

Comprehensive Long-Term Environmental Action Navy (CLEAN) II
Contract No. N62742-94-D-0048
Contract Task Order No. 0104

Final Health and Safety Plan
Preliminary Assessment of
Potential Release Locations
Environmental Baseline
Survey

Former Marine Corps Air Station
El Toro, California

Prepared for

Department of the Navy
Commander, Southwest Division
Naval Facilities Engineering Command
San Diego, California 92132-5190

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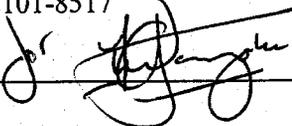
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Health and Safety Plan
for
Preliminary Assessment of Potential Release Locations
Environmental Baseline Survey
Former Marine Corps Air Station, El Toro, California
Contract No. N62742-94-D-0048
Contract Task Order No. 00104

By signing below, I acknowledge that I have reviewed and hereby approve the Health and Safety Plan for the Preliminary Assessment of Potential Release Locations at the Former Marine Corps Air Station in El Toro, California. This Health and Safety Plan has been written for the exclusive use of Earth Tech, Inc., its employees, and subcontractors. The plan is written for the specified site conditions, dates, and personnel, and must be amended if these conditions change.

Plan Approved By:



Date: 12/20/2002

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CTO Manager
Earth Tech, Inc., Long Beach



Date: 12/20/2002

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CONTENTS

APPROVAL PAGE	i
SIGNATURE PAGE	iii
ACRONYMS AND ABBREVIATIONS	ix
1. INTRODUCTION	1-1
1.1 Health and Safety Policy Statement	1-1
1.2 Classification of Activities	1-1
1.3 Regulatory Requirements	1-1
2. MANAGEMENT OF HEALTH AND SAFETY RESPONSIBILITIES	2-1
2.1 CLEAN Program Manager (Mr. Ken Vinson, P.E.)	2-1
2.2 CLEAN Health And Safety Manager (Mr. Robert Poll, CIH, CSP)	2-1
2.3 CTO Manager (Mr. Eli Vedagiri)	2-1
2.4 Field Manager (Mr. Rod Lazo)	2-2
2.5 Site Safety Officer (Mr. Rod Lazo)	2-2
2.6 Subcontractors	2-3
2.7 Onsite Personnel and Visitors	2-3
3. SUMMARY OF SITE CONDITIONS AND PLANNED WORK ACTIVITIES	3-1
3.1 Site Conditions	3-1
3.2 Planned Work Operations	3-1
3.2.1 Manual Sampling Procedures	3-2
3.2.2 Hand Auger Sampling	3-2
3.2.3 Direct Push Sampling	3-2
3.2.4 Hollow-Stem Auger Sampling	3-3
3.2.5 Potholing	3-3
3.2.6 Additional Work Procedures	3-3
4. GENERAL HEALTH AND SAFETY PROCEDURES	4-1
4.1 HAZWOPER Requirements	4-1
4.1.1 Medical Screening and Health Surveillance	4-1
4.1.2 HAZWOPER Training Requirements	4-1
4.1.3 Visitor Clearances	4-1
4.2 On-Site Training Procedures	4-2
4.2.1 Initial Orientation Training	4-2
4.2.2 Tailgate Safety Briefings	4-2
4.2.3 Hazard Communication Training	4-2
4.3 General Site Safety Rules	4-3
4.3.1 Smoking, Eating, and Drinking	4-3
4.3.2 Housekeeping	4-3
4.3.3 Personal Hygiene	4-3
4.3.4 Buddy System	4-4
4.3.5 Lighting	4-4
4.4 Controlled Work Areas	4-5
4.4.1 Work Area Control Records	4-5

4.5	Drum Handling	4-5
4.6	Heat Stress Prevention	4-6
4.7	Injury Reporting	4-9
5.	HAZARD ANALYSES	5-1
5.1	Specification of Work Tasks	5-1
5.1.1	Unanticipated Work Activities	5-1
5.2	Suspected Environmental Contaminants	5-1
5.2.1	Petroleum Hydrocarbon Fuels (Gasoline/Diesel Fuel)	5-2
5.2.2	Waste Solvents	5-2
5.2.3	Heavy Metals	5-4
5.2.4	Polynuclearcyclic Aromatic Hydrocarbons (PAHs)	5-4
5.2.5	Polychlorinated Biphenyls (PCBs)	5-4
5.2.6	Miscellaneous Pesticides/Herbicides	5-5
5.2.7	Assessment of Hazards	5-5
6.	ACTIVITY-SPECIFIC HEALTH AND SAFETY PROCEDURES	6-1
6.1	Slips, Trips, Falls, and Protruding Objects	6-1
6.2	Hazardous Noise Environments	6-1
6.3	Heavy Machinery	6-1
6.4	Underground Utilities	6-1
6.5	Excavation Safety	6-2
6.6	Hand and Portable Power Tools	6-3
6.7	Chemical Exposure Monitoring Procedures	6-4
6.7.1	Monitoring Procedures – Intrusive Activities (HSA Drilling, Potholing)	6-5
6.7.2	Monitoring Following Concrete Coring	6-5
7.	PERSONAL PROTECTIVE EQUIPMENT AND DECONTAMINATION REQUIREMENTS	7-1
7.1	Personal Protective Equipment Requirements	7-1
7.1.1	General	7-1
7.1.2	HAZWOPER PPE Ensembles	7-2
7.2	Decontamination Activities	7-4
7.2.1	Personnel Decontamination	7-4
7.2.2	Equipment Decontamination	7-6
7.2.3	Disposal Of Decontamination Wastes	7-7
8.	EMERGENCY CONTINGENCY PLAN	8-1
8.1	General	8-1
8.2	Responsibilities	8-1
8.2.1	Field Manager/Site Safety Officer	8-1
8.2.2	Other Onsite Personnel	8-1
8.3	Emergency Equipment	8-1
8.3.1	First Aid Kit	8-1
8.3.2	Fire Extinguisher	8-2
8.3.3	Eyewash Units	8-2
8.4	Response Actions—Safety Equipment Problems	8-2
8.5	Response Actions—Medical Emergencies	8-2

8.6	Response Actions-Chemical Release or Other Significant Incident	8-2
8.6.1	Incident Response Actions	8-2
8.7	Injury/incident Follow-Up Actions	8-4
8.7.1	Medical Assistance	8-5
9.	REFERENCES	9-1

APPENDIX

A	Response to Comments
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ATTACHMENTS

A	Health and Safety Forms
B	General Safety Rules for Subcontractors
C	Drill Rig Safety Guidelines
D	Task Hazard Analyses
E	Heavy Equipment Certification
F	HSP/APP Cross Reference

FIGURES

8-1	Hospital Location Map	8-7
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TABLES

3-1	Potential PRLs and Associated Contaminants	3-1
4-1	WBGT Values for Level D Work/Rest Cycles	4-7
4-2	WBGT Values for CPC Work/Rest Cycles	4-7
6-1	Air Monitoring Instrumentation	6-4
6-2	Monitoring Procedures and Action Levels for Intrusive Activities	6-5
8-1	How to Respond to Medical Emergencies	8-5
8-2	Emergency Telephone Numbers	8-6

PAGE NO. viii

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APP	accident prevention plan
bgs	below ground surface
bpm	beats per minute
BTEX	benzene, toluene, ethylbenzene, and xylene
CIH	Certified Industrial Hygienist
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	central nervous system
CRZ	contamination reduction zone
CSP	Certified Safety Professional
CTO	contract task order
dBA	decibels (A-weighted scale)
EPA	Environmental Protection Agency, United States
ES&H	environmental, safety and health
FM	field manager
H&S	health and safety
H&SM	health and safety manager
H&SP	health and safety professional
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
IDLH	immediately dangerous to life or health
IDW	investigation-derived waste
mg/m ³	milligram per cubic meter
MCAS	Marine Corps Air Station
MEK	methyl ethyl ketone
MSDS	material safety data sheet
NIOSH	National Institute of Occupational Safety and Health
NRR	noise reduction rating
OSHA	Occupational Safety and Health Administration
PAH	polynucleararomatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	Perchloroethylene/tetrachloroethylene
PEL	permissible exposure limit
PPE	personal protective equipment
ppm	part per million
PRL	potential release locations
RM	response manager
SAP	sampling and analysis plan
SRI	supervisor's report of incident
SSO	site safety officer
STEL	short-term exposure limit
SVOC	semi-volatile organic compound
SWDIV	Southwest Division, Naval Facilities Engineering Command
TCA	tetrachloroethane
TCE	trichloroethylene
THA	task hazard analysis
TLV	threshold limit value
TPH	total petroleum hydrocarbons

WBGT	wet bulb globe temperature
WP	work plan
VOC	volatile organic compound

1. INTRODUCTION

The provisions of this Health and Safety Plan (HSP) are mandatory for all Earth Tech personnel involved in the Preliminary Assessment of Potential Release Locations at the former Marine Corps Air Station (MCAS) El Toro, California. This HSP also provides the specification for the minimum acceptable requirements for all subcontractor organizations, and notification of the chemical and physical hazards known to be associated with the Earth Tech-managed activities addressed in this document.

Operational changes to this HSP that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the Earth Tech Contract Task Order (CTO) Manager and the cognizant Earth Tech Health and Safety Professional (H&SP). In the event of a conflict between this HSP and federal, state, or local regulations, the most stringent will apply.

These work activities to be conducted by Earth Tech on behalf of the Southwest Division, Naval Facilities Engineering Command (SWDIV), was authorized by the Pacific Division, Naval Facilities Engineering Command (PACNAVFACENGCOM) as part of Contract Task Order (CTO) No. 0104 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) II program, contract number N62742-94-D-0048.

1.1 HEALTH AND SAFETY POLICY STATEMENT

It is the policy of Earth Tech to provide a safe and healthful work environment for all its employees. Earth Tech considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At Earth Tech, we believe every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident.

This HSP presents procedures to be employed during all on-site work activities. The practices and procedures presented in this HSP are mandatory for all Earth Tech employees (and subcontractors) while engaged in work operations at the site. Earth Tech also requires that all visitors to areas under its control abide by these procedures.

1.2 CLASSIFICATION OF ACTIVITIES

The planned work activities are considered to be Hazardous Waste Operations as defined in Title 8 of the California Code of Regulations (CCR) Part 5192, Paragraph (b) [8 CCR §5192(b)].

1.3 REGULATORY REQUIREMENTS

This HSP meets the requirements and follows the guidelines established by the U.S. Navy, Federal and State of California regulatory agencies in the following documents:

- U.S. Army Corps of Engineers, Safety and Health Requirements Manual, EM-385-1-1
- U.S. Department of Labor Occupational Safety and Health Administration (OSHA) – 29 CFR Part 1910 and Part 1926
- Title 8, Chapter 4, Subchapter 7 of the California Code of Regulations, *General Industry Safety Orders*, with special attention to 8 CCR §5192

- Navy/Marine Corps Installation Restoration Manual, 2000 Update

The requirements specified in this HSP also conform to the CLEAN Health and Safety Program requirements set forth in the CLEAN Program Health and Safety Manual (Earth Tech, 1996), as well as Earth Tech's Corporate Environmental, Safety, and Health Program requirements.

2. MANAGEMENT OF HEALTH AND SAFETY RESPONSIBILITIES

Project/field-level management of health and safety requires that a management organization be established for each project. The organizational structure will be standardized for each Earth Tech project, and will consist of the following positions/responsibilities.

2.1 CLEAN PROGRAM MANAGER (MR. KEN VINSON, P.E.)

Earth Tech's CLEAN Program Manager is responsible for ensuring that CTO Managers are provided with adequate programmatic guidance, resources and support to enable safe planning and performance of field operations. Programmatic management and technical aspects of this responsibility are delegated to the CLEAN Health and Safety Manager (H&SM), however the Program Manager will retain ultimate responsibility for ensuring that work activities are performed safely.

2.2 CLEAN HEALTH AND SAFETY MANAGER (MR. ROBERT POLL, CIH, CSP)

The CLEAN Health and Safety Manager (H&SM) oversees the technical and programmatic aspects of Earth Tech's Corporate and CLEAN Health and Safety Programs. In addition, the H&SM exercises CTO-specific duties that include:

- Review and approval of this HSP
- Approval of the designated Site Safety Officer
- Review of all personal exposure monitoring results
- Investigation of any reported unsafe acts or conditions.

For this project the H&SM will also serve as the assigned Health and Safety Professional (H&SP), and will provide the CTO with all H&S-related technical services and support. The H&SM will be the first point-of-contact for all CTO H&S matters.

2.3 CTO MANAGER (MR. ELI VEDAGIRI)

The CTO Manager is responsible for coordinating with local Navy representatives, task managers, and subcontractors to complete all projects in accordance with requirements set forth in this HSP and/or other project H&S documentation. The CTO Manager has final responsibility for managing all aspects of the work operations, and is responsible to Earth Tech management for the safe performance and completion of the work activities. Specific safety-related duties include:

- Ensuring that an approved HSP is prepared and addresses all aspects of the work to be performed
- Ensuring that all personnel assigned to perform on-site activities meet the required qualifications
- Providing adequate resources and supplies to fulfill all work-safety requirements
- Assigning the Field Manager and Site Safety Officer, to provide on-site management of work activities

- Contacting the H&SP for guidance regarding any health and safety related matters

2.4 FIELD MANAGER (MR. ROD LAZO)

At each field work site, a Field Manager (FM) will be assigned who manages all Earth Tech and subcontractor activities at the site, and is responsible for field implementation of the specified H&S requirements. This includes communicating site requirements to all personnel, observing that field supervisors and subcontractors enforce all provisions of the HSP/other H&S documentation, working with the Site Safety Officer to implement all H&S performance elements, and consulting with the H&SP regarding any necessary changes to H&S requirements. Other responsibilities include:

- Reading and becoming familiar with the HSP
- Enforcing the HSP and other safety regulations
- Ensuring that no work is performed which is not properly addressed in this HSP (or approved supplemental guidance)
- Maintaining the presence of at least two qualified first aid providers on site at all times
- Contacting the H&SP for guidance regarding any health and safety related matters

2.5 SITE SAFETY OFFICER (MR. ROD LAZO)

The FM or designated alternate will serve as the Site Safety Officer (SSO) for each field location, and will be responsible for the execution of the routine on-site duties for health and safety, with assistance and direction from the designated H&SP. The responsibilities of the SSO include:

- Conducting periodic safety reviews of the project site and project documentation
- Performing regular and frequent site inspections to identify hazards and observe employees at work
- Stopping work, as required, to maintain personal and environmental health and safety
- Determining emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation
- Ensuring that all site personnel and visitors have received the proper training and medical clearance prior to entering the site
- Establishing any necessary controlled work areas (as designated in this HSP or other H&S documentation)
- Presenting tailgate safety meetings and maintaining attendance logs and records
- Discussing potential health and safety hazards with the FM, H&SP and the CTO Manager

- Implementing air monitoring according to directives in this HSP or other H&S documentation and forwarding all employee exposure monitoring information to the H&SP to enable the exposure notification
- Implementing the field elements of the Earth Tech Respiratory Protection Program
- Maintaining decontamination procedures that meet established criteria

2.6 SUBCONTRACTORS

Any Earth Tech subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personal protective equipment.

Earth Tech considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with those regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to Earth Tech for review prior to the start of on-site activities, if required. In the event that subcontractor procedures/requirements conflict with requirements specified in this HSP, the more stringent guidance will be adopted.

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

Attachment B provides Earth Tech's general subcontractor safety rules, which will be observed by all subcontractor organizations.

