workers should never walk directly behind or beside heavy equipment without the operator's knowledge.

- Workers should maintain visual contact with drill rig operators at all times.

- When an operator must maneuver equipment in tight quarters, the presence of a second person is required to ensure adequate clearance. If much backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operator's normal field of vision to relay signals.

- Auger sections and other equipment are extremely heavy. All lifting precautions should be taken before moving heavy equipment. Appropriate equipment, such as chains, hoists, straps, and other equipment, should be used to safely transport heavy equipment too heavy to safely lift.

- Proper personal lifting techniques will be used. Workers should lift using their legs, not their backs.

- Workers will not use equipment they are not familiar with. This precaution applies to heavy as well as light equipment.

- All personnel not essential to work activities will be kept out of the work area.

- Workers will be aware of their footing at all times.

- Workers will remain alert at all times.

After drilling operations are completed, employees should do the following:

- Shut down machinery before repairing or lubricating parts (except parts that must be in motion for lubrication).

- Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.

- Keep drill rigs in the exclusion zone until work has been completed. Such equipment should then be decontaminated within the designated decontamination area.

- Engage parking brakes when equipment is not in use.

- Implement an ongoing maintenance program for all tools and equipment. All tools and moving equipment should be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate in accordance with manufacturer specifications. Defective items should be promptly repaired or replaced. Maintenance and repair logs will be kept.

- Store tools in clean, secure areas to prevent damage, loss, or theft.

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SAFE WORK PRACTICES (SWP)

EXCAVATION PRACTICES

SWP NO.: 6-4

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EXCAVATION PRACTICES

This safe work practice (SWP) outlines minimum requirements to protect employees who may be exposed to hazards during trenching and excavation activities and to provide general guidance for compliance with Title 29 of the *Code of Federal Regulations* (CFR), Part 1926, Subpart P, "Excavations."

Project managers shall ensure that all excavation, shoring, and trenching activities are conducted in accordance with the requirements outlined in this document and Subpart P of 29 CFR 1926. Project managers must also ensure that projects involving trenching and excavation are staffed by an individual capable of performing "competent person" duties as described in this procedure.

The site safety coordinator (SSC) is responsible for on-site enforcement of this SWP.

Definitions and procedures used for excavations are discussed below.

1.0 DEFINITIONS

The following definitions apply to this SWP:

Benching: Forming one or a series of horizontal levels or steps in the sides of an excavation to protect employees from cave-ins

Competent Person: One capable of identifying existing or predictable hazards in the work environment that are unsanitary or dangerous to employees and who has authorization to take prompt corrective measures to eliminate the hazards

Excavation: Any manmade cut, cavity, trench, or depression in an earth surface formed by earth removal

Shoring: Metal, hydraulic, mechanical, or timber system that supports the sides of an excavation and that is designed to prevent cave-ins

Sloping: Sloping the sides of an excavation at an incline away from the excavation to protect employees from cave-ins

Trench: A narrow excavation (in relation to its length) that is usually deeper than it is wide but less than 15 feet wide

2.0 PROCEDURES

Described below are the general safety requirements and protective system requirements for trenching and excavation activities.

2.1 GENERAL SAFETY REQUIREMENTS

General safety requirements that must be in place before work begins are as follows:

- Utility companies or a utilities locating service in the area must be notified **before excavation or trenching activities begin** to arrange for locating and protecting underground utilities.
- Access to trenching areas must be controlled and limited to authorized personnel. Prior to entering a trench or excavation, workers must notify the project manager, SSC, and nearby equipment operators whose activities could affect the trench or excavation.
- No person may enter a trench or work at the foot of the face of an excavation until a qualified, competent person has inspected the excavation and determined whether sloping or shoring is required to protect against cave-in or subsidence and the appropriate protection has subsequently been installed.
- Trenches and excavations must be assessed by a qualified, competent person, even in the absence of working personnel, whenever heavy equipment will be operating nearby in order to ensure that the trench or excavation will support the weight of the equipment without subsistence or causing the accidental overturning of machinery.
- Trenches and excavations must be inspected regularly (daily at a minimum) to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibration, or nearby equipment operation have not caused weakening of the sides, faces, and floors and to ensure that personnel protection is being maintained.
- When subsidence or tension cracks are apparent anywhere in an excavation, all work should be stopped until the problem is corrected.
- The competent person must inspect trenches or excavations after any precipitation event to ensure integrity has been maintained.
- Sufficient ramps or ladders must be provided in excavations 4 or more feet deep to allow quick egress. Ramps or ladders may be placed no more than 25 feet apart, must be

secured from shifting, and must extend at least 3 feet above the top of the trench or excavation. Structural ramps must be designed by a competent person.

- Material removed from an excavation or trench must be placed far enough from the edge (at least 2 feet) to prevent it from sliding into the excavation or trench or from stressing the trench or excavation walls. Worker protection must also be provided from loose rock or soil on the excavation faces.

- If trenches or excavations are near walkways or roadways, guards or warning barriers must be placed to alert pedestrians and drivers of the presence of the trench or excavation.

- If possible, trenches or excavations should be covered or filled in when unattended. Otherwise, strong barriers must be placed around the trench or excavation and lighting must be provided at night if the trench or excavation is near a walkway or roadway.

- When a hazardous atmosphere could exist, the excavation must be tested for appropriate hazardous substances and oxygen level before personnel entry. Excavation where hazardous atmospheres exist must be treated as a confined space. Entry must follow procedures outlined in "Confined Spaced Entry Program," Document Control No. 2-5.

- Entry is not allowed into excavations where water has accumulated.

2.2 PROTECTIVE SYSTEM REQUIREMENTS

Protective systems protect employees from cave-ins, material that could fall in or roll off the face of the excavation, and collapse of adjacent structures. Protective systems include shoring, shielding, sloping and benching, and other systems. Sloping and benching and shoring system requirements are described below.

2.2.1 Sloping and Benching Requirements

Sloping and benching system construction must follow the guidelines established in Appendix B to Subpart P of 29 CFR 1926. Maximum allowable slopes for excavations are summarized below. All slopes indicated are expressed as the ratio of horizontal distance (H) to vertical rise (V).

Soil or Rock Type	Maximum Allowable Slope (H:V) for Excavations Less than 20 Feet Deep
Stable Rock	Vertical (90°)
Type A	0.75:1 (53°)
Type B	1:1 (45°)
Type C	1.5:1 (34°)

Soil types are defined in Appendix A to Subpart P of 29 CFR 1926 and are summarized below.

Type A: Cohesive soils with an unconfined compression strength of 1.5 tons per square foot (ton/ft^2) or greater (such as clay, silty clay, sandy clay, or clay loam)

Type B: Cohesive soils with an unconfined compression strength of greater than 0.5 but less than 1.5 ton/ft^2 (such as angular gravel, silt, silt loam, or sandy loam)

Type C: Cohesive soils with an unconfined compression strength of less than 0.5 ton/ft^2 (such as gravel, sand, loamy sand, submerged soil, or unstable submerged rock)

Sloping and benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

Soil types must be determined by the competent person using at least one visual and one manual test. Manual tests include plasticity, dry strength, thumb penetration, and drying tests.

2.2.2 Shoring System Requirements

Appendixes C, D, and E to Subpart P of 29 CFR 1926 outline requirements for timber shoring for trenches, aluminum hydraulic shoring for trenches, and alternatives to timber shoring, respectively. Guidelines for shoring systems are listed below.

- If it is not economically feasible or there are space restrictions to prevent cutting the trench or excavation walls back to a safe angle of repose, all trenches or excavations 5 feet deep or more must be shored.
- Shoring should be erected as trenching or excavation progresses and as closely as possible to the excavation floor.
- Shoring timber dimensions must meet the minimum timber requirements specified in Tables C1.1 through C1.3 of Appendix C to Subpart P 29 CFR 1926. Aluminum hydraulic shoring must be constructed using the guidelines and dimension requirements specified in Appendix D of the same standard.

- Trench shields may be used instead of shoring or bracing. Shields must be constructed of steel flat sides welded to a heavy framework of structural pipe. Shields should be moved along by the excavator as trenching or excavation proceeds.

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VOLUME III

SAFE WORK PRACTICES (SWP)

WORKING OVER OR NEAR WATER

SWP NO.: 6-5

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WORKING OVER OR NEAR WATER

This safe work practice (SWP) provides guidelines for working over or near bodies of water 3 or more feet deep or swiftly moving water. Workers will observe the requirements of the Occupational Safety and Health Administration (OSHA) specified in Title 29 of the *Code of Federal Regulations* (CFR), Part 1926.106, "Working Over or Near Water." The following sections discuss general procedures, underwater work, and cold water procedures.

1.0 GENERAL PROCEDURES

When working over or near water, the following precautions will be taken:

- All staff and team members must wear a personal flotation device (PFD) within 15 feet of a water body. Personnel will be provided with U.S. Coast Guard (USCG)-approved life jackets or work vests. The PFD should be Class III, which will support the head of an unconscious person above water.
- Life jackets and work vests will be inspected before each use.
- A USCG-approved life-saving skiff will be available.
- Under no circumstances will team members enter water bodies without protective clothing such as rubber boots or waders.
- At least one person will remain on shore as a look-out.

If a team member falls into the water, under no circumstances should another team member enter the water to rescue the person in the water. If possible, a branch, paddle, pole, or similar object should be extended to the person in the water. When the person in the water grabs the extended item, they should be pulled toward the shore or boat. If the person is unconscious, the PFD, clothing, or hair should be hooked to pull the person toward the shore or boat. Once the person has been safely retrieved, necessary emergency medical procedures should be performed by qualified personnel. If none are necessary, the retrieved team member should change into dry clothing as soon as possible after any necessary personal decontamination.

2.0 UNDERWATER WORK

Underwater work should be performed in accordance with the procedures and guidelines of the Diving Safety Program (Document Control No. 2-15 in Volume I).

3.0 COLD WATER PROCEDURES

When the water temperature is below 45 °F, hypothermia is a serious risk. A person can loose feeling in the extremities within 5 minutes. All field staff members should be familiar with cold water survival techniques or should receive training from an American Red Cross-certified swimming instructor in cold water survival techniques when site conditions warrant such knowledge.

After a person has been rescued from cold water, he or she should change into dry clothes as soon as possible. If the person who has fallen into the water displays hypothermia symptoms, he or she should be treated immediately and taken to a medical facility. Under no circumstances should the hypothermia victim be given hot liquids because this could accelerate shock. Drinks no warmer than normal body temperature are acceptable. If symptoms are severe and evacuation to a medical facility cannot be quickly conducted, any wet clothing should be removed, the victim should be placed in blankets or sleeping bags in a sheltered location, and the rescuer should climb into the blankets or sleeping bag with victim to provide additional warmth. The victim should also be treated continuously for shock, elevating feet and monitoring the victim's pulse and breathing rate.

If a team member falls into cold water, he or she should not remove any clothing while in the water because clothing provides additional insulation. Although clothing creates an added drag while swimming, the insulation outweighs the disadvantage of the additional drag. Each team member should carry a wool hat to place on his or her head in case he or she falls into the water. A wool hat, even when wet, provides good insulation for the head, where a large amount of body heat is lost.

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SAFE WORK PRACTICES (SWP)

DRUM AND CONTAINER HANDLING PRACTICES

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DRUM AND CONTAINER HANDLING PRACTICES

This safe work practice (SWP) establishes procedures to protect field personnel and the public from exposure to hazardous materials resulting from the handling, opening, sampling, transferring, overpacking, and shipping of drums.

Regional health and safety representatives (RHSR) and subsidiary health and safety representatives (SHSR) are responsible for providing technical guidance to project managers and site safety coordinators (SSC) on drum and container handling procedures. Project managers are responsible for ensuring implementation of this SWP, when warranted, on their projects. SSCs are responsible for enforcement of this SWP at the work site. Field personnel are required to adhere to drum and container handling guidelines and procedures.

All drum and container handling operations must adhere to all applicable federal, state, local, contractual, and company requirements. Preparation and shipping of containers of hazardous materials must comply with applicable U.S. Environmental Protection Agency (EPA) and U.S. Department of Transportation (DOT) regulations. All drums and containers used during hazardous waste operations must meet appropriate DOT regulations for the materials they contain.

Drum and container handling should be approached in a systematic, stepwise manner, especially when the contents are unknown or containers are in poor condition. Inspection, opening, sampling, overpacking, and staging requirements for drums and containers are described below.

1.0 INSPECTION

Drums or containers should be visually inspected before any work is conducted to gain as much information as possible about their contents. Field personnel should document in the field logbook the following information:

- Any labels or other markings indicating possible contents
- Drum or container condition (such as rusted, leaking, or dented)
- Signs of pressure (such as bulging or swelling)

- Drum or container size, construction, and type
- Configuration of drum or container head (open or closed top)

After observations are documented in the field logbook, each drum or container should be labeled with an identification code for future tracking.

2.0 OPENING

For efficient and safe drum or container opening, personnel must adhere to the guidelines below.

- If available, remote-controlled drum or container opening equipment should be used.
- In order to protect the employee, a suitable shield shall be placed between the employee and the drum being opened.
- Only spark-proof tools should be used to open drums and containers.
- Drums or containers containing unknown materials should be opened using Level B personal protection, including splash protection.
- Drums or containers containing radioactive material should not be opened or handled until the appropriate personnel with expertise in this area have been consulted.
- Air monitoring equipment should be available near the drum or container being opened, such as combination oxygen and combustible gas meters, colorimetric tubes, and photoionization detectors.
- Tools used for drum or container opening should be decontaminated after each use to avoid mixing incompatible wastes.
- Drums or containers should be resealed as soon as possible to minimize vapor generation.
- If possible, drums or containers exhibiting signs of pressure should not be opened.

3.0 SAMPLING

Drum and container sampling poses a variety of potential hazards to worker health and safety, including direct contact with hazardous materials, inhalation of hazardous vapors, and the possibility of drum or container explosion or rupture. The guidelines below should be used to properly sample drums and containers.

- Prior to sampling, a sample plan must be developed that includes the following information:
  - Background information on the waste
  - Which drums or containers will be sampled
  - Appropriate sampling devices
  - Sample containers to be used
- Sampling personnel should not stand on drums or containers or lean over other drums or containers to obtain samples.
- All phases in the vertical cross section of each drum or container should be sampled.
- Disposable glass tubing or other disposable sampling devices should be used to sample liquid.
- When sampling liquids, absorbent pads should be placed on drum tops to collect spillage that may occur while transferring samples into containers.
- Sampling personnel should document container number, any container labeling, sampling date and time, and number and color of different phases.

4.0 OVERPACKING

During an emergency, drums and containers should be handled as detailed below.

- Leaks should be plugged or patched immediately if this can be done without risk.
- Damaged drums and containers should be placed in an overpack container with absorbent pads to collect any spilled material or the contents transferred into a clean, compatible drum or container.
- Absorbent material should be used to collect any leakage that may occur during shipment.

During remedial actions, the procedures below apply to drum and container handling.

- Drums or containers should be placed in overpack containers, and any identification number assigned to the drum or container should be placed on the outside of the overpack container.

- If drum or container contents are to be bulked with other drum or container contents, the compatibility of the contents should be verified by a field characterization study prior to bulking.

5.0 STAGING

Staging refers to moving drums or containers in an organized manner to predesignated areas. Drums or containers may be staged to facilitate characterization and remedial action and also to protect drums or containers from potentially hazardous site conditions (such as high temperatures and proximity to ignition sources or heavy equipment). To ensure that staging is conducted in a safe and efficient manner, the guidelines below should be followed.

- Staging activities should be kept to a minimum to prevent hazards associated with increased handling of drums or containers.
- The staging area should be as close as possible to the site exit.
- The staging area should be level and covered with plastic sheeting or absorbent material.
- The staging area should be diked to contain possible spills.
- Drums or containers should be secured on pallets whenever possible to aid in the safe movement of drums or containers and to isolate the drums or containers from the soil surface.
- Drums or containers should not be stacked on top of each other.
- Drums or containers should be staged according to chemical composition of the contents. Drums or containers containing incompatible materials should be kept segregated.
- Drums and containers should be staged far enough apart to allow for the movement of equipment and personnel.

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SAFE WORK PRACTICES (SWP)

BIOHAZARDS

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BIOHAZARDS

Biological hazards, or "biohazards," include plants, animals or their products, and parasitic or infectious agents that may present potential risks to worker health. This safe work practice (SWP) discusses procedures for working with biohazards, preventive guidelines, and first-aid procedures for the most common hazards field staff are likely to encounter. This SWP does not address biohazards such as those associated with medical waste. Procedures for working with this type of biohazard should be addressed in the site-specific health and safety plan (HASP) on a case-by-case basis.

During preparation of the site-specific HASP, the preparer should consider which plants, animals, and other biological agents may be encountered; assess their potential risk to project personnel; and attach this SWP to the HASP, if necessary. Office health and safety representatives should become familiar with biological hazards indigenous to the geographical area in which most of their office personnel work and assist in evaluating the risks to personnel on projects staffed from their offices. SWPs for insects, snakes, animals, plants, waterborne pathogens (giardia), and hantavirus are provided below.

1.0 INSECTS

SWPs for reducing the chance of insect bites or stings and for treating bites or stings are listed below.

- Workers should keep as much skin area covered as possible by wearing long-sleeved shirts, long pants, and a hat. Pant legs should be tucked into socks or boots and shirts into pants. In addition, workers should wear light colored clothing.
- A proven insect repellent should be used on bare skin and clothing.
- When possible, tall grasses and brush that could harbor ticks should be avoided.
- Several times during the day and at the end of the work day, each worker should perform a check for evidence of imbedded ticks or previous bites. Particular attention should be paid to the scalp, neck, ankles, back of the legs, and waist.
- When opening well covers, vaults, or other closed items, workers should watch for hornet or wasp nests and black widow or brown recluse spiders. Workers should never reach into spaces with unprotected arms.
- Workers should watch carefully for bees around open soft drinks or food.

- If a worker is stung by a bee, the stinger should be carefully removed, if present. The wound should be washed and a cold pack applied. Allergic reaction should be watched for and is evidenced by extreme swelling, redness, pain, or difficulty breathing.

- If a worker is stung or bit by a spider or scorpion, medical attention should be obtained immediately.

2.0 SNAKES

SWPs for encounters with snakes and for treating snakebites are listed below.

- Workers should avoid walking in areas known to harbor snakes. Workers should be cautious when picking up or moving items that have been on the ground.

- Workers should wear boots made of heavy material that protect the ankles and pants. Heavy work gloves should be worn for picking up items.

- If one snake is encountered, others may be present. Workers should leave the area by retracing their steps.

- If a worker is bitten, the wound should be washed and the injured area immobilized and kept lower than the heart, if possible. Ice or a tourniquet should not be applied to a snake bite. The wound should not be cut. If medical care is more than 30 minutes away from a work site, a snakebite kit should be available on site and workers should know how to use it.

3.0 ANIMALS

SWPs for encounters with animals and for treating associated wounds are listed below.

- If workers encounter a wild animal, the animal should be observed for unusual behavior such as a nocturnal animal out during the day, drooling, an appearance of partial paralysis, irritability, meanness, or a strangely quiet demeanor.

- Workers should never touch the body of a dead animal because certain diseases could be carried by fleas still on the body.

- Workers should avoid animal droppings (including bird droppings). Pathogens, some of which can become airborne, may still be present in the droppings.

- If a worker is bitten, he or she should get away from the animal to avoid further bites. Workers should not try to stop, hold, or catch the animal.

- If the wound is minor, it should be washed with soap and water. Any bleeding should then be controlled, and an antibiotic ointment and dressing should be applied. All animal bite wounds should be watched for signs of infection.

- If the wound is bleeding seriously, the bleeding should be controlled but the wound should not be cleaned. Medical assistance should be summoned immediately.

- If a rabid animal is suspected, immediate medical attention should be summoned. If possible, workers should try to remember what the rabid animal looked like and the area in which it was last seen. The animal should be reported by calling the local emergency number.

4.0 PLANTS

SWPs for plants are as follows:

- Workers should be aware of the types and appearances of poisonous plants in the work site area. Poison ivy, oak, and sumac are the most frequently encountered plants that can cause reaction from casual contact. If a worker is extremely sensitive to these plants, he or she should avoid the area entirely because airborne drift could be sufficient to cause a reaction. Other plants, such as fireweed, can cause painful, short-term irritation and should be avoided as well. Workers should avoid touching face and eye areas after contact with any suspicious plant.

- Workers should wear proper clothing if working in or near overgrown areas. Disposable outerwear should be used, if necessary, and workers should not touch the material with bare hands during removal if the outerwear may have contacted poisonous plants.

- If contact with a poisonous plant has occurred, the affected area should be immediately washed thoroughly with soap and water. If a rash or weeping sore has already begun to develop, a paste of baking soda and water should be applied to the area several times a day to reduce discomfort. Lotions such as Calamine or Caladryl should be applied to help soothe the area. If the condition gets worse and affects large areas of the body or the face, a doctor should be consulted.

- Bushy and wooded areas should be thoroughly checked for thorn-bearing trees, brush, and bramble. In some cases, impalement can cause severe pain or infection.

5.0 WATERBORNE PATHOGENS-GIARDIA

Giardia is a waterborne pathogen consisting of a protoplasmic parasite of the mammalian digestive tract.

Giardia is present worldwide, with the highest occurrence in areas with poor sanitation. In the United

States, most reported cases are in mountainous regions where drinking water is obtained from streams and is unfiltered or untreated.

Giardia is contracted by ingesting water contaminated with giardia cysts in the dormant state. Giardia parasites can only thrive in the digestive tracts of mammals. Dormant giardia organisms enter water through the feces of infected animals or humans. Giardia symptoms include severe diarrhea and upset stomach. Some people are asymptomatic but can transmit the disease to others. Medical treatment of giardia can be difficult and unpleasant; therefore, prevention is critical. Precautions for preventing exposure to giardia are listed below.

- Workers should assume that all fresh water streams are infected with the giardia organism and not drink any untreated water.
- Team members collecting sediment and water samples from streams should wash their hands thoroughly with soap and water after collecting the samples.
- Giardia parasites are relatively easy to destroy or filter. Water should be treated for drinking or cooking with iodine or another recommended giardia treatment before use.

6.0 HANTAVIRUS

Hantavirus pulmonary syndrome (HPS) is a potentially fatal infection caused by a rodent-borne hantavirus. HPS begins with a brief illness most commonly characterized by fever, muscle pain, headache, coughing, and nausea or vomiting. Other early symptoms include chills, diarrhea, shortness of breath, abdominal pain, and dizziness. In the first identified cases of HPS, this stage of the infection lasted 2 to 5 days before victims were hospitalized. Typically, by the time of hospitalization, victims were found to have tachycardia (a heart rate of greater than 100 beats per minute) and tachypnea (a breathing rate of greater than 20 breaths per minute). Fever was also common. In most cases, death occurred within 2 to 16 days of the onset of symptoms, and victims exhibited pulmonary edema and severe hypotension.

Currently, experts believe that HPS is spread by the deer mouse (*Peromyscus maniculatus*). Though the deer mouse has been found to be the primary host of hantavirus, several other rodent species have also tested positive for the virus. Pinon mice (*Peromyscus truei*), brush mice (*Peromyscus boylii*), and western

chipmunks (*Tamia spp.*) are also likely to carry the virus. Also, cases of HPS have been reported in areas of the United States where these particular rodents are not indigenous.

Infected rodents shed the virus in their urine, feces, and saliva. Humans can be exposed to the virus through (1) inhalation of suspended rodent excreta or dust particles containing rodent excreta, (2) introduction of rodent excreta into the eyes or broken skin, and (3) ingestion of food or water contaminated by rodent excreta. HPS has a reported mortality rate of 55 percent. Transmission of hantavirus from infected individuals to healthy persons has not been documented.

Prevention of HPS infection is essential because no known antidote and no specific treatment exists for treating HPS. Therefore, employees should practice risk reduction and control measures. Guidelines for workers in locations that may have rodent infestations or habitats are listed below.

- The best approach for HPS control and prevention is through environmental hygiene practices that deter rodents from colonizing the work environment.
- Information about the symptoms of HPS and detailed guidance on preventive measures should be provided to all employees assigned to field activities.
- Medical attention should be sought immediately for workers who develop a febrile or respiratory illness within 45 days of the last potential exposure to rodents. Attending physicians should be advised of each worker's potential for occupational exposure to hantavirus. Physicians should contact local health authorities promptly if hantavirus-associated illness is suspected. A blood sample should be obtained from the affected worker and forwarded with the baseline serum sample through the state health department to the Centers for Disease Control and Prevention for hantavirus antibody testing.
- Respiratory protective equipment should be worn when handling rodents, when removing rodents from traps, and when working in areas with evidence of rodent droppings or hair. Respiratory protective equipment should include, at a minimum, a half-face air-purifying respirator (APR) or powered APR equipped with a high-efficiency particulate air (HEPA) filter (P100). Full-face regulators may be needed under some circumstances. Respiratory protective equipment should be used in accordance with Occupational Safety and Health Administration regulations.
- Dermal protection should be worn when handling rodents or traps containing rodents, or if contact with contaminated surfaces could occur. Dermal protection should include rubber or plastic gloves that should be washed and disinfected before removal.

- A trap contaminated with rodent urine or feces or in which a rodent was captured should be disinfected with a commercial disinfectant or a 0.4 percent bleach solution. A dead rodent should be disposed of by placing the carcass in a plastic bag containing enough general-purpose household disinfectant to thoroughly wet the carcass. The bag should be sealed and disposed of by burning or by burying it in a 2- to 3-foot-deep hole. Local and state health departments can also provide appropriate disposal methods.

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SAFE WORK PRACTICES (SWP)

NON-PERMIT-REQUIRED CONFINED SPACE ENTRY PRACTICES

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NON-PERMIT-REQUIRED CONFINED SPACE ENTRY PRACTICES

The following safe work practices (SWP) apply to entry into confined spaces classified as non-permit-required. The confined space must conform to the definition of a non-permit-required confined space as discussed in the Confined Space Entry Program (see Document Control No. 2-5 in Volume I). Entry into spaces classified as non-permit-required are preferable over entry into permit-required spaces. When feasible, efforts shall be directed to prepare confined spaces so they meet the definitions of non-permit-required confined space.

If any of the procedures discussed in this SWP cannot be completed or an unanticipated hazard is identified, the non-permit-required status of the space will be revoked until the space is re-evaluated and reapproved as a non-permit-required space by a technically qualified individual such as a Tetra Tech health and safety specialist.

Non-permit-required confined space entry procedures before entry into the space are listed below.

- The project manager and the site safety coordinator (SSC) should be notified of the need to enter into a confined space. This notification must allow sufficient time to assemble necessary safety equipment.
- A blank "Preparation and Testing of Non-Permit Required Confined Space" form (Form CS-2) must be obtained (see Volume III).
- The necessary safety equipment can include, but is not limited to, atmospheric testing meters and devices, a mechanical ventilator, and a ladder for entry and exit.
- All equipment to be used during entry must be tested and inspected before use. Atmospheric testing equipment shall be calibrated in accordance with the manufacturer's instructions to ensure proper operation. Calibration parameters shall be documented in the field logbook, and the equipment will be tagged with a label specifying these parameters.
- Hazardous conditions associated with the removal of the entrance cover should be eliminated before opening the confined space. After removal of the entrance cover, the opening should be promptly barricaded by a railing, temporary cover, or other temporary barrier to prevent employees and equipment from accidentally falling through the opening.
- The internal atmosphere should be tested for the following conditions, in the order given:

  - Oxygen content (should be between 19.5 to 23.5 percent)
  - Combustible gases (should be less than10 percent of the lower explosive limit)
  - Potential toxic air contaminants

- The space should be tested at all levels (top, middle, and bottom) and in all areas where work may occur. The atmosphere within the space must not be hazardous whenever an employee is inside the space.
- If forced-air ventilation is used, the following conditions apply:
  - Ventilation should not be used to control continuous sources of hazardous contaminants.
  - There must be a clean source of air that will not increase the hazard within the space.
- The entrant shall document on Form CS-2 that the space is safe for entry and that pre-entry measures required by this SWP have been taken. The form shall be made available to each employee entering the space and shall be kept at the work site until completion of confined space work. The certificate will then become part of the permanent project file.

The atmosphere within the confined space must be tested periodically while entrants are within the confined space. Frequency of testing shall be every 30 minutes during the first 2 hours, then hourly afterwards when entrants are in the confined space. If at any time during occupancy a hazardous atmosphere is detected, the entrants shall leave the space immediately. The space shall then be evaluated to determine how the hazardous atmosphere developed, and measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry. Re-entry shall not be allowed until atmospheric testing demonstrates acceptable conditions.

When changes in the use or configuration of a non-permit-required space cannot be eliminated or controlled, the SSC shall re-evaluate the space, and if necessary, reclassify it as a permit-required confined space.