2.7 ONSITE PERSONNEL AND VISITORS

Each person (Earth Tech or subcontractor employee) is responsible for his/her own health and safety, for completing assigned tasks in a safe manner, and for reporting any unsafe acts or conditions to his/her supervisor and/or the FM/SSO. All personnel are responsible for continuous adherence to the specified health and safety procedures during the performance of their work. No person may work in a manner that conflicts with the letter or intent of safety and environmental precautions expressed in these procedures. After due warnings, Earth Tech will dismiss from the work site any person who violates safety procedures. Earth Tech employees are subject to progressive discipline and may be terminated for blatant or continued violations.

All personnel working for Earth Tech and its subcontractors are required to read and acknowledge their understanding of the HSP and any other applicable H&S documentation. All visitors to controlled work areas of any project site must likewise read and acknowledge their understanding of the applicable H&S requirements. All personnel are expected to abide by all written H&S requirements and any supplementary instructions communicated by the FM/SSO, and cooperate

with supervisory personnel to ensure a safe and healthful work site. Site personnel are required to report immediately any of the following to the FM:

- Accidents and injuries, no matter how minor
- Unexpected or uncontrolled releases of any hazardous substances
- Any symptoms of exposure to a hazardous substance
- Any unsafe or malfunctioning equipment
- Any changes in site conditions that may affect the health or safety of project personnel

3. SUMMARY OF SITE CONDITIONS AND PLANNED WORK ACTIVITIES

The following is a summary of relevant data concerning sites to be evaluated by Earth Tech, and work procedures to be performed. The Work Plan prepared by Earth Tech as a companion document to this HSP provides significantly greater details concerning both site history and planned work operations.

3.1 SITE CONDITIONS

Former MCAS El Toro is located in a semi-urban, agricultural area of southern California, approximately 8 miles south of Santa Ana and 12 miles northeast of Laguna Beach (Figure 1-1). MCAS El Toro covers approximately 4,738 acres. Land use around the MCAS includes commercial, light industrial, and residential. MCAS El Toro closed on 2 July 1999, as part of the Base Realignment and Closure (BRAC) Act.

Earth Tech will perform preliminary assessment of a variety of buildings and areas. Although there are a large number of Potential Release Locations (PRLs) where Earth Tech will conduct EBS activities, the sites can be categorized into eight groups, each of which share similar characteristics and present similar hazards. The eight PRL groups are presented in the following table.

Table 3-1: Potential PRLs and Associated Contaminants

PRL Groups	Primary Suspected Contaminants
Storage Tanks (USTs or ASTs)	Fuel hydrocarbons, VOCs, SVOCs, PAHs
PCB Storage Equipment	PCBs
Temporary Accumulation Areas	Fuel hydrocarbons, VOCs, SVOCs, PCBs, metals, waste oils, pesticides, herbicides
Hazardous Waste Storage Areas	Fuel hydrocarbons, VOCs, SVOCs, PCBs, metals, waste oils, pesticides, herbicides
Fuel Pipelines	Fuel hydrocarbons, VOCs, SVOCs, PAHs
Ordnance Sites	Lead and other metals
Airfield Operations	Fuel hydrocarbons, VOCs, SVOCs, metals, PCBs, PAHs, waste oils
Railroad operations	Fuel hydrocarbons, VOCs, SVOCs, PCBs, PAHs, metals, waste oils, pesticides, herbicides

Although knowledge of past activities at the different PRL groups allows identification of the most likely environmental contaminants that might be present group-wise, sufficient data is not available for individual PRLs. Consequently, it precludes the elimination of any type of contamination as a potential concern. Therefore, as site activities proceed, precautionary measures will be implemented at all times to provide adequate exposure control for any or all of the contaminants identified in Table 3-1 and Section 5.2.

3.2 PLANNED WORK OPERATIONS

Earth Tech completed a visual evaluation of a variety of PRLs. Based on results of that survey, and information concerning the previous environmental conditions of the site, Earth Tech will determine

the need to perform environmental sampling procedures to properly characterize potential impacts. Determinations concerning specific sample collection requirements will be made during the field operations; however, techniques that may be employed include:

- Manual Sampling (surface soil or debris)
- Hand Auger Sampling (near-surface soil, subsurface soil)
- Direct Push Sampling (subsurface soil, groundwater or soil gas samples)
- Hollow-stem Auger Sampling (subsurface soil or groundwater samples)
- Potholing
- Concrete Bulk Sampling

Specific numbers and locations of samples to be collected will be determined during the field operations.

3.2.1 Manual Sampling Procedures

Soil samples will be manually collected from the surface using pre-cleaned disposable trowels and placed into 16-ounce glass jars (except for samples to be analyzed for volatile analytes, which will be collected in accordance with Method 5035). This technique presents no significant potential for airborne release of contaminants since no significant soil disturbance occurs.

3.2.2 Hand Auger Sampling

A hand auger will be used to collect near-surface/subsurface soil samples to depths of approximately 5 feet. Hand augering involves the manual placement and insertion (turning) of a small auger blade. Soil is displaced by the blade, creating a hole that allows access to soils located below the ground surface. Since only small volumes of soil are disturbed, the potential for airborne release of contaminants when performing this work is minimal.

3.2.3 Direct Push Sampling

Direct push techniques allow collection of subsurface soil, groundwater and soil gas samples at depths that are not practical using hand augering. Direct push involves the insertion of metal "push rods" into the soil by the use of a hydraulic ram assembly. As depths increase additional rods can be added to provide a continuous run. The direct push probe can be fitted with a variety of sample probes to allow collection of soil in the subsurface environment, or collection of groundwater or soil vapor through a Teflon tube connected to a sampling mechanism at the surface. At the conclusion of direct push sampling procedure the push rods are withdrawn, and the hole can be sealed using grout or allowed to collapse naturally.

Direct push "drilling" produces little to no spoils, regardless of the depths obtained (soil is compressed to the sides of the hole rather than removed along an auger). For this reason, direct push techniques present little potential for the airborne release of contaminants as the rods are advanced or withdrawn.

3.2.4 Hollow-Stem Auger Sampling

Hollow-Stem Auger (HSA) techniques allow collection of subsurface soil and groundwater samples, and are capable of operating over a greater range of depths and through more types of subsurface obstacles than direct push techniques. In HSA, auger bits (similar to, though larger than, those in hand augering) are advanced by mechanical means (a drill rig); additional auger can be attached to the auger "flight" as depths are advanced. Soils removed by the auger collect at the surface as spoils, which must be collected and disposed of. This technique allows for the collection of subsurface soil and groundwater samples by the downhole insertion of sampling tools, and auger holes can be converted for long-term groundwater sampling through the construction of a groundwater monitoring well. At the conclusion of an HSA sampling event the hole is typically sealed by the use of grout or a similar material, unless a monitoring well is constructed.

The removal of significant spoils, and the vapor migration space provided by the hollow auger stem can allow significant emissions of vapor-phase contaminants (in the event that volatile contaminants are present). Dusts from the surface spoils (entrained by wind on the site) released by augering can produce significant concentrations of contaminated aerosols where soils have been impacted by subsurface contamination.

3.2.5 Potholing

In some instances, it is desirable to directly observe subsurface soil/debris. Potholing allows this through the digging of a small excavation to the desired depth. A backhoe or other excavator is used, and excavated soils are placed adjacent to the pothole for use during backfilling. Since the walls of an open excavation can collapse, no entry into a pothole is permitted.

Because potholing is a highly intrusive technique, significant emissions of vapor or aerosol phase contaminants can occur.

3.2.6 Additional Work Procedures

The following additional procedures will be performed to support the field sampling efforts.

Surveying - Sampling locations will be identified with a survey stake placed adjacent to the sample location. Following this, a land surveyor will locate and map the sampling points based on the stakes. A plan view of the horizontal limits will be prepared for use on design drawings.

Geophysical Surveying - Geophysical surveys will be completed at suspected underground storage tank (UST) sites. The geophysical survey will determine the presence of subsurface anomalies and assist in determining if the suspected UST exists.

Concrete Coring - Sampling inside buildings or beneath foundation structures may require the removal of obstructing concrete. A large-diameter core barrel will be placed at the sampling site and rotated to cut through the concrete. The concrete "cap" is then removed, exposing the subsurface. During concrete coring, water is typically applied to remove heat generated by the coring machine, and to reduce dust emission levels.

Investigation-derived waste (IDW) Management - IDW will be collected and categorized as non-hazardous or hazardous. Potentially hazardous IDW (drill cuttings, purge water, decontamination fluids, etc.) will be tested and disposed of within 90 calendar days of completing the field activities. Non-hazardous IDW (normal trash) will be disposed of in a timely fashion following fieldwork.

4. GENERAL HEALTH AND SAFETY PROCEDURES

The following requirements apply to all work activities to be conducted during the sampling investigation to support the environmental baseline survey.

4.1 HAZWOPER REQUIREMENTS

All personnel assigned to investigation activities must be HAZWOPER-qualified by meeting the following training and medical monitoring requirements.

4.1.1 Medical Screening and Health Surveillance

Personnel performing sample collection/handling activities must have completed the following medical examination requirements in compliance with 8 CCR §5192 (f). Additional medical monitoring requirements are associated with Earth Tech's programmatic health and safety programs (e.g., hearing conservation, respiratory protection).

A physician specializing in occupational medicine will specify exam procedures and tests, and review the results of medical examinations. The medical evaluation must include a judgment of the employee's ability to use respiratory protective equipment and to participate in hazardous waste site activities. The examining physician must document his evaluation/recommendations in writing. Restrictions of onsite activities may be required for personnel with certain medical conditions, which could be aggravated by chemical exposure or physical demands at the site. Each employee is responsible for notifying the Health and Safety Professional of physical or medical restrictions. The Health and Safety Professional will then ensure that project management observes and enforces the restrictions. A copy of each person's written medical evaluation will be made available for review following a request from the Health and Safety Professional. Employees who have not received a medical examination within 12 months (365 days) of their previous medical exam will be required to immediately obtain an appropriate medical exam and provide a copy of the medical evaluation to the H&SP for review prior to starting work on the project.

4.1.2 HAZWOPER Training Requirements

Personnel involved with sample collection/handling must successfully complete training meeting the provisions established in 8 CCR §5192 (e)(2) and (e)(3) (40-hour or 24-hour initial training). All personnel will also receive annual refresher training in accordance with 8 CCR §5192 (e)(8), and must have completed the most recent training course within the previous 365 days.

Work supervisors will also receive an additional required 8 hours of training addressing supervisor responsibilities and obligations in maintaining an effective health and safety program in accordance with 8 CCR §5192 (e)(4).

4.1.3 Visitor Clearances

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

1. A written confirmation must be received by Earth Tech documenting that each of the visitors has received the proper training and medical monitoring required by this HSP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization

2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.

If the site visitor requires entry to any Exclusion Zone, but does not comply with the above requirements, all work activities within the Exclusion Zone must be suspended and monitoring using direct reading instruments must indicate that no airborne contaminant concentrations are present which exceed the established background levels. Until these requirements have been met, entry will not be permitted.

4.2 ON-SITE TRAINING PROCEDURES

The following training procedures will be accomplished for all operational activities.

4.2.1 Initial Orientation Training

All on-site personnel will be trained about potential hazards at the work site, and exposure prevention or control measures. Field personnel will be:

1. Instructed on the contents of applicable portions of this plan.
2. Made aware of task-specific physical hazards and other hazards, which may be encountered during site work (see the Task Hazard Analyses in Attachment D).
3. Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure, and heat stress.
4. Made aware of fire prevention measures, fire extinguishment methods, and evacuation procedures.

The FM shall ensure that this training is provided to each person prior to his/her entry into any controlled area. All site-specific training should be documented on the *Tailgate Safety Briefing Sign-in Log*, a copy of which is found in Attachment A.

4.2.2 Tailgate Safety Briefings

A tailgate safety briefing will be conducted at the start of each work day. The SSO will conduct the tailgate safety briefings, and will review and discuss the health and safety issues associated with the day's planned work activities, problems encountered, and modifications to existing procedures. Documentation of the tailgate safety briefings will be accomplished by using the *Tailgate Safety Briefing Sign-in Log*, a copy of which is found in Attachment A. The SSO will maintain copies of all tailgate safety briefing sign-in logs in the project files. All field personnel associated with each day's project activities are required to attend these meetings.

4.2.3 Hazard Communication Training

Section 5.2 provides information concerning the materials that may be encountered as environmental contaminant during the work activities. In addition, any organization wishing to bring any hazardous material onto any Earth Tech-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for approval and filing (the SSO will maintain copies of all MSDSs on site). MSDSs may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable. In

accordance with the requirements of Earth Tech Health and Safety Procedure HS401, *Hazard Communication*, all personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all MSDSs.

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

4.3 GENERAL SITE SAFETY RULES

All personnel must abide by the following requirements regarding smoking, eating, drinking, contact with contaminated materials, site awareness, housekeeping, and communications.

4.3.1 Smoking, Eating, and Drinking

Except where exempted by the SSO, smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any Earth Tech site.

4.3.2 Housekeeping

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

4.3.3 Personal Hygiene

In accordance with EM 385-1-1 Section 2, the following requirements will be observed:

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

- **Potable Water** - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.
- **Non-Potable Water** - Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

**Non-Potable Water
Not Intended for Drinking Water Consumption**

Toilet Facilities: A minimum of one toilet facility will be provided for each sex in a group of 20 employees or less. Where there are less than 5 employees, a toilet facility for each sex need not be provided. Exceptions to this requirement will apply to mobile crews where work activities and locations permit transportation to nearby toilet facilities.

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

4.3.4 Buddy System

All field personnel shall use the buddy system when working within any controlled work area. Personnel belonging to another organization onsite can serve as “buddies” for Earth Tech personnel. Under no circumstances shall an Earth Tech employee be present alone in a controlled work area.

4.3.5 Lighting

At a minimum, all portions of each work location will be sufficiently lit so that all surfaces are illuminated at 10 foot-candles or greater. Since work activities are expected to be conducted exclusively outdoors and during daylight hours, the use of supplemental lighting is not anticipated. However, should a need for supplemental lighting be identified (nighttime work activities are required, etc.), its use will conform to the following requirements.

Portable lighting may require the use of a portable generator to provide power. Care should be taken in the operation of this equipment. Only personnel trained in the operations and maintenance of generators will be permitted to operate the units. All electrical systems will include only Underwriters Laboratory (UL®)-approved components (or European Union equivalent), and all usage will conform to the following safety requirements:

Grounding. The non-current-carrying metal parts of fixed, portable, or plug-connected equipment shall be grounded. Electrical connections shall include a ground-fault interrupter system. Ground wires shall be tested with an electrical resistance meter to assure conductivity as often as necessary to assure safety. Portable tools and appliances protected by an approved system of double insulation need not be grounded.

Extension Cords. Extension Cords shall be the three-wire type for grounded tools (two-wire is permissible for double-insulated tools) and shall be protected from damage; do not fasten with staples or extend across an aisle way or walkway. Worn or frayed cords shall not be used. Cords shall not be run through doorways where the door could cut or damage them.

Light Bulbs. Exposed bulbs on temporary lights shall be guarded to prevent accidental contact, except where bulbs are deeply recessed in the reflector. Temporary lights shall not be suspended by their electric cords unless designed for this use. Explosion-proof bulb covers shall be used when contact with flammable vapors or gases is likely and shall meet Class I, Division I requirements.

Electrical Receptacles. Receptacles for attachment plugs shall be of the approved, dead-front, concealed contact type. Where different voltages, frequencies, or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.

Wet Environments. Work done in wet environments shall require ground fault interrupters and water-tight connectors.

If maintenance of electrical systems is required, the equipment will be de-energized and locked-out using an approved lock-out device. The lock will be removed only by the person performing the maintenance work.