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SAFE WORK PRACTICES (SWP)

USE OF HEAVY EQUIPMENT

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USE OF HEAVY EQUIPMENT

Truck-mounted heavy equipment and field trucks are among the types of equipment that may be used during field work. Heavy equipment can present a substantial hazard to workers. General requirements for motor vehicles and material-handling equipment are provided in the Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926, Subpart O. The following precautions will be followed when heavy equipment (such as drill rigs, front-end loaders, and backhoes) is in use:

- Heavy equipment will be inspected by the operator before each work shift. The site safety coordinator (SSC) will ensure compliance with these precautions
- Equipment operators will be instructed to report any abnormalities, such as equipment failure, oozing liquids, and unusual odors, to their supervisors or the SSC
- Only qualified and licensed personnel will operate heavy equipment
- Hard hats, steel-toed boots, and safety glasses or goggles will be worn at all times around heavy equipment. Other personal protective equipment (PPE) specified in the site health and safety plan (HASP) will also be required
- Workers will not assume that the equipment operator is keeping track of their exact location. Workers will never walk directly behind or to the side of heavy equipment without the operator's knowledge
- Workers in close proximity to heavy equipment will maintain visual contact with equipment operators at all times
- When an operator must maneuver equipment in tight quarters, the presence of a second person will be required to ensure adequate clearance. If backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operators's normal field of vision to relay signals
- All heavy equipment used at a contaminated work site will be kept in the exclusion zone until the work has been completed. Such equipment will then be decontaminated within the designated decontamination area
- Hand-signal communications will be established when verbal communication is difficult. One person per work team will be designated to give hand signals to equipment operators
- Equipment with an obstructed rear view must have an audible alarm that sounds when the equipment is moving in reverse (unless a spotter guides the operator)

- Parking brakes will be kept engaged when equipment is not in use
- Blades, buckets, dump bodies, and other hydraulic systems will be kept fully lowered when equipment is not in use
- Equipment cabs will be kept free of all nonessential and loose items
- Seat belts must be present in all vehicles having a rollover protective structure (ROPS)
- With certain exceptions, all material-handling equipment must be equipped with ROPS
- Material-handling equipment that lacks a ROPS will not be operated on a grade unless the grade can safely accommodate the equipment involved
- Drilling auger sections and other equipment are extremely heavy. All precautions must be taken before moving heavy equipment. Appropriate equipment must be used to transport heavy equipment
- Only chains, hoists, straps, and other equipment that safely aids transport of heavy materials will be used
- Proper personal lifting techniques will be used. Workers will lift using their legs, not their backs
- A safety barrier will be used to protect workers when tires are inflated, removed, or installed on split rims
- An ongoing maintenance program for all tools and equipment must be in place. All tools and moving equipment will be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate according to manufacturer specifications. Defective items will be promptly repaired or replaced. Maintenance and repair logs will be kept
- Tools will be stored in clean, secure areas to prevent damage, loss, or theft
- Workers will not use equipment with which they are not familiar. This precaution applies to heavy as well as light equipment
- Loose-fitting clothing and loose, long hair will be prohibited around moving machinery
- Workers will make sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines present a hazard in the work area
- All personnel who are not essential to work activities will be kept out of the work area

- Workers will be aware of their footing at all times
- Workers will remain alert at all times

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

RESPIRATOR CLEANING PROCEDURES

SWP NO.: 6-27

ISSUE DATE: FEBRUARY 1999

REVISION: 0

RESPIRATOR CLEANING PROCEDURES

This safe work practice (SWP) provides guidelines for proper and thorough cleaning of respiratory protection equipment. The Occupational Safety and Health Administration (OSHA) regulates the use of respiratory protection for general industry in Title 29 of the *Code of Federal Regulations* (CFR) Part 1910.134, "Respiratory Protection." Appendix B-2 of the standard outlines mandatory requirements for respirator cleaning and is used as the basis for this SWP. This SWP supplements Document Control No. 2-6, "Respiratory Protection Program." It provides specific respirator cleaning and disinfection procedures and shall be included as an attachment to the site-specific health and safety plan for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of respirators with reusable facepieces.

Respirators shall be cleaned and disinfected as discussed below.

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals.
- Respirators maintained for emergency use shall be cleaned and disinfected after each use.
- Respirators used in fit testing and training shall be cleaned and disinfected after each use.

2.0 CLEANING AND DISINFECTION PROCEDURES

Mandatory respirator cleaning procedures as defined in 29 CFR Part 1910.134, Appendix B-2, are listed below. All wash and rinse water should be warm, with a maximum temperature of 110 °F (43 °C).

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, and any other components as recommended by the manufacturer. Discard or repair any defective parts.

2. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

3. Rinse components thoroughly in clean, warm, preferably running water. Drain all components.

4. When the cleaner does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:

   - Hypochlorite solution [50 parts per million (ppm) of chlorine] made by adding approximately one milliliter of laundry bleach to 1 liter of warm water

   - Aqueous solution of iodine [50 ppm iodine made by adding approximately 0.8 milliliter of tincture of iodine (6 to 8 grams ammonium and/or potassium iodide per 100 cubic centimeters of 45 percent alcohol) to 1 liter of warm water]

   - Other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer

5. Rinse components thoroughly in clean, warm, preferably running water. Drain all components. The importance of thorough rinsing cannot be over emphasized. Detergents or disinfectants that dry on facepieces may cause dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

6. Components should be air-dried or hand-dried with a clean, lint-free cloth.

7. Reassemble the facepiece. Replace filters, cartridges, and canisters prior to next use.

8. Test the respirator to ensure that all components work properly.

9. Place the respirator in a clean bag and seal for storage.

Depending on work conditions, respirator facial sealing surfaces may need periodic cleaning during the course of daily use. Cleaning of the facial sealing surface during work breaks can reduce the chance of facial irritation caused by sweat, natural skin oil, or irritating materials that may have deposited on the facepiece. Facial sealing surfaces can be cleaned using disinfectant wipes soaked in isopropyl alcohol or benzalkonium chloride. After use of the disinfectant wipe, the sealing surface should air dry or be dried thoroughly using paper towels or tissues.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

SAFE WORK PRACTICES FOR USE OF AIR PURIFYING RESPIRATORS

SWP NO.: 6-28

ISSUE DATE: FEBRUARY 1999

REVISION: 0

SAFE WORK PRACTICES FOR USE OF RESPIRATORS

This safe work practice (SWP) was developed to ensure the proper use of respirators in routine and foreseeable emergency situations. The SWP supplements Document Control No. 2-6, "Respiratory Protection Program." This SWP shall be included as an attachment to the site-specific health and safety plan (HASP) for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of air purifying respirators and shall not be used for situations involving the use of supplied air systems such as self-contained breathing apparatuses and air-line apparatuses.

2.0 ROUTINE RESPIRATOR USE PROCEDURES

The procedures below apply to the routine use of air purifying respirators.

- Respirators shall not be issued to or worn by individuals when conditions prevent valve function or a good facial seal. These conditions may include but are not limited to facial hair, such as the growth of beard, sideburns, or excessive mustaches, and possibly the wearing of corrective eyeglasses.

- If spectacles, goggles, face shields, or welding helmets must be worn with a facepiece, they will be worn so as not to adversely affect the seal of the facepiece to the face.

- For all tight-fitting respirators, a positive and negative pressure seal check shall be performed each time the respirator is donned. Seal checks shall be performed as follow:

  – *Negative pressure check:* Close off the inlet opening of the canister or cartridge(s) by covering it with the palm of the hand(s), inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is satisfactory.

  – *Positive pressure check*: Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. The exhalation valve cover may have to be removed to perform this procedure.

- *Manufacturer's recommended seal check*: If the respirator manufacturer recommends specific procedures for performing a user seal check, these procedures may be used instead of the negative and positive pressure checks.

- Work areas must be monitored for conditions that may adversely affect the effectiveness of respiratory protection. Employees may leave the work area where respirators are required under the following conditions:

  - To wash the face and respirator facepieces as necessary to prevent eye or skin irritation

  - If vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece is detected

  - To replace the respirator or the filter, cartridge, or canister elements

  - If established monitoring instrument action levels are exceeded

  - For any other criteria as established in a project specific health and safety plan

3.0 RESPIRATOR USE DURING EMERGENCY SITUATIONS

Emergency situations may arise during the wearing of respiratory protection. These situations could include medical emergency, respirator failure, fire, chemical spills or leaks, and other events that pose an immediate risk. Procedures for respirator use during emergency situations are summarized below.

- When an emergency situation arises that creates or has the potential to create immediately dangerous to life and health (IDLH) conditions, the work environment shall be evacuated immediately and shall not be reentered by employees without suitable protective gear.

- Work environments with the potential for the development of atmospheres that may present IDLH conditions shall only be entered by employees using the buddy system.

- When an emergency situation arises that includes physical hazards that may interfere with the proper use of respiratory protection, the work environment shall be evacuated.

- Under no circumstances shall respirator users remove facepieces in hazardous atmospheres. In the event of respirator malfunction, users should leave the hazardous environment immediately and proceed to a known safe location before removal of the facepiece.

- Episodes of respirator failure shall be thoroughly investigated before work activities begin again. The investigation shall include re-evaluation of work area atmospheric

conditions, review of the respirator selection criteria and service life calculations, and an evaluation of the working conditions under which respirator failure occurred.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

RESPIRATOR QUALITATIVE FIT TESTING PROCEDURES

SWP NO.: 6-29

ISSUE DATE: APRIL 1999

REVISION NO.: 0

RESPIRATOR QUALITATIVE FIT TESTING PROCEDURES

The safe work practice (SWP) addresses the need for proper and thorough procedures for qualitative fit testing of respirators. The Occupational Safety and Health Administration (OSHA) regulates general industrial use of respiratory protection under Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.134. Appendix A of the standard outlines mandatory procedures to use for both qualitative fit tests (QLFT) and quantitative fit tests (QNFT). This SWP was written to meet the requirements of Appendix A for QLFTs. This SWP must be used in conjunction with the Tetra Tech, Inc. (Tetra Tech), "Respiratory Protection Program," Document Control No. 2-6.

The following sections describe the SWP's applicability, qualifications of fit testers, and fit testing procedures for use during QLFTs.

1.0 APPLICABILITY

This SWP applies to all Tetra Tech employees who use respirators on the job and to employees who conduct any fit testing. In addition, when a Tetra Tech company or office uses an outside service to perform fit testing, the organization conducting the fit testing shall meet the minimum requirements for QLFT and QNFT procedures specified in Appendix A of the standard.

Respirator fit testing shall be conducted at the following intervals:

- Prior to initial use of a respirator
- Whenever a different respirator facepiece (size, style, model, or make) is used
- At least annually thereafter
- After any reported or observed changes in an employee's physical condition that could affect respirator fit. This includes but is not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

If an employee notices that the fit of a respirator has become unacceptable, he or she will be given an opportunity to select another respirator facepiece.

2.0 QUALIFICATION OF FIT TESTERS

Tetra Tech employees who conduct QLFTs must demonstrate sufficient understanding and expertise in the required testing procedures. Fit testers shall qualify through appropriate education, experience, or both. Qualifications of fit testers shall be determined on a case-by-case basis by regional health and safety representatives (RHSR) or subsidiary health and safety representatives (SHSR) based on the fit tester's demonstrated knowledge of OSHA-mandated fit test procedures and performance of a simulated fit test. The RHSR or SHSR must ensure that persons administering fit tests are able to prepare test solutions, calibrate and operate equipment, perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order. The fit tester must also demonstrate how to clean and maintain equipment to operate within the parameters for which it was designed.

3.0 FIT TESTING PROCEDURES

Appendix A of 29 CFR 1910.134 provides instruction for five OSHA-accepted QLFT procedures. Tetra Tech has selected two of these procedures for its fit test program. The sections below describe general requirements that must be followed during all fit tests and for any fit test method used. Both the Bitrex™ and irritant smoke QLFT protocols are discussed below.

3.1 GENERAL REQUIREMENTS

QLFTs must be conducted in accordance with the general requirements discussed below.

- The test subject shall be shown how to put on a respirator, position it on the face, set strap tension, and determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning the facepiece.
- The test subject must be allowed to choose from a sufficient selection of models and sizes to identify a respirator that fits correctly and is comfortable. The subject shall be informed that he or she is being asked to select the respirator that provides the most acceptable fit. The subject shall be asked to hold each chosen facepiece up to the face and eliminate those that obviously do not provide an acceptable fit.
- The subject shall don the most comfortable respirator and wear it for at least 5 minutes to assess comfort. If the subject is not familiar with a particular respirator, the subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper strap tension.

- The tester shall review the following points with the subject and allow the subject adequate time to determine the comfort of the respirator:
  - Position of the mask on the nose
  - Room for eye protection
  - Ability to talk
  - Position of the mask on the face and cheeks
- The following criteria shall be used to help determine the adequacy of the respirator fit:
  - Chin properly placed
  - Adequate strap tension (not overly tight)
  - Fit across nose bridge
  - Proper size to span distance from nose to chin
  - Tendency of respirator to slip
  - Self-observation in a mirror to evaluate fit and respirator position
- The subject shall conduct a user seal check using the negative- and positive-pressure seal check procedures described in Appendix A of this SWP. Before conducting the check, the subject shall be instructed to seat the mask on the face by moving the head from side to side and up and down slowly while taking a few slow, deep breaths. If the seal checks fail, the subject shall choose another facepiece.
- Seal checks and fit testing shall not be conducted if there is any facial hair growth such as stubble beard growth, beard, mustache, or sideburns that interferes with the facepiece sealing surface. Any interfering apparel shall be altered or removed.
- If the subject experiences difficulty in breathing during testing, the testing shall stop immediately and he or she shall be referred to a company physician for assessment.
- If the subject finds the fit of the respirator unacceptable, the subject shall be given the opportunity to select a different respirator and to be retested.
- Prior to commencement of the fit test, the subject shall be given a written description of the respirator user seal check procedures (see Appendix A) and exercises to perform during the testing. Exercises and a prepared text to be read during the test are included in Appendix B of this SWP.
- All exercises in Appendix B must be performed for all QLFT methods.

3.2 BITREX™ SOLUTION QUALITATIVE FIT TEST PROTOCOL

Bitrex™ solution (denatonium benzoate) is a taste aversion agent. To conduct a QLFT using Bitrex™, the test subject must first pass a taste threshold screening. The entire procedure must be explained to the test subject before the screening is conducted. The sections below describe taste threshold screening and fit test procedures. Particulate filters (cartridges) are used during this test.

3.2.1 Taste Threshold Screening

The taste threshold screening is intended to determine whether the individual tested can detect the taste of Bitrex™. The procedures below shall be used for the taste screening.

- Prior to testing, the tester shall prepare a quantity of threshold check solution by adding 13.5 milligrams (mg) of Bitrex™ to 100 milliliters (mL) of 5 percent salt solution in distilled water. A nebulizer for taste screening shall be clearly marked to distinguish it from the fit test solution nebulizer. The taste screening nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every 4 hours.

- During the taste screening as well as during the fit testing, subjects shall wear an enclosure around the head and shoulders that is approximately 12 inches in diameter by 14 inches tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts #14 and #15 combined, is adequate.

- The test enclosure shall have a 0.75-inch hole in front of the test subject's nose and month area to accommodate the nebulizer nozzle.

- The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he or she detects a bitter taste.

- Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely. The bulb is then released and allowed to fully expand. Correct use of the nebulizer means that approximately 1 mL of liquid is used at a time in the nebulizer body.

- The nebulizer should be rapidly squeezed 10 times and then the test subject is asked whether the Bitrex™ solution can be tasted. If the subject reports tasting the bitter taste during the 10 squeezes, the screening test is complete. The taste threshold is noted as 10 regardless of the number of squeezes actually completed.

- If the first response is negative, the nebulizer is rapidly squeezed 10 more times and the test subject is again asked whether the Bitrex™ solution is tasted. If the test subject reports tasting the bitter taste during the second 10 squeezes, the screening test is completed. The taste threshold is noted as 20 regardless of the number of squeezes actually completed.

- If the second response is negative, the nebulizer is rapidly squeezed 10 more times and the test subject is again asked whether the Bitrex™ solution is tasted. If the test subject reports tasting the bitter taste during the third 10 squeezes, the screening test is completed. The taste threshold is noted as 30 regardless of the number of squeezes actually completed.

- If the Bitrex™ solution is not tasted after 30 squeezes, the test subject is unable to taste the Bitrex™ solution and cannot be fit tested using the Bitrex™ solution test.

- The tester will note the number of squeezes required to solicit a taste response. When a taste response has been elicited, the test subject shall be asked to note the taste for reference in the fit test.

3.2.2 Bitrex™ Solution Fit Test Procedures

The procedures below must be followed to conduct the actual Bitrex™ solution fit test:

- A fit test solution is prepared by adding 337.5 mg of Bitrex™ to 200 mL of a 5 percent salt solution in warm water. A second nebulizer dedicated to fit testing shall be clearly marked to distinguish it from the taste screening solution nebulizer. The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every 4 hours.

- The test subject shall be instructed not to each, drink, smoke, or chew gum for 15 minutes before the test.

- The person being fit tested shall don the respirator without assistance and perform the required user seal check (see Appendix A).

- The fit test uses the same enclosure described for taste threshold screening in Section 3.2.1. The test subject shall don the enclosure while wearing the respirator selected as described in the general requirements in Section 3.1. The respirator shall be properly adjusted and equipped with particulate filter(s).

- As before, the test subject shall breathe through his or her slightly opened mouth with tongue extended, and shall be instructed to report is he or she tastes the bitter taste of Bitrex™

- The nebulizer is inserted into the hole in front of the enclosure, and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20, or 30) based on the number of squeezes required to elicit taste response noted during the screening test.

- After generating the aerosol, the test subject shall be instructed to perform the test exercises provided in Appendix B.

- Every 30 seconds, the aerosol concentration shall be replenished using one half the number of squeezes used initially (such as 5, 10, or 15).

- The test subject shall indicate to the tester if at any time during the fit test the taste of Bitrex™ solution is detected. If the test subject does not report tasting the Bitrex™ solution, the test is passed.

- If the taste of Bitrex™ solution is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried, and the entire test procedure (screening and test) is repeated.

3.3 IRRITANT SMOKE (STANNIC CHLORIDE) QUALITATIVE FIT TEST PROTOCOL

This QLFT uses a person's response to irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator. To conduct this QLFT, the general requirements and precautions, a sensitivity screening check, and fit test procedures discussed below must be followed.

3.3.1 General Requirements and Precautions

General requirements and precautions related to the irritant smoke QLFT are discussed below.

- The respirator to be tested shall be equipped with high-efficiency particulate air (HEPA) or P100 series filter(s). Tetra Tech recommends that the person performing the fit test also wear a full-face respirator with HEPA or P100 series filters.

- Only stannic chloride smoke tubes shall be used for this protocol.

- No test enclosure or hood for the test subject shall be used.

- The smoke can irritate the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be

taken when performing the sensitivity screening checks that only the minimum amount of smoke is used necessary to elicit a response from the test subject.

- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or buildup of irritant smoke in the general atmosphere.

3.3.2 Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke as discussed below.

- The tester shall break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to (1) a low-flow air pump set to deliver 200 mL per minute or (2) an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his or her eyes closed while the test is performed.

- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he or she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine if he or she can detect it.

3.3.3 Irritant Smoke Fit Test Procedures

The procedures below must be followed to conduct the actual irritant smoke fit test.

- The person being fit tested shall don the respirator without assistance and perform the required user seal check (see Appendix A).

- The test subject shall be instructed to keep his or her eyes closed.

- The tester shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject using the low-flow pump or squeeze bulb at least 12 inches from the facepiece. The tester shall move the smoke stream around the whole perimeter of the mask. The tester shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.

- If the person being tested does not have an involuntary response or detect the irritant smoke, the test should proceed with the test exercises provided in Appendix B.

- The test exercises shall be performed by the test subject while the respirator seal is being continually challenged by the smoke around the perimeter of the respirator at a distance of 6 inches.

- If the person being fit tested reports detecting the irritant smoke at any time, the fit test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

- Each test subject passing the irritant smoke test without evidence of a response is required to undergo a second sensitivity screening check after the respirator has been removed using the smoke from the same smoke tube used during the fit test to determine whether he or she still reacts to the smoke. Failure to evoke a response shall render the fit test void. If the subject responds during the second sensitivity check, the fit test is passed.

APPENDIX A

RESPIRATOR USER SEAL CHECK PROCEDURES

APPENDIX A

RESPIRATOR USER SEAL CHECK PROCEDURE

Individuals using tight-fitting respirators must perform a user seal check each time a respirator is put on to ensure that an adequate seal is achieved. Two methods are available for use; one is the positive- and negative-pressure check and the other is the respirator manufacturer's method. Either the positive- and negative-pressure checks described below may be used or, if a manufacturer of a particular respirator brand has developed its own recommended seal check method, that method may be used in place of the negative- and positive-pressure seal checks. User seal checks are not a substitute for qualitative or quantitative fit tests. The user check procedures described below are as described in the mandatory Appendix B-1 of Title 29 of the *Code of Federal Regulations*, Part 1910.134.

- Positive-Pressure Check

  Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replace it after the test.

- Negative-Pressure Check

  Close off the inlet opening(s) of the canister or cartridge(s) by covering the opening with the palm of the hand(s) or by replacing the filter seal(s). Inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. The inlet opening of some cartridges cannot be effectively covered with the palm of the hand. In this case, the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

APPENDIX B

RESPIRATOR FIT TEST EXERCISES

RESPIRATOR FIT TEST EXERCISES

Test subjects shall perform the exercises below during fit test process. Prior to the actual fit test, the test subject shall (1) select a suitable and comfortable respirator; (2) don, adjust, and then wear the respirator for 5 minutes to assess comfort; (3) conduct a user seal check in accordance with the procedures outlined in Appendix A, (4) report any difficulties breathing while wearing the respirator, (5) select a different respirator if the fit and level of comfort is unacceptable, and (6) perform the fit test exercises described below in the order listed. The qualitative fit test (QLFT) shall be performed in a test environment.

Test Exercises

Each exercises below shall be conducted for 1 minute. During testing, the subject will be questioned and observed to determine if the respirator is comfortable. The respirator shall not be adjusted during the fit testing procedure. Any adjustment voids the test, and the test must be repeated from the beginning.

1. **Normal breathing.** In a normal standing position without talking, breathe normally.
2. **Deep breathing.** In a normal standing position, breathe slowly and deeply. Be careful not to hyperventilate.
3. **Turning head from side to side.** Standing in place, slowly turn the head from side to side between the extreme positions on each side. Hold the head at each extreme momentarily and inhale at each side.
4. **Moving head up and down**. Standing in place, slowly move the head up and down. Inhale in the up position (such as when looking toward the ceiling).
5. **Talking.** Talk out loud slowly and loud enough to be heard clearly by the fit tester. Read the entire "Rainbow Passage" on the next page.
6. **Bending over.** Bend at the waist as if to touch the toes.
7. **Normal breathing.** Complete the same exercise as item 1 above.

After these test exercises are completed, the tester shall ask the test subject about the comfort of the respirator. If the respirator is uncomfortable, another respirator shall be tried and the fit test, as well as user check and screening procedures, will be repeated.

RAINBOW PASSAGE

"When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."

Source: Appendix A of Title 29 of the *Code of Federal Regulations,* Part 1910.134

APPENDIX B
FORMS

- Incident Report
- Incident Form IR-A
- Incident Form IR-B
- Incident Form IR-C
- Form AF-1, Field Audit Checklist
- Form AR-1, Accident and Illness Investigation Report
- Form HSP-4, Health and Safety Plan Compliance Agreement
- Form HST-2, Daily Tail Gate Safety Meeting Form
- Form SSC-1, Daily Site Log
- Form HSP Amendment, Health and Safety Plan Amendment
- HIPAA Authorization to Release and Disclose Health Information

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT REPORT

Report Date	Report Prepared By	Incident Report Number

INSTRUCTIONS:

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	☐ Complete IR Form Only
Injury or Illness	☐ Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	☐ Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	☐ Complete Form IR-C; Motor Vehicle

INFORMATION ABOUT THE INCIDENT

Description of Incident

_____

_____

_____

_____

Date of Incident	Time of Incident
	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐
Weather conditions at the time of the incident	**Was there adequate lighting?**
	_____ Yes ☐ No ☐

Location of Incident

_____ Was location of incident within the employer's work environment? Yes ☐ No ☐

Street Address	City, State, Zip Code and Country
Project Name	**Client:**
Tt Supervisor or Project Manager	**Was supervisor on the scene?**
	Yes ☐ No ☐

WITNESS INFORMATION (attach additional sheets if necessary)

Name	Company
Street Address	**City, State and Zip Code**
Telephone Number(s)	

CORRECTIVE ACTIONS

Corrective action(s) immediately taken by unit reporting the incident:

_____

_____

_____

_____

Corrective action(s) still to be taken (by whom and when):

_____

_____

_____

_____

ROOT CAUSE ANALYSIS LEVEL REQUIRED

Root Cause Analysis Level Required: Level - 1 ☐ Level - 2 ☐ None ☐

Root Cause Analysis Level Definitions

Level - 1	**Definition:** A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office. The following events may trigger a Level 1 RCA: ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of $75,000 ▪ When requested by senior management
Level - 2	**Definition:** A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided. The following events will require a Level 2 RCA: ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

NOTIFICATIONS

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT FORM IR-A

INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

EMPLOYEE INFORMATION

Company Affiliation

Tetra Tech Employee? ☐ TetraTech subcontractor employee (directly supervised by Tt personnel)? ☐

Full Name	**Company (if not Tt employee)**
Street Address, City, State and Zip Code	**Address Type**
_____ _____	Home address (for Tt employees) ☐ Business address (for subcontractors) ☐

Telephone Numbers

Work: _____ Home: _____ Cell: _____

Occupation (regular job title)	**Department**
Was the individual performing regular job duties?	**Time individual began work**
Yes ☐ No ☐	_____ AM ☐ PM ☐ *OR* Cannot be determined ☐

Safety equipment

Provided? Yes ☐ No ☐

Used? Yes ☐ No ☐ If no, explain why

_____
_____
_____

Type(s) provided:
☐ Hard hat ☐ Protective clothing
☐ Gloves ☐ High visibility vest
☐ Eye protection ☐ Fall protection
☐ Safety shoes ☐ Machine guarding
☐ Respirator ☐ Other (list)

_____

NOTIFICATIONS

Name of Tt employee to whom the injury or illness was first reported	**Was H&S notified within one hour of injury or illness?**
	Yes ☐ No ☐
Date of report	**H&S Personnel Notified**
Time of report	**Time of Report**

If subcontractor injury, did subcontractor's firm perform their own incident investigation?

Yes ☐ No ☐ If yes, request a copy of their completed investigation form/report and attach it to this report.

INJURY / ILLNESS DETAILS

What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time"

Describe the object or substance that directly harmed the individual: Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes ☐ No ☐ If yes, describe the type of first aid administered and by whom?

Was treatment provided away from the site: Yes ☐ No ☐ If yes, provide the information below.

Name of physician or health care professional	**Facility Name**
Street Address, City State and Zip Code	**Type of Care?**
	Was individual treated in emergency room? Yes ☐ No ☐ Was individual hospitalized overnight as an in-patient? Yes ☐ No ☐ Did the individual die? Yes ☐ No ☐ If yes, date: ____ Will a worker's compensation claim be filed? Yes ☐ No ☐
Telephone Number	

NOTE: Attach any police reports or related diagrams to this report.

SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	**Affected individual (signature)**	**Telephone Number**	**Date**

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT FORM IR-B

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

TYPE OF INCIDENT (Check all that apply)

Property Damage ☐ Equipment Damage ☐ Fire or Explosion ☐ Spill or Release ☐

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

Response Actions Taken:

Responding Agency(s) (i.e. police, fire department, etc.)	**Agency(s) Contact Name(s)**

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	**Extent of damage:**	**Estimated repair cost**

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	**Estimated quantity and duration**	**Specify Reportable Quantity (RQ)**
		_____ Exceeded? Yes ☐ No ☐ NA ☐

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes ☐ No ☐ If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	**Name of person notified**	**By whom**	**Date / Time**
Client: _____ Yes ☐ No ☐			
Agency: _____ Yes ☐ No ☐			
Other: _____ Yes ☐ No ☐			

Who is responsible for reporting incident to outside agency(s)? Tt ☐ Client ☐ Other ☐ Name: _____

Was an additional written report on this incident generated? Yes ☐ No ☐ If yes, place in project file.

TETRA TECH, INC.
Safety Excellence

TETRA TECH, INC.
INCIDENT FORM IR-C

INSTRUCTIONS:

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)	

INCIDENT DETAILS

Name of road, street, highway or location where accident occurred	**Name of intersecting road, street or highway if applicable**

County	**City**	**State**

Did police respond to the accident?	**Did ambulance respond to the accident?**
Yes ☐ No ☐	Yes ☐ No ☐
Name and location of responding police department	**Ambulance company name and location**
Officer's name/badge #	

Did police complete an incident report? Yes ☐ No ☐ If yes, police report number: _____
Request a copy of completed investigation report and attach to this form.

VEHICLE INFORMATION

How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		**Vehicle Number 2 – Other Vehicle**	
Vehicle Owner / Contact Information		**Vehicle Owner / Contact Information**	
Color		**Color**	
Make		**Make**	
Model		**Model**	
Year		**Year**	
License Plate #		**License Plate #**	
Identification #		**Identification #**	
Describe damage to vehicle number 1		**Describe damage to vehicle number 2**	
Insurance Company Name and Address		**Insurance Company Name and Address**	
Agent Name		**Agent Name**	
Agent Phone No.		**Agent Phone No.**	
Policy Number		**Policy Number**	

DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		**Driver's Name**	
Driver's Address		**Driver's Address**	
Phone Number		**Phone Number**	
Date of Birth		**Date of Birth**	
Driver's License #		**Driver's License #**	
Licensing State		**Licensing State**	
Gender	Male ☐ Female ☐	**Gender**	Male ☐ Female ☐
Was traffic citation issued to Tetra Tech driver? Yes ☐ No ☐		Was traffic citation issued to driver of other vehicle? Yes ☐ No ☐	
Citation #		**Citation #**	
Citation Description		**Citation Description**	

PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.
Driver information is captured in the preceding section.
Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.
Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? _____		How many passengers (excluding driver) in the vehicle? _____	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	
Non-Injured Passenger Name and Address		**Non-Injured Passenger Name and Address**	

INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐
Name of injured person 2				**Address of injured person 2**		
Age	**Gender**	**Car No.**	**Location in Car**	**Seat Belt Used?**	**Ejected from car?**	**Injury or Fatality?**
	Male ☐ Female ☐			Yes ☐ No ☐	Yes ☐ No ☐	Injured ☐ Died ☐

OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	**Property Owner's Address**

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

TETRA TECH EM INC.

FIELD AUDIT CHECKLIST

Project Name: _____ Project No.: _____

Field Location: _____ Completed by: _____

Project Manager: _____ Site Safety Coordinator: _____

General Items		In Compliance?		
Health and Safety Plan Requirements		Yes	No	NA
1	Approved health and safety plan (HASP) on site or available			
2	Names of on-site personnel recorded in field logbook or daily log			
3	HASP compliance agreement form signed by all on-site personnel			
4	Material Safety Data Sheets on site or available			
5	Designated site safety coordinator present			
6	Daily tailgate safety meetings conducted and documented			
7	On-site personnel meet HASP requirements for medical examinations, fit testing, and training (including subcontractors)			
8	Compliance with specified safe work practices			
9	Documentation of training, medical examinations, and fit tests available from employer			
10	Exclusion, decontamination, and support zones delineated and enforced			
11	Windsock or ribbons in place to indicate wind direction			
12	Illness and injury prevention program reports completed (California only)			
Emergency Planning				
13	Emergency telephone numbers posted			
14	Emergency route to hospital posted			
15	Local emergency providers notified of site activities			
16	Adequate safety equipment inventory available			
17	First aid provider and supplies available			
18	Eyewash stations in place			
Air Monitoring				
19	Monitoring equipment specified in HASP available and in working order			
20	Monitoring equipment calibrated and calibration records available			
21	Personnel know how to operate monitoring equipment and equipment manuals available on site			
23	Environmental and personnel monitoring performed as specified in HASP			

TETRA TECH, INC.

FIELD AUDIT CHECKLIST (Continued)

Safety Items		In Compliance?		
Personal Protection		Yes	No	NA
1	Splash suit			
2	Chemical protective clothing			
3	Safety glasses or goggles			
4	Gloves			
5	Overboots			
6	Hard hat			
7	Dust mask			
8	Hearing protection			
9	Respirator			
Instrumentation				
10	Combustible gas meter			
11	Oxygen meter			
12	Organic vapor analyzer			
Supplies				
13	Decontamination equipment and supplies			
14	Fire extinguishers			
15	Spill cleanup supplies			
Corrective Action Taken During Audit:				
Corrective Action Still Needed:				

Note: NA = Not applicable

_____ _____

Auditor's Signature Site Safety Coordinator's Signature

_____

Date

TETRA TECH EM INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
Subsidiary Health and Safety Representative

Cc: _____
Workers Compensation Administrator

Project name: _____

Project number. _____

Prepared by: _____

Position: _____

Office: _____

Telephone number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Home address: _____

_____

Home telephone number: _____

Occupation (regular job title): _____

Department: _____

Office: _____

Gender: M ☐ F ☐ No. of dependents: _____

Marital status: _____

Date of birth: _____

Social Security Number: _____

Date of Accident: _____

Time Employee Began Work: _____

Time of Accident: _____ a.m. ☐ p.m. ☐

☐ Check if time cannot be determined

Location of Accident

Street address: _____

City, state, and zip code: _____

County: _____

Was place of accident or exposure on employer's premises? Yes ☐ No ☐

Information About the Case

What was the employee doing just before the incident occurred?: Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

What Happened?: Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH EM INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Case (Continued)

What was the injury or illness? Describe the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." Examples "strained back"; "chemical burn, right hand"; "carpal tunnel syndrome, left wrist."

Describe the Object or Substance which Directly Harmed the Employee: Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, enter a NA.

Did the employee die? Yes ☐ No ☐ Date of death: _____

Was employee performing regular job duties? Yes ☐ No ☐

Was safety equipment provided? Yes ☐ No ☐ Was safety equipment used? Yes ☐ No ☐

Note: Attach any police reports or related diagrams to this accident report.

Witness(es):

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Medical Treatment Required? ☐ Yes ☐ No ☐ First Aid only

Name of physician or health care professional: _____

If treatment was provided away from the work-site, where was it given?

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Was the employee treated in an emergency room? ☐ Yes ☐ No

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH EM INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Was the employee hospitalized overnight as an in-patient? ☐ Yes ☐ No

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: _____

Date of Report: _____ **Time of Report:** _____

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

_____ _____

Printed Name of Injured Employee Telephone Number

_____ _____

Signature of Injured Employee Datee

The signatures provided below indicate that appropriate personnel have been notified of the incident.

Title	Printed Name	Signature	Telephone Number	Date
Project or Office Manager				
Site Safety Coordinator				

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH EM INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To be completed by the Subsidiary Safety and Health Representative:

Classification of Incident:

☐ Injury ☐ Illness

Result of Incident:

☐ First Aid Only

☐ Days Away From Work

☐ Remained at Work but Incident Resulted in Job Transfer or Work Restriction

☐ Incident Involved Days Away and Job Transfer or Work Restriction

☐ Medical Treatment Only

No. of Days Away From Work _____

Date Employee Left Work _____

Date Employee Returned to Work _____

No. of Days Placed on Restriction or Job Transfer: _____

OSHA Recordable Case Number _____

To be completed by Human Resources:

SSN: _____

Date of hire: _____ Hire date in current job: _____

Wage information: $ _____ per ☐ Hour ☐ Day ☐ Week ☐ Month

Position at time of hire: _____

Current position: _____ Shift hours: _____

State in which employee was hired: _____

Status: ☐ Full-time ☐ Part-time Hours per week: _____ Days per week: _____

Temporary job end date: _____

To be completed during report to workers' compensation carrier:

Date reported: _____ Reported by: _____

Confirmation number: _____

Name of contact: _____

Field office of claims adjuster: _____

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH EM INC.

HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

Project Name: _____

Project Number: _____

I have read and understand the health and safety plan indicated above and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the plan.

Name	Signature	Employer	Date

TETRA TECH EM INC.

DAILY TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Project No.: _____

Client: _____ Site Location: _____

Site Activities Planned for Today: _____

_____

Safety Topics Discussed
Protective clothing and equipment:
Chemical hazards:
Physical hazards:
Environmental and biohazards:
Equipment hazards:
Decontamination procedures:
Other:
Review of emergency procedures:
Employee Questions or Comments:

TETRA TECH EM INC.

DAILY TAILGATE SAFETY MEETING FORM (Continued)

Attendees	
Printed Name	**Signature**

Meeting Conducted by:

_____ _____

Name Title

_____

Signature

TETRA TECH EM INC.

DAILY SITE LOG

Site Name:_____ Date: _____

Name (print)	Company	Time	
		In	Out

Comments:

_____

_____

_____

_____

TETRA TECH EM INC.

HEALTH AND SAFETY PLAN AMENDMENT

Site Name: _____

Amendment Date: _____

Purpose or Reason for Amendment: _____

_____

_____

_____

_____

Required Changes in PPE: _____

_____

_____

_____

_____

Action Level Changes: _____

_____

_____

_____

_____

AMENDMENT APPROVAL

HSD or Designee	_____ Name	_____ Signature	_____ Date
Site Safety Coordinator	_____ Name	_____ Signature	_____ Date

Date presented during daily site safety meeting: _____

HIPAA Authorization to Release and Disclose Health Information

1. Employee/Patient Name: _____ Date of Birth: _____

2. I hereby authorize _____ located at the following address:
(healthcare provider)

_____
(address) *(city)* *(state)* *(zip)*

to release and disclose all my medical health information (including my medical history diagnostic test results, physical examination findings, treatment plans and any other information related to my mental or physical condition) to WorkCare, an occupational health firm contracted by _____ located at
(company)

☒ WorkCare South – 300 S. Harbor Boulevard, Suite 600 Anaheim, CA 92805 **FAX: (714) 922-1029**

☐ WorkCare North – 1320 Harbor Bay Parkway, #115 Alameda, CA 94502 **FAX: (510) 748-6915**

3. I understand that my health medical information may include information concerning drug/alcohol testing, substance abuse, mental health or HIV test results–if it's contained in the medical record held by the provider named above. I hereby specifically consent to authorize the release and disclosure of information relating to drug/alcohol testing, substance abuse, mental health or HIV test results. I further understand this authorization does not apply to psychotherapy notes.

4. My health information may be used or disclosed for the following purposes:
   - To determine my medical qualifications to perform the job duty with my employer
   - To make pre-employment physical determinations
   - To conduct medical surveillance and case management activities for occupational or non-occupational injuries/illnesses
   - To provide treatment and coordination of medical care

5. I understand that I have a right to revoke this authorization at any time by providing written notice to the healthcare provider set forth above. I further understand that the revocation will not apply to information that has already been released pursuant to this authorization.

6. This authorization is effective immediately and shall remain in effect until I am no longer an employee of the employer named above.

7. I understand that authorizing the disclosure of this health information is voluntary. I can refuse to sign this authorization. I further understand that if I refuse to sign this authorization, no health care services will be provided to me and no information will be furnished to WorkCare. I understand that if these services are being rendered for occupational health-related purposes, my employment with the employer named above may be adversely affected

8. I may inspect or copy the information to be used or disclosed. I understand that any disclosure of information carries with it the potential for re-disclosure by the recipient and the information may not be protected by federal confidentiality rules. If I have any questions about disclosures of my healthcare information, I can contact WorkCare at the above office location.

9. I have the right to WorkCare's Notice of Privacy Practices at anytime. I agree that WorkCare has provided me a copy of its Notice of Privacy Practices in either paper form or electronically through its web site at www.workcare.com.

10. I understand that I have a right to receive a copy of the authorization form after it has been signed.

Print Employee/Patient Name: _____

Signature of Employee/Patient: _____ Date: _____

Please complete with signature and return to WorkCare at the above fax number.

ATTACHMENT 1
HEALTH AND SAFETY PLAN, UNIVERSITY OF CALIFORNIA, BERKELEY, RICHMOND FIELD STATION REMEDIATION PROJECT, RICHMOND, CALIFORNIA, DATED JULY 19, 2002, PREPARED BY URS CORPORATION

FINAL REPORT

HEALTH AND SAFETY PLAN

UNIVERSITY OF CALIFORNIA BERKELEY RICHMOND FIELD STATION REMEDIATION PROJECT, RICHMOND, CALIFORNIA

Prepared for
University of California Berkeley
Capital Projects
1936 University Ave, 2nd floor
Berkeley, California 94720

July 19, 2002

URS
URS Corporation
500 12th Street, Suite 200
Oakland, California 94607

51.09967067.01

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Appendices

1.2 INTRODUCTION

This Health and Safety Plan (HSP) establishes guidelines and requirements for the safety of URS field personnel while conducting field activities at the University of California Berkeley (UCB) Richmond Field Station in Richmond, California. This HSP is for use in conjunction with the applicable project Work Plans for all field activities at the Site.

1.3 SCOPE AND APPLICABILITY

The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards. This plan outlines the health and safety procedures and equipment required for activities at this site to minimize the potential for exposures of field personnel.

The HSP summarizes health and safety hazard information for activities conducted by URS Corporation (URS). It is not intended to encompass the scope of work that individual contractors are engaged in, nor is it designed to supply non-URS employees with all the information they need to perform their jobs safely. It is provided to non-URS personnel for information purposes only.

URS employees must follow the provisions of the HSP during all site activities. All work will comply with the CAL/OSHA Standard, "Hazardous Waste Operations and Emergency Response," Title 8 California Code of Regulations (CCR), section 5192 and other federal, state, and local procedures that require the development and implementation of a HSP. Generation of this document certifies that the workplace has been evaluated for the hazards as described. A hazard assessment has been performed and the adequacy of the personal protective equipment (PPE) selected is hereby certified per Title 8 CCR, sections 3380 – 3387 and is duly noted by the signature(s) and date appearing on the cover page of this document.

The HSP will be on site and readily available during site activities. All URS site personnel must read this HSP and sign the Safety Compliance Agreement (Appendix A) before being permitted site access.

The elements and requirements of this HSP also apply to all URS subcontractor employees and URS-sponsored visitors. All URS subcontractors are responsible for their own work, their own health and safety, and for ensuring that they and their employees obey all applicable laws, regulations, and requirements for hazardous waste operations at the site. All URS-sponsored visitors must read this HSP and sign the Safety Compliance Agreement (Appendix A) before being permitted site access.

This HSP must be modified or amended when circumstances or conditions develop that are beyond the scope of this plan.

1.4 RESPONSIBILITIES AND AUTHORITIES

The responsibilities and authorities of the key URS project personnel, relating to health and safety issues, are described in Table 1-1.

2.1 SITE LOCATION

The UCB Richmond Field Station, shown in Figure 2-1, is located at 1301 South 46th Street, Richmond, California. The RFS includes the western portion of Stege Marsh (the Marsh) located on the eastern side of central San Francisco Bay. Stege Marsh has been the subject of several environmental investigations to evaluate Chemicals of Potential Concern (COPCs). Based on the results of previous studies conducted in the Marsh, the California Regional Water Quality Control Board (RWQCB) Bay Protection Toxic Cleanup Program has identified the Marsh as one of the highest priority sediment "hot spots" within Central San Francisco Bay. Previous investigations identified several potential sources, including the RFS property, which may have contributed to the contamination in the Marsh. Five metals (arsenic, copper, mercury, selenium, and zinc), polychlorinated biphenyls (PCBs), and pesticides have been identified as COPCs which may pose potential risks to human health and/or the environment.

2.2 SITE HISTORY

Around 1870 to 1875 chemical and explosive industries began to acquire sections of the property. Around 1871 Hercules Powder Company moved into the area, and in 1877 sold their property to the California Cap Company (the Cap Company). A high-explosives blasting cap manufacturing plant was located on what is now the eastern portion of the RFS property. The Cap Company flourished as a family operation under the leadership of William Letts Oliver and was for a time the largest supplier of dynamite caps in the United States (from a Sanitary Engineering Research Laboratory annual report, ~1972-1975). According to an article published in the July 1922 edition of *The Detonator*, the Cap Company manufacturing plant consisted of approximately 150 buildings including administration buildings, a shell and metal drawing unit, a wire drawing unit, the blasting cap line unit, an electric blasting cap unit, and fulminate nitrating and recovery units. All components of the blasting caps were reportedly manufactured on site, including explosives, shells, copper containers, tin boxes, paper cartons, and insulated wire. The chief constituent of the explosive used by the Cap Company was a guncotton (nitro cellulose) base called "Tonite". Manufacturing of the explosive included the production of mercury fulminate, $Hg(CNO)_2$, a whitish-gray solid material derived by treating mercury with nitric acid and alcohol. The former mercury fulminate facility was located in the southeastern portion of the property. Other former facilities associated with the Cap Company included the shell manufacturing area, the blasting cap manufacturing area, an explosives test pit area, and an explosives storage area. The entire Cap Company facility covered approximately 30 acres, with an additional 30 acres of trees surrounding the facility.

Sometime prior to 1946 a breakwater consisting of large concrete rubble was placed on the bay side of, and subparallel to, the sea wall from Meeker Creek on the west to the South 46th street private roadway. This breakwater corresponds to the RFS's northern edge of the Marsh.

A wooden pier extended from the northern edge of the marsh just west of South 46th Street out into the mud flats and open water. The date of origin of this structure is unknown, but may date to the late 1800's and conceivably could precede the Cap Company's ownership. Although only a severely dilapidated portion of the pier remains today on the bay side of the embankment, it was originally reported to have been used for unloading barges in its early years. Following purchase of the property by UC Berkeley, the pier was used by the Seawater Conversion

Laboratory and the Hydraulics Engineering Laboratory as an access to a Bay water pumping station located at its southern end. From examination of old aerial photographs, the pier appears to have been treated as an informal property boundary in the mudflats. At some point, wooden barriers were placed along the pier pilings forming a makeshift north-south barrier along the pier.

On RFS property adjacent to the current Zeneca cinder landfill, pyrite cinders were deposited or migrated into the southern and southeastern areas of the RFS property. These locations include the following:

- Adjacent to the east side of the former pier;
- Between the former sea wall and the concrete breakwater on the west side of the pier (what is now the southeastern portion of the upland property); and
- South of the breakwater.

In October 1950, the Cap Company property was purchased by UC Berkeley with the agreement that the Cap Company would remove all hazardous materials from the property. The Cap Company reportedly complied with the purchase agreement, though subsequent site testing and on-site observations revealed potential hazardous material problems remaining onsite. For example, several explosions of unknown magnitudes occurred between 1950 and 1953 when UC Berkeley attempted to clear vegetation at the RFS by using a controlled burn (Jones & Stokes Associates, Inc., 1990). The explosions were thought to be associated with residual chemicals used by the California Cap Company.

In 1951, the University acquired the adjacent undeveloped property to the west. During the 1950s, a number of new buildings were constructed in the northeastern portion of the RFS to accommodate research programs sponsored by UC Berkeley's College of Engineering. Some of the new buildings included administration buildings and the Forest Products Laboratory (circa 1955). The first studies conducted at the Forest Products Laboratory involved the treatment of wood with pentachlorophenol in liquefied petroleum and gas, mixed with a small percentage of isopropyl ether cosolvent (approximately 4%). After approximately five to six years, the facility converted to a waterborne preservative formulation process, including the use of chromated copper arsenate and ammoniacal copper arsenate. (Jonas & Associates, 1990).

Around 1959 the Southern Pacific Railroad placed fill material along the coastline in the marsh to build a rail spur. A small linear area of fill parallel to the rail spur appeared about the same time and was probably due to the construction of the spur. Also, about this time, the University filled a two-acre area in the northwest corner of the RFS's Marsh adjacent to Meeker Creek.

In 1976, the RFS demolished the inner marsh portion of the pier and replaced it with a road using fill material that had been deposited against the pier supports over the years. This fill, which contains pyrite cinders, appears to have originated from the cinder landfill area located adjacent to the pier. In the late 1970s to early 1980s, the Bay Conservation and Development Commission required that the RFS move the road, which was relocated to its present location directly adjacent to the western edge of Zeneca's cinder landfill. The road was constructed of the original cinder-laden fill, which was excavated from the old road and vicinity creating additional marsh. The "orange" pond (colored orange from the oxidation of iron) is now located in this area. The road is used to access the East Bay Regional Parks District trail built on the old railroad embankment.

Current academic teaching and research activities include the following: the Forest Products Laboratory and the Northern Regional Library Facility, the Earthquake Engineering Research Center, the Fire Test Laboratory, Engineering geosciences units, the Hydraulics Basin Model Laboratory, the Soil Mechanics Laboratory, the Structural Research Laboratory, the Sanitary Engineering, the Environmental Health Research Laboratory, and the Asphalt Pavement Research Center. In addition to UC Berkeley's research facilities on-Site, the United States Environmental Protection Agency began operating its Region IX Laboratory on the southwestern portion of the RFS property in 1993. The RFS has had, and still has, a number of tenants, including the San Francisco Estuary Institute, leasing workspace over the years.

2.3 CONSTITUENTS OF CONCERN

The chemicals of primary concern at this site are metals (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, sliver thallium, and zinc) and polychlorinated biphenols (PCBs). The exposure limits for the primary chemicals of concern are as follows:

Chemical of Concern	OSHA PEL
Antimony	0.5 mg/m^3
Arsenic	0.01 mg/m^3
Beryllium	0.5 mg/m^3
Cadmium	0.01 mg/m^3
Chromium	0.5 mg/m^3
Copper	0.1 mg/m^3
Lead	0.05 mg/m^3
Mercury	0.05 mg/m^3
Nickel	1 mg/ m^3
Selenium	0.20 mg/m^3
Silver	0.01 mg/m^3
Thallium	0.1 mg/m^3
Zinc	0.1 mg/m^3
PCB's	0.5 mg/m^3

PELs are permissible exposure limits established by OSHA. The OSHA PEL's are the recognized levels to which the monitoring at the site will adhere to. These levels are the concentrations to which a worker may be exposed without any adverse health reactions.

PPE will be upgraded to include the use of respirators once sustained readings in the breathing zone of any worker are measured at one-half the PEL. Due to work practices (especially dust suppression) and the fact that some excavation will be of wet soils, it is not expected that any site contaminants will become airborne in the breathing zone of any site worker in concentrations

approaching one-half the PEL. Such work practices should also eliminate the possibility of contaminants leaving the site during remediation.

2.3.1 Metals

The following paragraphs gives a brief description of the health hazards associated with the metals onsite.

Antimony: Antimony is silver-white, lustrous, hard, brittle solid. It presents in scale-like crystals or a dark-gray lustrous powder. It is a non-combustible solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame. Exposure routes are inhalation, ingestion, skin and/or eye contact. Target organs are eyes, skin, respiratory system, and cardiovascular system. Symptoms of exposure to antimony include irritation of the eyes, skin, nose, throat and mouth; coughing; dizziness; headache; nausea, vomiting and diarrhea; stomach cramps; insomnia; anorexia; loss of sense of smell.

Arsenic: Arsenic is a silver-gray or white metallic solid. It is used as an alloying agent for heavy metals, and in solders, medicines, and herbicides. Arsenic enters the body via inhalation and dermal contact. Skin contact can cause irritation, burning, itching, thickening, and color changes. Eye contact can cause irritation and burns, red, watery eyes. Breathing arsenic can irritate the nose and throat. High or repeated exposure can damage the nerves, with "pins and needles," numbness, and weakness of arms and legs, as well as stomach problems, nose ulcers, hoarseness, or damage to the liver. High exposures can cause poor appetite, nausea, vomiting, and muscle cramps. It has been shown to cause skin and lung cancer. Arsenic is a known carcinogen, may damage developing fetuses, and in some compounds, a teratogen.

Beryllium: Beryllium is a hard, brittle, gray-white solid. It is a non-combustible solid in bulk form, but a slight explosion hazard in the form of a powder or dust. Exposure routes are inhalation, skin and/or eye contact. Target organs are eyes, skin, and respiratory system. Symptoms of exposure to beryllium include berylliosis (chronic exposure); anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; eye irritation, and dermatitis. Beryllium is a potential occupational carcinogen.

Cadmium: Cadmium is a silver-white, blue tinged, lustrous, odorless solid. It is a non-combustible solid in bulk form, but will burn in powder form. Exposure routes are inhalation and ingestion. Target organs are respiratory system, kidneys, prostate, and blood. Symptoms of exposure to cadmium include pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of sense of smell), emphysema, proteinuria, mild anemia. Cadmium is a potential occupational carcinogen.

Chromium: Chromium is a blue-white to steel-gray, lustrous, brittle, hard, odorless solid. It is a non-combustible solid in bulk form, but finely divided dust burns rapidly if heated in a flame. Exposure routes are inhalation, ingestion, skin and/or eye contact. Target organs are eyes, skin, and respiratory system. Symptoms of exposure to chromium include irritation of eyes or skin; lung fibrosis (histologic).

Copper: Copper is a reddish, malleable solid commonly used in electric wiring, plumbing, roofing, and alloys. The eyes, skin, and respiratory system are target organs of copper.

Symptoms of exposure may include irritation of the eyes, nose and respiratory tract and a metallic taste. Exposure to copper at this site is expected to be limited to inhalation of dust particles containing copper. However, the probability of exposure to low due to the low concentration of copper on site.

Lead: The primary route of entry for metals, including lead is through inhalation and ingestion via dermal contact. Hand auger sampling could create some dust containing metals. Most metals are relatively nontoxic if ingested and mildly toxic by inhalation and skin contact. Some metals such as lead and mercury can cause central and peripheral nervous system disorders and damage. Long-term exposure to lead has been shown to cause brain damage to children and adults; however, children are more sensitive to the effects of lead.

Lead has been shown to cause damage to the central and peripheral nervous system. Lead exposure in dust and paint has been linked to brain and nervous system disorders in children. Long-term exposure to lead can damage brain cells and nerve cells if ingested or inhaled. Acute toxic symptoms include ataxia, repeated vomiting, headache, stupor, hallucinations, tremors, convulsions, and coma. Lead is a Class B2 carcinogen and is listed as a possible teratogen by the State of California and ACGIH.

Mercury: Mercury is a silvery, extremely heavy liquid, soluble in sulfuric acid, nitric acid and lipids. Insoluble in water, alcohol, ether, and hydrochloric acid. Most inorganic and organic compounds are highly toxic by skin absorption and inhalation of fumes or vapors. Spillage may be a toxic hazard due to droplet proliferation. Clean-up requires special care. Mercury compounds cause dysfunction of the central nervous system and kidneys and are irritants of the eyes, mucous membranes, and skin. Symptoms of poisoning include numbness and tingling of the lips, hands, and feet, concentric constriction of the visual fields, impairment of hearing and emotional disturbances.

Nickel: Nickel is a lustrous, silvery, odorless solid. It is a combustible solid; nickel sponge catalyst may ignite spontaneously in air. Exposure routes are inhalation, ingestion, skin and/or eye contact. Target organs are nasal cavities, lungs, and skin. Symptoms of exposure to nickel include sensitization dermatitis, allergic asthma, pneumonitis. Nickel is a potential occupational carcinogen.

Selenium: Elemental selenium and selenium compounds as dusts, vapors, and fumes are irritants of the eyes, mucous membranes and skin. Chronic exposure may cause central nervous system effects, gastrointestinal disturbances and loss of hair and fingernails. Selenium is an amorphous, red powder becoming black on standing and crystalline on heating. Exposure hazard is inhalation.

Silver: Silver is a white, lustrous solid. It is a non-combustible solid, but flammable the form of dust or powder. Exposure routes are inhalation, ingestion, skin and/or eye contact. Target organs are nasal septum, eyes, and skin. Symptoms of exposure to silver include blue-gray eyes, nasal septum, throat, skin; skin irritation and/or ulceration; gastrointestinal disturbance.

Thallium: Thallium's appearance and odor vary depending upon the specific soluble tallium compound. Exposure routes are inhalation, skin absorption, ingestion, skin and/or eye contact. Target organs are eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, and body hair. Symptoms of exposure to thallium include nausea, diarrhea, abdominal pain, vomiting; ptosis, strabimus,; peri neuritis, tremor; retrosternal tightness; chest

pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs.

Zinc: Zinc is a shining white metal with bluish-gray luster, soluble in acids and alkalines, insoluble in water. Inhalation of zinc oxide fume causes an influenza-like illness termed metal fume fever. Effects include dryness and irritation of the throat, a sweet or metallic taste, constriction in the chest and a dry cough. Several hours following exposure, the subject develops chills, malaise, fatigue, frontal headache, lower back pain, muscle cramps and occasionally blurred vision, nausea, and vomiting. The symptoms usually last up to 24 hours and occur after exposure to freshly formed fumes. The dust of zinc oxide is considered a nuisance dust that has little adverse effect on the lung and does not produce significant organic disease when exposures are kept under reasonable control. Nickel is a silver-white metal; salts are crystals. Metallic nickel and certain nickel compounds cause sensitization dermatitis. Nickel sensitivity, once acquired, is apparently not lost; recovery usually occurs within 7 days of cessation of exposure but may take several weeks. Nickel dust is flammable and toxic and considered a carcinogen by OSHA. Exposure hazard is inhalation, skin contact.

2.3.2 Pesticides

Pesticides are not a contaminant of concern at this site. This is mentioned only because neighboring sites have pesticide issues.

2.3.3 Polychlorinated Biphenyls (PCBs)

PCBs are a colorless to pale-yellow, viscous liquid (or solid below 50^0F) with a mild hydrocarbon odor. PCBs are a potential occupational carcinogen. Exposure routes are inhalation, skin absorption or ingestion. Symptoms include irritation to eyes, chloracne, liver damage and/or reproductive effects.

2.4 ROUTES OF EXPOSURE

The effects of exposure depend not only on the chemical, its concentration, route of entry, and duration of exposure, but also on personal factors, such as an individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex. There are four major routes of exposure: inhalation, direct contact, ingestion, and injection.

2.4.1 Inhalation

Chemicals can enter the respiratory tract through inhalation or breathing. To protect against this hazard, air monitoring will be conducted and if vapor or dust concentrations exceed applicable standards, appropriate protective equipment such as respirators will be employed. Engineering controls including dust suppression or ventilation will also be used as appropriate to reduce exposure to acceptable levels. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums will be medically evaluated to determine if such a condition would place them at unacceptable risk and preclude their working at the task in question.

2.4.2 Direct Contact

Some chemicals can cause injury as a result of direct contact with skin or eyes. Protective techniques such as wearing protective equipment, avoiding use of contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals will be used to protect against the risk of direct skin and eye contact.

2.4.3 Ingestion

Deliberate ingestion of chemicals is unlikely; however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics onsite may provide a route of entry for chemicals. Eating, drinking, and/or smoking will not be allowed in the contaminated zone.

2.4.4 Injection

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (for example, by stepping or tripping and falling onto a sharp, contaminated object). To protect against this potential hazard, workers will be instructed to wear safety shoes, avoid physical hazards, and take common-sense precautions.

2.5 MARINE SAFETY AND BOAT OPERATIONS

This section of the HSP establishes guidelines for the safe conduct of personnel working in the marine environment and personnel operating watercraft during sediment sampling.

Maritime work has the same risks associated with land-side activities and adds the dimensions of drowning, hypothermia, and the energy of wave action. It is an inherently dangerous environment that must be treated with respect. In this project, subcontractors who specialize in the operation of watercraft will be contracted to use the Vibracore to obtain sediment samples, if adequate access to the area can be provided.

2.5.1 GENERAL MARINE SAFETY

In general, the two additional hazards that maritime work involves are drowning and hypothermia. All other hazards are generally similar to our land-side activities, and the personal protective equipment requirements are identical (hardhat, safety glasses, hearing protection, steel-toe shoes, etc).

The risk of drowning is mitigated by wearing a personal floatation device. Company employees are required to wear a type III PFD anytime they are aboard a small craft and are outside of an enclosed cabin. The PFD must be readily accessible for personnel inside a cabin. If employees are working aboard a larger vessel (>26 feet in length), a PFD must be readily accessible, but need not be worn unless engaged in activities on an open deck or at the rail.