4.4 CONTROLLED WORK AREAS

The area surrounding each sampling location presents hazards related to the physical hazards associated with the work procedures. To minimize hazards to personnel not directly involved in sampling procedures a controlled work area will be established. The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities. To meet this requirement, the following minimum distances will be used:

- **Direct Push Drilling Activities.** A distance of 20 feet in all directions will be cleared from the rig.
- **HSA Drilling.** Determine the mast height of the drill rig. This height will be cleared, if practical, in all directions from the bore-hole location and designated as the exclusion zone. The cleared area will be sufficient to accommodate movement of necessary equipment and the stockpiling of spoils piles.
- **Potholing Activities.** A distance of 25 feet will be cleared in all directions from the backhoe and the location where the excavated soil is deposited.
- **Slab Cutting.** A distance of 10 feet in all directions from the cutting location will be cleared when using manual methods (i.e., chisel or equivalent) and 20 feet when using a concrete saw.
- **Hand Augering.** A distance of 10 feet will be cleared in all directions from the sampling location in order to accommodate additional sampling equipment.
- **Concrete Bulk Sampling.** A distance of 10 feet will be cleared in all directions from the bulk collection point.

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

4.4.1 Work Area Control Records

The SSO will record the identities of all personnel working or entering the Exclusion Zone each day.

4.5 DRUM HANDLING

Drum sampling activities are not a specific part of the preliminary assessment activities. However, due to the potential for use of drums for containerization of spoils and decontamination water, this section has been included as a standard part of Earth Tech's Health and Safety Plan.

The handling of all containers used for storage of materials will be performed in accordance with the requirements of Earth Tech Health and Safety Procedure HS 724, *Handling of Drums and other Large Containers*, and the following:

- Where containers of capacity greater than 10 gallons are used for containerizing chemical products or waste materials, handling of the containers will be accomplished in accordance with the following:
 - When not in use, drums/containers will be covered with tight fitting lids
 - At the conclusion of each work shift all drums/containers will be placed in a designated waste storage area. This area will be properly marked and secured
 - Mechanical or powered drum handling equipment will be used to move drums/containers. Manual handling of the drums leads to musculo-skeletal injuries and will be avoided to the maximum extent possible.

If sampling of drums for waste characterization purposes is required, it will be accomplished in a manner to minimize potential for skin contact. Handling of potentially contaminated soils and groundwater presents the risk of contact with hazardous substances. In order to provide protection against skin contact with contaminated materials, all sample collection activities will be performed using Modified Level D protective equipment ensembles. Specified personnel decontamination procedures will also be observed.

4.6 HEAT STRESS PREVENTION

Heat stress can be a significant field site hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress casualties.

Workers should be encouraged to immediately report any difficulties or heat-related problems that they may experience or observe in fellow workers. Supervisors should use such information to alter the work-break schedule to accommodate such problems. During breaks, workers should be encouraged to drink plenty of water or other liquids to replace lost fluids and to help cool off. Should any worker exhibit signs of severe heat distress, such as profuse sweating, extreme confusion and irritability, or pale, clammy skin, that worker should be relieved of all duties at once and made to rest in a cool location and drink plenty of water. Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) should be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.). Severe heat stress (heat stroke) is a life threatening condition that must be treated by competent medical authority.

Heat Stress Monitoring

The prevention of heat stress-related accidents/illnesses is best performed through continuous observation of employees and routine heat stress awareness training activities. Heat stress monitoring can be accomplished using one of the techniques discussed below.

Any results obtained from monitoring techniques should be used as guidance only. To properly mitigate the effects of heat stress, it is necessary to establish a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of such work breaks must be determined by the individual work location supervisor based upon factors such as the

ambient temperature and sunshine, the amount of physical labor being performed, the physical condition of the workers, and protective clothing being used. While heat stress measurement techniques provide guidance in optimizing this routine, breaks must always be sufficient to prevent workers from manifesting symptoms of heat stress regardless of monitoring results.

Evaluation of heat stress, to determine appropriate work/rest cycles, will be performed whenever fieldwork activities are occurring at ambient temperatures greater than 70 degrees F. The Basic Instrument Measurements Method shown below must be used for personnel using *Level D protective equipment only*. Where any type of chemically protective clothing (CPC) is in use the Modified Instrument Measurements Method will be used together with the Direct Observation method to provide guidance in appropriate work/rest cycles.

Basic Instrument Measurements Method: This method will only be used to monitor heat stress where workers are not using chemically protective clothing. The Wet Bulb Globe Temperature (WBGT) value will be determined using a WBGT meter (Reuter-Stokes 214 DL or equivalent), and compared with the values shown in Table 4-1 to determine appropriate work/rest cycles.

Modified Instrument Measurements Method: This method will be used whenever personnel use chemically protective clothing. The WBGT value will be determined as above. The measured value will then be compared with the values shown in Table 4-2 to determine the appropriate work/rest cycle.

Table 4-1: WBGT Values for Level D Work/Rest Cycles

Work-Rest Regimen	°F -WBGT ^a			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85	81	78	N/A
75% Work – 25% Rest	86	83	81	N/A
50% Work – 50% Rest	88	85	83	81
25% Work – 75% Rest	90	87	86	85

^aModified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents for acclimatized workers

Table 4-2: WBGT Values for CPC Work/Rest Cycles

Work-Rest Regimen	°F -WBGT ^a			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74	70	67	N/A
75% Work – 25% Rest	75	72	70	N/A
50% Work – 50% Rest	77	74	72	70
25% Work – 75% Rest	79	76	75	74

^aModified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents for acclimatized workers

Direct Observation: This method can be used as a substitute for the Modified Instrument Measurements Method, and can be used whenever personnel use chemically protective clothing.

At the start of the workday each worker's baseline pulse rate will be determined in beats per minute (bpm). Worker pulse rates will then be measured at the beginning and end of each break period. As recommended by the ACGIH each worker's maximum heart rate at the start of any break should be less than [180 minus workers age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes. At the end of each work period all workers heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be re-measured and the end-of-break criteria again applied.

Heat-Related Illnesses

The following guidance can be used in the identification and treatment of heat-related illness.

Mild Heat Strain. The mildest form of heat-related illness. Victims exhibit irritability, lethargy, and significant sweating. The victim may complain of headache or nausea. This is the initial stage of overheating, and prompt action at this point may prevent more severe heat-related illness from occurring.

First Aid: Provide the victim with a work break during which he/she may relax, remove any excess protective clothing, and drink cool fluids. If an air-conditioned spot is available this is an ideal break location. Once the victim shows improvement he/she may resume working, however the work pace should be moderated to prevent recurrence of the symptoms.

Heat Exhaustion. Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. The victim exhibits an extremely high body temperature ($> 102^{\circ}\text{F}$). The bowels may move involuntarily. The victim is very pale, with clammy skin, and he or she may perspire profusely. The pulse is weak and fast, breathing is shallow. He or she may faint unless they lie down.

First Aid: Immediately remove the victim from the work area, to a shady or cool area with good air circulation (avoid drafts or sudden chilling). Remove all protective outerwear. Call a physician. Treat the victim for shock. (Make the victim lie down, raise his or her feet 6-12 inches, and keep him or her cool by loosening all clothing). If the victim is conscious, it may be helpful to give him or her sips of water. Transport victim to a medical facility as soon as possible.

Heat Stroke. This is the most serious of heat illness, and represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105°F - 110°F . As the victim progresses toward heat stroke symptoms such as headache, dizziness, nausea can be noted, and the skin is observed to be dry, red, and hot. Sudden collapse and loss of consciousness follows quickly and death is imminent if exposure continues. Heat stroke can occur suddenly.

First Aid: Immediately evacuate the victim to a cool and shady area. Remove all protective outerwear and all personal clothing. Lay the victim on his or her back with the head and shoulders slightly elevated. Apply cold wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water. The main objective is to cool without chilling the victim. Give no stimulants or hot drinks. Since heat stroke is a severe medical condition requiring professional medical attention emergency medical help should be summoned immediately to provide on-site treatment of the victim and proper transport to a medical facility.

4.7 INJURY REPORTING

Any workplace accident will be promptly reported to the SSO and the FM.

If any Earth Tech employee requires medical treatment Earth Tech's Workers Compensation Adjuster, Sedgwick CMS (877-261-8926) will be notified. The PM will initiate a written report, using the *Supervisor's Report of Incident* form (found in Attachment A). The PM will complete the first three sections of this form, and forward to the H&SP within 24 hours of the incident.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures, however copies of all documentation (which at a minimum must include the OSHA Form 101 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

The H&SP will review the documentation and assist in the performance of any necessary accident investigation or other follow-up. The PM will ensure that the recommendations resulting from any investigation are implemented without delay.

5. HAZARD ANALYSES

For this project, Earth Tech will perform field sampling/investigation tasks associated with the EBS at MCAS El Toro. Performance of these tasks can expose personnel to a variety of hazards due to the operational activities, physical conditions of the work locations, and the potential presence of environmental contaminants (see Section 3.1.1).

5.1 SPECIFICATION OF WORK TASKS

The following is a listing of the work tasks to be performed. A task hazard analysis (THA) has been prepared for each which details the activity, identifies the related hazards and applicable safety procedures, and specifies any additional requirements (e.g., monitoring procedures). The THAs can be found in Attachment D.

1. Visual Site Inspection/Surveying/Geophysical Surveying
2. Concrete Coring
3. Manual Sampling (surface soil or debris)
4. Hand Auger Sampling (near-surface soil, subsurface soil)
5. Direct Push Sampling (subsurface soil, groundwater or soil gas samples)
6. Hollow-stem Auger Sampling (subsurface soil or groundwater samples)
7. Potholing

5.1.1 Unanticipated Work Activities

Where work activities are identified which are not addressed in this HSP, appropriate safety documentation and procedures will be implemented. Prior to initiation of work activities any subcontractor organization tasked with performance of such work will submit a work procedure document, which presents appropriate safety procedures applicable to the specific work activities to be undertaken. Submitted safety procedures will be reviewed by the H&SP for adequacy and compliance with applicable regulatory requirements and the requirements presented in this HSP. Work will not be initiated until this review is completed and any identified deficiencies corrected to the satisfaction of the H&SP.

The H&SP may issue an exemption to this requirement based on the nature of the work activities to be undertaken.

5.2 SUSPECTED ENVIRONMENTAL CONTAMINANTS

The information presented below is intended to inform site personnel about the expected hazards associated with known or suspected environmental contaminants. Hazards associated with the use of commercially available hazardous materials are addressed as part of worker hazard communication requirements (see Section 4.2.3).

Suspected environmental contaminants include:

- Petroleum Hydrocarbons

- Waste solvents
- Heavy metals
- Polynuclearcyclic Aromatic Hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Dioxins
- Acid wastes
- Miscellaneous pesticides/herbicides

5.2.1 Petroleum Hydrocarbon Fuels (Gasoline/Diesel Fuel)

Petroleum hydrocarbon fuels compounds are complex mixtures of aromatic compounds. The most commonly encountered of these materials are the hydrocarbon fuels gasoline and diesel fuel. The constituents of hydrocarbon fuels possess a range of vapor pressures. For highly volatile components, chronic exposures or exposures to a high concentration may cause unconsciousness, coma, and possible death from respiratory failure. Exposure to low concentrations of vapor may produce flushing of the face, slurred speech, and mental confusion. Fuels are also irritating to the skin, and may cause drying and dermatitis as a result of prolonged contact.

Various components and additives of the fuels can themselves present significant additional hazards. The aromatic compounds benzene, toluene, ethylbenzene and xylene (BTEX) are of greatest concern in relation to site investigation activities. However some additives used for performance enhancement and water scavenging can also present significant hazards as a result of prolonged inhalation or skin exposure.

Control of inhalation exposure to petroleum fuels (and the various components and additives) can be accomplished through the use of air purifying respirators equipped with organic vapor cartridges. The use of skin protection (chemically-protective gloves, etc.) is required when handling fuel-contaminated materials.

5.2.2 Waste Solvents

The widespread use of organic solvent compounds for a variety of cleaning and surface treating industrial applications has occurred for many decades. During that time, usage patterns have changed as better compounds have been identified. Costs have changed and/or knowledge concerning the hazards associated with particular solvents has prompted replacement with less hazardous alternatives. Therefore there is no means for identifying which solvents may be present as environmental contaminants. In addition, many types of solvents, especially chlorinated compounds, break down in the environment into several intermediate solvent compounds (e.g., TCE can form several isomers of dichloroethylene).

The following information addresses the solvents commonly used in military activities. Should other solvent materials be identified, supplemental information can be provided to this HSP. However, since most solvents share similar hazards and modes of exposure, a single set of safety procedures should be adequate to protect against the range of materials.

Tetrachloroethylene (Perchloroethylene – PCE). PCE affects the central nervous system, causing uncoordination, headache, vertigo (loss of balance), light narcosis, dizziness, and unconsciousness. In extremely high concentrations death may occur. Various types of irritable effects have been attributed

to PCE exposure. Some of the symptoms involved include: eye, nose, and throat irritation, indications of nausea and intestinal gas, and possible changes to both the liver and the kidneys. Skin exposure to PCE has not been seen to produce harmful effects in cases where the PCE was allowed to evaporate immediately after contact. However, in cases where skin was exposed to PCE frequently and for prolonged periods of time without evaporating, symptoms of dermatitis by defatting of the skin was evident. PCE is listed as an anticipated human carcinogen by the NTP. The OSHA PEL and the ACGIH TLV are 25 ppm with an ACGIH STEL of 100.

Methylene Ethyl Ketone (MEK). MEK exhibits properties similar to other organic solvents. Acute exposure may lead to CNS depression, causing symptoms such as confusion, lethargy, nausea, and headache. Chronic exposure can result in damage to the liver. Exposure routes of concern are inhalation and skin absorption; further, skin contact can lead to the formation of contact dermatitis. Both the OSHA PEL and ACGIH TLV are 200 ppm.

Stoddard Solvent. Stoddard solvent, also known as white mineral spirits, is a colorless, flammable liquid, with a kerosene-like odor. It is widely used as a general cleaning and degreasing agent. Stoddard solvent is produced through refining of light petroleum distillates, and is composed of various paraffins, naphthenes and alkylbenzenes, with a trace of benzene. The effects of exposure to Stoddard solvent resemble the effects seen with gasoline, and can include nausea, cough and pulmonary irritation with acute exposures, and liver and blood-forming organ damage due to chronic exposure. Skin contact can produce irritation, drying/scaling, and development of dermatitis.

Adequate protection against elevated airborne concentrations of Stoddard solvent can be provided by air purifying respirators using organic vapor cartridges. The use of chemically resistant gloves and clothing is necessary where there is the potential for skin contact. The OSHA PEL is 500 ppm, while the ACGIH TLV is 100 ppm.

1,1,1-Trichloroethane (TCA). TCA (also known as methyl chloroform) exhibits low oral toxicity. It can defat the exposed skin of workers and cause redness and scaling. Although TCA has a low systemic toxicity, it is an anesthetic capable of causing death if inhaled at concentrations of 14,000 ppm to 15,000 ppm. Fatalities that have occurred in poorly ventilated areas such as pits or tanks are attributed to anesthesia and/or sensitization of the myocardium to epinephrine. Quick and complete recovery is reported upon prompt removal of unconscious exposed persons from the area of exposure. The exposure standards are set to prevent initial anesthetic effects and/or objections to the odor. Both the OSHA PEL and the ACGIH TLV are 350 ppm, while the OSHA and ACGIH STELS are 450 ppm.

Trichloroethylene (TCE). Moderate exposures to TCE cause symptoms similar to those of alcohol inebriation. Higher concentrations cause narcotic effects. Ventricular fibrillation has been cited as the cause of death following heavy exposures. TCE-induced hepatocellular carcinomas have been detected in mice during tests conducted by the National Cancer Institute. Organ systems affected by overexposure to TCE are the CNS (euphoria, analgesia, anesthesia), degeneration of the liver and kidneys, the lungs (tachypnea), heart (arrhythmia) and skin (irritation, vesication, and paralysis of fingers when immersed in liquid TCE). Contact with the liquid defats the skin, causing topical dermatitis. Certain people appear to experience synergistic effects from TCE exposure concomitant with exposure to caffeine, alcohol, and other drugs. Other reported symptoms of TCE exposure include abnormal fatigue, headache, irritability, gastric disturbances, and intolerance to alcohol. The OSHA PEL is 100 ppm, the ACGIH TLV is 50 ppm, and the ACGIH STEL is set at 100 ppm.

5.2.3 Heavy Metals

Heavy metals are toxic to a number of organs and organ systems in the body, including the liver, kidneys, blood-forming organs (primarily located in the bones), and the CNS. Acute exposure to metals can produce symptoms such as stomach distress and vomiting, mental confusion and sluggishness, heart palpitations, breathing difficulties, and renal (kidney) failure. Chronic exposure can be characterized by CNS degradation and deterioration of liver and kidney function.

The expected concentrations of heavy metals, although potentially of environmental concern, are not expected to be sufficient to present a significant occupational exposure hazard. The primary route of exposure to heavy metals during this project is contact with contaminated soils, which can lead to ingestion exposure through contamination of food. Protection against ingestion can be accomplished using a combination of protective clothing and decontamination procedures.

5.2.4 Polynuclearcyclic Aromatic Hydrocarbons (PAHs)

PAHs are produced during combustion events due to inadequate oxidation of fuel. Consequently, they may be encountered when opening the cap over landfill burn areas. PAHs in the pure state are yellowish crystalline solids. They are found in coal tar and in products of incomplete combustion. These chemicals have varying degrees of potency for causing cancer, with benzo(a)pyrene being among the most potent. The PAHs are evaluated collectively as COAL TAR PITCH VOLATILES. Coal tar pitch volatiles may cause photo-sensitization and a rash where sunlight strikes the skin. Exposure may also cause cancer of lungs, skin, bladder or kidneys. Benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3,c,d)pyrene have been identified as carcinogenic.

This information on PAH compounds is presented for site contaminant awareness. While the potential for site personnel sustaining significant inhalation exposures to volatilized PAH compounds during the site activities of this project is minimal, there is the potential for inhalation of PAH-contaminated dust, and handling of contaminated soils presents skin exposure hazards. Use of dust suppression techniques (as appropriate) and the proper use of the PPE will adequately protect against significant exposure.

5.2.5 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) were used in the past as a component of dielectric fluids in transformers and similar electrical equipment. PCB is actually a generic term used to refer to a family of similar chlorinated phenyl compounds.

PCBs can produce a number of toxic effects. Skin contact can lead to the production of an acne-like condition known as chloracne. PCBs are also readily absorbed through the skin, and chronic exposure via this route can lead to liver damage and possible reproductive effects. PCBs have also been identified as potential human carcinogens.

PCBs exhibit a relatively low vapor pressure, and present little potential for significant airborne exposure during site investigations. However, skin contact should be prevented through the use of chemically protective clothing when handling contaminated materials. Ingestion results largely from hand-to-mouth contact, and can be prevented through the use of proper decontamination procedures when exiting from PCB-contaminated areas. Both the ACGIH and OSHA have adopted the same exposure standards: PCBs containing 42 percent chlorine have a standard of 1 ppm, while those with 54 percent chlorine have a standard of 0.5 ppm.

5.2.6 Miscellaneous Pesticides/Herbicides

As with PAHs, pesticide compounds are solids at room temperature, and most are not readily absorbed through the skin without the aid of a solvent vehicle. Different classes of pesticides affect various organ systems: Organophosphorous pesticides (e.g., parathion) affect the central nervous system by inhibiting the function of enzyme acetylcholinesterase. Organochlorine pesticides (e.g., lindane) are also neurotoxins; however, they function by stimulation of CNS activity. Carbamates (e.g., aldicarb) function in a similar manner to organophosphorous compounds, by inhibition of acetylcholinesterase function. Other classes of pesticide compounds are primarily used as herbicide agents, and have only limited health effects in humans.

5.2.7 Assessment of Hazards

There is the potential for occupational exposure to occur through two direct routes (inhalation and skin contact) and one indirect route (ingestion). Descriptions of exposure hazards and protective measures for each contaminant type can be found in Sections 5.2.1 through 5.2.6.

Inhalation

Due to the unknown characteristics/contaminants at each site where intrusive operations will occur, a potential inhalation hazard exists during HSA drilling, potholing, and concrete coring (from beneath the slab). Real-time air monitoring, using a Photoionization Detector (PID), for airborne organic compounds will be conducted during these activities. In addition, the potential presence of heavy metals and PAHs requires that aerosol monitoring be accomplished to determine the dust concentration during the above activities.

Skin Contact

Contact with contaminated materials is likely during intrusive activities and collection/handling of environmental samples. However, protection against skin contact/absorption can be accomplished through the use of protective gloves/clothing (see Section 7.1).

Ingestion

Contact with contaminated materials is likely during intrusive activities and collection/handling of environmental samples. However, protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas (see Section 7.2.1).

6. ACTIVITY-SPECIFIC HEALTH AND SAFETY PROCEDURES

The following requirements will be observed during performance of this project and all on-site work activities.

6.1 SLIPS, TRIPS, FALLS, AND PROTRUDING OBJECTS

Hazards from protruding objects, careless movements, or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to ensure the prevention of such injuries.

6.2 HAZARDOUS NOISE ENVIRONMENTS

Working around large equipment often creates excessive noise. The effects of noise can include physical damage to the ear, pain, and temporary and/or permanent hearing loss. Workers can also be startled, annoyed, or distracted by noise during critical activities.

Earth Tech has compiled noise-monitoring data which indicates that work locations within 25 feet of operating heavy equipment (drill rigs, earthworking equipment, etc.) can result in exposure to hazardous levels of noise (levels greater than 90 dBA). Accordingly, all personnel are required to use hearing protection (ear plugs or ear muffs) within 25 feet to any operating piece of heavy equipment.

The Health and Safety Professional may also monitor employee exposure to hazardous noise levels as part of Earth Tech's Hearing Conservation Program.

6.3 HEAVY MACHINERY

The use of heavy machinery (e.g., direct push rigs, HSA drill rigs, and backhoes) poses significant hazards if equipment is not maintained in good working order. In order to assure that all equipment used on site presents no unwarranted safety hazards, the owner/operator of each drill rig must complete a *Drill Rig Safety Inspection Checklist*. Instructions and a copy of the submittal form can be found in Attachment C.

Operators should ensure that equipment is being run in a safe manner, and should be aware of the location of unprotected personnel at all times while operating this machinery to avoid serious accidents. Heavy equipment, such as backhoes, operators must also complete a *Heavy Equipment Certification* to ensure the safe operation of the equipment. The certification can be found in Attachment E.

6.4 UNDERGROUND UTILITIES

Various forms of underground utility lines or pipes may be encountered during intrusive work activities. Prior to the start of intrusive operations the following steps will be taken:

1. Underground Service Alert (Dig Alert) will be contacted at least 48 hours prior to the work.
2. Geophysical clearance will be performed.
3. Authorization will be obtained from all concerned public utility department offices.

Should intrusive operations cause equipment to come into contact with utility lines, the SSO and the Health and Safety Professional will be notified immediately, and a Supervisor's Report of Incident (see Attachment A) will be completed. Work will be suspended until the appropriate actions for the particular situations can be taken.

6.5 EXCAVATION SAFETY

Competent Person

The SSO or designated alternate will serve as the site's "competent person" for excavation operations. The designated competent person must meet the following qualifications:

- Has sufficient experience to identify existing and predictable hazards in the excavation surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees, and
- Is a registered Professional Engineer (P.E.) in civil engineering, or
- Has completed a minimum of 6 hours of training in excavation safety which includes the following elements:
 - Soils classification and identification.
 - Appropriate sloping/shoring methods.
 - Shoring system types and construction.
 - Operational safety practices.
 - Inspection of excavations.

The designated competent person will be responsible for overseeing excavation operations to ensure that they conform to the requirements of 8 CCR §1541 and 8 CCR §1541.1, and the following operational safety guidelines.

Operating Safety Guidelines

The following safe operating guidelines will apply to excavations exceeding 4 feet in depth.

1. Excavated materials will be stored and retained at least 3 feet from the edge of the excavation.
2. Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
3. Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
4. Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall will not be permitted unless the wall is underpinned and all other precautions have been taken to ensure the stability of the adjacent walls.
5. Diversion ditches, dikes or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.

6. When mobile equipment is used or allowed adjacent to excavations, stop logs or barricades will be installed. The grade will always be away from the excavation.
7. Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used upon the direction of the SSO.
8. Field personnel shall not enter any excavation, without specific direction, for any reason except to rescue injured individuals who have fallen into the excavated area.

All ladders used in excavation operations will be in accordance with the requirements of 8 CCR Sections 1675-1678.

6.6 HAND AND PORTABLE POWER TOOLS

Storage and handling

- All tools shall be stored in a manner to prevent damage and injury.
- Tools shall be properly put away after use.
- Sharp or pointed tools shall be handled only if the sharp/pointed edge is covered, carried in a tool box or other device designed for that purpose, or the sharp/pointed edge is pointed downward, away from the body.

Inspection and use requirements

- Hand and portable power tools shall be inspected prior to each use for defects or missing parts.
- Employees shall not modify tools.
- Hand-held power tools shall be equipped either with a constant pressure switch or control, and may have a lock-on control if turn-off can be accomplished with a single motion of the same finger or fingers that turned it on.
- Hand tools shall be used only for the purpose for which they were designed. Tools used in electrical work shall be equipped with non-conductive handles.
- Hand tools shall not be used if inspection indicates defects from the original design. These defects include the following:
 - Split, cracked, broken or splintered wood handles.
 - Mushroomed edges on equipment such as chisels, punches and wedges.
 - Sprung or cracked jaws (e.g., on pliers, wrenches)
 - Worn faces (e.g., on pliers, wrenches)
 - Bent straight tool (e.g., screwdriver)
 - Bent or cracked chains or a hook on chain falls.
- Chain falls and pulleys shall not be used for more than the rated capacities. This capacity shall be permanently and clearly marked.

- Hot sticks shall not be used in excess of the manufacturers rated capacity.
- Only grounded electric power tools, or tools that are clearly labeled as double insulated, shall be used.
- Pneumatic tools or the associated equipment (e.g., hoses) shall not be operated at air pressures higher than for which they are rated.
- A line supplying air to pneumatic grinders regulated by a governor shall be equipped with a filter to remove water, contaminated oil, and dirt.
- Pneumatic grinders regulated by a governor shall be provided with a means of continuous lubrication.
- Employees either operating or in the vicinity of powered staplers or nailers shall wear safety glasses.
- Adjustments or unjamming of power tools shall not be performed unless the power has been turned off, and, if plug operated, the plug is disconnected.
- A chain saw shall not be started within 10 feet of its refueling point.

6.7 CHEMICAL EXPOSURE MONITORING PROCEDURES

This section presents monitoring procedures that will be employed during bioinvestigation activities to assess employee exposure to chemical and physical hazards. Monitoring will consist primarily of onsite determination of various parameters (e.g., airborne contaminant concentrations and heat stress effects), but may be supplemented by more sophisticated monitoring techniques, if necessary.

Table 6-1: Air Monitoring Instrumentation

Instrument	Manufacturer/Model*	Substances Detected
Photoionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNu Model Hnu 10.2 eV Bulb	Petroleum hydrocarbons Organic Solvents
Colorimetric Detector Tubes	Sensidyne Draeger	Benzene 0.5–10 ppm
Aerosol Monitor	MIE Model PDM-3	Aerosols

* Or similar unit, as approved by H&SP

All instruments will be calibrated on a daily basis in accordance with the manufacturer's written procedures for each device. Calibration information for each instrument will be recorded in the site log.

The following monitoring procedures and response action levels will be used for each of the site types to be sampled.

6.7.1 Monitoring Procedures – Intrusive Activities (HSA Drilling, Potholing)

The monitoring procedures outlined in Table 6-2 will be followed during HSA drilling activities, and potholing activities.

Table 6-2: Monitoring Procedures and Action Levels for Intrusive Activities

Parameter	Zone Location and Monitoring Interval	Response Level (Above Background)	Response Activity
VOCs (total by PID)	Breathing Zone, every 30 minutes during HSA drilling activities	< 5 units	Continue work in required PPE and continue monitoring.
		5-15 units (sustained for more than 5 minutes)	Continue work in required PPE, continue monitoring, and use benzene detector tubes.
		15-50 units (sustained for more than 5 minutes)	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		> 50 units (sustained for more than 5 minutes)	Cease work, exit, and contact the H&SP and PM.
Benzene (by Colorimetric Tube)	Breathing zone, where indicated by VOC readings	No color change	Continue work activities.
		Noticeable color change up to 10 ppm	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		>10 ppm	Cease work, exit the area, and contact the SSO and PM.
VOCs (total by PID)	Edge of Exclusion Zones, every 30 minutes during HSA drilling activities	< 10 units	Continue work in required PPE, monitor air, and implement engineering controls.
		> 10 units (sustained for more than 5 minutes)	Continue mitigation measures and contact the SSO.
Aerosols (total by aerosol monitor)	Breathing zone every 30 minutes during HSA drilling activities	< 3 mg/m ³	Continue work in Level D, continue monitoring, and continue dust suppression measures
		3 – 15 mg/m ³	Contact the SSO, upgrade dust suppression measures, upgrade PPE to Level C (P100 cartridge).
		>15 mg/m ³	Cease activities and re-evaluate dust suppression measures; contact the H&SP

Note: All VOC monitoring will be conducted using PID only.

6.7.2 Monitoring Following Concrete Coring

Removal of the concrete cap after coring may result in the release of trapped VOCs. To prevent personnel exposure during subsequent work, a PID will be used to assess these emissions immediately after removal of the cap. The PID inlet will be placed at the center point of the hole, level with the surrounding concrete surface. If VOC levels exceed 25 ppm, personnel will move at least 15 feet from the hole and allow ventilation to occur for at least 15 minutes. The monitoring procedure should then be completed. If adequate clearance cannot be obtained after one hour, the cap should be replaced and sealed using plastic and the H&SP should be contacted for guidance.

7. PERSONAL PROTECTIVE EQUIPMENT AND DECONTAMINATION REQUIREMENTS

7.1 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

All use of protective equipment and clothing will comply with the following requirements.

7.1.1 General

Protective equipment (PPE) will meet the performance/certification requirements provided below. Task-specific PPR requirements are specified in the THAs found in Attachment D.

Head Protection

Employees will wear hard hats on work sites at all times unless otherwise specified in the HSP, other applicable H&S documentation, or directed by the SSO. Where necessary, ear protection and faceshields may be attached to hard hats, provided the method of attachment does not compromise the integrity of the hard hat.

All hardhats shall meet the requirements set forth in ANSI Z89.1. Additional requirements (e.g., electrical or heat resistance) may be specified in the HSP or other applicable H&S documentation.

Eye Protection

Eye protection will be worn on work sites at all times unless otherwise directed by the SSO. All selected eye protection will meet the following minimum requirements:

- Provide adequate protection against the particular hazards for which they are designed
- Be reasonably comfortable when worn under the designated conditions
- Fit snugly and not unduly interfere with the wearer's movements
- Be durable
- Be easily cleaned and disinfected.

Where specified due to particular work conditions, eye protection must also meet the impact and durability standards set forth in ANSI Z87.1. However, where this is not specified, the use of commercial sunglasses will be permitted at work sites (due to the limited potential for high velocity impact hazards associated with most Earth Tech work activities).

Persons whose vision requires correction and are required to wear eye protection may wear goggles or spectacles of one of the following types:

- Spectacles whose protective lenses provide optical correction (Rx)
- Goggles that can be worn over corrective (Rx) spectacles without disturbing the adjustment of the spectacles
- Goggles that incorporate corrective (Rx) lenses mounted behind the protective lenses.