The risk of hypothermia is mitigated by wearing appropriate insulated floating outerwear when cold weather or cold water is a threat. The wearing of these PFDs is required when the air temperature and the water temperature combined are less than 100 degrees F (38 degrees C), ***and***

when the small craft is less than 26 feet in length. When the working platform is larger than 26 feet, the wearing of a mustang suite is at the discretion of the site supervisor and site workers.

2.5.2 OPERATING LIMITATIONS

URS personnel may perform work form a boat under the following conditions:

- The boat used for the work must be appropriate to the type of work and suitable for safe carriage of the workers necessary for the task.
- The work site must be located in a protected area like a bay, sound, lake, or body of water that is protected from open-sea weather conditions.
- The work site must be within sight of land, and in no case more than 5 miles from shore.
- All operations will be completed in daylight hours under reasonable weather conditions with good visibility.
- The operator of the boat must have sufficient experience and knowledge to be competent in the operation of the boat at the work site location.
- The boat and personnel must be properly equipped as specified below.

The site activities to be conducted during the project are briefly described below.

- **Hollow-stem auger (HSA):** This rig will be used by a subcontractor in the construction of monitoring wells. It will also be used to collect soil and groundwater samples at greater depth, if necessary. A URS representative will oversee the subcontractor and provide technical direction regarding location of sample sites.
- **Geoprobe®:** This unit will be used to collect water and soil samples. The samples are collected by a subcontractor by driving a rod into the ground at a constant rate using up to nine tons of thrust delivered via a specialized field vehicle. A URS representative will oversee the subcontractor and provide technical direction regarding location of sample sites.
- **Temporary piezometer installation:** Temporary piezometers will be installed by pushing a Geoprobe® or CPT rod with a sacrificial tip to the desired depth, and inserting a ¾-inch to 1-inch polyvinyl chloride (PVC) well with screen into the rods, and removing the rods from the ground. Temporary piezometers may also be installed by conventional drilling methods such as mud rotary or air rotary drilling methods.
- **Groundwater sampling:** Groundwater samples will be collected from piezometers, wells, and hydropunch. Samples may be chemically analyzed by a laboratory or with field equipment.
- **Soil sampling:** The soil samples from the Geoprobe® and other borings will be collected and may be chemically analyzed by a laboratory or field equipment.
- **Water level measurement:** The depth to water and the total well depth will be measured for piezometers and wells.
- **Well installation:** Monitoring wells will generally be installed using Hollow-Stem Auger (HSA) drilling.
- **Remediation:** Remediation work will primarily consist of excavation of contaminated material, surveying the bottom of the excavation, treating groundwater within the excavation, hauling the material offsite, backfilling the excavation, final grading, and revegetation. For remediaion details, see URS' report titled "Remedial Design Details – Addendum" dated August 16, 2002.

The hazards associated with the activities described in Section 3.0 have been separated into three groups: chemical, physical and biological. The characteristics of each of these groups and potential employee exposure to these hazards as they relate to the field investigation activities are discussed in Sections 4.1 through 4.4, respectively. The controls (e.g., safe work practices) that will be used to reduce employee exposure to these hazards are discussed in Sections 5.4 through 5.9.

4.1 CHEMICAL HAZARDS

The main chemicals of concern for the field work are discussed in Section Two (2.3 to 2.7 inclusive) of this plan.

4.2 PHYSICAL HAZARDS

The physical hazards and potential for employee exposure to the hazards (e.g., low, probable, and high) anticipated during the field investigation are discussed below. Safe work practices (see Section 5.9) will be followed as necessary to reduce the potential for employee exposure to physical hazards.

4.2.1 Heavy Equipment

The hazards involved with using heavy equipment (e.g., hydraulic probing rig, drill rig, etc.) include hazards of pinch points; entrapment in machinery; impact from moving parts; fatigue; electrocution from lightning, overhead wires, or buried utilities; and improper operation. Using or working near hand tools, moving equipment, and conducting required repairs in the areas in which this equipment is operating can increase physical risks. The potential for employee exposure to heavy equipment hazards is considered high during drilling, HydroPunch/CPT activity, and well installation.

4.2.2 Noise Exposure

Excessive noise exposure can cause temporary and permanent hearing effects. Temporary effects of excessive noise include ringing in the ears, interference with communication, and hearing threshold changes. The effect of long-term excessive noise includes varying degrees of noise-induced hearing loss. The potential of employee exposure to hazardous noise levels is considered high during heavy equipment operation.

4.2.3 Slips, Trips, Falls, and Ergonomics

Site activities can pose a variety of slip, trip, and fall hazards. Examples of conditions that contribute to slips, trips, and falls include uneven ground surfaces created during site activities, slick or wet surfaces, unstable earth slopes that serve as access routes and poor housekeeping. Ergonomic hazards that workers may be exposed to include repetitive motions that cause strain on a muscle or joint and improper lifting of heavy objects. In addition, personal protective equipment (PPE) such as respirators, gloves, and protective clothing can limit visibility, hearing, and manual dexterity, which increases the potential for slips, trips, and falls. The potential of

employee exposure to slips, trips, falls, and ergonomic hazards is considered high during all field activities associated with this project.

4.2.4 Overhead and Underground Utilities

Typical site activities such as movement of equipment (e.g., raising a drill rig mast, extending a ladder) or intrusive activities (e.g., drilling operations) present the risk of contact with overhead or underground utilities, such as energized electric lines, gas lines, or sewer lines. Contact with electricity can shock, burn, or be fatal. Gas or sewer lines can contain hazardous levels of explosive or toxic gases. The potential of employee exposure to utility hazards is considered probable during intrusive activity.

4.2.5 Heat Stress

High temperatures, direct sun, use of PPE, and labor-intensive activities may contribute to heat stress. Heat stress can involve a high risk of illness or death. Exposure to heat stress at this site is considered probable.

4.2.6 Fire and Explosion

As detailed in Section 2.2, Site History, a high explosives blasting cap manufacturing plant was located at this worksite. Physical and chemical remnants may remain at the site. Prior to any intrusive work, all field personnel will receive awareness training on the recognition and response measures to be taken in case of encountering any explosive related items.

The risk of fire on site may also stem from the presence of vegetation, heat and fuel sources from construction equipment and site vehicles, generators, hydraulic lines on heavy equipment, or from presence of combustible gases or vapors in contaminated soil and/or wells. Potential exposure to fire and explosion hazards is considered low.

4.2.7 Trenching and Excavation

The hazards associated with working in and around excavations and trenches are significant and include cave-ins or slides, engulfment, falls and exposure to hazardous atmospheres within the trench. Potential exposure to trenching and excavation hazards is considered low.

4.2.8 Traffic Hazards

Work activities along or in roadways at the site will include exposure to traffic hazards. Potential exposure to traffic hazards at this site is considered high, especially in the area of the loading racks.

4.2.9 Driving Hazards

Driving any motorized vehicle presents a hazard on or off-site, but especially in constricted, construction areas with moving heavy equipment, such as those at this site. Potential exposure to driving hazards at this site is considered high, especially in the area of the loading racks.

4.2.10 Night Work

Night Work is not planned on this project.

4.2.11 Tools and Machinery

Tools and machinery may pose a hazard through moving or impacting parts, electrically charged connections or hot surfaces. Potential exposure to these hazards is considered probable at this site during drilling, well installation and pump testing.

4.2.12 Electrical Hazards

Some work activities may require equipment which will be energized by a portable generator, posing an electrical hazard. Other electrical hazards include contacting underground or overhead utilities, and electrical storms, electrical connections in control boxes at circulation wells. Potential exposure to these hazards is considered probable during intrusive activity.

4.2.13 High-Pressure/Steam Cleaning Hazards

Serious lacerations, bruises and burns may result from contact with high-pressure or steam cleaning units. Potential exposure to these hazards is considered high during decontamination activities.

4.2.14 Adverse Weather

Sudden inclement weather can encroach on unprepared workers in the field including high winds, rain, or electrical storms. Potential exposure to adverse weather is probable.

4.3 BIOLOGICAL HAZARDS

During field activities at the Site, a wide variety of insects, including bees, wasps, ticks, and spiders, may be encountered. Stings of bees and wasps may cause serious allergic reactions in certain individuals. Ticks are parasites that feed on the blood of an animal/human host and can carry several severe diseases, the least bringing several days of fever and pain and the worst causing brain damage. Poisonous snakes or spiders may also be encountered on these sites. The potential for employee exposure to these biological hazards is low.

Rodents and their droppings may be encountered at the Site. Aerosolized hantavirus from rodents' urine, feces or nesting materials can cause Hantavirus Pulmonary Syndrome if inhaled. This syndrome begins with fever, muscle aches, headache and shortness of breath, and can quickly escalate to filling of the lungs with fluid, and death, if untreated. Since ultraviolet light destroys the virus, the potential of employee exposure to hantavirus is considered low in outdoor areas. However, employees entering sheds or utility buildings where rodents (especially deer mice) have nested, and where these nesting materials are disturbed, have a much greater potential of being exposed to the hantavirus.

OSHA standards and the URS Health and Safety Program contain provisions for medical surveillance, health and safety training, personnel training, and documentation.

5.1 PERSONAL TRAINING AND MEDICAL CLEARANCE REQUIREMENTS

Training and medical clearance requirements are presented below.

5.1.1 Health And Safety Clearance

All on-site URS employees are required to obtain a health and safety clearance by the URS Site Health and Safety Officer (SHSO) before beginning work at this site. Clearance requirements are discussed below. All training and field experience shall be certified.

5.1.1.1 Medical Surveillance

Personnel assigned to conduct field activities must participate in a medical surveillance program in accordance with 29 CFR 1910.120(f)/8 CCR 5192. Personnel must be certified by an occupational physician of physical fitness and ability to perform assigned field work, including the ability to wear a respirator.

5.1.1.2 40-Hour Hazardous Waste Operations (HAZWOPER)

Personnel assigned to field activities must have completed the initial HAZWOPER training and have received 8-hour annual refresher training as required under 29 CFR 1910.120/8 CCR 5192.

5.1.1.3 Hazardous Waste Site Supervisor Training

The hazardous waste site supervisor training course consists of 8 hours of specialized training on managing hazardous waste operations. The 8 hours of specialized training includes instruction covering the URS health and safety program, employee training program, PPE program, spill containment procedures, and health hazard monitoring procedures and techniques.

5.1.1.4 First Aid/Cardiopulmonary Resuscitation (CPR) Training

At least one person assigned to field activities should have completed a Red Cross or equivalent CPR Training Course within the last year and a Red Cross or equivalent First Aid Training Course within the last three years.

5.1.2 Personnel Training Requirements

5.1.2.1 Field Coordinator

The on-site field coordinator must have completed the initial HAZWOPER training course and the site supervisor training.

5.1.2.2 Site Health and Safety Officer

The SHSO must have completed the initial HAZWOPER training course and the site supervisor training. In addition, the SHSO must have current First Aid and CPR certification.

5.2 HEALTH AND SAFETY BRIEFING

Before field investigation activities begin, a site-specific health and safety orientation shall be conducted for all on-site employees, including subcontractors. The following topics will be discussed at the briefing:

- Health and safety personnel names and alternates responsible for site health and safety
- Site hazards
- PPE
- Safe work practices
- Personnel and equipment decontamination procedures
- Air monitoring
- Emergency procedures
- Other applicable topics

If an employee who has not gone through the site-specific health and safety briefing is assigned to the site, the SHSO must present a similar briefing to the new employee before they participate in any field activities. All new employees must sign the Safety Compliance Agreement Form (Appendix A) before beginning field work.

In addition to the site-specific health and safety briefing, weekly health and safety briefings will be conducted as necessary to address changes in procedures or other health and safety concerns. These periodic briefings will be documented using the On-Site Health and Safety Tailgate Meeting Record Form in Appendix A.

5.3 HEALTH AND SAFETY DOCUMENTATION

The URS SHSO will document implementation of the HSP. The documentation forms to be used for this HSP are included in Appendix A. The URS SHSO will set up an on-site health and safety file containing health and safety related records and reports. This file will contain the following:

- Signed copies of the Safety Compliance Agreement
- Calibration records for health and safety monitoring equipment
- Health and safety incident reports
- Records of safety violations and remedial actions taken
- Record of Respirator Standard Operating Procedure for this site (Attachment 42-3 in Appendix C)

- On-Site Health and Safety Tailgate Meeting Record Form

Other information will be documented in a logbook including:

- Weather conditions
- Site employees
- PPE level worn
- Monitoring instrumentation readings (average, peak, and background)
- Safety violations

Additionally, copies of the following will be on site in a location accessible to all project personnel:

- Approved Health and Safety Plan (containing emergency phone numbers and a route to the hospital)
- URS (and URS subcontractors) Injury and Illness Prevention Plan (IIPP) (see URS Safety Management Standard (SMS) 5, Appendix C)
- OSHA poster
- California Proposition 65 Warning (Figure 5-1)

5.3.1 Incident/Accident Reporting

In the event of an incident or accident, the URS Health and Safety Manager (HSM) and the URS Project Manager will be notified (see URS SMS 49, Appendix C). The PM shall notify the Phillips representative as soon as possible of any accident, whether or not it resulted in injury to persons of damage to equipment.

The following types of incidents/accidents are considered reportable:

- Physical injury
- Fire, explosions, and flashes resulting from activities performed by URS or their subcontractors
- Unexpected chemical exposures
- Vehicular accidents
- Property damage accidents
- Near accidents
- Infractions of safety rules and requirements

The following types of incidents/accidents will be reported by the fastest available means to the URS Regional Health and Safety Manager (RHSM):

- Incidents likely to result in death or permanent disability
- Incidents requiring hospitalization

- Incidents involving two or more employees
- Incidents that are likely to receive coverage by news media, so that families may be notified by the company beforehand, if possible
- Incidents involving collapse, cave-in, or other failure of structures or equipment
- Serious incidents involving equipment or vehicles

Work will be suspended to correct the cause of incident/accident and to modify the HSP, if necessary.

For any incident or accident requiring medical care, the following forms will be completed and sent to the URS HSM:

- An "Employer's First Report of Injury" must be completed for the state in which the injured person is employed.
- A Worker's Compensation Form must be submitted in the state in which the employee resides.
- A URS Health and Safety Incident Report (Attachment 49-1) as shown in Appendix C must be completed.

5.4 SITE CONTROL

Access to hazardous or potentially hazardous areas (e.g. active intrusive work area) must be controlled to reduce the probability of an incident or injury to field personnel, visitors, and the public. Site control is primarily the responsibility of the site manager, however all personnel are required to help control unauthorized access to the work site.

5.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is used to limit employee exposure to anticipated hazards. The United States Environmental Protection Agency (EPA) has defined levels of PPE based on skin and respiratory protection. The components of these PPE levels are shown in Table 5-1. The initial PPE level for work at this site is presented in Table 5-2. Orange or yellow reflective safety vests will be worn by all field personnel when working around areas with vehicular traffic or construction equipment.

The SHSO may modify these initial PPE levels in response to additional site information, with the approval of the HSM. The level of PPE necessary for any decontamination activities will be determined by the SHSO and will be based on specific monitoring results obtained during field investigation activities.

5.5.1 Limitations of Protective Clothing

The PPE selected for this project are anticipated to provide protection against the types and concentrations of hazardous materials that may potentially be encountered during field operations. However, no protective garment, glove or boot is resistant to all chemicals at any concentrations; in fact, chemicals may continue to permeate or degrade a garment even after the source of the contamination is removed.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all URS personnel:

- Inspect all clothing, gloves and boots both prior to and during use for:
  - Imperfect seams
  - Non-uniform coatings
  - Tears
  - Poorly functioning closures
- Inspect reusable garments, boots and gloves both prior to and during use for:
  - Visible signs of chemical permeation such as swelling, discoloration, stiffness or brittleness
  - Cracks or any signs of puncture or abrasion

Any reusable garments exhibiting any such characteristics will be discarded.

5.5.2 Duration of Work Tasks

The duration of work tasks in which personnel use PPE that include chemical protective clothing (including uncoated Tyvek®) will be established by the SHSO. Variables to be considered include ambient temperature and other weather conditions, the capacity of individual personnel to work in the required level of PPE in heat and cold, and the limitations of specific PPE.

5.6 RESPIRATORY PROTECTION

The SSHO is responsible for filling out Attachment 42-3 of URS SMS 42 (Appendix C) and filing this form in the project's health and safety file. The following information shall be included in site safety briefings, should respirator use be required (based on air-monitoring results).

5.6.1 Respirator Selection

Engineering controls and safe work practices (e.g., elimination of the source of contamination, ventilation equipment, working upwind, limiting exposure time, etc). must always be the primary control for air contaminants. Respirators will be used if engineering or work practice controls are not feasible for controlling airborne exposures to dust emissions.

Once the need for respirators has been established, the respirators will be selected on the basis of the hazards to which the worker is exposed. Only NIOSH-approved respirators will be issued.

CAUTION: Full-face piece or half-face piece air-purifying respirators are not to be used where there is an oxygen deficiency. Personnel will not enter into any areas if instrumentation indicates an unsafe environment.

CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.

5.6.2 Medical Screening

URS project employees shall be enrolled in the URS Medical Surveillance. Employees not physically or psychologically capable of wearing respirators shall not be assigned to this project.

The medical status of each employee is reviewed annually and as may be deemed necessary by the examining physician if the physical status of the employee changes.

5.6.3 Fit Testing

A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skullcaps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed for full-face respirators. Persons with facial conditions that prevent a proper seal are not allowed to wear a respirator until the condition is corrected. Facial conditions that may cause a seal problem include missing dentures, scars, severe acne, etc. Contact lenses can be used with air purifying, but not supplied air respirators.

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been fit tested within the last year. Quantitative fit testing will be performed in accordance with accepted fit test procedures defined in URS SMS 42 (Appendix C).

Records of fit testing will be maintained on site or by the employee's office and/or corporate medical surveillance program.

Respirator wearers will perform a user seal check each time the respirator is put on. For air purifying respirators, the positive user seal check is performed by first removing the exhalation valve cover, then placing the palm over the respirator exhalation valve and exhaling gently. The respirator mask should puff out without noticeable leakage. The negative user seal check is performed by placing the palms over both of the respirator cartridges, inhaling gently, and holding the breath for 10 seconds. The respirator mask should remain collapsed on the face without noticeable leakage.

5.6.4 Respirator Use Instructions

Only those employees who have been properly trained and qualified on the specific type of respirator to be worn may use respirators. No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained.

All employees whose job assignment requires the use of respirators will be trained during initial 40-hour and annual refresher training for hazardous waste operations.

Hands-on training on inspecting and donning a respirator, including user seal checks, was also provided at the time of fit testing. Retraining is performed annually on each type of respirator worn by the individual. In addition, site-specific respirator training is provided during Site Safety Briefings conducted by the SHSO. Training records are kept in the employee's training file.

5.6.5 Respirator Change Out Schedule

Respirator cartridges should be changed out at the beginning of every shift or if chemical breakthrough is detected (see Attachment 42-4 of URS SMS 42, Appendix C).

5.6.6 Respirator Inspection

The user will inspect respirators before and after each day's use.

Inspection procedure, air purifying respirators (full-face piece and half-face piece cartridge respirators):

- Examine the face piece for:
  - Excessive dirt
  - Cracks, tears, holes, or distortion from improper storage
  - Inflexibility
  - Cracked or badly scratched lenses (full-face only)
  - Incorrectly mounted eyeglass lenses or broken or missing mounting clips (full-face only)
  - Cracked or broken air purifying element holder, badly worn threads, or missing gaskets
- Examine the head straps or head harness for:
  - Breaks or cracks
  - Broken or malfunctioning buckles
  - Excessively worn serration on the head straps, which may permit slippage
- Examine the inhalation valves (2) and exhalation valve for:
  - Foreign material (e.g. hairs, particles, etc.)
  - Improper insertion of the valve body in the face piece
  - Cracks, tears, or chips in the valve body, particularly in the sealing surface
  - Missing or defective exhalation valve covers
- Examine the air-purifying cartridge for:
  - Missing or worn cartridge holder gasket
  - Incorrect cartridge/canister for the hazard
  - Incorrect cartridge installation, loose connections, or cross threading in the holder
  - Cracks or dents in the outside case or threads of filter or cartridge/canister

5.6.7 Cleaning of Respirators

Respirators assigned and worn by one individual must be dismantled and thoroughly cleaned and disinfected after each day's use. Visitors or multi-assigned respirators must be cleaned and

disinfected after each use. A disinfectant spray or wipe is approved as a disinfectant between uses during the day but not for cleaning and sanitizing after each day's use. Care must be taken to prevent damage from rough handling during the cleaning procedure. After cleaning, respirators must be reassembled.

Respirator Cleaning Procedure

Washing: Disassemble and wash with a mild liquid detergent in warm water (not to exceed 110°F). A stiff bristle (not wire) brush may be used.

Rinsing: Rinse in clean water (110°F maximum) to remove all traces of detergent. This is very important to prevent dermatitis.

Disinfecting: Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. Alternatively, a weak chlorine bleach solution (1 milliliter liquid bleach/liter of water) may be used.

Final Rinsing: Rinse thoroughly in clean water (110°F maximum) to remove all traces of disinfectant. This is very important to prevent dermatitis.

Drying: Drain and dry hanging by the straps from racks (take care to prevent damage); or towel drying with clean soft clothes or paper towels.

5.6.8 Maintenance of Respirators

Routine respirator maintenance such as replacing missing valves, gaskets, nose cups etc., must only be performed by URS trained respirator users or a respirator manufacturer's representative. Only approved replacement parts must be used. Substitution of parts from a different brand or type of respirator is generally not possible, invalidates the technical approval of the respirator, and is not permitted. Any respirator suspected of being defective must be removed from service and replaced.

5.6.9 Storage of Respirators

When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage. Respirators must be stored in sealable (e.g. Ziplock® or twist-tie) reusable plastic bags between shifts.

The respirator storage environment must be clean, dry, and away from direct sunlight. Onsite cabinets or cases are suggested. Storing bagged respirators in vehicles is discouraged due to the potential for damage from other material or equipment.

5.7 AIR MONITORING

Personnel exposure monitoring will be performed to protect URS field personnel from exposure to hazardous concentrations of chemicals. Dust monitoring will be conducted daily at five locations shown on Figure E-1 along the site perimeter to verify that no excessive concentrations of airborne dust are leaving the site.

A Jerome Mercury Vapor Analyzer will be used to monitor for mercury vapors. Because of relatively high concentrations of mercury in soil (up to 5,400 mg/kg) within the Mercury Fulminate Area, exposure to mercury vapors is a significant concern at the Richmond Field Station site. A Jerome Mercury Vapor Analyzer will be used during soil excavation activities in areas with known elevated mercury concentrations in soil, cinders, or sediment. During excavation activities, personnel will stay upwind from the excavation as much as possible. A windsock or stake with flagging will be used to evaluate the wind direction.

An air monitoring log will be maintained onsite detailing all monitoring conducted. URS personnel will calibrate the dust monitors daily prior to work activities. The monitors will be placed on the site perimeter throughout the work day. At the end of the day, the dust monitors will be collected, the average and maximum dust concentrations will be recorded, and the batteries recharged for the next day. The daily measurements for each station will be recorded in a table for each week. These results will be distributed to RFS personnel and be available to the public.

5.8 ACTION LEVELS

The table printed in Section Two of this plan gives PEL concentrations for contaminants of concern at this site. Respirators with appropriate cartridges will be donned, along with appropriate body and foot protection, when sustained readings at 50% of the PEL are reached in the breathing zone.

For mercury vapor in the breathing zone, the action level is 0.025 mg/m^3. At this level as detected by the Jerome Mercury Vapor Analyzer, respirators with mercury cartridges will be donned. If the concentration of mercury in the breathing zone reaches 1.25 mg/m^3, a supplied-air or powered, air-purifying respirator is required. Without these types of respirators, work will stop and the area will be evacuated until mercury concentrations in the breathing zone diminish.

5.9 DECONTAMINATION

Decontamination of personnel is described below. Emergency decontamination of personnel will take place to prevent the spread of contamination into clean zones, as well as to reduce exposure to personnel and the environment.

5.9.1 Personnel Decontamination

Persons leaving the exclusion zone (EZ) must first follow decontamination procedures in the contamination reduction zone (CRZ). Hand tools and other sampling equipment used in the EZ and reusable PPE (boots, safety glasses, etc.) should be cleaned prior to removal from the site each day. The step-by-step sequence for personnel decontamination is as follows:

- Remove boot covers (if used) at the boot-washing station and place them in the disposal container provided;
- Wash outer gloves and chemical resistant boots (if used) at the boot-washing station;
- Remove wrist tape (if used) and outer gloves and place them in the disposal container provided;

- Remove ankle tape (if used) and disposable coveralls (if used) and place them in the disposal container provided;
- Remove respirators (if used) and place them in the designated locations in the CRZ;
- Remove inner gloves and place them in the disposal container provided; and
- Wash hands and face and proceed to the support zone SZ.

Respirators must be fully decontaminated after each use. If monitoring or a general exposure assessment indicates that an employee has become contaminated, the URS Health and Safety Manager at the site should be notified.

5.9.2 Equipment Decontamination

All equipment leaving the EZ must be decontaminated, either within the CRZ or at the central decontamination area. Small equipment such as hand tools, should be thoroughly decontaminated within the CRZ before being placed in the SZ. Personnel performing decontamination should wear the appropriate level of PPE (refer to Section 5.5).

The high-pressure/high-temperature water cleaning of larger equipment (for example, the equipment used in drilling operations) and the rear section of the drilling rig should occur at the central decontamination area. Drill rigs will be grossly decontaminated before moving out of the EZ to decrease contamination in the CRZ. Except for small pieces of sampling equipment decontaminated within the CRZ, all other equipment should be secured in plastic in the EZ and transported to the central decontamination area for appropriate decontamination. Each person performing high-pressure/high-temperature cleaning shall wear at a minimum:

- A full-face splash guard;
- Chemical-resistant/water-resistant outer garments;
- Chemical-resistant/water-resistant safety boots or safety boots with chemical-resistant/water-resistant boot covers;
- Nitrile outer gloves; and
- An air-purifying respirator if deemed necessary by the SSHO.

5.10 HAZARD COMMUNICATION

The OSHA Hazard Communication Standard along with URS SMS 2 (Appendix C) requires that workers be informed of potential chemical hazards. To that end, MSDSs will be available on-site for the expected site contaminants, as well as for any hazardous chemicals brought on site. The specific hazards related to these materials will be addressed as part of site-specific safety briefings.

5.11 WORK PRACTICES

Safe work practices are designed to limit worker exposure to hazards. The work practices in this section are to be followed at all times as they apply to the work described in Section 3.0. URS operating procedures (Safety Management Standards, or SMSs) referenced in this section are

included in Appendix C. In addition, Phillips general safety guidelines defined in the Phillips CSM shall be followed as they apply to all field work.

5.11.1 Safe Work Permits

Hot work permits are required for all work areas that require any work equipment capable of producing flames, sparks, or ignition sources. This includes but is not limited to excavations, trenching, boring and drilling. The URS Project Manager or Field Coordinator will check with the facility representative before beginning work to obtain any required permits.

5.11.2 Site Control Measures

At the work site, site control measures must be enforced to prevent or reduce the migration of potentially contaminated materials and to prevent unauthorized personnel into the designated work area. The URS SHSO should clearly define and identify the work zones based on several area-specific criteria, including the physical features of the work area, traffic activity, wind direction, and road activity. The results of periodic air monitoring with direct reading instruments should be used to determine the protection level needed and whether a work stoppage is necessary. Should URS personnel encounter contaminated soil or a hot spot during sampling, the URS SHSO should specify whether an upgrade in PPE is required.

Work zones should be delineated around specific bore hole, piezometer locations, excavations, or other areas that may pose the risk of potential exposure to the hazards. The SHSO should identify the work zones during the mobilization of the drilling rig or other equipment at each planned location. The exclusion zones (EZs) should be demarcated with warning tape or appropriate materials (e.g., barricades) to keep unauthorized personnel away from the work area. The exclusion zone will be bordered by a contaminant reduction zone (CRZ) in which worker decontamination takes place. A support zone (SZ) or clean area will be designated outside of the CRZ. The SZ serves as an access control point for the any support equipment and while the CRZ diminishes the possibility of moving contaminants to a formerly uncontaminated area. Once work commences, no outside personnel are allowed into the EZ without appropriate gear and proof of health and safety training.

5.11.3 Confined Work Space

Confined space entry is not authorized for this project. For purposes of this HSP, confined space entry is considered to be breaking the plane of entry to any confined space, including trenches deeper than four feet. If it is determined during the course of field activities that a confined space entry is required, the HSM will be contacted before entry to determine if an addendum to the HSP is necessary. Any work involving trenching and excavation will be performed from the surface of the excavation.

5.11.4 Sample Handling

Sample handling, packaging, and preservation will be conducted in support of several field activities. Employee procedures and work practices to be followed during these activities include:

- Skin contact with contaminated water, soils, debris, or equipment shall be avoided at all times.
- Caution should be exercised when filling bottles containing acid or base preservatives. Both liquid and vapor phases of acid can cause severe burns.
- Following sample collection, sample container lids should be tightened securely to prevent any leaks, and the containers should be rinsed with clean water to ensure that they are free of chemical constituents. Sample containers should be protected to prevent breakage during transport.
- Field personnel shall position themselves upwind (if possible) of chemical exposure sources when conducting sampling activities, sample collection, and equipment decontamination procedures.
- The personnel handling acids and the other corrosive materials are required to wear long pants, long-sleeved shirts, and closed-toe shoes (preferably leather). In addition, nitrile gloves and chemical goggles must be worn. All transfers should take place in a properly operational fume hood or a well-ventilated area. In the event of a small spill, the spill area should be thoroughly flushed with water.

5.11.5 Safe Use of Portable Generators

Generator fuel and fuel containers will be handled with care, and the container will be grounded to a metal part of vehicle during refueling. Use a funnel or spout to pour fuel from container to tank. The generator shall be off during refueling. Fuel containers shall be properly labeled. A fire extinguisher should be kept in the transport vehicle or no more than 75 feet from the refueling area. Fuel containers shall be in good condition, with self-closing lids and flame arresters. Fuel containers should not be transported in vehicle passenger compartments, and should be secured during transport. Place generators so that hot exhaust is direct away from dry materials or stored fuel.

Generators should be inspected before use to make sure they are in good condition. Nip points, fly wheels or other moving parts should be guarded. The frame of a portable generator need not be grounded when the generator supplies only equipment mounted on the generator and/or cord- and plug-connected equipment through receptacles mounted on the generator. Caution should be exercised around hot equipment such as generators to avoid burns. Allow generators to cool down before moving.

5.11.6 Dust Control Measures

Airborne dust concentrations will be controlled during all activities that are intrusive into potentially contaminated soils. If visible dust is created and cannot be controlled, or if work

involves entering sheds or utility buildings where rodents have nested, personnel will be required to upgrade the PPE level.

5.11.7 Buddy System

The "buddy system" will be used during all field work. Each employee shall be assigned a buddy, and shall remain in contact with that person during field work. Buddies shall look for signs or symptoms of heat stress, chemical exposure, PPE breakthrough, or other problems.

5.11.8 Communications

Radios or cellular phones for on-site and off-site communication will be available.

5.11.9 Prohibited Activities

The following activities are prohibited:

- Working without proper work permits.
- Smoking in unauthorized areas.
- Sleeping, fighting, horseplay.
- Failure to follow traffic rules.
- Lighters and matches will be prohibited on site except for designated smoking areas.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited except in designated areas.
- Loose clothing, hair or jewelry will not be permitted around moving equipment.
- Prescribed drugs should not be taken by personnel during operations where the potential for absorption, inhalation, or ingestion of toxic substances exists, unless it is specifically approved by a qualified physician.
- No facial hair that interferes with a satisfactory fit of the mask-to face seal is allowed on personnel required to wear respirator or self-contained breathing apparatus.
- No alcoholic beverages, illegal drugs or weapons will be permitted on site.

5.11.10 Illumination

For work during hours of darkness, areas accessible to employees will be provided with lighting according to the minimum intensities presented below:

Foot Candles	Area of Operations
3	General site areas including equipment staging areas
5	Excavation areas, access ways, active storage, loading platforms, refueling and field maintenance areas.

	Lighting shall be placed around the perimeter so that it is evenly distributed.
5	Indoors–warehouses, corridors, hallways, and exit ways
10	EZ and CRZ work areas. Provide emergency egress flashlights.
30	First aid stations, infirmaries, and offices.

5.11.11 Sanitation

Potable water, hand/face washing facilities, and toilet facilities will be available to on-site personnel.

5.11.12 High-Pressure Washing

Washing or cleaning certain pieces of equipment may require the use of high-pressure or steam washers. Personal protective equipment will be worn as described in Section 5.9.2. Only trained personnel will operate the high-pressure washer. Do not allow any part of the body to contact the water stream. Do not attempt to hold down equipment with the feet while using the washer.

5.11.13 Machine Guarding

All machinery that may present a hazard (e.g., moving or impacting parts, electrically charged connections, and hot surfaces) shall have the manufacturer original machine guard in place. All machine guards will be maintained, checked, and repaired according to manufacturer specifications. Personnel shall not modify original machine guards.

5.11.14 Hearing Conservation

Regulations require that hearing protection be used when noises levels exceed 85 decibels (dBA) averaged over an 8-hour day (see URS SMS 26 in Appendix C). In the absence of noise level monitoring, hearing protection will be worn when any site activities are performed that produce noise loud enough to make conversation difficult without raising the voice at a distance of three feet. Hearing protection will be required during operation of heavy equipment, particularly during Percussion-Hammer drilling. Foam insert ear plugs or protective ear muffs capable of at least a 25 dBA noise reduction rating will be used.

5.11.15 Utility Clearance

All intrusive locations shall be cleared for utilities by URS before intrusive activities begin. This clearance must be documented. If drilling cuttings indicate any signs of buried lines, metals or structures, drilling should cease immediately and the drilling supervisor should contact the project manager and ST Services for further guidance. Work in areas with overhead utilities will be performed at a safe distance from the utility. The safe distance will be designated by the SHSO and based on the type of utility and equipment to be used. See URS SMS 34, Appendix C.

5.11.16 Electrical Safety

Drill rigs must not be raised within 50 feet of active overhead power lines. When using extension cords, field team members should ensure that the cords are in good condition. Extension cords should not be used in wet areas without plugging the extension cord into a ground fault interrupter (GFI). GFIs will sense a short to ground and cut power. The drill rig supervisor should monitor local weather conditions. If the potential for lightning develops, drilling should cease and the mast should be lowered.

5.11.17 Slips, Trips, Falls, and Ergonomic Hazard Prevention

Workers should exercise caution when walking around the site to avoid fall and trip hazards. If holes or uneven terrain are located in the work area that could cause site personnel to fall or trip, they must be covered, flagged or marked to warn workers. If conditions become slippery (such as around the trench), gravel or sand should be spread in muddy areas to reduce slipperiness. Workers should watch where they are walking and plan the route to walk in areas of good stability.

The following guidelines will be followed whenever lifting equipment or any other objects that are of odd size or shape, or that weigh over 40 pounds.

- Get help when lifting heavy loads. Portable generators will only be lifted using a two-person lift.
- When moving heavy objects such as drums, sample coolers or containers, use a dolly or other means of assistance.
- Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1,2,3 lift," etc.)
- Wear sturdy shoes in good conditions that supply traction when performing lifts.
- Keep your back straight and head aligned during the lift and use your legs to lift the load – do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side.
- Keeping the heavy part of the load close to your body will help maintain your balance.

In addition, see URS SMS 45 in Appendix C.

5.11.18 Heat Stress Precautions

Workers should not expose their skin to the sun for long periods. Use a strong sunscreen and wear a full-brimmed hard hat or neck drape to protect the back of the neck. Employees shall have access to break periods and potable drinking water. Heat stress monitoring shall commence when personnel are wearing PPE, including Tyvek®-type coveralls, and the ambient temperature exceeds 70°F. If standard work garments (cotton coveralls) are worn, monitoring shall commence at 85°F. Signs, symptoms, and prevention of heat stress, and heat stress monitoring and control guidance can be found in URS SMS 18 (Appendix C). Also see Section 6.5.4, Injury Due to Heat.

5.11.19 Adverse Weather Safety Precautions

Sudden inclement weather can encroach on unprepared workers in the field. Field crew members shall carry clothing appropriate for bad weather. In severe weather conditions (i.e., high wind or electrical storms), the field crews should leave the area and find shelter until the weather abates and field activities can continue or until a decision is made to halt the field activities.

Preparedness and precaution are the best defenses against lightning. Many lightning deaths and injuries happen before or after a thunderstorm's peak. The SHSO shall monitor weather forecasts for predictions of electrical storms in the area. At first sight of lightning, operations shall be stopped and only resumed when conditions permit. The SHSO shall monitor weather conditions to determine when it is appropriate to resume work. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap. Other precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or a vehicle. Do not go into a shed in an open area. Most park shelters are not safe from lightning.
- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae and towers.
- Stay away from lakes, streams, pools, or any water.
- Stay away from railroad tracks that can carry lightning charges for long distances.
- If you are in a forest, find a low area with small trees. If the area is wide open, go to a valley or ravine, but be aware of flash flooding. Do not stand on top of a hill.
- If you are caught in a level area such as a prairie or field during an electrical storm, and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees, or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct lightning. Don't touch the ground with your hands.
- Do not use telephones during electrical storms, except in the case of emergency.

5.11.20 Heavy Equipment Safety Guidelines

Operation of heavy equipment during site activities presents potential physical hazards to personnel. URS' procedures for heavy equipment operations are located in URS SMS 19 (Appendix C).

The following precautions must be observed whenever heavy equipment is in use:

- URS personnel will not operate heavy equipment and will remain at a safe distance during operation.
- Personal protective equipment (PPE) such as steel-toed shoes, safety glasses or goggles, orange safety vests and hard hats must be worn whenever such equipment is present.

- Personnel must at all times be aware of the location and operation of heavy equipment, and take precautions to avoid getting the way of its operation. Never assume that the equipment operator sees you; make eye contact and use hand signals to inform the operator of your intent, particularly if you intend to work near or approach the equipment.
- Traffic safety vests are required for URS personnel working near mobile heavy equipment, such as backhoes and other excavators.
- Never walk directly in back of or to the side of, heavy equipment without the operator's acknowledgment.
- When an equipment operator must operate in tight quarters, the equipment subcontractor should provide a person to assist in guiding the operator's movements.
- Keep all non-essential personnel out of the work area.
- Any heavy equipment that is used in the exclusion zone should remain in that zone until its task is completed. The equipment subcontractor should completely decontaminate such equipment in the designated equipment decontamination area as required prior to moving the equipment outside of the exclusion zone/contamination reduction zone.

5.11.21 Drill Rig Safety Guidelines

Drill rig maintenance and safety is the responsibility of the drilling operator. The following are provided as general guidelines for safe practices on the site:

- Do not consume or store food or beverages in the operational areas;
- Inspect the route of travel before moving the drill rig off the road. Note rocks, trees, erosion, uneven surfaces, and utilities;
- Remove all passengers from the cab before moving the drill rig onto rough or sloped terrain;
- Engage multiple-drive power trains (when available) on the rig vehicle when mobilizing off road;
- Travel directly up or down grade on slopes when feasible. Avoid off-camber or traverse approaches to drill sites;
- Approach changes in grade squarely to avoid shifting loads or unexpected weighing;
- Use a spotter (person at grade) to provide guidance when vertical and lateral clearance is questionable;
- Lower rig mast when moving the drill rig;
- Secure all loads to the rig prior to moving the drill rig;
- Locate overhead and buried utilities prior to drilling operations;
- Treat overhead electrical lines as if they were energized;
- Contact the appropriate utility agency to manipulate and deactivate overhead service in areas that interfere with drilling operations. Do not attempt to handle utilities;

- Contact the appropriate utility agency to survey, mark, and flag locations of buried utility lines;
- Maintain orderly housekeeping on and around the drill rig;
- Store tools, materials, and supplies to allow safe handling by the drill crew members. Proper storage on racks or sills will prevent spreading, rolling, or sliding;
- Avoid storage or transportation of tools, materials, or supplies within or on the drill rig derrick;
- Maintain working surfaces free of obstructions or potentially hazardous substances;
- Store gasoline only in containers specifically designed and approved for such use;
- Wear eye protection when chipping, chiseling, or breaking material that presents a risk of flying objects;
- Inspect wire rope, hoisting hardware, swivels, hooks, bearings, sheaves, guides, rollers, clutches, brakes for the following:
  - abrasions,
  - breaks,
  - wear,
  - fatigue,
  - corrosion,
  - jamming, and
  - kinking.
- Avoid the suspension of loads when the hoist is unattended;
- Prevent hoisting loads directly over field personnel;
- Restrict hoisting operations during unfavorable environmental conditions, such as rain or high winds;
- Maintain safe hand distance from hoisting equipment (e.g., wire rope, hooks, pinch points) when slack is reduced;
- Begin auger borings slowly with the drive engine operating at low revolutions per minute;
- Establish a communication system between driller, helper, and engineer for responsibilities during drilling operations;
- Engage the auger to power coupling as recommended by the manufacturer;
- Restrict contact with a power coupling or the auger during rotation;
- Prevent placing hands or feet under auger during rotation;
- Prevent placing hands or feet under auger sections during hoisting over hard surfaces;
- Avoid the removal of soil cuttings with hands or feet; and

- Ensure the drill rig is in neutral and the augers are not rotating before cleaning the augers.

In addition, see URS SMS 56 in Appendix C.

5.11.22 Trenching and Excavation

For this project work, URS personnel are prohibited from entering a trench or excavation deeper than four feet. If personnel are required to enter a trench or excavation that is deeper than four feet, all the provisions of URS SMS 13 must be provided prior to entry by the contractor who created the excavation including:

- If hazardous atmospheres are suspected, any trench or excavation more than four feet deep must be monitored.
- Adequate shoring, sloping, or benching techniques must be employed.
- Adequate means of employee access and egress must be utilized.
- A Trench/Excavation Authorization form must be completed prior to personnel entering the trench (see SMS 13).
- The contractor's trained, competent person must inspect the trench or excavation on a daily basis, before work commences and on an as-needed basis throughout the day.

The nature of the trench excavation process used for this project makes the use of barricades around the trench impractical. Hence, it is the responsibility of each employee to exercise extreme caution around the trenching operations, and to follow the precautions listed below:

- Stay well clear of the trench and heavy equipment whenever possible.
- Be aware of your position relative to all heavy equipment, and make eye contact with equipment operators before moving into the area.
- Use agreed-upon hand or other signals to communicate with operators.
- Eliminate wet, slippery, walking surfaces whenever possible, especially near the trench opening, as described in Section 5.10.13.
- Wear all required PPE, as described in Section 5.5.

5.11.23 Fire Prevention

The use of matches, lighters, cigarettes, etc. is prohibited at the terminal. Smoking is allowed outside the gate. Air monitoring for combustible gases or vapors will be performed throughout work activities and appropriate actions will be taken as described in Section 5.7 and Table 5-3.

Fire extinguishers will be included in the site emergency equipment; however, only trained employees shall attempt to fight only small, immediately extinguishable fires. In addition, see URS SMS 14 in Appendix C.

5.11.24 Traffic and Driving Safety

All employees will obey the Contractor's traffic plan as well as traffic signs, signals, speed limits and other traffic regulations. The Site speed limit is 5 m.p.h. unless otherwise posted. Seat belts and shoulder straps shall be worn while travelling in vehicles.

All employees will wear orange or yellow reflective safety vests and exercise extreme caution while working in the construction area where heavy equipment or vehicular traffic is present.

5.11.25 Waste Management

Waste Management will be completed as follows:

- Soil cuttings from drilling shall be contained in 55-gallon drums and transported from the work area to an on-site soil staging area;
- Spent wash water from decontamination and groundwater from monitoring well development and purging from sampling shall be stored in 55-gallon drums or Baker tank for off-site disposal;
- Discarded PPE, disposable bailers, and other trash shall be placed in trash bags and disposed of offsite.

Waste management procedures will be reviewed by the URS field coordinator to ensure that they meet current requirements.

- Objects in Eyes:
  Keep the victim from rubbing the eye. Flush the eye with water. If flushing fails to remove the object, apply a dry, protective dressing and seek medical attention.

6.4.4 Injury Due to Heat

If a person is suffering from **heat exhaustion** (profuse perspiration, normal body temperature), the following procedures will be conducted (also see URS SMS 18 in Appendix C):

- Remove the person to a cooler, shaded area.
- Give 8 ounces of water every 15 minutes for three or four doses.
- Allow the person to rest.
- If the person is suffering from cramps, press warm, wet towels over the cramped area.

If a person is suffering from **heat stroke** (skin hot and dry, very high body temperature), the following procedures will be conducted:

- Decontaminate the victim.
- Transport the victim to a hospital for medical attention as soon as possible.
- Cool the victim quickly by soaking the victim in cool but not cold water, sponging the body with rubbing alcohol or cool water, or pouring water on the body.
- Reduce the body temperature to a safe level (about 102 to 105 degrees Fahrenheit [°F]).
- Observe the victim for at least 10 minutes. If the body temperature starts to rise again, cool the victim again.

6.4.5 Fire/Explosion

In the event of a fire or explosion, the local fire department will be summoned immediately. Upon their arrival, the URS Field Coordinator/SHSO or designee will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

If it is safe to do so (i.e., the fire is small and immediately extinguishable), trained site personnel may:

- Use on-site fire fighting equipment to control or extinguish the fire.
- Remove or isolate flammable or other hazardous materials that may contribute to the fire.

Otherwise, evacuate the area immediately.

In the event of an explosion, all personnel shall be evacuated and the fire department notified. No one shall re-enter the area until it has been cleared by explosives safety personnel.

Report any events of fire or explosion to the Phillips representative verbally within a 24 hour period.

6.4.6 Natural Disasters

Natural disasters may occur at the site. These may include lightning, high winds or earthquakes. If a natural disaster is predicted to occur, personnel shall check with the SHSO before going to the work site to determine if it will be safe to go to the work site. If lightning, high winds, or earthquakes occur while on site, the following steps will be taken:

- Lightning - Personnel should not work in open areas or near trees or other equipment outside during lightning storms. Stop work until the storm passes. If possible, clear the site until the storm passes.
- High winds - If high winds are forecast, clear the site before the winds become hazardous. Workers should be instructed to go to an appropriate shelter.

If an evacuation is called, the SHSO will account for all on-site project personnel before leaving the site. The URS Project Manager will be notified of any work stoppage due to natural disasters.

6.5 EMERGENCY EQUIPMENT

Emergency equipment will be stored in support vehicles and/or at appropriate locations selected during site mobilization. Emergency response equipment shall be moved from one site to another based on changing locations of field activities in order to ensure that emergency equipment is available in the work area. The following emergency equipment will be available on site:

- One 10-pound A/B/C type fire extinguisher in each vehicle
- First aid kit - At least one industrial first aid kit will be provided and maintained fully stocked in the support zone
- Potable water
- Emergency eye wash station
- Cellular phone
- Flashlight with extra batteries

TABLES

Table 1-1

HEALTH AND SAFETY RESPONSIBILITIES AND AUTHORITIES

Position	Responsibilities	Authorities
URS Project Manager Diane Mims	• Ensure that the project is performed in a manner consistent with the URS Health and Safety Program. • Ensure that the HSP is prepared, approved, and properly implemented. • Ensure that adequate funds are allocated to fully implement project health and safety. • Coordinate with the HSM on health and safety matters.	• Assign an HSM-approved SHSO to the project and, if necessary, assign a suitably qualified replacement. • Suspend field activities if health and safety of personnel are endangered, pending further consideration by the HSM and RHSM. • Suspend a URS individual from field activities for infractions of the Health and Safety Plan, pending an evaluation by the HSM, RHSM, and URS Health and Safety Manager.
URS Health and Safety Director Phil Jones	• Administer and audit key aspects of the URS Health and Safety Program. • Manage the URS employee medical surveillance program. • Maintain URS health and safety records (including medical surveillance, training, fit testing, chemical exposure, and incidents/accidents). • Maintain a working understanding of and track health and safety regulations. • Supervise RHSMs.	• Implement improvements to the URS Health and Safety Program. • Establish employee training and medical surveillance procedures. • Approve or disapprove HSPs. • Approve employee health and safety qualifications. • Suspend work on any project that jeopardizes personnel health and safety.
URS RHSM Rick Moore	• Direct the implementation and coordination of the Health and Safety Program of a specific URS Operating Group (or responsibility area) and provide recommendations for improvement of the program. • Maintain a working understanding of health and safety regulations and URS health and safety policies. • Provide URS employee health and safety training. • Supervise HSMs. • Determine the need for and review and approve HSPs. • Monitor implementation of Health and Safety Plans. • Investigate reports of incidents or accidents and report to Health and Safety Manager. • Determine if an accidental exposure or injury merits a change in the affected individual's work assignments and if changes in work practices are required.	• Direct Operating Unit HSM to prepare project Health and Safety Plans. • Approve or disapprove HSPs. • Access and review URS project files. • Suspend work on any project that jeopardizes the health and safety of personnel involved. Direct changes in personnel work practices to improve employee health and safety. • Remove individuals from project if their conduct jeopardizes their health and safety or that of coworkers.

Table 1-1 (continued)

HEALTH AND SAFETY RESPONSIBILITIES AND AUTHORITIES

Position	Responsibilities	Authorities
URS HSM Cornelius Flynn	• Administer the Health and Safety Program within a specific URS Operating Unit. • Maintain a working understanding of health and safety regulations and URS health and safety policies. • Provide URS staff training and orientation on health and safety-related activities. • Report to the RHSM on health and safety matters. • Develop or review and approve project HSPs before submittal to the RHSM for review. • Monitor compliance with SSHPs and conduct site audits. • Coordinate with the project manager on health and safety matters and assist in obtaining required health and safety equipment. • Appoint and approve SHSOs. • Approve personnel to work on hazardous waste management projects with regard to medical examinations and health and safety training.	• Suspend work or otherwise limit exposures to personnel if health and safety risks are unacceptable. • Direct personnel to change work practices if existing practices are deemed to be hazardous to employee health and safety. • Remove personnel from projects if their actions or conditions endanger their health and safety or the health and safety of co-workers.
URS SHSO	• Direct health and safety activities on site. • Immediately report all safety-related incidents or accidents to the HSM and the Project Manager. • Assist Project Managers in implementing HSPs. • Conduct periodic safety review sessions for the drilling crew and other onsite personnel • Ensure that safety equipment is properly maintained or disposed of. • Ensure that air monitoring is conducted if required. • Ensure that URS Field Team correctly select and use Personnel Protective Equipment (PPE) and apply safety practices that are appropriate to the site-specific conditions. • Maintain health and safety equipment on site. • Ensure that HSP is onsite. • Implement emergency procedures, as required. • Review certifications/medical surveillance status of all site personnel.	• Temporarily suspend field activities if personnel health and safety is endangered, pending further consideration by the HSM and RHSM. • Temporarily suspend a URS individual from field activities for infractions of the HSP, pending an evaluation by the HSM and RHSM.

Table 1-1 (continued)

HEALTH AND SAFETY RESPONSIBILITIES AND AUTHORITIES

Position	Responsibilities	Authorities
URS Field Coordinator	• Coordinate Field Activities with the subcontractor staff on a regular basis. • Locate the support facilities in an uncontaminated area.	• Temporarily suspend activities if personnel health and safety is endangered, pending further consideration by the HSM & RHSM.
URS Field Team	• Read and understand this HSP. All URS field personnel must sign the Compliance Agreement Form (Appendix A). • Perform work safely. • Report any unsafe conditions or other health and safety concerns to the HSM. • Suggest improved work practices or safety procedures to be practiced in the field to the Field Coordinator, Project Manager, or HSM or RHSM. • Be aware of and alert for signs and symptoms of exposure to site contaminants and heat or cold stress in themselves and others.	• Temporarily suspend activities if personnel health and safety is endangered, pending further consideration by the HSM and RHSM.

Table 5-1

STANDARD PPE LEVELS

EPA PPE Level	Required PPE
Level D	• Safety glasses with side shields • Steel-toed shoes with good tread • Hard hat (where overhead hazards exist) • Hearing protection (in high noise areas) • Reflective safety vest (around terminal and other areas with vehicular traffic)
Modified Level D	• Tyvek®, or equivalent (e.g., Comfort-Gard) coveralls/disposal work clothes • Safety glasses with side shields • Nitrile gloves (where contact is made with contaminated materials) • Steel-toed shoes with disposable shoe covers or chemical protective steel-toed shoes • Hard hat (where overhead hazards exist) • Hearing protection (in high noise areas) • Reflective safety vest (around terminal and other areas with vehicular traffic)
Level C	• Tyvek® or equivalent (e.g., Comfort-Gard) coveralls/disposal work clothing • Inner nitrile gloves (where contact is made with contaminated materials) • Outer nitrile gloves (where contact is made with contaminated materials) • Steel-toed shoes with disposable shoe covers or chemical protective steel-toed shoes • Hard hat (where overhead hazards exist) • Full-face respirator with combination dust (N 100) and organic vapor cartridges. • Hearing protection (in high noise areas) • Reflective safety vest (around terminal and other areas with vehicular traffic)

Table 5-2

MINIMUM PPE REQUIRED FOR FIELD ACTIVITIES

Type of PPE	Supervision of Geoprobe®, Well Installation	Groundwater Sampling	Soil Sampling	Sample Handling and Preservation	Pump Testing
Standard work clothes	X	X	X	X	X
Disposable tyvek	O[1]	O[1]		O[1]	O[1]
Safety glasses with side shields	X	X	X	X	X
Chemical splash goggles	O[1]	O[1]		O[1]	O[1]
Class A hard hat	X	X	X	X	X
Hearing protection	O[2]	O[2]	O[2]		O[2]
Inner and outer nitrile gloves	O[3]	X	X	X	O[3]
Heavy nitrile gloves		O[4]	O[4]		O[4]
Steel-toe and -shank work boots	X	X	X	X	X
Chemical-resistant work boots	O[5]	O[5]	O[5]		O[5]
Reflective safety vest	X[6]	X[6]	X[6]	X[6]	X[6]
Half face respirator	X[7]	X[7]	X[7]	X[7]	X[7]

X = Required

O = Optional

[1] = Chemical splash goggles and hard hat face shield are to be used and disposable tyvek is to be worn when significant splash or dermal contact hazard exists.

[2] = Hearing protection must be worn during Percussion-Hammer drilling. Hearing protection may be required for other drilling methods; see Section 5.11.14

[3] = Nitrile gloves required when in contact with soil, groundwater, or in contact with equipment that has been in contact with soil or groundwater.

[4] = Heavy nitrile gloves or butyl rubber outer gloves or equivalent shall be worn if tearing of gloves is a possibility such as when shoveling or completing other manual labor.

[5] = Steel toed rubber boots or chemical resistant over boots over steel toed boots shall be worn if working in saturated soil or standing water.

[6] = Reflective safety vests are required around terminal and other areas with vehicular traffic.

[7] = Field personnel shall have available a half face air purifying respirator equipped with organic vapor N100 cartridges. (A N100 filter is a filter that is restricted to atmospheres free of oil aerosols and has at least a 99.97% filter efficiency.) Respirators are to be used for emergency evacuation and/or Level C site work as indicated in Table 5-3.

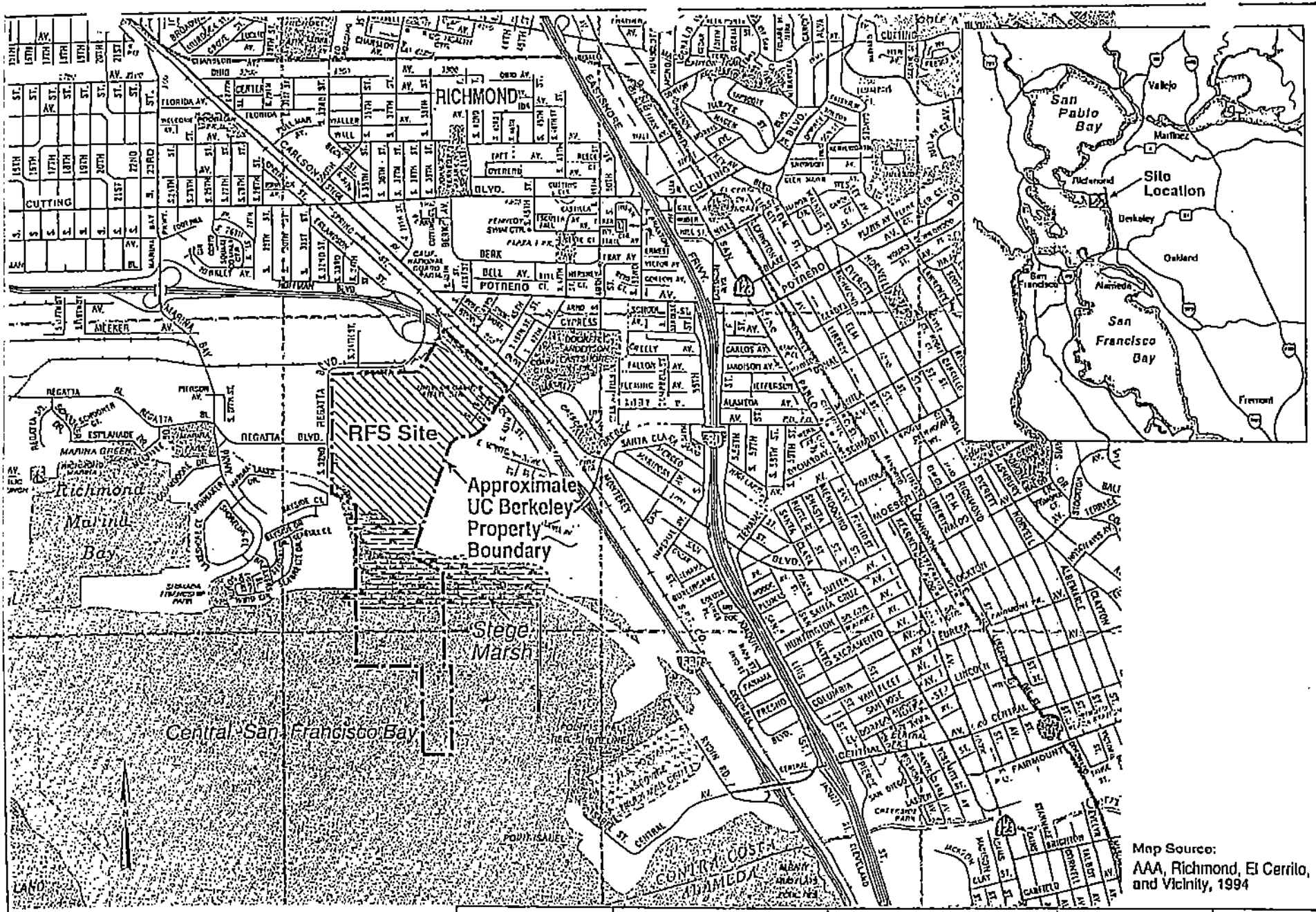
PPE = Personal protective equipment

Table 6-1

EMERGENCY PHONE NUMBERS AND HOSPITAL ROUTE

Emergency Agency		Phone No.
Hospital: Kaiser Hospital		510-307-1500
Distance from Site to Hospital: Approximately 3 miles		
Directions to Hospital: From the site, turn left on Meade St, right on Regatta Blvd/Erlandson St, right on 31st St, left on Cutting Blvd to 14th St.		
Facility Contacts	Ted Getchell	510-231-9503
	Larry Bell	510-231-9530
Environmental Emergency (National Response Center)		800-424-3063
CHEMTREC		800-424-9300
Poison Control Center		800-523-2222
National Pesticide Center		800-845-7633
URS Project Health & Safety Manager	Cornelius Flynn	510-874-3040
URS Project Manager	Diane Mims	510-874-3284
URS Onsite Field Coordinator	Bill Copeland	510-874-3192
Police Department	Emergency/Non-Emergency	911 / 510-620-6666
Fire Department	Emergency/Non-Emergency	911 / 510-307-8031

FIGURES



Map Source:
AAA, Richmond, El Cerrito, and Vicinity, 1994

URS

Project No. 51-09967067.00

UC Berkeley
Richmond Field Station

UNIVERSITY OF CALIFORNIA, BERKELEY
RICHMOND FIELD STATION
SITE LOCATION MAP

Figure 2-1

51-09967067.00-00003/101701/gos

Figure 5-1

CALIFORNIA PROPOSITION 65 WARNING

WARNING:

THE CALIFORNIA STATE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65) REQUIRES PUBLIC NOTIFICATION OF THE PRESENCE OF CHEMICALS KNOWN BY THE STATE OF CALIFORNIA TO CAUSE CANCER OR ARE A REPRODUCTIVE TOXIN. COMPOUNDS INCLUDED ON THE LIST, SUCH AS

Benzene

MAY BE PRESENT DURING THIS OPERATION.