Hearing Protection

Appropriate hearing protection (ear plugs, canal caps, or ear muffs) will be provided when noise may be a problem, such as around heavy machinery, power support equipment, and impact tools. All hearing protectors will provide a minimum noise reduction rating (NRR) of 25. Employees who may be exposed to hazardous noise must be participants in a hearing conservation program, which meets the requirements of 8 CCR §5097.

Foot Protection

Employees will wear appropriate foot protection while working on site, which will consist of leather or chemical-resistant boots (as appropriate) with safety toes. All footwear must meet the specifications of ANSI Z41.1.

Hand Protection

Employees will use appropriate hand protection when exposed to hazards that could cause injury to the hands. Gloves must resist puncturing and tearing as well as provide any necessary physical abrasion or chemical resistance.

7.1.2 HAZWOPER PPE Ensembles

Each task hazard analysis (see Attachment D) provides the task-specific requirements for PPE; however, personnel performing sample collection activities will generally utilize a Level D ensemble, with the use of chemically protective gloves as appropriate. The following gloves will be acceptable:

Inner Gloves

- Best Safety Model N-Dex gloves (nitrile rubber)
- Other models approved on a case-by-case basis by the H&SP

Outer gloves

- Ansell-Edmont Model Sol-Vex gloves (nitrile rubber)
- Other models approved on a case-by-case basis by the H&SP

Upgrades in PPE ensembles (Modified Level D, Level C, Level B or Level A) are not anticipated due to the low hazard potential associated with site activities and contaminants. If site conditions present a more significant inhalation or skin contact hazard than anticipated, work will cease and the H&SP will be contacted for additional guidance and development of revised/supplemental documentation.

Level D Ensemble

Level D protection is the lowest level of personal protection allowed on site. Respiratory protection is not required, since concentrations of airborne contaminants are expected to be below applicable action levels. The ensemble will consist of:

- Hard hat
- Short-sleeved shirt (tank tops are not acceptable)

- Long pants (shorts or cut-offs are not acceptable)
- Safety-toed work boots
- Safety glasses

For all intrusive operations and the collection and handling of samples personnel will use nitrile rubber protective gloves (Best Safety N-Dex or Ansell-Edmont Sol-Vex gloves (as desired) or equivalent).

Modified Level D Ensemble

If the potential exists for contact with chemical contaminants (e.g., minor splashes, "dirty operations," etc.), but the respiratory hazard is low, the use of a Modified Level D ensemble is appropriate. Modified Level D consists of protective clothing to preclude hazards due to contact with contaminated materials, but does not provide increased respiratory protection. The use of protective clothing in a Modified Level D ensemble can also serve to aid in personal cleaning and decontamination efforts through the use of disposable outer protective garments.

The use of Modified Level D PPE will be required for on-site operations where contact with contaminated soils can be expected (i.e., sample collection, soil handling/containerization). The Modified Level D ensemble provides moderate skin protection against chemical contact, but no respiratory protection. Upgrading to greater levels of protection will be executed as required in Table 6-2.

Modified Level D Equipment List

- Chemical-resistant disposable outer coveralls (Tyvek® or Tychem® QC coveralls)
- Chemical-resistant outer gloves (taped to outer coveralls)
- Chemical-resistant inner gloves
- Hard hat
- Short-sleeved shirt (tank tops are not acceptable)
- Long pants (shorts or cut-offs are not acceptable)
- Safety-toed work boots
- Safety glasses
- Hearing protection (as required)
- Full-face air purifying respirator w/organic vapor cartridges (available for emergency use).

Level C Ensemble

Level C protection is defined by the use of a full-face, air-purifying respirator. This level of protection can be used when low levels of contaminants of a known nature are present, sufficient oxygen is available, and contaminants are not considered immediately dangerous to life or health

(IDLH). The Level C ensemble provides considerable skin protection against chemical contact, and moderate respiratory protection.

Level C Equipment List

- Full-face air purifying respirator w/organic vapor cartridges
- Chemical-resistant disposable outer coveralls (Tychem[®] QC or Tychem[®] SL coveralls)
- Chemical-resistant outer gloves (taped to outer coveralls)
- Chemical-resistant inner gloves
- Hard hat
- Short-sleeved shirt (tank tops are not acceptable)
- Long pants (shorts or cut-offs are not acceptable)
- Chemical-resistant safety-toe boots (taped to outer coveralls)
- Safety glasses
- Hearing protection (as required)

Level A and B Ensembles

The need for the use of Level A or Level B protective equipment during site activities is considered to be highly unlikely. Should conditions be encountered for which Level B is inadequate work operations will cease and the H&SP will be contacted for guidance. Work will not resume until the H&SP has approved supplemental mitigation procedures.

7.2 DECONTAMINATION ACTIVITIES

7.2.1 Personnel Decontamination

Decontamination procedures must be carried out on all personnel who have been in contact with contaminated materials. Under no circumstances (except emergency evacuations) will personnel be allowed to leave a controlled work area where contaminants are exposed without performing decontamination.

A Personal Decontamination Station (PDS) will be established at the exit location of each controlled work area. The PDS will allow a soap and water washing and water rinse of exterior protective gear to remove contaminants, followed by doffing of the gear. To accomplish this, the specific PDS set-up/procedures will be established based on the level of protective equipment in use:

Level D Personnel Decontamination: Personnel exiting the Exclusion Zone while site activities require the use of Level D PPE will perform decontamination as follows:

1. Place tools, instruments, samples and trash at the drop location. The equipment drop area should be clean and dry and at a minimum, plastic bags should be available for trash. Waste PPE will not be placed in the same containers as general trash.
2. Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples, and tools prior to removal from the Exclusion Zone areas.
3. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
4. Prior to exiting the Exclusion Zone areas, personnel will wash their hands with soap and water in order to minimize the potential for contaminant exposure.

Modified Level D Personnel Decontamination: Where activities are performed in Modified Level D PPE, personnel will perform decontamination as follows:

1. Place tools, instruments, samples and trash at the drop location. The equipment drop area should be clean and dry and at a minimum, plastic bags should be available for trash. Waste PPE will not be placed in the same containers as general trash.
2. Inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples, and tools prior to removal from the exclusion zone areas.
3. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
4. Wash and rinse outer work gloves and boots (boot covers) with soap and water.
5. Wash/brush off outer protective coverall (Tyvek®).
6. Untape wrists and ankles.
7. Remove outer work gloves and place them in an appropriate container specified for waste PPE.
8. Remove outer Tyvek® coveralls and place them in an appropriate container specified for waste PPE.
9. Wash, rinse, and remove inner protective gloves and place them in an appropriate container specified for waste PPE.
10. Wash hands using soap and water (separate from other decontamination cleaners/solutions).

Level C Personnel Decontamination: Where activities are performed in Level C PPE personnel will perform decontamination as follows:

1. Place tools, instruments, samples and trash at the drop location. The equipment drop area should be clean and dry and at a minimum, plastic bags should be available for trash. Waste PPE will not be placed in the same containers as general trash.
2. Inspect equipment, samples and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples and tools prior removal from the exclusion zone areas. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
3. Wash and Rinse outer work gloves and boots (boot covers) with soap and water.
4. Wash/brush off outer protective coverall (Tyvek®).
5. Untape wrists and ankles.
6. Remove outer work gloves and place them in an appropriate container specified for waste PPE.
7. Remove outer Tyvek® coveralls and place them in an appropriate container specified for waste PPE.
8. Remove respirator mask (also goggles if worn).
9. Wash, rinse, and remove inner protective gloves and place them in an appropriate container specified for waste PPE.
10. Wash hands using soap and water (separate from other decontamination cleaners/solutions).

Respirator Decontamination: Respirators will be decontaminated each day. Taken from the drop area, the masks will be disassembled, the cartridges disposed of and the rest placed in a cleansing solution. Personnel will inspect their own masks to be sure of proper strap readjustment for correct fit. Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded, and replaced.

In addition to being decontaminated, all respirators, protective clothing, and other personal articles must be sanitized before they can be used again. The insides of masks and clothing become soiled from exhalation, body oils, and perspiration. The manufacturer's instructions should be followed in sanitizing the respirator mask. If practical, protective clothing should be machine washed after a thorough decontamination. Otherwise, it should be cleaned by hand.

7.2.2 Equipment Decontamination

Equipment that might require decontamination includes sampling equipment, tools, and the drill rig. The following is general guidance for use in determining equipment decontamination procedures:

Hand Tools: Tools will be dropped into a plastic pail, tub or other container at the work site. They will be brushed off, washed with a detergent solution, and rinsed with clean water.

Sampling Equipment: Sampling equipment will be decontaminated before and between sampling to prevent cross contamination, and before removal from the work site, following the same procedure as for hand tools.

HSA/Direct Push Drill Rig: The drill rig will be decontaminated at a wash rack decon station established in accordance with applicable installation environmental regulations. A pressure washer will be used to decontaminate the auger components and other parts of the drill rig, as necessary.

7.2.3 Disposal Of Decontamination Wastes

Solid and liquid decontamination waste should be containerized. Solids may be double bagged, or placed in a sealed drum or similar container. Liquids will be collected during decontamination and placed in sealed containers. Containers must be clearly labeled for content, the operation from which they were filled, and the dates of accumulation.

8. EMERGENCY CONTINGENCY PLAN

8.1 GENERAL

Three major categories of emergencies could occur during site operations:

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

Although a catastrophic event or severe medical emergency is unlikely, an emergency contingency plan has been prepared for this project, should such critical situations arise.

8.2 RESPONSIBILITIES

8.2.1 Field Manager/Site Safety Officer

The FM/SSO will be the primary contact and coordinator of all emergency activities. The FM/SSO will be responsible for:

1. Evaluating the severity of the emergency,
2. Implementing the appropriate response action,
3. Summoning appropriate emergency services (e.g., fire department, police, or ambulance), and
4. Notifying all site personnel, the H&SP, and concerned Navy authorities of the emergency situation.

8.2.2 Other Onsite Personnel

Field personnel are required to inform the SSO of all emergency situations and to abide by their issued response actions. Special medical problems of field personnel, such as allergies to insects, plants, or prescription medication, will be reported to the SSO.

8.3 EMERGENCY EQUIPMENT

The following emergency equipment will be available at the work site and in proper working condition.

8.3.1 First Aid Kit

A first aid kit will be available that meets the following requirements:

- First aid kits will be in weatherproof containers, be approved by the Earth Tech Occupational Physician, meet all regulatory requirements, and be present at all locations where Earth Tech employees are working.
- Use of any item from the first aid kit necessitates completion of a Supervisor's Employee Injury Report. The report will be submitted to the Health and Safety department within one working day.
- Personnel permitted to use first aid kits will possess a current first aid card. A minimum of two trained first aid/CPR provider will be present on site at all times.

8.3.2 Fire Extinguisher

A fire extinguisher with a minimum rating of 1A, 10B, C will be available on site at all times. Site personnel will be trained in the use of the available fire extinguisher type(s), and will be kept aware of any on-site locations of where extinguishers are placed (for access in case of fire).

In addition, a fire extinguisher will be mounted on each piece of heavy equipment for use in an emergency. The minimum rating for each vehicle-mounted extinguisher will be 2A, 10B.

8.3.3 Eyewash Units

An eyewash unit will be available at the work site at all times. The eyewash must meet the latest requirements of American National Standards Institute (ANSI) Standard Z358.1, and will be capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4-gallon per minute.

8.4 RESPONSE ACTIONS—SAFETY EQUIPMENT PROBLEMS

A malfunction or other problem with any health and safety equipment can potentially lead to a medical emergency. Examples include the following:

- Leaks or tears in protective clothing
- Failure of respiratory protective devices (i.e., self-contained breathing apparatus or air-purifying respirators)
- Encountering contaminants for which prescribed protective equipment may not be suitable.

These equipment problems must be corrected before proceeding with field activities. Personnel affected by the equipment problem(s) must exit the work area until the problem has been corrected.

8.5 RESPONSE ACTIONS—MEDICAL EMERGENCIES

A medical emergency is a situation that presents a significant threat to the health of personnel onsite. Chemical exposure, heat stress, cold stress, and poisonous insect bites can cause medical emergencies. Proper care must be initiated immediately. Proper care may be in the form of first aid treatment or emergency hospitalization.

Response personnel will accompany victims to the medical facility, whenever possible, to advise on decontamination. Table 8-1 provides instructions to respond to general categories of medical emergencies.

8.6 RESPONSE ACTIONS-CHEMICAL RELEASE OR OTHER SIGNIFICANT INCIDENT

On-site personnel will implement the following procedure in response to any "incident" which results in an injury, causes damage to Navy or other property which could exceed \$500, causes a stoppage in work of more than 2 hours.

8.6.1 Incident Response Actions

1. The senior on-site leader, typically either the FM or SSO will assume full control of all work activities as the designated Response Manager (RM).
2. The RM will make an assessment of the incident consequences, and will order an immediate evacuation of the site if an uncontrolled hazard exists to site personnel.

3. Once the risk of worker injury is controlled, priority will be given to identifying and treating injuries, under the direction of the RM. First aid procedures will be implemented immediately for all victims; emergency medical assistance will be contacted (in accordance with HSP procedures) if injuries warrant response by emergency medical technicians. As appropriate, less severely injured personnel should be transported to the designated hospital (as time/resources permit), sent home, or released to resume work.
4. Once injury response activities are under control, the RM will perform an assessment of the site conditions and determine if off-site support is required to implement control or corrective procedures. If no outside support is necessary the RM will direct worker recovery actions to allow resumption of normal activities. Once activities are restored the RM will contact the CTO Manager and HSP-designated Health and Safety Professional (H&SP) and provide a complete report of the incident occurrence, any resulting injuries or damage, and the completed response actions. Additional directions issued by the CTO Manager or H&SP will be implemented by the RM. The CTO Manager will be responsible for notifying the RPM and the CLEAN Program Manager of the incident in as timely a manner as possible. Additional follow-up notifications will be performed as needed, in accordance with the follow-up activities discussed below.
5. If outside support is required in response to post-incident conditions the RM will contact a designated/appropriate response agency in accordance with the HSP. The response agency will be provided with information concerning site location, the nature of the incident, the assessment of conditions, and what type of support is required. In addition, during the initial contact the response agency must be informed that the work site is undergoing environmental investigation and that response actions may entail exposure to environmental contaminants.
 - a. After notifying the response agency of the incident, the RM will *immediately* contact the CTO Manager and HSP-designated H&SP and provide a complete report of the incident occurrence, any resulting injuries or damage, and the status of the on-going response actions. Additional directions issued by the CTO Manager or H&SP will be implemented by the RM. The CTO Manager will be responsible for notifying the RPM and the CLEAN Program Manager of the incident before close of business that day, if possible, or else at the start of the next business day. Additional follow-up notifications will be performed as needed, in accordance with the follow-up activities discussed below.
6. If response team support will be immediate the RM will remain on site to meet the response team. If response will be delayed the RM will coordinate the response schedule to be present when the response agency arrives¹. The RM will provide the response team leader with a copy of the HSP, along with a concise briefing on site conditions, known physical/chemical hazards, and recommended safety procedures. The RM will attempt to answer any questions the response team leader may have regarding the environmental conditions of the site or the circumstances of the incident.
7. Once the status briefing is complete the RM will relinquish operational control of the site to the response team. The RM will remain on site throughout the response team's work unless

¹ If response will not be immediate the RM will ensure that the site is controlled and poses no health or safety hazard to persons or property before leaving it uncontrolled. If this cannot be ensured the RM or other designated personnel will stay on site to maintain control until the response team arrives.

dismissed by response team leader or relieved by an appropriate Earth Tech representative (e.g., the CTO Manager), however the RM will NOT direct any response team actions. When the response team has completed its work, control of the site will return to the RM.