Route to Hospital

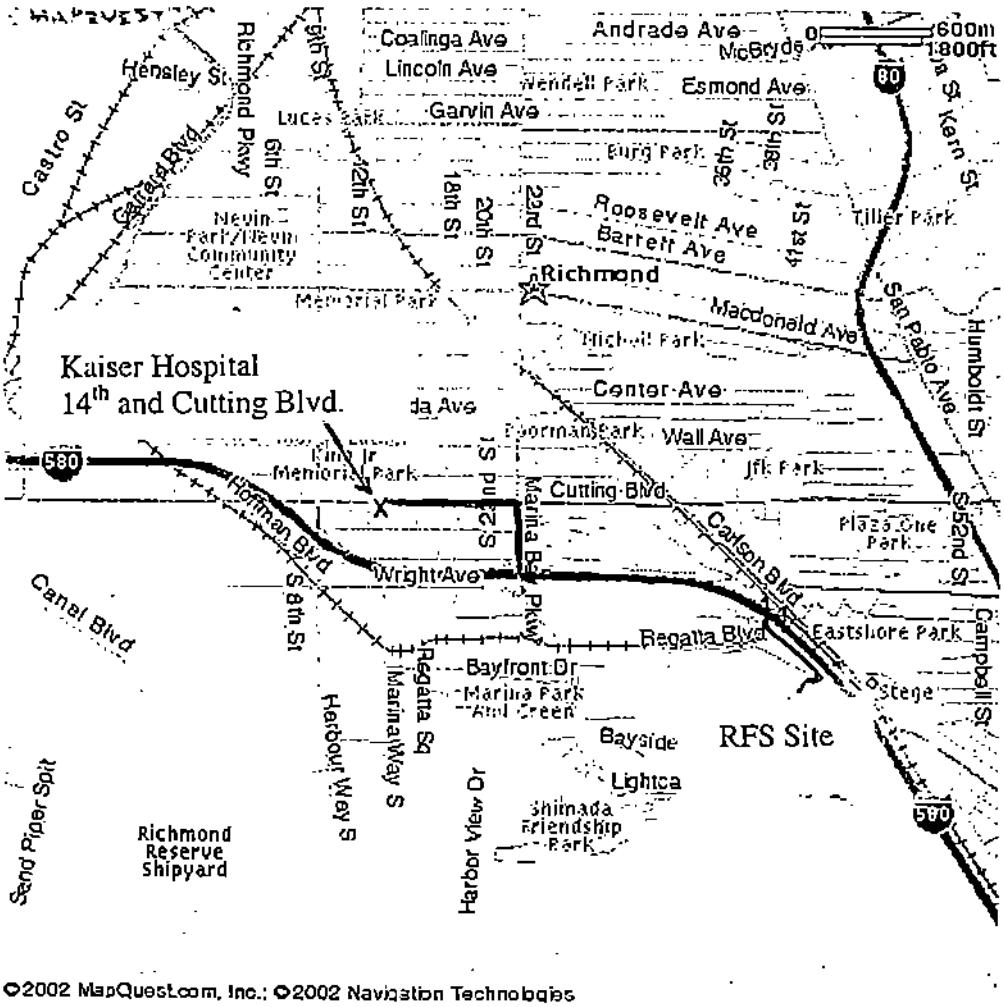


Figure 6-1

Appendix A
Forms

Safety Compliance Agreement and Documentation of Site Safety Briefing

Organic Vapor Detector Calibration Record

On-Site Health and Safety Tailgate Meeting Record Form

Appendix B
Material Safety Data Sheet

Not used. No chemicals used on site.

Appendix C

URS Safety Management Standards (SMSs)

URS SMS 2	Worker Right-to-Know (Hazard Communication)
URS SMS 5	Injury and Illness Prevention Program (California)
URS SMS 13	Excavation Safety
URS SMS 18	Heat Stress
URS SMS 19	Heavy Equipment Operations
URS SMS 26	Noise and Hearing Conservation
URS SMS 34	Utility Clearance
URS SMS 42	Respiratory Protection
URS SMS 45	Back Injury Prevention
URS SMS 49	Injury/Illness/Incident Reporting
URS SMS 56	Drilling Safety Guidelines

URS SAFETY MANAGEMENT STANDARD
Worker Right-to-Know (Hazard Communication)

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

The worker right-to-know program provides URS personnel with information and training about safety and health hazards associated with the chemicals they might encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel working in offices and at field site locations, and how information is to be provided to employees of other employers working at the location. The requirements include steps to acquire this information, maintain it, and train everyone to use it.

3. Implementation

Office Locations: Implementation of this program is the responsibility of the Office Manager.

Field Activities: Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Hazardous Material Inventory

1. Maintain a hazardous material inventory that lists all of the hazardous materials used at this workplace. Use chemical names consistent with the applicable MSDS's.

2. File a copy of the chemical inventory in the Safety Filing System.

B. Material Safety Data Sheets (MSDS's)

1. Obtain a MSDS for each chemical before it is used.

2. Review each MSDS when it is received to evaluate whether the information is complete and to determine if existing protective measures are adequate.

3. Maintain a collection of all MSDS's where they are accessible at all times.

4. Replace MSDS sheets when updated sheets are received. Communicate any significant changes to those who work with the chemical.

5. MSDS's are required for all hazardous materials used on site by project personnel.

C. Labels

Label all chemical containers with:

1. Identity of the hazardous chemical(s),

2. Appropriate hazard warnings, and

3. Name and address of the chemical manufacturer, importer, or other responsible party.

D. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, provide each employee with information about hazards to which they may be exposed during such an activity.

This information will include:

1. Specific chemical hazards.

2. Protective/safety measures which must be utilized.

3. Measures that have been taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

E. Informing Contractors/Subcontractors

Provide contractors/subcontractors the following information on chemicals used by or provided to URS personnel:

1. Names of hazardous chemicals to which they may be exposed while on the jobsite.

2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

3. Location of URS MSDS's and written chemical inventory.

F. Training

1. Conduct training of all employees potentially exposed to hazardous materials on the following schedule:

a. Before new employees begin their jobs.

b. Whenever new chemicals are introduced into the workplace, or

c. Annually thereafter.

2. This training will include:

a. Applicable regulatory requirements.

b. Names of those responsible for implementing this program.

c. Location of the program, inventory and MSDS 's.

d. Chemicals used, and their hazards (chemical, physical and health).

e. How to detect the presence or release of chemicals.

f. Safe work practices.

g. How to read an MSDS.

3. Document the training.

5. Documentation Summary

A. File these records in the Office Safety Filing System

1. Chemical Inventory.

2. Location of the MSDS inventory.

3. Training records.

4. Contractor/Subcontractor notifications.

B. File these records in the Project Safety File.

1. Chemical Inventory.
2. Location of the MSDS inventory.
3. Training records.
4. Contractor/Subcontractor notifications.

6. Resources

A. U.S. OSHA Technical Links - Hazard Communication (http://www.osha-slc.gov/SLTC/hazardcommunications/index.html)

B. U.K. - Control of Substance Hazardous to Health - Regulations

URS SAFETY MANAGEMENT STANDARD
Injury and Illness Prevention Program (California)

1. Applicability

All URS offices and field operations in California are required to comply with the State regulations regarding the Injury and Illness Prevention Program (IIPP). To achieve compliance, each office shall either:

- Adopt this Safety Management Standard as their IIP Program or
- Utilize an existing program previously developed by a URS Division (provided it complies with California Code of Regulations Title 8, Sections 1509 and 3203),

2. Purpose and Scope

The purpose of the Injury and Illness Prevention Program (IIPP) is to minimize the incidence of workplace injuries and illnesses. This standard complies with California Code of Regulations Title 8, Sections 1509 and 3203.

3. Implementation

Office Locations -	Implementation of this procedure is the responsibility of the Office Manager.
Field Activities -	Implementation of this procedure is the responsibility of the Project Manager.
Program Administration -	The Western Division Health and Safety Manager for the General Engineering Division (Mark Litzinger, 206-674-1874) will serve as the IIPP Administrator. This person is responsible for the overall maintenance and implementation of the IIPP and will report to the URS Corporation Health and Safety Director. In addition, each office will identify a Health and Safety Representative to assist with the implementation of the IIPP for that specific location.

4. Requirements

A. Program Implementation:

1. Inform employees of the provisions of this program.

2. Evaluate the safety performance of employees on an ongoing basis, and formalize the observations during the annual performance evaluation.

    a. Provide additional safety training to employees whose safety performance is deficient.

    b. Discipline those employees who fail to comply with URS Safety Management Standards in accordance with Human Resources guidelines.

    c. Recognize those employees whose safety performance is superior, documenting such recognition in the employee's personnel file.

B. Communication

Occupational health and safety issues and programs will be communicated in a manner that is readily understood by all employees. Each office will:

1. Verify that all new employees complete New Employee Safety Orientation within one week of starting work (see SMS 25, "New Employee Health and Safety Orientation").

2. Require that job specific health and safety training courses are provided to employees in a timely manner.

3. See that employees have access to the URS Corporation Health and Safety Program and Management System on the URS Corporation intranet site. The URS Health and Safety website address is http://healthandsafety/ (or the website may be accessed via the IP address by typing 10.1.5.21).

4. Establish an office wide communication system for health and safety information. The communication system must allow all workers to inform management of health and safety issues without fear of reprisal. The communication system may consist of one or more of the following elements:

    a. An office health and safety committee. The committee should meet at regular intervals (i.e., once per month). The committee should consist of the office manager, the local health and safety representative, and line managers.

Committee meetings may be conducted as part of other currently established meetings (such as routine line manager meetings). Each meeting should be documented and communicated to office employees.

b. An employee suggestion box. Office management is responsible for responding to suggestions in a timely manner. The system must allow for employees to provide suggestions anonymously if they choose to do so.

c. An office-wide newsletter. The newsletter should be published at regular intervals and include information such as program updates, training schedules, health and safety tip, etc.

5. Conduct regular field briefings for all employees on a project (see SMS on Site Safety Briefings).

6. Encourage employees to identify health and safety issues as they are observed. Inform employees that they may communicate health and safety concerns anonymously without fear of reprisal.

C. Hazard Assessment

1. Conduct hazard assessments in accordance with the URS Hazard Analysis Process.

2. Conduct hazard assessments:

a. When new substances, processes, procedures or equipment that present potential new hazards are introduced into the workplace. Contact a URS Health and Safety Program Representative if you are not certain that an assessment should be initiated.

b. When new, previously unidentified hazards are recognized, either through an employee report or a workplace inspection.

c. In conjunction with an incident investigation.

D. Accident and Exposure Investigations

Conduct investigations of accidents, near-misses, or chemical exposures in accordance with SMS 049 - Incident Reporting.

E. Hazard Correction

1. Require that unsafe or unhealthy work conditions, practices or procedures are corrected in a timely manner based on the severity of the hazards.

2. Hazards discovered during a formal audit shall be abated in accordance with the timetable provided in the audit report.

3. Correct imminent hazards either:

   a. Immediately, or

   b. If immediate correction cannot be accomplished without endangering employees and/or property, remove employees from the hazard area until the hazard can be safely abated.

4. Document hazard corrections to the project or office safety file.

F. Training and Instruction

Provide training:

1. To all new employees

2. To employees with new job assignments for which training has not been previously accomplished.

3. Whenever new substances, processes, procedures or equipment are introduced to the workplace and may represent a new hazard not addressed by previous training.

4. To supervisory employees to familiarize them with the safety and health hazards to which workers under their supervision may be exposed.

5. Specific to an employee's job assignment as required by Cal-OSHA. (Contact your office Health and Safety Representative or Regional Health and Safety Manager for guidance.)

G. Program Evaluation

Evaluate the IIP Program for each location on an annual basis using the checklist in Attachment 5-1 - IIPP Evaluation Checklist.

5. Documentation Summary

A. Maintain in the Office Safety File. At a minimum, the file should contain:

1. Employee training records.
2. Office hazard assessments and corrective actions.
3. Incident reports and records.
4. Communication records (i.e., Safety Committee notes, employee suggestions and resolutions, newsletters, etc).
5. A copy of this Program

B. Maintain in the Project Safety File:

1. Copies of employee training certificates.
2. Project Hazard Assessments – Hazard Analysis Process.
3. Safe Work Plan or Health and Safety Plan.

6. Resources

A. Cal/OSHA Standard - Injury and Illness Prevention Program - 8 CCR 3203 (http://www.dir.ca.gov/title8/3203.html)

B. Attachment 5-1 – IIPP Evaluation Checklist

URS SAFETY MANAGEMENT STANDARD
Excavation Safety

1. Applicability

This procedure applies to projects where URS controls trenching and excavation activities, and/or where URS employees are exposed to hazards associated with trenching and excavation activities.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with excavation entry activities.

3. Implementation

Field Operations - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Competent Person

Appoint an Excavation Competent Person when URS controls excavation activities. The Excavation Competent Person:

1. Is responsible for conducting daily inspections of excavation, adjacent areas, and protective systems prior to each shift.
2. Is responsible for inspection after every rainstorm or other hazard.
3. Must have knowledge of soils and soil classification.
4. Understands design and use of protective systems.
5. Has authority to stop work and take corrective actions when conditions change.
6. Has the ability to recognize and test hazardous atmospheres.
7. Has formal documentation of training as an Excavation Competent Person.
8. Is physically located at the excavation while work is in progress.

B. Access/Egress

1. Trench excavations will have ramps or ladders within 25 feet (8 meters) of the entrants.

C. Soil Classification

Soil classifications must be conducted in accordance with Attachment 13-1. For the purposes of this standard all soils will be classified by a person meeting the qualifications of a competent person as described in 29 CFR 1929 subpart P. The competent person shall consult with a Registered Professional Engineer in the event the soil classification requires additional technical expertise.

D. Protective Systems

Protect employees in excavations deeper than 4 feet (1.2 meters) by means of properly designed protective systems. All protective systems must comply with 29 CFR 1926 Subpart P Appendices B, D, and E.

1. Sloping and Benching

   See Attachment 13-2

2. Timber Shoring for Trenches

   Timber shoring for trenches must be designed and stamped by a Registered Professional Engineer in accordance with 29CFR Subpart P, Appendix C.

3. Aluminum Hydraulic Shoring for Trenches

   Aluminum hydraulic shoring for trenches must be approved by a Registered Professional Engineer in accordance with 29CFR 1926 Subpart P, Appendix D.

4. Alternatives to Timber Shoring

   Trench shields and boxes must be either premanufactured with listed load ratings or designed, stamped and constructed under the direction of a Registered Professional Engineer.

5. Protective systems designed to protect employees in excavations deeper than 20 feet (6.1 meters) must be designed and stamped by a Registered Professional Engineer.

6. Excavations will be clearly identified and barricaded to keep unauthorized individuals out.

E. Permit Authorization and Inspections

1. Use the Excavation Authorization Form (Attachment 13-3) of this procedure that requires the following issues to be addressed:

   a. Employee training/briefings.

   b. Electrical safety.

   c. Surface encumbrances.

   d. Underground installations and utilities.

   e. Protective systems.

   f. Access and egress.

   g. Exposure to vehicular traffic.

   h. Exposure to falling loads.

   i. Warning systems for mobile equipment.

   j. Testing for hazardous atmospheres.

   k. Emergency rescue equipment.

   l. Protection from hazards associated with water accumulation.

   m. Stability of adjacent structures.

   n. Protection of employees from loose rock.

   o. Inspections.

   p. Fall protection.

2. Require daily inspections of excavations to be conducted by Competent Person using Attachment 13-4.

F. Training/Briefings

Conduct daily safety briefings for all employees associated with excavation activities and document on Attachment 13-3. Discuss excavation hazards, protective measures, and work practices that will be applicable to the day's activities.

5. Documentation Summary

Records required for the Project Safety File:

A. Competent person qualifications.

B. Excavation Authorization Form.

C. Daily Competent Person inspections.

D. Daily worker briefing documentation.

E. Daily inspection records.

6. Resources

A. U.S. OSHA Standard - Excavations - 29 CFR 1926, Subpart P

1. Appendix B, Sloping and Benching
2. Appendix C, Timber Shoring
3. Appendix D, Aluminum Hydraulic Shoring

B. U.S. OSHA Technical Links - Trenching and Excavation

The following documents are PDF files requiring the use of Adobe Acrobat reader.

C. US Army Corp of Engineers projects, the requirements of EM 385-1-1, Section 25 (PDF file)

D. Attachment 13-1 - Soils Classification

E. Attachment 13-2 - Simple Slopes

F. Attachment 13-3 - Excavation Authorization Form

G. Attachment 13-4 - Daily Excavation/Trench Inspection Form

URS	Health and Safety Program SOILS CLASSIFICATION	Attachment 13-1

"Type A" soils

Are cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater.

Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A.

However, no soil is Type A if:

i. The soil is fissured; or
ii. The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
iii. The soil has been previously disturbed; or
iv. The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V)or greater; or
v. The material is subject to other factors that would require it to be classified as a less stable material.

"Type B" soils are:

i. Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
ii. Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
iii. Previously disturbed soils except those which would otherwise be classed as Type C soil.
iv. Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
v. Dry rock that is not stable; or
vi. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" soils are:

i. Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
ii. Granular soils including gravel, sand, and loamy sand; or
iii. Submerged soil or soil from which water is freely seeping; or
iv. Submerged rock that is not stable, or
v. Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

URS	Health and Safety Program **SIMPLE SLOPES**	Attachment 13-2

MAXIMUM ALLOWABLE SLOPES
SOIL OR ROCK TYPE
MAXIMUM ALLOWABLE SLOPES (H:V)[1]
FOR
EXCAVATIONS LESS THAN 20 FEET DEEP[3]

STABLE ROCK	VERTICAL (90 Deg.)
TYPE A[2]	¾:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 ½:1 (34 Deg.)

[1] *Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.*

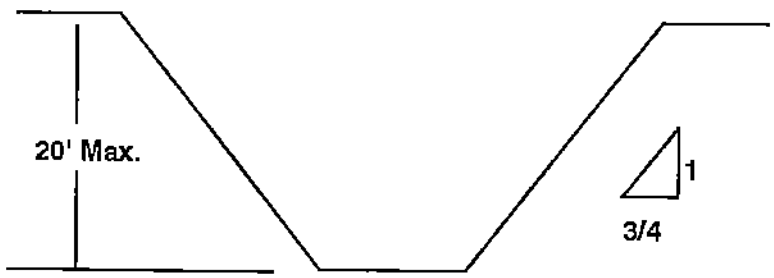
[2] *A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavation in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).*

[3] *Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.*

Slope Configurations (All slopes stated below are in the horizontal to vertical ratio)

Excavations Made in Type A Soil

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.

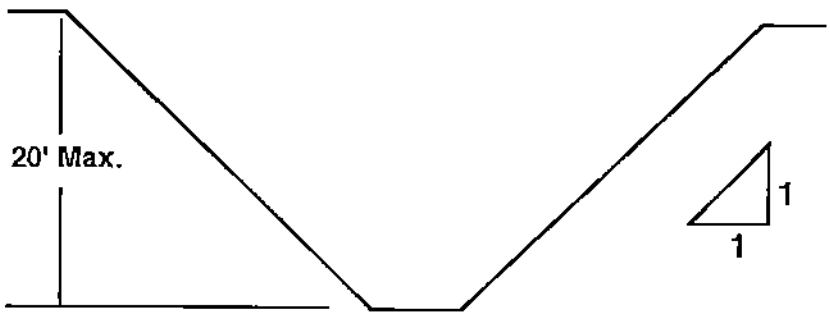


SIMPLE SLOPE - GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

Excavations Made in Type B Soil

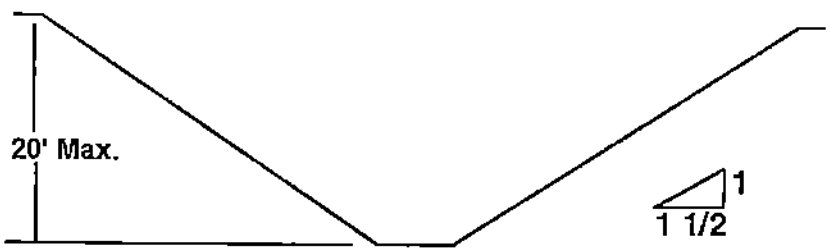
All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



SIMPLE SLOPE

Excavations Made in Type C Soil

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

URS SAFETY MANAGEMENT STANDARD
Heat Stress

1. Applicability

This procedure applies to URS field projects where ambient (not adjusted) temperatures exceed 70°F (21°C) for personnel wearing chemical protective clothing, including Tyvek coveralls, and 90°F (32°C) for personnel wearing normal work clothes.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the effects of heat related illnesses.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Monitor ambient temperatures and conduct Heat Stress Monitoring when threshold temperatures (see Section 1) are reached.

B. Conduct initial monitoring to determine first rest break.

1. Measure the air temperature with a standard thermometer with the bulb shielded from radiant heat; this yields T (actual).

2. Estimate the fraction of sunshine by judging what percent time the sun is not shielded by clouds that are thick enough to produce a shadow. 100 percent sunshine - no cloud cover = 1.0; 50 percent sunshine - 50 percent cloud cover = 0.5; 0 percent sunshine - full cloud cover = 0.0.

3. Plug these variables into the following equation to determine the adjusted temperature:

T (adjusted) = T (actual) + (13 x fraction sunshine)

C. Body Temperature Monitoring

1. Monitor oral body temperature to determine if employees are adequately dissipating heat buildup. Ear probe thermometers which are adjusted to oral temperature are convenient and the

preferred method of measurement. Determine work/rest regimen as follows:

a. Measure (oral adjusted) temperature at the end of the work period.

b. If temperature exceeds 99.6 °F (37.5°C)., shorten the following work period by 1/3 without changing the rest period.

c. If temperature still exceeds 99.6 °F (37.5°C), shorten the following work period by 1/3.

d. Do not allow a worker to wear impermeable PPE when his/her oral temperature exceeds 100.6 °F (38.1°C).

2. Oral temperatures are to be obtained prior to the employee drinking water or other fluids.

D. Pulse Rate Monitoring

1. Take the radial (wrist) pulse as early as possible in the rest period.

a. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third.

b. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by an additional one-third.

E. Record monitoring results on Heat Stress Monitoring Form (Attachment 18-2).

F. Investigate the use of auxiliary cooling devices in extreme heat conditions.

G. Conduct briefings for employees regarding health hazards and control measures associated with heat stress whenever conditions require the implementation of heat stress monitoring. Review the information provided in Attachment 18-3.

H. Provide water and electrolyte replacement drinks fluids as described in Attachment 18-3.

I. Allow employees who are not accustomed to working in hot environments appropriate time for acclimatization (see Attachment 18-3).

J. Provide break areas as described in Attachment 18-3.

5. Documentation Summary

File these records in the Project Safety File.

A. Heat Stress Monitoring Forms.

B. Employee Safety Briefing Verification Forms.

6. Resources

A. NIOSH - "Working in Hot Environments"

B. AFL-CIO Building Trades Division - "Heat Stress in Construction"

The following documents are PDF Files that must be read with Adobe Reader.

C. Attachment 18-1 - Initial Work Monitoring Cycles

D. Attachment 18-2 - Heat Stress Monitoring Record

E. Attachment 18-3 -Informational Supplement

URS SAFETY MANAGEMENT STANDARD
Heavy Equipment Operations

1. Applicability

This procedure applies to URS field projects where heavy equipment is in operation.

2. Purpose and Scope

The purpose of this procedure is to require that heavy equipment is operated in a safe manner, that the equipment is properly maintained and that ground personnel are protected.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Authorized Operators

1. Evaluate operators through documentable experience (resume) and a practical evaluation of skills.
2. Allow only qualified operators to operate equipment.
3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
4. Maintain a list of operators for the project and the specific equipment that they are authorized to operate.
5. Require operators to use seat belts at all times in all equipment and trucks.
6. Operators shall maintain three points of contact whenever entering and exiting a piece of equipment.
7. Brief operators on the following rules of operation:
    a. Operators are in control of their work area.
    b. Equipment will be operated in a safe manner and within the constraints of the manufacturer's Operation Manual.

c. Operators will stop work whenever unauthorized ground personnel or equipment enter their work area and only resume work when the area has been cleared.

B. Ground Personnel

1. Require that ground personnel on the site have received training and comply with the following rules of engagement:

   a. All ground personnel must wear orange protective vests when in work areas with any operating equipment.

   b. Ground personnel will stay outside of the swing zone or work area of any operating equipment.

   c. Ground personnel may only enter the swing or work area of any operating equipment when:

      1. They have attracted the operator's attention and made eye contact.

      2. The operator has idled the equipment down and grounded all extensions.

      3. The operator gives the ground personnel permission to approach.

   d. Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment.

C. Equipment

1. Maintain operations manuals at the site for each piece of equipment that is present on the site and in use.

2. Require that operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual.

3. Require that all equipment is provided with roll-over protection systems (ROPS). Tracked excavators are exempt from ROPS requirements but must have a cab which provides protection from overhead hazards

4. Verify that seatbelts are present and functional in all equipment.

5. Prohibit the use of equipment which has cab glass which is cracked, broken or missing.

6. Require that backup alarms are functional on all trucks and equipment. Tracked excavators must have bidirectional alarms or the operator must be provided with a spotter whenever tracking in either direction.

7. Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use.

8. Require brakes to be set and wheels chocked (when applicable) when not in use.

D. Inspection and Maintenance

1. Require daily inspections of equipment by operators using Attachment 19-1.

2. Prohibit use of equipment deemed to be unsafe as a result of daily inspection until required repairs or maintenance occur.

3. Conduct maintenance as prescribed by the manufacturer in the Operations Manuals for each piece of equipment.

4. During maintenance/repair, require that:

a. Motors are turned off.

b. All extensions are grounded or securely blocked.

c. Controls are in a neutral position.

d. Brakes are set.

5. Documentation Summary

File the following documents in the Project Health and Safety File.

A. List of authorized operators.

B. Operator qualifications.

C. Daily Equipment Inspection Logs.

D. Site Briefing documentation for operator rules and ground personnel "rules of engagement".

6. Resources

A. U.S. OSHA Standard - Motorized Vehicles and Mechanized Equipment - 29 CFR 1926, Subpart O

B. National Association of Demolition Contractors – Safety Manual

C. Queensland Workplace Health and Safety - Competency Standard for Users & Operators of Industrial Equipment

D. Attachment 19-1 - Equipment Inspection Form

3. Require that hearing protectors are used and thus effectively protect hearing.

C. Noise Surveys

1. Noise surveys must be conducted in a manner that reasonably reflects the exposure of the affected employees. Surveys must be conducted under the supervision of a URS Safety Program Representative.

2. Sound level meters and audio dosimeters used to determine employee exposure to noise sources must be Type II (accurate to within +/- 2 dBA), operated in "slow" response, on the "A" scale, and be calibrated to factory guidelines (including periodic factory recalibration).

D. Noise Controls

Eliminate noise sources to the extent possible. Examples of controls that must be considered follow:

1. Addition or replacement of mufflers on motorized equipment.

2. Addition of mufflers to air exhausts on pneumatic equipment.

3. Following equipment maintenance procedures to lubricate dry bearings.

4. Isolation of loud equipment with newer and quieter models.

E. Audiometric Exams

1. Tests

Details on the medical surveillance program (including audiometric testing) are included in SMS 24.

Audiometric tests shall be performed by a person meeting OSHA's 1910.95 (g)(3)'s definition. Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram shall be established against which subsequent audiograms can be compared. Testing to establish a baseline audiogram shall be preceded by 14 hours without exposure to noise. Hearing protectors may be used as a substitute for the requirement that

baseline audiogram shall be preceded by 14 hours without exposure to workplace noise. The medical surveillance provider shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination. For multi-year projects, an annual audiogram shall be obtained for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if there is a standard threshold shift (STS). If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer will obtain a retest within 30 days and consider the results in assessing an STS as the annual audiogram. The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. If an STS has occurred, the medical surveillance provider will notify the employee within 21 days of the determination.

2. Standard Threshold Shifts

   If an employee's test results show a confirmed STS, their hearing protection will be evaluated and refitted, and a medical evaluation may be required.

F. Training

Verify that each employee who must work in a noisy environment is current on the required Hearing Conservation Training. Training must include the following topics:

1. The effects of noise on hearing.
2. The purpose of hearing protectors.
3. The advantages and disadvantages of various types of hearing protectors.
4. The attenuation of various types of hearing protection.
5. The selection, fitting, care, and use of hearing protectors.
6. The purpose of audiometric testing.

7. An explanation of the audiometric testing procedure.

5. Documentation Summary

A. File these records in the Office Safety Filing System:

1. Noise surveys, when applicable.

2. Training Records.

B. File noise surveys, when applicable, in the Project Safety File:

6. Resources

A. U.S. OSHA Standard – Occupational noise exposure – 29 CFR 1910.95

B. U.S. OSHA Construction Standard – Occupational noise exposure – 29 CFR 1926.52

C. U.S. OSHA Technical Links - Noise and Hearing Conservation

D. American Industrial Hygiene Association: The Occupational Environment – Its Evaluation and Control, Chapter 20. Fairfax, VA: 1997

E. National Hearing Conservation Association web site

F. URS SMS 24 Medical Screening and Surveillance

URS SAFETY MANAGEMENT STANDARD
Utility Clearances And Isolation

1. Applicability

This procedure applies to URS projects where personnel may encounter subsurface or overhead utilities.

2. Purpose and Scope

Many field activities are conducted near aboveground and underground utilities. The primary purpose of this Standard is to establish operating requirements that will permit employees to work safely in the vicinity of electrical, natural gas, fuel, water, and other utility systems and installations. The secondary purpose is to prevent economic damage to utility systems from operations associated with project-related activities.

The term "utility clearance" includes

A. The positive locating of utility systems in or near the work area.

B. A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

Note that in some cases, utility representatives may deem it appropriate or necessary to use insulating blankets to isolate a power line; this is an acceptable alternative to positive de-energizing (only utility representatives can make the determination).

"Contact" with overhead power lines is considered to occur when equipment is closer to power lines than permitted by the criteria in the table in Section 4.0.C.2.b below. (See note for U.K. operations).

3. Implementation

Field Operations - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Time for Completion

Complete utility clearances prior to the start of any work in the area of the utility that could feasibly result in contact with or damage to that utility.

B. Local Regulations

Research local codes and regulations regarding utility locating and isolation requirements. Utility companies and locating services are among the appropriate resources.

C. Overhead Power Lines

1. Proximity to Power Lines

No work is to be conducted within 50 feet (15 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15 meters) of overhead power lines without first making this determination.

2. Operations adjacent to overhead power lines are **PROHIBITED** unless one of the following conditions is satisfied:

a. Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.

b. The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked so that no part, including cables, can come within the minimum clearances shown in the table.

MINIMUM DISTANCES FROM POWERLINES	
Powerlines Nominal System kV	Minimum Required Distance
0-50	10 feet (3 meters)
51-100	12 feet (3.6 meters)
101-200	15 feet (4.6 meters)
201-300	20 feet (6.1 meters)
301-500	25 feet (7.6 meters)
501-750	35 feet (10.7 meters)
751-1000	45 feet (13.7 meters)

Note: for U.K. operations, the specific safe distance is determined by the utility company.

c. The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine

the minimum safe operating distance; get this determination in writing with the utility representative's signature.

3. All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the Project Manager prior to the start of work.

D. Underground Utilities

1. Do not begin subsurface work (e.g., trenching, excavation, drilling, etc.) until a check for underground utilities and similar obstructions has been conducted. The use of as-built drawings must be confirmed with additional geophysical or other survey.

2. Contact utility companies or the state/regional utility protection service at least two (2) working days prior to excavation activities to advise of the proposed work, and ask them to establish the location of the utility underground installations prior to the start of actual excavation.

3. Obtain utility clearances for subsurface work on both public and private property. Clearances are to be in writing, signed by the party conducting the clearance.

4. Protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations. If the markings of utility locations are destroyed or removed before excavation commences or is completed, the Project Manager must notify the utility company or utility protection service to inform them that the markings have been destroyed.

5. Do not conduct mechanical-assisted subsurface work (e.g., powered drill rig, mechanical excavator, etc.) within five (5) feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure. Confirm minimum distances for mechanical-assisted subsurface work with the utility owner, as distances beyond this five foot minimum may be required.

6. Subsurface work within five feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure must be done by hand (e.g., hand auger, shovel) to the point where the obstruction is visually located and exposed. Once the obstruction location is confirmed in this manner, mechanical-assisted work may commence.

7. Reference SMS 13, "Excavation Safety" for additional information regarding subsurface operations.

E. Training

Conduct a site briefing for site employees regarding the hazards associated with working near the utilities and the means by which the operation will maintain a safe working environment. Detail the method used to isolate the utility and the hazards presented by breaching the isolation.

5. Documentation Summary

File these records in the Safety Filing System:

1. Documents requesting utility clearance.
2. Documents confirming utility clearance.
3. Training/briefing documentation of each isolation.

6. Resources

1. Utility Locating Services (typically under "Utility" in the Yellow Pages)
2. NIOSH Alert - Preventing Electrocutions from Contact Between Cranes and Power Lines (http://www.cdc.gov/niosh/crane.html)
3. One Call Utility Locating List (http://www.underspace.com/refs/ocdir.htm)
4. National Utility Locating Contractor's Association (http://www.underspace.com/nu/index.htm)
5. U.K. - Health and Safety Executive GS6

URS SAFETY MANAGEMENT STANDARD
Respiratory Protection

1. Applicability

This program defines responsibilities and procedures and is applicable to URS operations that may require the use of respiratory protection including Immediately Dangerous to Life and Health (IDLH) and emergency conditions. This program also addresses the voluntary use of respirators.

2. Purpose and Scope

The purpose of this procedure is to protect those employees performing operations for which exposures can not be controlled by use of conventional engineering or administrative controls and prior to establishing a negative air exposure assessment, and to require that respiratory protective equipment is selected, used, maintained, and stored in accordance with acceptable practices.

3. Implementation

Laboratory/Office/Shop Locations -	Implementation of this program is the responsibility of the Office Manager.
Field Activities -	Implementation of this program is the responsibility of the Project Manager.
Program Administration-	URS Health and Safety Director is responsible for the development and annual review of this program.

URS Health and Safety Program Representatives are responsible to:

- Assist responsible employees in the implementation of the program.
- Assessing local compliance with the program.

4. Requirements

A. Determine if respirators are needed or going to be used for hazardous jobs before assigning that job to an employee.

1. If the determination is that a potential for respiratory hazards exists with any portion of that job activity then, complete Attachment 42-1.

2. Contact a URS Health and Safety Program Representative if any of the questions in Attachment 42-1 are checked "yes."

3. Follow instructions in Attachment 42-2 for employees who wish to voluntarily use dust masks.

4. Follow all the requirements of this procedure for employees who wish to voluntarily use tight-fitting (e.g., air purifying) respirators.

5. Required respirators will be paid for by URS and will be provided without cost to the employee.

B. Select the proper respirator for the job.

1. For those jobs identified in Attachment 42-1, contact a URS Health and Safety Program Representative for assistance in respirator selection.

2. Contact a URS Health and Safety Program Representative for follow up if there are any problems implementing the recommendations made.

C. Require employees who will use respirators to be medically qualified before fit testing and assigning them a respirator.

1. For program details, refer to SMS 24, Medical Screening and Surveillance.

2. Require that employees have a current and accurate Medical Surveillance form (Attachment 24-2)

3. Obtain a copy of the employee's Health Status Medical Report from the Health and Safety Representative. The consulting occupational physician of the medical service provider following each work related examination issues the Health Status Medical Report. Employees cannot be assigned respirators unless they are medically cleared for respirator use.

D. Require respirator users to receive appropriate training.

1. All respirator users must be trained:

a. Before they are assigned a respirator.

b. Annually thereafter.

c. Whenever a new hazard or job is introduced.

d. Whenever employees fail to demonstrate proper use or knowledge.

2. Training must address, at a minimum, the following:

   a. Why the respirator is necessary, and what conditions can make the respirator ineffective.

   b. What the limitations and capabilities of the respirators are.

   c. How to use respirators effectively in emergency situations.

   d. How to inspect, put on and remove, and check the seals of the respirator.

   e. What the respirator maintenance and storage procedures are.

   f. How to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.

E. Require respirator users to be fit tested.

1. Any employee who has been assigned a reusable respirator must be fit tested on an annual basis (no more than one year may elapse between fit tests), or when the employee is assigned a respirator of a different make, type or size from that previously tested.

2. Fit testing can be performed by contract or in house personnel.

3. Obtain a signed written copy of the fit test results. The fit test results should include:

   a. Employee's name and social security number.

   b. Respirator brand, model and size fitted for.

   c. Date fit tested.

   d. Method of fit testing used.

   e. Name and signature of fit tester.

   f. Statement that fit test protocol met the requirements of 29 CFR 1910.134.

g. Manufacturer and serial number of fit testing apparatus.

A fit test results form is available at Attachment 42-5.

F. Provide qualified employees with respirator(s) and adequate amounts of parts and cartridges.

1. Assign employees whose duties require respirators their own respirator for which they have been fit tested.

2. Provide special eyeglass inserts designed for the respirator if an employee must wear eyeglasses with a full facepiece respirator. Contact lenses may be worn when wearing a full facepiece respirator.

G. Require respirators to be used properly.

1. Prohibit facial hair where the respirator-sealing surface meets the wearer's face.

2. Require employees to perform a positive and negative fit check every time the respirator is put on.

3. Employees will leave the area where respirators are being used:

a. Before removing the facepiece for any reason.

b. To change cartridges.

c. If any of the following is detected:

1. Vapor or gas breakthrough.

2. Leakage around the facepiece.

3. Changes in breathing resistance.

4. Use cartridges with End of Service Life Indicators or determine the respirator cartridge changeout schedule. See Attachment 42-4 for Guidance.

H. Require respirators to be cleaned and stored properly.

1. Clean and disinfect respirators after each use.

2. Store respirators in a plastic bag or case and in a clean location.

3. Inspect respirators before use and after each cleaning.

I. Address issues associated with special use respirators self-contained breathing apparatus; air supply respirators; emergency use respirators).

1. Self Contained Breathing Apparatus

   Inspect self-contained breathing apparatus and other emergency use respirators monthly and after each use in accordance with manufacturer's instructions.

2. Air Supplied Respirators

   a. Air used for atmosphere-supplying respirators must meet or exceed the requirements for Type 1 - Grade D breathing air. Never use oxygen.

      1. A certificate of analysis must accompany bottled air.

      2. Compressors used to supply breathing air must:

         i. Prevent entry of contaminated air into the air supply.

         ii. Minimize moisture content.

         iii. Have suitable in-line sorbent beds and filter to provide appropriate air quality.

         iv. Have a high carbon monoxide alarm that sounds at 10 ppm.

   b. Couplings on air hose lines must be incompatible with other gas systems.

J. Require follow up training and medical surveillance to be provided as directed.

1. Provide follow-up physical examinations as directed by the SMS 24-3, Medical Screening and Surveillance Exam Protocol table.

2. Provide follow-up physicals as directed by the Regional Medical Surveillance Administrator.

3. Provide annual refresher training.

4. Provide annual fit testing.

5. Documentation Summary

A. Laboratory

1. File these records in the Laboratory Safety Filing System

   a. Completed forms:

      1. "Identifying When A Respirator Is Needed" - Attachment 42-1; and,

      2. "Respirator Standard Operating Procedure" - Attachment 42-3.;

   b. Employee Health Status Medical Report includes clearance for respirator use.

   c. Employee Fit Test Records; and,

   d. Employee Respirator Training Records.

2. Send a copy of the following records to the Regional Health and Safety Manager:

   a. Completed "Voluntary Use of Respirators" form - Attachment 42-2.

   b. Employee Fit Test Records.

   c. Employee Respirator Training Records.

B. Field

1. File these records in the Project Health and Safety File:

   a. Completed forms:

      1. "Identifying When A Respirator Is Needed" - Attachment 42-1; and,

2. "Respirator Standard Operating Procedure" - Attachment 42-3.

3. Employee Health Status Medical Report includes clearance for respirator use.;

4. Employee Fit Test Records; and,

5. Employee Respirator Training Records.

2. Send a copy of the following records to the Regional Health and Safety Manager:

   a. Completed "Voluntary Use of Respirators" form - Attachment 42-2;.

   b. Employee Fit Test Records; and,

   c. Employee Respirator Training Records.

6. Resources

A. U.S. OSHA Standard - Respiratory Protection - 29 CFR 1910.134

B. U.S OSHA Technical Links - Respiratory Protection

C. ANSI Z88.6, Respirator Use – Physical Qualifications for Personnel, Current Revision

D. ANSI Z88.2, Respiratory Protection, Current Revision

E. 3M Cartridge Service Life Interactive Program

F. Australian Standards AS/N25 1715 - 1994. Selection, Use, and Maintenance of Respiratory Protection Devices

G. Australian Standards HB9-1994. Occupational Personal Protection

H. AIHA, The Occupational Environment - Its Evaluation and Control

The following documents are PDF files which must be read with Adobe Reader:

I. NIOSH Respirator Decision Logic

J. NIOSH Guide to Industrial Respiratory Protection

K. Attachment 42-1 - Identifying When a Respirator is Needed

L. Attachment 42-2 - Voluntary Use of Respirators

M. Attachment 42-3 - Respirator Standard Operating Procedure

N. Attachment 42-4 - Respiratory Cartridge Change Schedule

O. Attachment 42-5 - Fit Test Results Form

P. Medical Screening and Surveillance Program - SMS 24

URS SAFETY MANAGEMENT STANDARD
Back Injury Prevention

1. Applicability

This procedure applies to URS operations where personnel perform manual lifting.

2. Purpose and Scope

The purpose of this procedure is to prevent back injuries to URS personnel.

3. Implementation

Office Locations - Implementation of this procedure is the responsibility of the Office Manager.

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Safe Lifting Practices in the Office

1. Require that personnel receive the training described in (C) below.
2. Evaluate all assignments that involve lifting, such as moving boxes of files and paper, computer equipment, and the like to see that the task can be completed without risk of back injury to assigned personnel.
3. Provide material handling devices, such as carts and dollies, to assist in the safe moving of materials.
4. Obtain outside assistance, such as contract movers, if the job cannot be safely accomplished by URS personnel.
5. Require that heavier items are stored on lower shelving units.

B. Safe Lifting Practices in the Field

1. Recognize that field assignments tend to be lifting-intensive, and that URS has a duty to provide the means by which personnel can perform lifting duties without risk of injury.
2. Require that personnel receive the training described in (C) below.

3. Evaluate all field assignments that involve lifting to see that the tasks can be completed without risk of back injury to assigned personnel.

4. Provide material handling devices, such as carts, dollies, trucks with lift gates, to assist in the safe moving of materials. If required, assign additional personnel to the task.

5. Direct field personnel not to assist in lifting tasks that are normally undertaken by subcontractor personnel.

6. Contact a URS Health and Safety Program Representative when assistance is necessary to evaluate a lifting task that may pose a back injury risk to assigned personnel.

C. Training

1. Require that personnel who may have lifting as part of their duties receive training that includes the following topics:

   a. Showing personnel how to avoid unnecessary physical stress and strain.

   b. Teaching personnel to become aware of what they can comfortably handle without undue strain.

   c. Instructing personnel on the proper use of equipment.

   d. Teaching personnel to recognize potential hazards and how to prevent or correct them.

2. This training must be completed prior to an employee being assigned to a task that involves lifting.

D. Office Moves and Relocations

1. Utilize professional movers (who are appropriately insured) to move office furniture such as desks, file cabinets, and bookcases, even if such a move is only between offices or cubicles at a particular location (on-site move).

2. Utilize professional movers for intensive moving of file boxes and other heavy materials.

E. Material Packaging

1. Use only smaller size (<18") file ("Banker") boxes for file storage, as the larger (>18") boxes are awkward and readily overloaded.

2. Use only smaller coolers for field samples, as the larger coolers are awkward and readily overloaded.

5. Documentation Summary

File the following documents in the Office Health and Safety File

- Training rosters

File the following documents in the Project Health and Safety File

- Training rosters

6. Resources

A. Work Practices Guide for Manual Lifting, NIOSH

URS SAFETY MANAGEMENT STANDARD
Injury / Illness / Incident Reporting

1. Applicability

This procedure applies to URS Corporation offices and field operations.

2. Purpose and Scope

The purpose of this procedure is to provide guidance for the timely reporting of work related injuries, illness, and incidents.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the employee's Supervisor.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Reporting: All employees shall immediately notify their appropriate level of management (line, project, and/or office) of a reportable incident. A reportable incident includes the following:

1. An injury to any URS employee, subcontractor, client representative, or private citizen, even if the injury does not require medical attention;
2. An injury to a member of the public occurring on a URS work site or possibly resulting from a URS or subcontractor activity or involving URS or subcontractor property, equipment, or resource;
3. Illness resulting from suspected chemical exposure;
4. Chronic or re-occurring conditions such as back pain or cumulative trauma disorders (example: carpal tunnel syndrome);
5. Fire, explosion, or flash;
6. Any vehicle accidents occurring on site, while traveling to or from client locations, or with any company-owned or leased vehicle;
7. Property damage resulting from any URS or subcontractor activity;
8. Structural collapse or potential structural hazards;

9. Unexpected release or imminent release of a hazardous material;

10. Unexpected chemical exposures to workers or the public;

11. A safety related complaint from the public regarding URS activities.

12. Any other significant occurrence that could impact safety.

B. Actions: The following actions will be taken following a reportable incident:

1. Employees:

a. If necessary, suspend operations and secure and/or evacuate the area;

b. Immediately notify your supervisor and/or project manager

c. Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved, description of event, and actions taken);

d. Assist with incident investigation as directed by management;

e. Implement corrective actions as directed by management;

f. *Do not* discuss the incident with members of the news media or legal representatives (except URS legal counsel or your personal legal advisor) unless directed to do so by URS management;

g. *Do not* make statements pertaining to guilt, fault, or liability.

2. Line/Project Management:

a. Review circumstances of the incident with applicable employee(s);

b. Notify local Health and Safety representative. If incident involves and an injury/illness of a URS employee, also notify the local Human Resources Representative;

c. Complete and distribute injury/incident report within 24 hours. (Note: If the employee is unable to complete the

report, another company employee, line manager, project manager, or local health and safety representative may complete the report.);

d. Review and verify that necessary corrective actions are identified and implemented;

e. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.

3. Local Health And Safety Representative

   a. Assist with incident evaluation;

   b. With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence;

   c. Review injury/incident report for completeness and accuracy;

4. Local Human Resources Representative

   a. Report work-related injuries and illness to worker compensation carrier

      AIG Claim Services @ 1-877-366-8423

5. Corporate Health and Safety Management

   The Occupational Health Specialist (OHS), Corporate Health and Safety Director, and Construction Services Division Safety and Health Director will review all reported incidents (U.S.-based employees only) to determine OSHA reporting and recording requirements. All decisions will be based strictly on current Federal OSHA guidelines.

   a. Official records (including required reports, logs, for all reported incidents will be maintained at one central location by the OHS.

   b. The OHS will send each establishment any required government report for their establishment following receipt of an incident report.

c. Each January the OHS will prepare and distribute, to each URS establishment, the appropriate government injury/illness reports. These reports will summarize all required government information for incidents that occurred during the preceding calendar year. Each establishment will post these reports in a prominent location for the time specified by current regulations.

5. **Documentation Summary**

A. File these records in the Office Safety File:

1. Attachment 49-1 - Incident Report Form

2. Maintain OSHA 200 Log.

B. File these records in the Project Health and Safety File

1. Attachment 49-1 - Incident Report Form

2. Maintain OSHA 200 Log if applicable for Project.

6. **Resources**

A. U. S. OSHA

http://www.osha.gov/

URS	Health and Safety Program **INCIDENT REPORT FORM**	Attachment 49-1 Revised: 5/08/01

ADMINISTRATIVE INFORMATION:

URS Division/Company: _____

Project Office: _____

Project Number: _____

Date/Time of Incident: _____ _____

Location/Client: _____ _____

FOR INJURIES / ILLNESSES:

Name of Injured Employee _____

Job Title _____

Phone Number _____ Age _____

Sex ○ Male ○ Female

See a Doctor? ○ Yes ○ No
If yes, attach a doctor's report.

Describe Injury:

TYPE OF INCIDENT (Check all applicable items)			
☐ Illness	☐ Injury	☐ Fire, Explosion, Flash	☐ Unexpected Exposure
☐ Property Damage	☐ Vehicular Accident	☐ Other (describe):	

DESCRIPTION OF INCIDENT:

(Describe the facts contributing to the incident. Identify individuals involved, witnesses, and their affiliations. Attach additional sheets, drawings, or photographs as needed.)

URS	Health and Safety Program **INCIDENT REPORT FORM**	Attachment 49-1 Revised: 5/08/01

PREPARED BY:

Name: _____

Date: _____

Signature: _____

Reporter must deliver this report to the operating unit health and safety representative within 24 hours of the reported incident for medical treatment cases and within 5 days for other incidents.

REVIEWED BY:

_____

Supervisor Date

_____

Health and Safety Representative Date

DISTRIBUTION:

- Division Health and Safety Manager
- Project File
- Occupational Health Specialist (Fax 512-419-6413)
- Local Human Resources (Injury / Illness cases only)

CORRECTIVE ACTONS (*For Internal Use Only*):

URS SAFETY MANAGEMENT STANDARD
Drilling Safety Guidelines

1. Applicability

This program applies to URS projects in which truck-mounted, or other engine powered, drill rigs are used. It is applicable to URS employees and URS owned rigs. For drill rigs operated by contractors, the primary responsibility for drilling safety is with the drilling contractor.

2. Purpose and Scope

The purpose of these guidelines is to provide an overview for working safely around drilling operations with truck-mounted and other engine-powered drill rigs. The procedure addresses off-road movement of drill rigs, overhead and buried utilities, use of augers, rotary and core drilling, and other drilling operations and activities.

3. Implementation

Field Activities — Drill rig safety and maintenance is the responsibility of the drill rig operator. URS employees are responsible for their own safety including recognizing and avoiding drill rig hazards. URS employees that observe a drill rig condition believed to be unsafe shall advise the drill rig operator of the unsafe condition.

4. Safety Guidelines

A. General Guidelines

URS technicians, geologists, engineers, or other field staff assigned to observe drilling operations or collect soil samples should observe the following guidelines:

- Require a meeting at project start-up regarding the drill rig operator responsibility for rig safety and any site and equipment specific safety requirements
- Set up any sample tables and general work areas for the URS field staff to the side of the drill rig (preferably 10 meters away) and not directly behind the rig.
- URS engineers, technician, and geologists shall not assist the drillers with the drilling equipment or supplies and shall not at any time operate the drill rig controls.

B. Movement of Drill Rigs

Before moving a rig, the operator must do the following:

- To the extent practical, walk the planned route of travel and inspect it for depressions, gullies, ruts, and other obstacles.
- Check the brakes of the truck/carrier, especially if the terrain along the route of travel is rough or sloped.
- Discharge all passengers before moving on rough or steep terrain.
- Engage the front axle (on 4x4, 6x6, etc. vehicles) before traversing rough or steep terrain.

Driving drill rigs along the sides of hills or embankments should be avoided; however, if side-hill travel becomes necessary, the operator must conservatively evaluate the ability of the rig to remain upright while on the hill or embankment. The possibility must be considered that the presence of drilling tools on the rig may reduce the ability of the rig to remain upright (raises the center of mass of the rig).

Logs, ditches, road curbs, and other long and horizontal obstacles should be normally approached and driven over squarely, not at an angle.

When close lateral or overhead clearance is encountered, the driver of the rig should be guided by another person on the ground.

Loads on the drill rig and truck must be properly stored while the truck is moving, and the mast must be in the fully lowered position.

After the rig has been positioned to begin drilling, all brakes and/or locks must be set before drilling begins. If the rig is positioned on a steep grade and leveling of the ground is impossible or impractical, the wheel of the transport vehicle should be blocked and other means of preventing the rig from moving or topping over employed.

C. Buried and Overhead Utilities

The location of overhead and buried utility lines must be determined before drilling begins, and the locations should be noted on boring plans and/or assignment sheets.

When overhead power lines are close by, the drill rig mast should not be raised unless the distance between the rig and the nearest power line is at least 20 feet (7 meters) or other distance as required by local ordinances, whichever is greater. The drill rig operator or assistant should walk completely around the rig to make sure that proper distance exists.

When the drill rig is positioned near an overhead line, the rig operator should be aware that hoist lines and power lines can be moved towards each other by wind. When necessary and approved by the Project

Manager (PM), the utility and/or power lines may be shielded, shut down, or moved by the appropriate personnel.

For additional information, please refer to SMS #34 "Utility Clearances and Isolation".

D. Clearing the Work Area

Before a drill rig is positioned to drill, the area on which the rig is to be positioned should be cleared of removable obstacles and the rig should be leveled if sloped. The cleared/leveled area should be large enough to accommodate the rig and supplies.

E. Safe Use of Augers

Never place hands or fingers under the bottom of an auger flight or drill rods when hoisting the augers or rods over the top of another auger or rod in the ground or other hard surfaces, such as the drill rig platform.

Never allow feet to get under the auger or drill rod while they are being hoisted.

When the drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.

Move auger cuttings away from the auger with a long-handled shovel or spade; never use hands or feet.

Never clean an auger attached to the drill rig unless the transmission is in neutral or the engine is off, and the auger has stopped rotating.

Do not wear loose clothing or jewelry while working near the drill rig. Long hair must be pulled back to avoid entanglement with moving parts.

Hearing protection is required when working near an operating drill rig.

F. Safe Use of Hand Tools

Regulations regarding hand tools should be observed in addition to the guidelines provided below:

- Each tool should be used only to perform tasks for which it was originally designed.
- Damaged tools should be repaired before use or discarded.
- Safety goggles or glasses should be worn when using a hammer or chisel. Nearby co-workers and by-standers should be required to wear safety goggles or glasses also, or move away.

- Tools should be kept cleaned and stored in an orderly manner when not in use.

G. Safe use of Wire Line Hoists, Wire Rope, and Hoisting Hardware

Safety rules described in Title 29 Code of Federal Regulations (CFR) 1926.552 and guidelines contained in the Wire Rope User's Manual published by the American Iron and Steel Institute shall be used whenever wire line hoists, wire rope, or hoisting hardware are used. The driller should provide written reports (upon request) documenting inspections of equipment.

H. Traffic Safety

Drilling in streets, parking lots or other areas of vehicular traffic requires definition of the work zones with cones, warning tape, etc. and compliance with local police requirements.

I. Fire Safety

- Fire extinguishers (type ABC) shall be kept on or near drill rigs for fighting small fires.
- If methane or other flammable gases or vapors are suspected in the area, a combustible gas indicator (CGI) shall be used to monitor the air near the borehole with all work to stop at 20 percent of the Lower Explosive Limit (LEL).
- Work shall stop during lightning storms.

J. Protective Gear

1. Minimum Protective Gear

Items listed below should be worn by all staff working within 30 feet (10 meters) of drilling activities.

- Hearing Protection;
- Hard Hat;
- Eye Protection (safety glasses, goggles, or face-shield)
- Safety Shoes (shoes or boots with steel toes)

2. Other Gear

Items listed below should be worn when conditions warrant their use. Some of the conditions are listed after each item.

- **Safety Harnesses and Lifelines:** Safety harnesses and lifelines shall be worn by all persons working on top of an elevated derrick beam or mast. The lifeline should be secured at a position that will allow a person to fall no more than six feet (2 meters). OSHA Fall Protection (1926 Subpart M) requirements apply.
- **Life Vests:** Use for work over water.