8. Once response activities have been completed the RM will notify the CTO Manager and the H&SP.

8.7 INJURY/INCIDENT FOLLOW-UP ACTIONS

Following any onsite incident or injury involving more than first aid treatment, a mishap report (*Contractor Significant Incident Report – CSIR*) must be prepared by the H&SP and submitted to the CLEAN Contracting Officer according to the following schedule:

Serious Contractor Mishap - Any mishap involving a fatality or the hospitalization of three or more workers, or resulting in property damage exceeding \$200,000 in value.

1. The H&SP will provide immediate telephone notification to the Contracting Officer.
2. The H&SP will provide e-mail or written notification to the Contracting Officer within 4 hours of the incident.
3. A Preliminary CSIR must be submitted to the Contracting Officer within 24 hours of the mishap.
4. The Final CSIR must be submitted to the Contracting Officer within 5 days of the mishap.

Non-serious Contractor Mishap – Any mishap which causes one or more OSHA-recordable injuries or which results in more than \$2000 in property damage, but does not qualify as Serious.

1. The H&SP will provide telephone or e-mail notification to the Contracting Officer within 4 hours of the mishap.
2. The CSIR must be submitted to the Contracting Officer within 5 days of the mishap..

Follow-Up Investigations. The H&SP will investigate the circumstances of the incident/injury through review of the incident documentation, and will assist in the performance of any necessary accident investigation or other follow-up. A report detailing the investigation findings will be prepared, which will include identification of causative factors and recommendations concerning corrective actions. The CTO Manager will ensure that the recommendations resulting from any investigation are implemented without delay.

Table 8-1. How to Respond to Medical Emergencies

Emergency	Response
Inhalation	<ol style="list-style-type: none"> 1. Call for medical assistance. 2. Workers wearing proper respiratory protective equipment should remove the victim from the contaminated atmosphere. 3. Voluntary basis only: If the victim is not breathing, administer mouth-to-mouth resuscitation or CPR immediately.
Eye Contact	<ol style="list-style-type: none"> 1. Do not rub eyes. 2. Flood eyes with emergency eyewash solution. Hold the eye open and flood so that all surfaces are thoroughly washed. 3. Continue washing for 15 minutes while calling for medical assistance.
Skin Exposure	<ol style="list-style-type: none"> 1. Wash skin with soap and water for a minimum of 15 minutes. All contaminated areas on the body, including hair, should be thoroughly decontaminated. 2. If clothing is contaminated, it should be removed in a way to minimize further contact with the substance. 3. Seek medical assistance.
Heat Stress	<ol style="list-style-type: none"> 1. Remove excess clothing. 2. Pour water on the victim. 3. If the victim is conscious, offer water or Gatorade. 4. Seek medical assistance.

8.7.1 Medical Assistance

The FM or SSO will keep on site the list of emergency telephone numbers and locations of the local fire department, hospitals, ambulance service, and other emergency services (see Table 8-2).

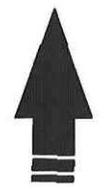
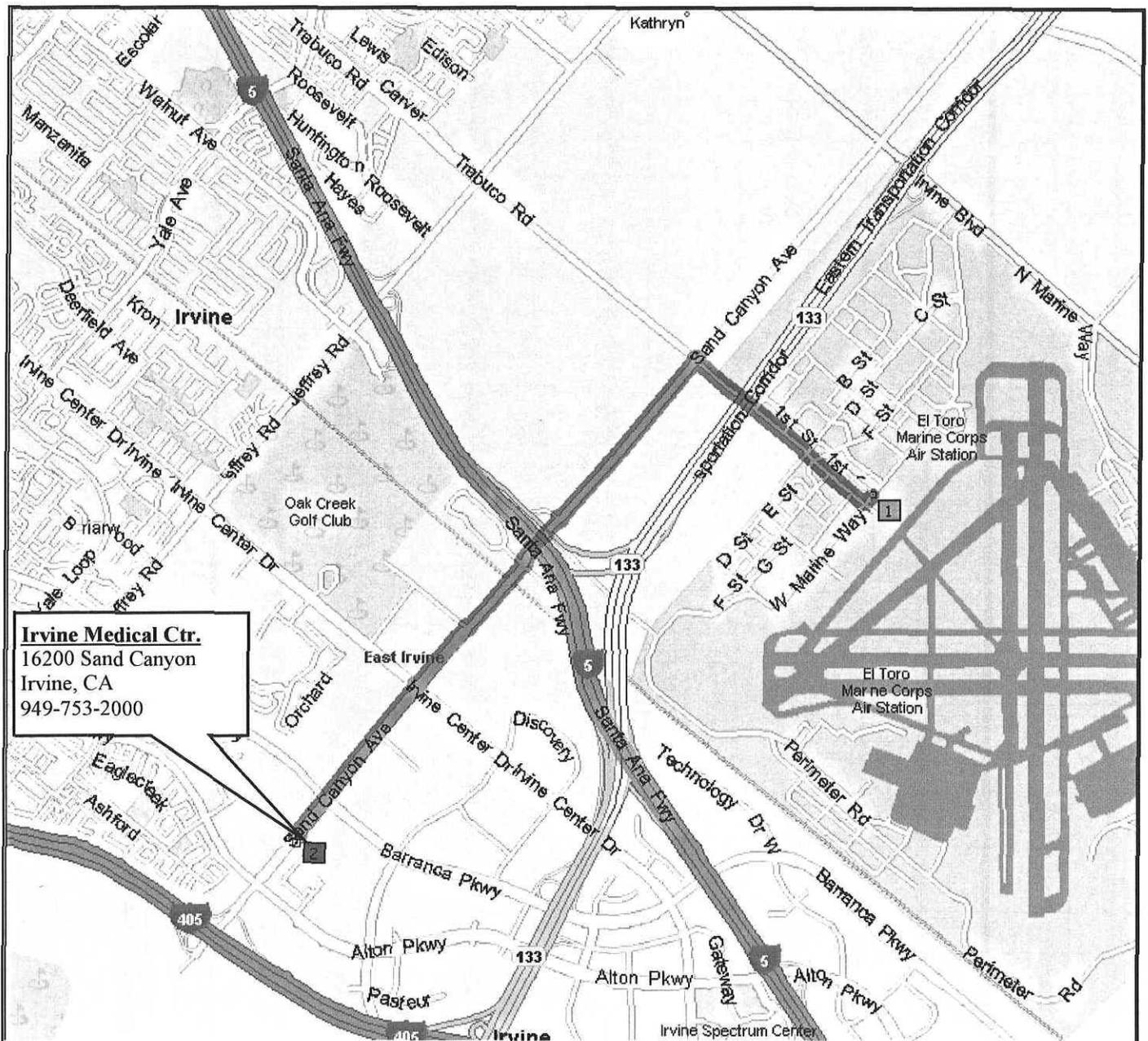
In the event of severe injury, transport personnel to Irvine Medical Center, located in Irvine, California (see Table 8-2 and Figure 8-1).

At least 2 qualified first aid providers will be present on site at all times to provide immediate care in the event of accident or injury. The SSO will inform hospital personnel of any medical treatment administered to personnel for onsite injury, illness, or exposure to chemical contaminants.

Table 8-2: Emergency Telephone Numbers

Fire Department:	
Fire Department	911 or (949) 726-3333
Medical Care:	
Irvine Medical Center 16200 Sand Canyon Road Irvine, CA 92718	911/(949) 753-2250
Police:	
Local Police	911
Installation Emergency Service Desk	(949) 726-2172
Provost Marshal	911 or (949) 726-3525
Information and Response Organizations:	
National Response Center (if spill over RQ)	(800) 424-8802
Local Poison Control Center	(800) 484-5151
National Poison Control Center	(800) 458-5842
Navy Personnel:	
Resident Officer In Charge of Construction (ROICC), Scott Kehe	(949) 726-2506 or (949) 726-2254
Navy Technical Representative (NTR), Kyle Olewnik	(619) 532-0789
Earth Tech Personnel:	
CLEAN II Program Health and Safety Manager, Robert M. Poll, CIH, CSP	(562) 951-2242 Mobile: (562) 884-1414
CLEAN Technical Director, Ken Vinson, P.E.	(808) 471-9267 Mobile: (808) 371-7441
CTO Manager, Eli Vedagiri	(562) 951-2042 Mobile: (213) 924-8563
Site Safety Officer, Rod Lazo	(562) 951-2181 Mobile: (562) 245-9232

Route to Irvine Medical Center: From the site, travel north along Perimeter Road to the intersection with Trabuco Road. Turn left (west) on Trabuco (exit through Trabuco Gate), and travel to the intersection with Sand Canyon Avenue. Turn south left (south) on Sand Canyon, and follow for approximately 2 miles. Irvine Medical Center will be on the left immediately before the intersection of Sand Canyon Avenue and Alton Parkway.



NORTH

<p>EARTH  TECH <small>A tyco INTERNATIONAL LTD COMPANY</small></p>	<p>Preliminary Assessment of Locations of Concern</p>
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**Former Marine Corps Air Station, El Toro, CA
 Hospital Map**

Dec-02 Figure 8-1

9. REFERENCES

Earth Tech. 1996. CLEAN Program Health and Safety Manual.

_____. 2002. Draft Work Plan, Preliminary Assessment of Locations of Concern Environmental Baseline Survey, Former MCAS El Toro, California. Honolulu. May.

Appendix A
Response to Comments

Document Title:

(1) Draft Health and Safety Plan, Preliminary Assessment of Potential Release Locations, Environmental Baseline Survey, MCAS El Toro

Reviewers: Triss M. Chesney, P.E., Remedial Project Manager, Office of Military Facilities, DTSC **Dated:** November 14, 2002

Comment No./ Reviewer	Section/ Page No.	Comment	Response
SPECIFIC COMMENTS			
1.	Table 3-1	Potential PRLs (Potential Release Locations) and Associated Contaminants: The primary suspected contaminants for temporary accumulation areas and hazardous waste storage areas should be the same. As a result, please add herbicides for temporary accumulation areas and metals for hazardous waste storage areas. Additionally, please add polynuclear aromatic hydrocarbons (PAHs) as a suspected contaminant for fuel pipelines and herbicides for railroad operations. Although revisions were made to the list of potential contaminants identified for PRL groups in the Draft Work Plan, Preliminary Assessment of Locations of Concern, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California (Earth Tech, May 2002) (Work Plan) based on comments from DTSC, the Work Plan should be revised to be consistent with this HSP.	Concur. The requested changes have all been made to Table 3-1.
2.	Table 3-1	Potential PRLs and Associated Contaminants: Analyses of soil and groundwater samples collected from ordnance sites should be consistent with those identified in the Final Work Plan, Phase II Remedial Investigation, IRP Site 1, Explosive Ordnance Disposal Range, Marine Corps Air Station, El Toro, California (Earth Tech, November 2001). As a result samples should be analyzed for petroleum hydrocarbons, volatile organic compounds, semi-volatile organic compounds, explosives, dioxins/furans, metals, perchlorate, pH, and nitrate. Please provide sufficient justification, such as historical information from each ordnance site or the analytical results from Site 1, for exclusion of any analyses.	Comment noted; the scope of the work plan (WP) and the health and safety plan (HSP) does not address investigation of ordnance sites such as IRP Site 1, which involved detonation of munitions and associated pits/trenches.

Document Title:

(1) Draft Health and Safety Plan for Preliminary Assessment of Potential Release Locations, Environmental Baseline Survey, Former MCAS El Toro, CA

Reviewer: David T. Matsumoto, CIH/REHS, Associate Industrial Hygienist, HERD, IHSB, DTSC. *Dated:* December 9, 2002

Comment No.	Section/ Page No.	Comment	Response
SPECIFIC COMMENTS			
1.	General	Please incorporate the "Response to Review Comments" into the final version for the following: <ol style="list-style-type: none"> 1. Page 4-5, section 4.5, drum handling 2. Page 4-7, section 4.6, Heat Stress Prevention, Heat Stress Monitoring, Table 4-2: WGBT Values for CPC Work / Rest Cycles. 	The Final HSP will incorporate information provided in the two noted "Response to Review Comments".
2.	Page 6-5, Section 6.7.1	Monitoring Procedures: Intrusive Activities (HAS Drilling, Potholing), Table 6-2: Monitoring Procedures and Action Levels for Intrusive Activities. <i>Response:</i> "Carbon Tetrachloride is not included as part of the monitoring program since it has not been identified as a significant occupational exposure concern for this preliminary investigation." <i>Comment:</i> On page 5-3, section 5.2.2, Waste Solvents – please delete entry for carbon tetrachloride.	The referenced material discussing Carbon Tetrachloride has been removed from the Final HSP.
2.	Section 4.1.1	Include a general statement that all required medical surveillance will be in accordance with all applicable regulations (HAZWOPER, respiratory protection, hearing conservation, applicable metals, etc.). <i>Response:</i> "Applicable medical monitoring requirements are already specified within the HSP (Section 4.1.1), as well as being incorporated into Earth Tech's overarching Corporate EHS Programs." <i>Comment:</i> Incorporate language to reflect this statement as section 4.1.1, Medical Screening and Health Surveillance, addresses 8 CCR, §5192 (f) only.	The following text has been added to Section 4.1.1 of the Final HSP" "Personnel performing sample collection/handling activities must have completed the following medical examination requirements in compliance with 8 CCR §5192 (f). Additional medical monitoring requirements are associated with Earth Tech's programmatic health and safety programs (e.g., hearing conservation, respiratory protection)."

Document Title:

(1) Draft Health and Safety Plan for Preliminary Assessment of Potential Release Locations, Environmental Baseline Survey, Former MCAS El Toro, CA

Reviewer: David T. Matsumoto, CIH/REHS, Associate Industrial Hygienist, HERD, IHSB Dated: November 14, 2002

Comment No.	Section/ Page No.	Comment	Response
GENERAL COMMENTS			
1.	General	<p>The Department of Toxic Substances Control (DTSC) reviewed the HASP for compliance with Title 8, California Code of Regulations (8 CCR), §5192: "Health and Safety for Hazardous Waste Operations and Emergency Response" as well as other appropriate State and Federal Health and Safety Regulations. Please note that in addition to the requirements of this section, the employer is responsible for the implementation of an Illness and Injury Prevention program, which is required by the 8 CCR, §1509 and §3203. The requirements of those sections have not been included in this review.</p> <p>An industrial hygienist from HERD-IHSB may perform a field audit in order to confirm the implementation of the provisions and specifications presented in the HASP.</p> <p>DTSC is unable to foresee all the health and safety hazards in the work place by the review of the submitted plan. Continuous surveillance of the work-site and creation of an effective health and safety program by the employer will reduce work place injuries and reduce liability.</p> <p>HERD-IHSB review of this HASP is not a guarantee that it will be properly and safely implemented. HASP implementation is the employer's responsibility. The acceptance is limited to concurrence that all the required elements of a safety plan are present. In addition, the supervisor or project manager will be responsible for verifying the required training and certification of all employees and subcontracted employees.</p>	Noted.
SPECIFIC COMMENTS			
1.	Page 4-5, Section 4.5	<p>Drum Handling – drum handling and sampling activities were not addressed as part of the scope of work activities on page 3-1, section 3.2, Planned Work Operations. Please include details for drum handling and sampling in section 3.2 or delete section 4.5 if these activities are not part of the scope of work activities.</p>	<p>Drum sampling activities are not a specific part of the Preliminary assessment activities. However, the drum handling procedure in HASP Section 4.5 is included as a standard part of Earth Tech's Health and Safety Plan document because of the potential for use of drums for the containerization and handling of investigation derived waste (IDW) and decontamination water.</p>

Document Title:

(1) Draft Health and Safety Plan for Preliminary Assessment of Potential Release Locations, Environmental Baseline Survey, Former MCAS El Toro, CA

Reviewer: David T. Matsumoto, CIH/REHS, Associate Industrial Hygienist, HERD, IHSB Dated: November 14, 2002

Comment No.	Section/ Page No.	Comment	Response
2.	Page 4-7, Section 4.6	Heat Stress Prevention, Heat Stress Monitoring, Table 4-2: WBGT Values for CPC Work/Rest Cycles – please provide source and/or rationale for values given in the table.	The procedure is an Earth Tech Corporate Standard which is based on American Conference of Governmental Industrial Hygienists guidelines.
3.	Page 6-5, Section 6.7.1	Monitoring Procedures – Intrusive Activities (HAS Drilling, Potholing), Table 6-2: Monitoring Procedures and Action Levels for Intrusive Activities – please include use of carbon tetrachloride detector tubes for VOCs (total by PID) at 5 – 15 units and include in the table after Benzene (by Colorimetric Tube).	Carbon Tetrachloride has not been identified as a significant occupational exposure concern for this preliminary investigation.
4.	-	Include a general statement that all required medical surveillance will be in accordance with all applicable regulations (HAZWOPER, respiratory protection, hearing conservation, applicable metals, etc.).	Applicable medical monitoring requirements are already specified within the HASP (Section 4.1.1), as well as being incorporated into Earth Tech's overarching Corporate EHS Programs.