5. Resources

A. International Association of Drilling Contractors Safety Alerts http://iadc.org/alerts.htm

B. Fall Protection - SMS 040

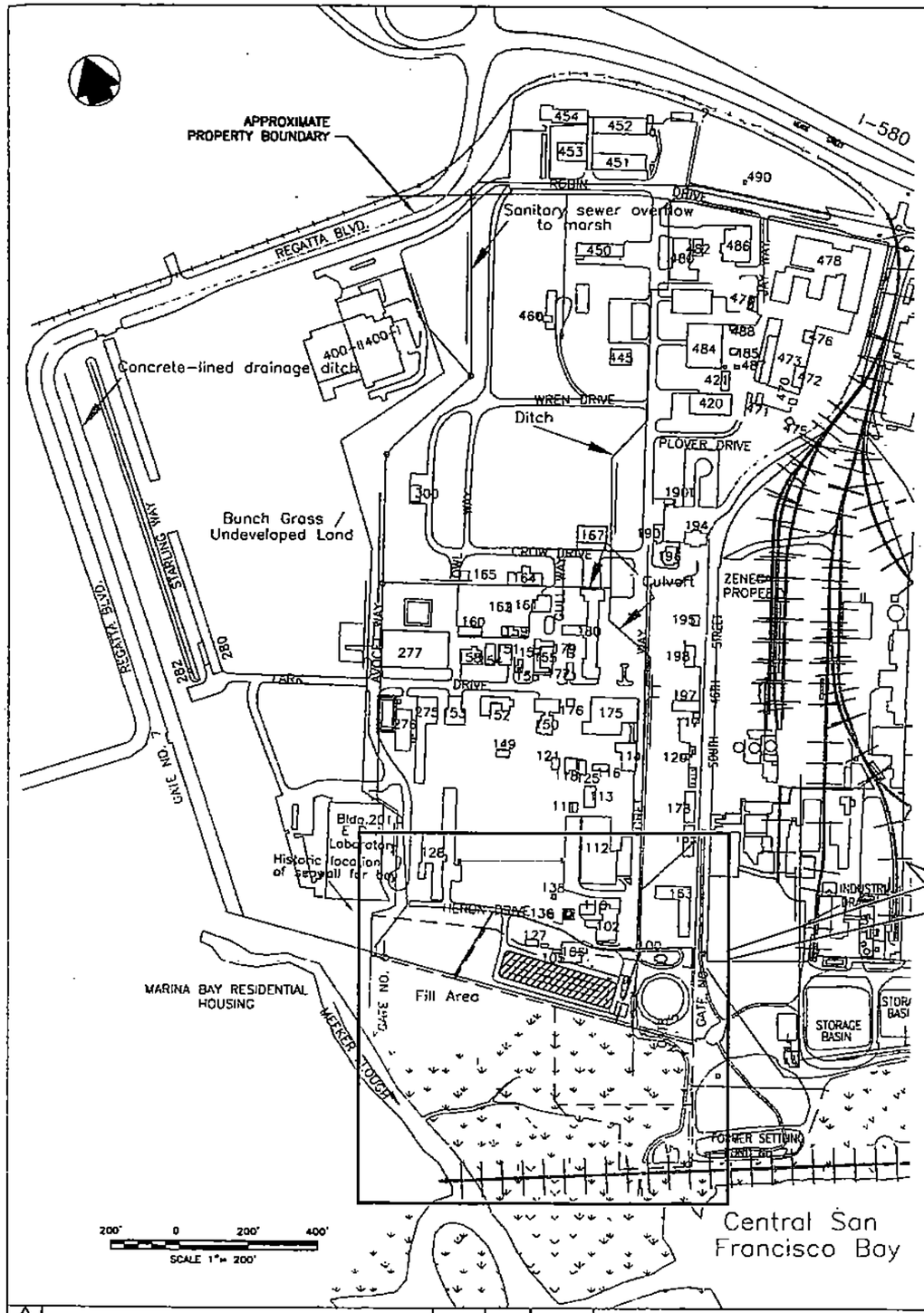
C. Hearing Conservation - SMS 026

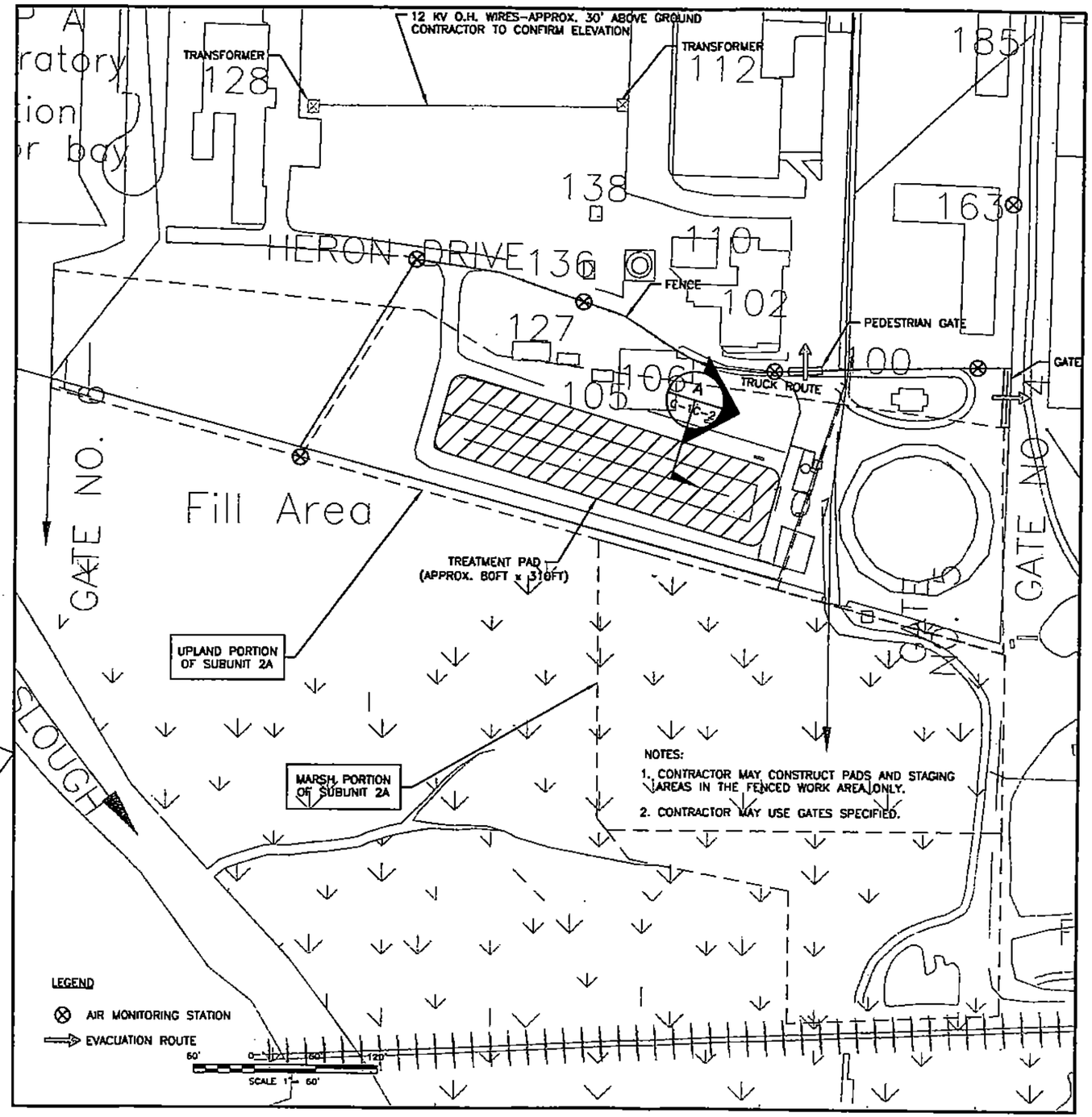
D. Subcontractor Health and Safety Requirements - SMS - 046

E. Utility Clearances and Isolation - SMS 034

APPENDIX E

Site Evacuation Plan





REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
0	100% SUBMITTAL	AV		09/11/02

University of California, Berkeley
Capital Projects
1936 University Avenue, 2nd Floor
Berkeley, CA 94720-1360

URS
500 12th Street, Suite 200
Oakland, CA 94607-4014

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	CFD
DRAWN	CS
CHECKED	CFD
PEER REVIEWED	AV
PROJECT MANAGER	DKM
DATE	09/11/02

ADDENDUM B
RFS SUBUNIT 2A MERCURY STABILIZATION AND SOLIDIFICATION PROJECT
PROJECT NO. 19335A, RICHMOND FIELD STATION
RICHMOND, CALIFORNIA

EVACUATION ROUTES AND AIR MONITORING STATIONS

REVISION	0
PROJECT	26813393
DRAWING	E-1
SHEET	3 OF 4

APPENDIX B
JOB SAFETY ANALYSES FOR RICHMOND FIELD

Job Safety Analysis

Safety Information for the University of California, Berkeley

Richmond Field Station
Excavation Using a Backhoe or Similar Equipment

Task	Hazards	Controls
1. Determine potential exposure to contaminated soil.	Inhalation of soil dust containing metals and pesticides (contaminants of concern (COC)). COCs are associated with pyrite cinders or remnants form the original owner, Cal Cap Company's operations.	Prior to any excavation activities notify EH&S. Employees performing the excavation must consult a current map noting locations of historic structures, where soil samples have been obtained and the associated contaminant levels. This map must be referenced so employees are fully informed of potential hazards when the ground is disturbed.
2. Perform an equipment inspection prior to operation	Physical Impact during inspection	Stay aware of the locations of equipment components while looking for hydraulic leaks, checking mechanical connections, and testing the functionality of controls.
3. Pre wet the surface to be disturbed.	None foreseen	To avoid potential cross contamination of ground water and soil surface outside of the planned work area, do not over water.
4. Place the chosen equipment and engineering controls to avoid conflict during operations, and after the soil is removed.	Impact or instability of the equipment due to unforeseen hazards or ground configuration	Survey potential obstacles within the operating range of the excavation equipment during it's operation
5. Verify the locations of underground utilities.	Gas release and explosion, electrocution, flooding, or any combination	Look for evidence of the location of underground utilities; manhole covers, conduits that lead into the ground next to buildings or transformers, or any other ground level access points to underground pipes or conduits.
6. Begin water dust control measures	Slips, Trips, and Falls	Wear shoes that will have good traction in the mud
		Be aware of the hose location to avoid trips
		Refer to the "Hand Tool Excavation" JSA
7. Begin excavation	Unforeseen underground hazards.	See #5 above.
		Plan escape routes and procedures to avoid compounding the problem, like creating sparks in a gas release, if hazards involving gas, water , or sewer release are encountered.
		Plan procedures and escape routes to avoid electrocution if an electrical conduit is disturbed.
	Inhalation of COC.	Keep the soil damp while it is being disturbed. If pre wetting has not sufficiently dampened the soil it should be misted or sprayed during its disturbance.
		Assume that contamination could be found at any location at RFS.

		If pyrite cinders are found during excavation that were not previously known, and they have unfamiliar characteristics (different than the "usual" cinders) suspend activities and report the location to Senior Superintendent of Physical Plant/Facilities Manager or Building Maintenance Supervisor. Don't resume operations until it has been determined, through EH&S, that the hazard has not increased due to the presence and disturbance of the cinders.
	Falling in the hole	Stay aware of where you are in relation to the hole. Marking the hole, with 2 x 4s or similar, 2 feet away from the hole can act as a limit for foot traffic and a limit to soil piles from the excavation
	Injuries and death due to collapsing excavation walls.	Shoring or steeping is required if the excavation is four feet or more. There are other Cal/OSHA requirements depending on the excavation dimensions and the consistency (type) of soil. Refer to the Shop Safety Manual or EH&S for clarification of those requirements.
8. Cover the hole with a walkable surface and make a barrier (there may be other options) around it if it can't be filled immediately after completion of the work below the ground and has to be left unattended.	Muscle strain from the weight of the cover and angle of the placement of the cover	Two persons should place a panel unless it can be dragged into place.
	Falling in the hole.	Stay aware of where you are in relation to the hole and markings that were put in place.

Required Training:

1. Operation of the excavation machine
2. Hazards associated with the disturbance of the COCs.
3. Procedures for reporting previously unknown locations of soil that may contain COCs

Required Personal Protective Equipment (PPE)

1. Gloves
2. Hard toed and steel shank boots
3. Dust masks

EH&S Construction Health & Safety Specialist, Gary Bayne
August 2005

For more information about this JSA, contact the *Office of Environment, Health and Safety* at UC Berkeley, 317 University Hall #1150, Berkeley, CA 94720-1150
(510) 642-3073 λ http://www.ehs.berkeley.edu

Job Safety Analysis

Safety Information for the University of California, Berkeley

Richmond Field Station
Hand Tool Excavation

Task	Hazards	Controls
1. Determine potential exposure to contaminated soil.	In halation of soil dust containing heavy metals and pesticides.	Prior to any excavation activities, employees must consult a current map noting locations of historic structures, where soil samples have been obtained and the associated contaminant levels. This map must be referenced so employees are fully informed of potential hazards when the ground is disturbed.
2. Assemble tools and engineering controls appropriate for the type of soils to be excavated	If a Hudson type airless sprayer is used as an engineering control it may have been used to apply pesticides or defoliants. Thus, potential exposure to previously used substances.	Clean the sprayer with an appropriate solvent or surfactant to neutralize previously used substances.
3. Pre wet the surface to be disturbed.	None foreseen	
4. Begin excavation	Foot injury	Steel (or similar) toed shoes with metal shank arches are required
	Muscle Strain	Don't rush; use the tools with the advantage of your weight. Keep the weight of shovelfuls manageable. Don't pitch the shovelfuls a long distance.
	Impact on other people from use of hand tools	If you are using the tools such as axe or pick that require swinging to provide sufficient impact on the soil or roots be sure you are clear of someone else and you announce, "heads" or similar, before you start swinging.
	Impact from use of hand tools by others	Keep your eyes open about what others are doing in your area.
	Impact from the separation of parts of tools such as axe, pick, or shovel heads	Check the tools prior to use to determine the heads are securely attached

		Exposure to soil dust potentially containing contaminants of concern (COC)	Keep the soil damp while it is being disturbed. If pre wetting has not sufficiently dampened the soil it should be misted or sprayed during its disturbance.
			If cinders are found during excavation that were not previously known, or there are unfamiliar characteristics (different than the "usual" cinders) suspend activities and report the location to John Felling or Lino. Don't resume operations until it has been determined, through EH&S, that the hazard has not increased due to the presence and disturbance of the cinders.
		Falling in the hole	Stay aware of where you are in relation to the hole. Marking the hole, with 2 x 4s or similar, 2 feet away from the hole can act as limit for foot traffic and a limit to soil piles from the excavation
	4. Cover the hole with a walkable surface and make a barrier (there may be other options) around it if it can't be filled immediately after completion of the work or if it has to be left unattended.	Muscle strain from the weight of the cover and angle of the placement of the cover	Two persons should place a panel unless it can be dragged into place.
		Falling in the hole.	Stay aware of where you are in relation to the hole and markings that were put in place.

Required Training:

1. Lifting loads
2. Hazards associated with the disturbance of the COCs.
3. Procedures for reporting previously unknown locations of soil that may contain COCs or unusual cinders.

Required Personal Protective Equipment (PPE)

1. Gloves
2. Hard toed and steel shank boots
3. Standard work clothes (coveralls etc to be used at work only)
4. Wash hands and face after work.

Other Information:

Contributors: EH&S Construction Health & Safety Specialist, Gary Bayne

Created: July 2005

JSA Library Number:

For more information about this JSA, contact the *Office of Environment, Health and Safety* at UC Berkeley, 317 University Hall #1150, Berkeley, CA 94720-1150
(510) 642-3073 λ http://www.ehs.berkeley.edu

The development of Job Safety Analyses is a Balanced Scorecard initiative of the AVC-BAS Safety Committee, sponsored by the Associate Vice Chancellor-Business and Administrative Services (AVC-BAS) and the AVC-BAS Leadership Team λ http://bas.berkeley.edu/balancedscorecard

Job Safety Analysis

Safety Information for the University of California, Berkeley

Richmond Field Station Remediation and restoration project

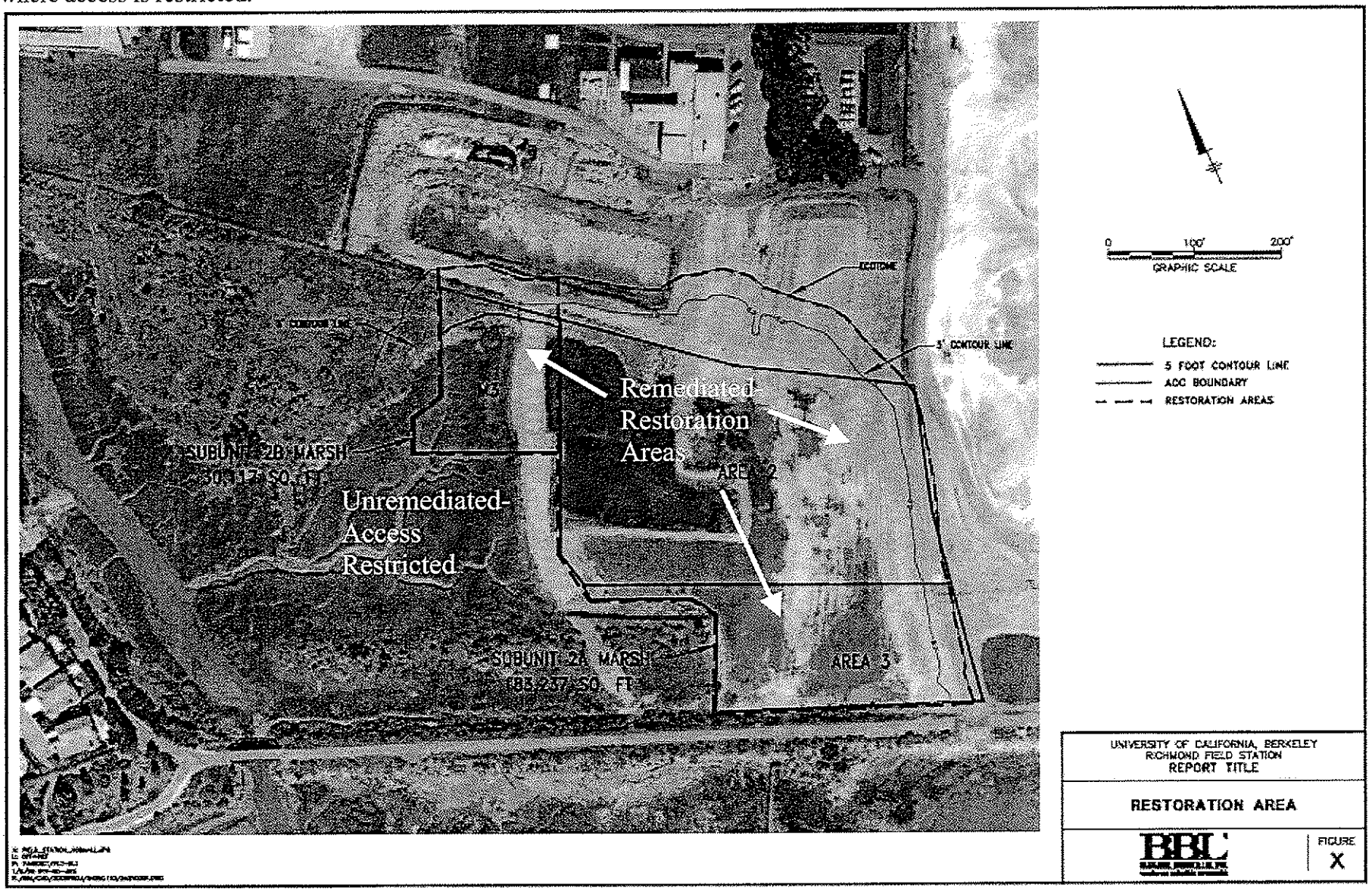
tidal marsh planting and weeding

Task	Hazards	Controls
1. Determine potential exposure to contaminated sediments.	Ingestion of or dermal (skin) exposure to soil containing heavy metals, pesticides, PCBs and other organic chemical, and/ or pathogenic bacteria.	Consult with current map (below) noting locations of un-remediated sediments, or other restricted access locations prior to any planting or weeding activities. This map must be referenced so employees or volunteers are fully informed of potential hazards when the ground is disturbed. The Project Manager communicates this information to employees or volunteers.
2. Determine exposure to adverse weather conditions.	Sunburn.	Sunblock, hats, long-sleeved shirts.
	Heat exhaustion.	Light clothing. Reduce work time. Take breaks.
	Hypothermia.	Heavy clothing and rain gear. Reduce work time
3. Digging in marsh sediment to plant or weed.	Exposure to sediments or water containing chemicals of concern or microbiological contaminants.	Wear personal protective equipment (see below). Avoid touching exposed skin with muddy tools or gloves.

		Impact to others from using hand tools.	If you are using tolls such as axes or picks that require swinging to provide sufficient impact on the soil or roots, be sure you are clear of someone else and you announce, "swinging" or "heads up" or something similar before you begin.
		Muscle strain (back strain, repetitive motion strain)	Don't rush. Use tools with the advantage of your weight. Keep the weight of shovelfuls manageable.
		Impact of use of hand tools by others ("struck by").	Keep your eyes open about what others are doing in your area.
		Exposure to foot injury from heavy objects (tools such as digging bars, vehicles)	Steel toed shoes with metal shank arches are required when using equipment that could cause injury to the foot. Operators of motorized vehicles should stay clear of pedestrians.
		Slips, falls to grade or becoming stuck in the mud.	Evaluate terrain before entry. Probe area of sloughs with a stick or long-handled hand tools near bends to determine depth of fine sediments. When working in areas with substantial fine sediments work with a buddy.
		Tsunami	In the event of a tsunami warning or strong earthquake, leave the marsh area and go inland far away from shore. Tsunami waves can be as high as 16 feet or more in the East Bay.

		Biological hazards- 1) poison oak 2) mosquitoes	1) Learn to recognize the plant and avoid contact. 2) Wear long-sleeved shirts and mosquito repellant.
	4. Washing tools and personal protective equipment	Exposure to sediment containing chemicals of concern.	Use scrub brushes to thoroughly remove mud with water until none is visible on tools, boots or gloves (discard rinse water below high tide line). Discard disposable gloves in the trash. Complete a final rinse with clean, soapy water (discard to grass or in sanitary sewer)
	Required Training: Hazards associated with the disturbance or exposure to sediments containing chemicals of concern.	**Required Personal Protective Equipment (PPE)** 1. Gloves 2. Boots 3. Standard work clothes (coveralls etc. to be used at work only) 4. Wash hands and face when done	
Contributors: **Created:** **JSA Library Number:**	EH&S December 2005		

The following aerial photo of Richmond Field Station Western Stege Marsh shows the upper extent of tidally influenced salt marsh as the red line at approximately 4- 5 feet above the mean sea level. Areas 2, 3 and M3 have been excavated and back-filled with clean fill. These are tidal- marsh areas being restored through planting and weeding. Subunit 2B Marsh to the west of M3 and Areas 2 and 3 is unremediated where access is restricted.



APPENDIX C
BEST MANAGEMENT PRACTICES FOR STORMWATER POLLUTION PREVENTION REQUIREMENTS

Outdoor Storage of Dry Material

Stockpile Management

Wind Erosion Control

July 2003

Outdoor Storage of Dry Materials

In response to recent Federal and State water quality regulations and requirements, municipalities in Contra Costa County have joined to form the Contra Costa Clean Water Program (CCCWP).

The CCCWP *consists of the Municipalities of Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, Walnut Creek, Contra Costa County and Contra Costa County Flood Control and Water Conservation District.*

The Goal of the CCCWP *is to control discharges of pollutants to municipal storm drain systems (and local creeks, the San Francisco Bay and Delta). The CCCWP encourages using Best Management Practices to effectively eliminate illegal discharges and connections.*

The Storm Drain System *was built to collect and transport rain to prevent flooding in urban areas. Anything that flows or is discharged into the storm drain system goes directly into local creeks, the San Francisco Bay or Delta without any treatment.*

The Sanitary Sewer System *collects and transports sanitary wastes from interior building plumbing systems to the wastewater treatment plant where the wastewater is treated.*

Best Management Practices (BMPs) *are methods and practices such as good housekeeping, spill prevention, or treatment measures to prevent or minimize pollutant discharges to municipal storm drain systems.*

Illegal Discharges or Illicit Connections *discharge non-storm water to municipal storm drain systems and contribute to water pollution.*

Urban Runoff *is rain and any other water that passes through and out of developed areas (streets, parking lots, roof tops, etc.) into the storm drain system and eventually to creeks and other waters.*

Keeping pollutants out of our storm drain system protects our local creeks, reservoirs, the San Francisco Bay and the Delta. Materials swept, blown, or washed into the storm drains end up in these open waters where they degrade water quality and harm aquatic life. In general, wastewater discharged to the storm drains is illegal.

In addition to reviewing their own practices, municipalities participating in the Contra Costa Clean Water Program (CCCWP) have instituted a business education campaign and inspection program. Inspectors work with contractors and businesses to identify and control potential discharge of pollutants to the storm drain system. *Property and business owners are responsible for their contractors' practices.*

Stormwater runoff from outdoor materials storage areas contributes to urban runoff pollution. Sediment, metals, landscape waste, grease, automotive fluids, and concrete products are some of the pollutants that get into the storm drain system. Stockpiles of galvanized metal products are concentrated sources of pollutants.

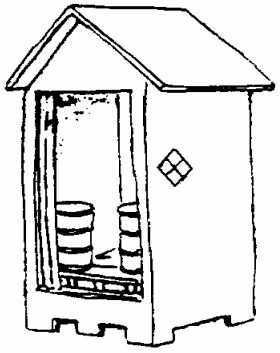
All businesses can apply common sense practices to minimize or eliminate their contribution to stormwater pollution. Some such practices related to outdoor storage of dry materials are identified on the reverse side of this page.

If you need additional information concerning stormwater pollution and its prevention contact your local program representatives at **1-888-BAY-WISE**.

Best Management Practices

Follow these BMPs to control pollutant discharges. The objectives are: 1) to keep pollutants from contacting rain, and 2) to keep pollutants from being dumped or poured into the storm drains. The goal is "only rain in the storm drain."

- Keep rainfall from directly contacting dry materials stored outdoors by doing any of the following: **



- move storage indoors
- cover the outdoor areas with a roof
- move materials into a shed
- cover the outdoor areas with plastic sheeting or a tarp, and secure with weighted tires or sand bags

- Store dry materials on a mounded area, on a pallet, or in a bermed area to keep rain from running onto or through the storage area.
- Sweep the area frequently; dispose of debris in the garbage.
- Keep dumpster areas free of litter and keep lids closed.
- Do not use the area for washing; wash water from cleaning operations must be discharged to the sanitary sewer. Contact the local wastewater treatment plant.
- Stencil storm drain inlets with "No Dumping, Drains to Bay" message.

** Check with local building, zoning, and fire departments concerning indoor storage requirements.

REFERENCE: ACCWP Best Management Practices for Industrial Storm Water Pollution Control booklet, 1994.

Stockpile Management WM-3

Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other materials.

Limitations

None identified.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater runon using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, gravel bags, or straw bale barriers.

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- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- During the rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.
- During the non-rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of "cold mix"

- During the rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material at all times.
- During the non-rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate

- During the rainy season, treated wood should be covered with plastic or comparable material at all times.
- During the non-rainy season, treated wood should be covered with plastic or comparable material at all times and cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected further as follows:

- All stockpiles should be protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Costs

All of the above are low cost measures.

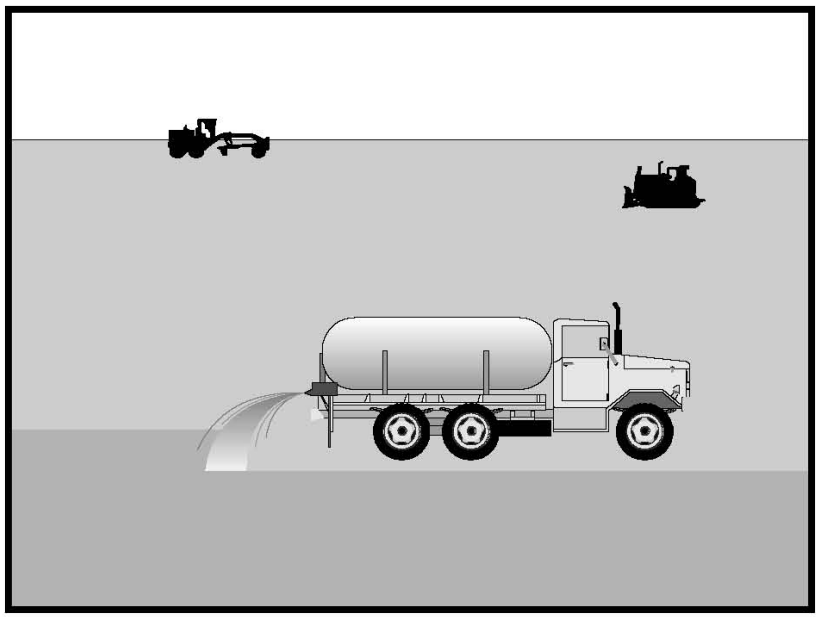
Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Wind Erosion Control WE-1



Objectives

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Over watering may cause erosion.

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- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated sub grades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.
- Opacity Emission Limits: Enforce compliance with California air pollution control laws.
- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

SITE CONDITION	DUST CONTROL PRACTICES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry Out					X		X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs

Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

APPENDIX D
ANALYTICAL RESULTS FOR RFS UPLAND AREA PYRITE CINDERS SOIL SAMPLING

TABLE D-1. ANALYTICAL RESULTS FOR PYRITE CINDERS SOIL SAMPLES FROM THE RFS UPLAND AREA (ALL RESULTS MG/KG)
Interim Soil Management Plan, Richmond Field Station, Richmond, California

Analyte	Sample ID 05060C180	Sample ID 05060C164	Sample ID 05060C112	Sample ID W. PERI-METER COMP 3	Sample ID RFSPC001	Sample ID RFSPC002	Sample ID RFSPC003	Avg.	95% UCL	TTLC	Construction Worker H-SSTL[a]	Commercial/ Industrial Worker H-SSTL[a]
Arsenic	23	38	110	44	71	66	70	60	86	500	120	27.3
Copper	540	420	820	490	580	760	910	646	811	2,500	98,900	75,900
Lead	53	220	260	150	290	74	69	159	247	1,000	750	750
Mercury	3.9	0.94	0.7	2.1	1.1	0.99	0.88	1.52	2.54	20	494	264
Zinc	130	230	420	150	350	240	260	254	346	5,000	100,000	100,000

Sample ID locations:

05060C180 - One discrete soil sample collected on June 6, 2005 from a small excavation of a tree stump, parking lot east of Bldg. 180.

05060C164 - One discrete soil sample collected on June 6, 2005 from a hand shovel excavation for a water line north side of Bldg. 164.

05060C112 - One discrete soil sample collected on June 6, 2005 from area near former transformer pad north of Bldg. 112 (by RFSPC001).

W. PERI-METER COMP 3 – Composite sample collected November 18, 2005 along the northwest perimeter of Building 155 where cinders were found in near-surface soils next to the foundation. The composited sample consisted of three discrete subsamples collected at various depths between 0 and 12 inches deep from 17 sample locations. This sample probably also contained a small percentage of non-cinder soil, but was predominantly pyrite cinders.

RFSPC001 - One discrete soil sample collected on July 11, 2006 from area near former transformer pad north of B112.

RFSPC002 - One discrete soil sample collected on July 11, 2006 from northeast corner of Crow and Owl intersection dig.

RFSPC003 - One discrete soil sample collected on July 11, 2006 from northeast corner of North field (north of B167).

Notes:

a H-SSTLs for construction workers and commercial/industrial workers as reported in Table 3-13 of URS Corporation (2001).

Avg. Average
H-SSTL Human health site-specific target level
ID Identification
TTLC Total threshold limit concentration
UCL Upper confidence level

Reference:

URS Corporation. 2001. "Human Health and Ecological Tiered Risk Evaluation, University of California, Berkeley, Richmond Field Station/Stege Marsh, Richmond, California." Final Report. November 21.