Attachment A
Health and Safety Forms

Supervisor's Report of Incident

This is an official document to be initiated by the injured employee's Supervisor regarding possible employee injury. Please answer all questions completely. Fax to Health and Safety within 24 hours of the injury: (804) 515-8313. See 2nd page for instructions.

Section 1: Data for Employee Involved in Incident – To be completed by supervisor. Avoid reporting delays and complete as much as possible now, submit fully completed form (including corrective actions) at a later time.

Complete Sections 1 & 2, then call 877-261-8926 (TYCO) to obtain a Sedgwick Claim#: _____				
Office Location Code (3-digit number) _____		Employee Department (4-digit number) _____		
Employee Office Location Address _____				
<input type="checkbox"/> Injury	<input type="checkbox"/> Illness	<input type="checkbox"/> Injury From a Vehicle Incident	<input type="checkbox"/> Near Miss	
Employee Name	Work Phone	Home Phone	Birth Date	SSN
Home Address (City, State, Zip) _____				
Hire Date	Hourly Wage	Marital Status	Dependents	Job Title

Section 2: Supervisor (Must complete each item) - Print Clearly

Date of Incident	Time	Date/Time Reported	To Whom
Client Name/Job Number	Job Assignment at Time of Incident		Time Shift Began
Exact Location & Address of Incident			
Describe Incident			
Root cause of Incident			
Nature of Injury			
Medical Attention? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe treatment			
Dr./Hospital Name		Address/Phone of Hosp.	
Witness Name (Any witnesses should attach a short statement)			
Did injured leave work? When?		Has injured returned to work? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Corrective Action(s) to Prevent Future Occurrence:			
Supervisor/Foreman (Print Name)		Signature	Telephone Date

Section 3: Manager

Comprehensive comments on root cause of incident and corrective action		
Manager (Print Name)	Signature	Telephone Date

Section 4: Environmental Safety and Health Professional

Concur with action taken? <input type="checkbox"/> Yes <input type="checkbox"/> No Remarks:	
<input type="checkbox"/> No Medical Care <input type="checkbox"/> First Aid Only <input type="checkbox"/> Medical Care by Medical Professional <input type="checkbox"/> Fatality	
<input type="checkbox"/> OSHA Classification Pending OSHA <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Days away from work _____ <input type="checkbox"/> Restricted Days _____	
ESH Professional (Print Name)	Signature Date

Supervisor's Report of Incident
Instructions For Completion

The following types of incidents must be reported using this form:

1. Occupational Injury or Illness (includes first aid only, medical treatment, hospitalization, fatality)
2. Vehicle Accident Injuries
3. Near Miss (incident where employee(s) could have been injured) this includes vehicle incidents

INSTRUCTIONS

Immediate:

1. Employees must report such incidents to their Supervisor **immediately**.
2. The Supervisor must complete **Sections 1 and 2, Employee Data and the Supervisor Section** of the SRI. Any work-related injury or illness that requires medical treatment or care will require notifying SCMS at 877-261-8926.
3. The Supervisor must verbally notify his/her Manager, who in turn must sign **Section 3, Manager**, of the SRI. To avoid delaying SRI process, a separate copy of the SRI with the Manager's signature can be faxed within 3 days to Health and Safety.
4. The Supervisor must verbally notify Health and Safety with a follow-up SRI faxed within 24 hours (see below for fax numbers). Health and Safety will review and complete **Section 4, Environmental Health and Safety**. For near-miss situations that could have resulted in an injury to an employee, the Supervisor must notify his/her Manager (see Item 3 above) and Health and Safety with a follow-up SRI faxed within 24 hours.

PRIMARY CONTACTS

<p>Environmental/Engineering/Transportation</p> <p>East: Dale Prokopchak, CIH, CSP Telephone: 804-515-8556 Fax: 804-515-8313</p> <p>West: Bob Poll, CIH, CSP Telephone: 562-951-2242 Fax: 562-951-2100</p> <p>Administrator: Telephone: 804-515-8557 Fax: 804-515-8313</p>	<p style="text-align: center;">Construction</p> <p>Chuck Pryor, CSP Telephone: 510-419-5133 Fax: 510-419-6746</p> <hr/> <p style="text-align: center;">Contract Operations</p> <p>Mark Robinson, CSP Telephone: 920-451-2862 Fax: 920-458-0537</p>
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Attachment B
General Safety Rules for Subcontractors

General Safety Rules for Contractors

Introduction

The rules and requirements contained in this attachment have been written for the guidance of Contractors who are performing work under contract with Earth Tech. This booklet prescribes general requirements. Additional specific rules may be necessary to ensure the safety of workers on a particular job. The Contractor, working in collaboration with the Earth Tech representative, will be expected to establish such additional rules and procedures as may be necessary to conduct a safe operation and comply with all Earth Tech, regulatory, and insurance requirements and those of our clients. Earth Tech health and safety professionals are available to assist.

The term Contractor, as used in this attachment, shall be understood to include any and all persons, sole proprietorships, partnerships, corporations, or other business ventures under contract, oral or written, to Earth Tech.

Contractor is responsible for informing its subcontractors of these requirements, for directing and supervising work of subcontractors, and for assuring that its subcontractors adhere to the requirements herein. Earth Tech may request Contractor to provide proof of its subcontractor's adherence to all rules and regulations and will prohibit access to Earth Tech property or job sites or our client's property for those Contractors not in compliance.

In order to assist Contractor in following these instructions, a Earth Tech Representative will be assigned to the Contractor to act as Earth Tech's agent in all matters relative to work activities at Earth Tech facilities or job sites. Under no circumstances shall any work be started until the Earth Tech Representative has been contacted, a job orientation has been conducted by the Earth Tech Representative, and all permits, insurance, Earth Tech, client, and regulatory pre-job requirements met.

The Earth Tech Representative and the Earth Tech Health and Safety professionals are authorized to stop any work which they may consider hazardous to Earth Tech personnel or equipment or Contractor personnel. This authority may be delegated to appropriate individuals.

General Safety Rules and Requirements

Accident Reporting

All accidents (personal and property damage) shall be reported orally to the Earth Tech Representative as soon as emergency conditions no longer exist. A written report shall follow within 7 days after emergency conditions are resolved.

Alcohol, Firearms, etc.

Alcoholic beverages, illegal drugs or narcotics, or guns and ammunition are not permitted on Earth Tech property or job sites. Personnel under the

influence of alcohol or drugs shall not be allowed on Earth Tech property or job sites.

Approvals

The Contractor shall be required to obtain pertinent work permits or authorization and approval from the Earth Tech Representative before:

- Working on existing pipelines or equipment
- Entering tanks or closed vessels
- Entering any designated high-hazard areas
- Using torches, electrodes, electronic motors, forges, soldering irons, any open flames, or any device which could produce sparks or ignition source
- Closing walkways, roads, or restricting traffic
- Starting excavations
- Removing tanks from excavations
- Backfilling excavations
- Using utilities such as steam, water, compressed air, or electricity
- Sandblasting, spray painting, or guniting
- Storing flammable materials such as gasoline, oil, paints, oxygen cylinders, etc.
- Walking or working on roofs of buildings or equipment
- Drilling, boring, preparing test pits, or using geophysical equipment or any other exploratory equipment requiring penetration of surfaces
- Operating cranes or similar equipment near overhead power lines or pipelines
- Opening cutting through firewalls or berms
- Fueling or repairing Contractor operating equipment on Earth Tech property or job sites.

Security

For security reasons, entrance to and exit of Earth Tech facilities and job sites is restricted to those areas designated as the Contractor's work area.

Speed Limits

All vehicles on Earth Tech job sites and facilities must observe a maximum speed limit of 10 mph unless otherwise posted.

Vehicle Safety

- All vehicles must be parked in authorized areas only.

General Safety Rules for Contractors

- There will be no passing of moving vehicles at job sites where there are narrow roads and short-sight distances.
- Vehicles will only be operated by personnel with valid licenses and good driving records.
- Vehicles shall have all required inspection and operating permits.
- Seat belts shall be used.

Safe Work Practices

Communication

Communication and coordination is vital to prevent accidents on construction sites. Every worker must be aware of equipment operating in his vicinity.

Confined Space Entry

Confined spaces include storage tanks, bins, sewers, in-ground vaults, degreasers, boilers, vessels, tunnels, manholes, pits, etc. These enclosures, because of inadequate ventilation and/or the introduction of hazardous gases and vapors, may present conditions that could produce asphyxiation or injury.

Before entering a confined space, Contractor must notify the Earth Tech Representative of intent to enter. The Earth Tech Representative will review with Contractor the safe entry requirements which include:

Removal of Contents. Before entering, confined spaces should be as clean and free of hazardous materials and chemicals as possible. Where appropriate, confined spaces may be purged by water or other suitable means. Purging with hazardous solvents should be avoided where possible.

Isolation. All input lines which discharged into the confined space shall be disconnected and capped or isolated. The use of a single in-line valve shut-off as the sole means of isolating the confined space from any input lines is prohibited.

However, the use of a double in-line valving arrangement with a vent or drain in between the two valves is acceptable provided that dangerous air contaminants are not introduced by such venting. Isolation valves shall be locked closed, vent or drain valves shall be locked open, and the key shall be kept by that person performing the job.

Electrical Lockout. Where electrical devices located within the confined space (motors, switches, etc.) are to be repaired or worked on, the line-disconnect switches supplying the power must be tagged and locked in the "OFF" position. The lock key is to be kept by the person performing the job, and only this person is authorized to unlock the switch and remove the tag upon completion of the job. Where more than one person is working on the line, each must place a lock on the switch and retain his own key.

- Where there are multiple sources of power to an electrical device that supplies power to

the device through an automatic or manual bus transfer switch, lockout devices must be placed on the breaker nearest to the electrical device that is to be isolated, and an electrician shall test the power supply lines to ensure that power has been secured.

- Line-disconnect switches supplying power to any mechanical apparatus in the confined space (mixers, conveyors, etc.) must also be tagged and locked in the "OFF" position. This must be done for any entry, even though work will not be performed on the apparatus itself.

Securing of Covers. All manhole and cleanout covers shall be removed and the openings maintained clear of any obstructions. When hinged doors or lids are provided, they shall be secured so they cannot close. See **Excavations and Trenches** for guarding requirements.

Testing Atmosphere. A qualified person (NIOSH Publication No. 80-106) using only equipment approved and tagged for Class 1, Division 1 locations shall make appropriate tests of the atmosphere in the confined space and place a record of the test results at the entrance to the confined space. Testing shall ensure the following:

- Combustible gas and vapor concentrations do not exceed 10 percent of the lower explosive limit
- Oxygen content is no less than 20 percent and no greater than 25 percent
- Appropriate respiratory protective equipment and other appropriate personal protective devices have been provided for all employees when concentrations of toxic materials exceed established threshold limit values (TLVs).

Continuous Monitoring. If the nature of the work to be performed introduces, or has the potential to introduce, harmful air contaminants, continuous monitoring of the atmosphere and/or the oxygen content drops below 20 percent, all personnel shall evacuate the confined space immediately.

Ventilation. All confined spaces found to be unsafe must be ventilated by means of mechanical exhaust systems arranged so as to avoid recirculating contaminated air. The Contractor must contact the Earth Tech Representative to obtain approval not to ventilate. Personnel shall be evacuated immediately in the event of failure of the mechanical ventilation system. The confined space shall be retested prior to reentry following ventilation system repair.

Buddy System. At least two workers shall remain outside the confined space. One standby worker shall be stationed just outside the access opening of the any confined space while such space is occupied. This person shall:

- Maintain continuous awareness of the activities and well-being of the occupant in the confined space

General Safety Rules for Contractors

- Be able to maintain communication at all times
- Be alert and fully capable of quickly summoning help
- Be physically able and equipped to assist in the rescue of an occupant from a confined space under emergency conditions.

Safety Gear and Personal Protective Equipment.

All Contractor employees must be instructed in accordance with OSHA regulations regarding safety gear and personal protective clothing, hard hats, respirators, lifelines, and harnesses. Such instructions shall be received and documented before entering any confined space.

Compressed Gas Cylinders

Valve protection caps. Valve protection caps shall be in place when compressed gas cylinders are transported, moved, or stored.

Cylinder valves. Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved.

Compressed gas cylinders. Compressed gas cylinders shall be secured against rolling or tipping (roped or chained) at all times, except when cylinders are actually being hoisted or carried.

Gas regulators. Gas regulators shall be in proper working order while in use.

Leaks. If a leak develops in a gas cylinder, after donning appropriate safety equipment, immediately remove it to a safe location. If the leak cannot be corrected, report it to the Earth Tech Representative.

Identification of Contents. Cylinders should be permanently marked or stenciled to identify the type of gas in the cylinder.

Breathing Air. All compressed breathing air shall meet OSHA specifications for breathing air quality. All compressed breathing air cylinders shall have their contents checked at the job site for correct oxygen concentration and rejected for breathing air if the oxygen concentration is not $20.7\% \pm 0.2\%$.

Oil and oily rags. Oil and oily rags shall be kept away from oxygen equipment.

Cranes, Hoists, and Other Heavy Equipment

Contractor personnel will not be permitted to use hoists and powered apparatus belonging to Earth Tech unless approval is obtained in each instance from the Earth Tech Representative.

ROPs. Roll over protection shall be used when conditions or regulations call for such use.

Cutting or Welding

Hot Work/Welding/Burning. "Hot Work" authorization must be obtained from the Earth Tech Representative before any welding, cutting, or other "hot work" is done. "Hot work" permits and results of tests are to be submitted to the Earth Tech Representative at the completion of the job or at the end of each workday.

Welding Flash. Noncombustible or flame-proof shields or screens must be provided to protect welder or others who might be harmed by direct rays or arc.

Personal Protective Equipment. Goggles, gloves, aprons, and other personal protective equipment appropriate to the job shall be used.

High Fire-Hazard Areas

- Contractor personnel are responsible to see that a fire watch is maintained and all adjacent combustible materials are protected or removed as designated by the Earth Tech Representative.
- Contractor shall provide his own calibrated combustible gas meter or other instruments for checking areas before hot work.
- Documentation of calibration shall be submitted to the Earth Tech Representative for review by the Earth Tech Health and Safety Section.
- Contractor is responsible for all testing and monitoring required by applicable regulations and to assure work place safety.
- Earth Tech shall have the right, not the responsibility, to perform additional testing. Earth Tech testing shall not be in lieu of Contractor's requirements.
- In the event of a bona fide emergency, such as emergency spill response work, and where the Contractor warrants that he cannot conduct the required testing, Earth Tech may upon written agreement then conduct all tests necessary to assure safety and regulatory compliance. The Contractor shall cosign the "hot work" permit form when tests are conducted by Earth Tech personnel.
- Contractor shall provide his own fire extinguisher(s) for welding and cutting, as designated by the Earth Tech Representative.

Electrical Safety

Grounding. The noncurrent-carrying metal parts of fixed, portable, or plug-connected equipment shall be grounded. Since ground wires can break, they shall be tested with an electrical resistance meter to assure conductivity as often as necessary to assure safety. Portable tools and appliances protected by an approved system of double insulation need not be grounded.

Extension Cords. Extension Cords shall be the three-wire type for grounded tools (two-wire is permissible for double-insulated tools) and shall be protected from damage; do not fasten with staples or extend across an aisleway or walkway. Worn or frayed cords shall not be used. Cords shall not be run through doorways where the door could cut or damage them.

Light Bulbs. Exposed bulbs on temporary lights shall be guarded to prevent accidental contact, except

General Safety Rules for Contractors

where bulbs are deeply recessed in the reflector. Temporary lights shall not be suspended by their electric cords unless designed for this use. Explosion-proof bulb covers shall be used when contact with flammable vapors or gases is likely and shall meet Class I, Division I requirements.

Electrical Receptacles. Receptacles for attachment plugs shall be of the approved, dead-front, concealed contact type. Where different voltages, frequencies, or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.

Wet Environments. Work done in wet environments shall require ground fault interrupters and water-tight connectors.

Emergency Equipment

Earth Tech's fire equipment is not to be moved, relocated, or otherwise rendered inaccessible unless specific permission is granted in each case by the Earth Tech Representative.

Self-contained breathing apparatus, first aid equipment, fire blankets, stretchers, eyewash fountains, and deluge showers are not to be moved, relocated, or blocked without the express permission of the Earth Tech Representative.

Excavations and Trenches

Permits. Before any excavation work begins, all required permits shall be obtained.

"Dig-Alert". Before any excavation work begins, the existence and location of underground pipes, electrical conductors, etc., must be determined by Contractor who shall in turn notify the Earth Tech Representative.

Cave In Protection. The walls and spaces of all excavations and trenches (which will be entered by people) more than 4 feet deep shall be guarded by shoring, sloping of the ground, or some other equivalent means, in accordance with Cal/OSHA regulations.

Daily Inspections. Daily inspections of excavations shall be made by the Contractor. If there is evidence of possible cave-in or slide, all work in the excavation shall cease until the necessary safeguards have been taken.

Egress. Trenches more than 4 feet deep shall have ladders or steps located so as to require 10 feet or less of lateral travel between means of access.

Backfill. All trenches shall be backfilled as soon as practical after work is completed and all associated equipment removed.

Housekeeping. All Contractor equipment, such as pipe, rebar, etc., shall be kept out of traffic lanes and access ways. Equipment shall be stored in a manner which ensures the safety of Earth Tech and Contractor employees at all times.

Fall In Protection. All trenches shall be completely guarded on all sides. Standard guardrails are preferred. However, when wooden or metal

barricades are used for trench guarding, they shall be spaced no further apart than 20 feet, and at least two feet from the edge of the trench. Such barricades shall be at least 36 inches high when erected.

- Battery-lighted barricades shall be used as follows:

- (1) A minimum of two battery-lighted barricades shall be used at corners, one on each side of the barricade.
- (2) At least one battery-lighted barricade shall be used where vehicular traffic approaches the trench at right angles.
- (3) Where trenches parallel roadway, distance between battery-lighted barricades shall not exceed 40 feet unless this requirement conflicts with Item (1), above, and additional units are required.
- (4) All battery-lighted units shall be serviced as necessary to ensure equipment is operating.

- Caution tape shall be stretched securely between barricades. The caution tape shall be at least 3/4-inch-wide and shall be yellow or yellow and black and may have the words "CAUTION - DO NOT ENTER."

- Barricaded sections immediately adjacent to where pedestrians cross trenches shall be arranged to direct pedestrians to the walkway or bridge.

Encroachment. Use of other trench excavating equipment, or storage of equipment or supplies within a distance equal to the depth of the trench, will not be permitted without approval by the Earth Tech Representative.

Bridges. All pedestrian bridges shall be of sufficient strength to prevent no greater vertical deflection than one-half inch when a 250-pound weight is applied to the center of the bridge.

- Handrails shall consist of intermediate and top rails on both sides of the bridge. The top rail shall be between 42 and 45 inches above the walking surface and be capable of withstanding a lateral force of 200 pounds against the center of the top rail.
- All surfaces which a person could reasonably contact should be sufficiently free of splinters, nails, or protrusions which may cause injury.
- All bridges intended for vehicular traffic shall be constructed to withstand twice the load of the heaviest vehicle anticipated.

Earth Grading Activity

Vest. All persons within an area where earthmoving are operating shall wear a safety vest or jacket at all times. Vests may be red, orange, or day-glo green in color, but bright or fluorescent orange is preferred.

General Safety Rules for Contractors

Significantly faded or damaged vest must be replaced.

Communication. Anytime a test pit is to be excavated, the technician shall notify the grading contractor's authorized representative for that area. That individual may be acting in the capacity as a dump man, operator, or supervisor from an independent vehicle. Advise that representative of the test pit location and request their cooperation to promote safety during the test period. This should include their advising those under their supervision of your existence in the grading area. Make a notation on your records of the name of the individual with whom you spoke so that the communication is documented.

- Provide notice to the grading contractor
- Identify location of test pit
- Request the cooperation through the completion of the tests and document accordingly.
- A flag must be affixed to any vehicle driving in an earth grading activity area and hazard warning lights shall be operated.

Flags. Every over-the-road vehicle operating in the area of earthmoving equipment activity must carry a flag. The flag must be at least 300 square inches in area with no dimension less than 12 inches. Flags must be high visibility red, orange, day-glo green and mounted approximately 12 feet above grade level.

Hazard Warning Lights. Every over-the-road vehicle operating in the area of earthmoving equipment activity must operate the hazard warning flashers at all times.

Rotating or Flashing Beacon. All vehicles stationary in the grading area shall use a rotating or flashing amber beacon or strobe light on the top of the cab of the vehicle during all field testing.

Orientation of Test Pits. The technician is responsible for selecting a test pit location. Of paramount concern is the technician's safety. The test pit should be located behind the established pattern of grading equipment and outside any existing patterns. The orientation of the pit should include the use of the technician's vehicle as a barrier to potential oncoming traffic. The waste pile created from the excavation of the test pit should be opposite the vehicle so that the test pit is positioned between the vehicle and the waste pile. A flag shall be placed immediately on top of the waste (spoil) pile, satisfying the same requirements as the vehicle flag.

Zone of Non-Encroachment. The location of the test pit must be selected so that no earthmoving equipment will approach closer than 50 feet from the center of the test pit. This is not only for the technician's safety, but to ensure the integrity of the test. Excessive vibration from the operation of earthmoving equipment operating too closely may impair the accuracy or spoil the test results.

Completion of Tests. Immediately upon completion of tests, record the data and withdraw flags and

vehicles outside the grading area to record notes and do calculations.

Fire Prevention

Earth Tech Representative, or his designee, is authorized to correct any condition which he may consider a fire hazard. In any emergency, the site personnel are authorized to act directly with Contractor's Foreman in regard to fire hazards without waiting for the Earth Tech Representative.

Floor Openings

Floor openings shall be guarded by substantial barriers, railings, and/or covering materials strong enough to sustain twice the load of pedestrians or vehicular traffic. Barriers will be supplied by the Contractor.

Where a danger of falling exists for personnel, elevated floor areas must be provided with guardrails. In addition, toeboards shall be provided when the possibility of falling objects striking personnel below exists.

High-Hazard Areas

Although this list may not be all inclusive, there are certain areas and operations at Earth Tech facilities and job sites where extra precautions must be taken because of the nature of the hazards. When starting up any operation, the Contractor is required to check with the Earth Tech Representative for a review of the safety and health rules which apply before entering any of the following areas:

- Confined spaces (tanks, manholes, vaults, pits, etc.)
- Laboratories
- Chemical storage and disposal areas.

The contractor is also required to check with the Earth Tech Representative before any work is done on a flammable gas or solvent line; a tank or vessel that presently contains, or has contained, a flammable material; and before making an excavation anywhere on the site.

Housekeeping

Material should be carefully stacked and located so that it does not block aisles, doors, self-contained breathing apparatus, fire extinguishers, fire blankets, stretchers, emergency eyewash fountains, emergency safety showers, fixed ladders, stairways, or electrical breaker panels.

- Nails protruding from boards must be removed or bent over.
- All work areas shall be kept clear of form and scrap lumber and all other debris.
- Combustible scrap, waste materials, and debris shall be removed at regular and frequent intervals.

General Safety Rules for Contractors

- Containers shall be provided for the collection and separation of refuse by type. Covers shall be provided on containers used for flammable, combustible, or harmful substances.
- Overhead storage of debris, tools, equipment, pipes, etc., is prohibited.
- At the end of each work day, Contractor shall provide for pick up of all debris such as paper, rags, empty cans and bottles, etc.

Ladders

The use of ladders with broken or missing rungs or steps, broken or split handrails, or with other faulty or defective construction is prohibited.

- Ladders must not be placed adjacent to a door unless the door is locked or guarded.
- Metal ladders shall not be used for electrical work.
- Tie off top of ladder to structure.

Medical Service and First Aid

Emergency Medical Service. Preplanned emergency medical service shall be provided as designated by Contractor and approved by the Earth Tech Representative.

First Aid Kit. Each Contractor shall provide a first aid kit for his employees which meets minimum OSHA requirements.

Mobile Cranes

Mobile cranes, including portable crane derricks, power shovels, or similar equipment, shall not be operated within ten feet of overhead electrical power lines.

Overhead Work

No overhead work shall be performed when, as a result of that work, the possibility of a falling object striking any person exists. Do not work above any person at any time.

Personal Protective Clothing and Equipment

In certain construction and maintenance operations, personal protective equipment such as safety glasses, chemical goggles, respirators, hard hats, and protective clothing is required. The type of protective equipment to be worn will be determined by the degree of exposure to the potential hazard. There will be very few occasions when hard hats and eye protection will not be required at Earth Tech job sites. When in doubt of the safety measures to be observed, Contractor shall contact the Earth Tech Health and Safety Section. This shall not, however, relieve Contractor of his responsibilities to determine appropriate protection.

Eye protection is required when engaging in such operations as the following:

- Drilling, chipping, grinding, wire brushing

- Handling caustics and acids
- Breaking bricks or concrete
- Hammering chisels, drift pins, etc.
- Burning or welding
- Other situations which create a possible eye hazard, e.g., chemical environments.

Photographs

Only Earth Tech photographers, with permission from DIPEF, are permitted to carry cameras or take pictures. If progress or finished construction photographs are desired, request for same should be made through the Earth Tech Representative.

Power Tools

Power and Air-Actuated Tools. Gasoline-powered, electric, or air-actuated tools are not to be used on Earth Tech property or job sites without prior approval of the Earth Tech Health and Safety Department. To obtain approval, Contractor must contact the Earth Tech Representative.

Explosive-Actuated Tools. Explosive-actuated (powder-actuated) fastening tools shall meet the design requirements in "American National Standard Safety Requirements for Explosive-Actuated Fastening Tools" (ANSI A10.3-1970). A tool which does not meet these design standards cannot be used.

- Power tools shall never be left unattended in a place where they would be available to unauthorized persons.
- Power tools shall not be used in explosive or flammable atmospheres.

Fall Protection

Appropriate fall protection, such as safety harness and lanyard, must be worn when worker is exposed to falling more than 6 feet. Lanyard or lifeline must be tied off to appropriate structure capable of supporting five times the weight of the person (nominal 1000 pounds).

- Appropriate fall protection, such as safety harness and lanyard, must be worn when working above eight feet on straight or extension ladders when the work involves pushing, pulling, or action which may dislodge the person from the ladder.
- Safety harnesses are also required on swinging or portable scaffolds when handrails and toeboards are not provided (eight feet or more above ground or floor level).
- Safety harnesses and lifelines (including extraction devices for top entry spaces) are required on all work performed in confined spaces where an oxygen deficiency or toxic vapors may exist.
- All lifelines shall be safety secured to stable and adequate supports.

General Safety Rules for Contractors

- Safety harnesses and lifelines must be worn on rooftops where there are no guardrails and where the work is within ten feet of the edge.

Salamanders

- "Hot work" authorization must be obtained from the Earth Tech Representative before using a salamander.
- Salamanders must be a Factory Mutual or Underwriters Laboratories-approved type.
- Position salamanders away from all combustible material to reduce the possibility of uncontrolled fire.
- Guard salamanders from traffic to prevent them from being overturned.

Scaffolds

All scaffolds, whether fabricated on site, purchased, or rented, shall conform to the specifications found in ANSI A10.8, Safety Requirements for Scaffolding. Rolling scaffolds shall maintain a three-to-one height-to-base ratio.

- The footing or anchorage for a scaffold shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- Unstable objects, such as barrels, boxes, loose bricks, or concrete blocks, shall not be used to support scaffolds or planks.
- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons.
- Scaffolds and their components shall be capable of supporting at least four times the maximum intended load without failure.
- Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor.
- Scaffolds measuring four to ten feet in height, and having a horizontal dimension of less than 45 inches, shall have standard guardrails installed on all open sides and ends of the platform.
- Wire, synthetic, or fiber rope used for suspended scaffolds shall be capable of supporting at least six times the rated load.
- No riveting, welding, burning, or open flame work shall be performed on any staging suspended by means of fiber or synthetic rope.
- Tested fiber or approved synthetic ropes shall be used for or near any work involving the use of corrosive substances.
- All scaffolds, boatswain's (bosun's) chairs, and other work access platforms shall conform to the requirements set forth in the

federal OSHA Regulations for Construction (29 CFR 1926.451) except where the specifications in ANSI A10.8 7 or state or local regulations are more rigorous.

Smoking and Open Flames

Smoking and the use of open flames are strictly prohibited in areas where flammable liquids, gases, or highly combustible materials are stored, handled, or processed. Obey "No Smoking" signs. Smoke only in designated areas.

Solvents and Paints

- Adequate ventilation must be maintained at all times when paints or solvents are used.
- Personnel should use proper respiratory protection and protective clothing when toxicity of the material requires such protection.
- Flammable solvents and materials must be used with extreme caution when possible sources of ignition exist.
- Flammable paints and solvents must be stored in an approved (Factory Mutual or Underwriters Laboratories) flammable liquids storage cabinet when storage is required inside the buildings. If an approved cabinet is not available, paints and solvents must be removed from the building when not in use.
- Flammable liquids must be dispensed in safety cans with flash arresters bearing a Factory Mutual or Underwriters Laboratories approval. These containers must be clearly identified as to their contents.
- Material Safety Data sheets, for materials used by the Contractor, shall be maintained by the Contractor, and a copy provided to the Earth Tech Representative.

Tarpaulins

When tarpaulins are required for the detection of hot slag, dust, paint drippings, etc., or as security barriers, they shall be flame-resistant and in good condition.

Tools

Hand and power tools shall be kept in safe operating condition. Mushroomed heads on cold chisels, star drills, etc., are unsafe and should not be used. Hammers should have handles which are not cracked, split, or broken.

Nonsparking tools may be necessary in certain areas where flammable materials are handled or where sparks could create an explosion.

Transporting Material and Equipment

Extreme care must be taken while carrying sections of pipe, conduit, and other materials to assure safety to Earth Tech, Contractor, and client personnel and

General Safety Rules for Contractors

property. This includes, but is not limited to, flagging and use of two people to carry pipe of lengths greater than 10 feet.

- Tools, materials, and equipment must not be left unattended in access ways.
- Tools, material, and equipment shall not be removed from the job site without permission of the Earth Tech Representative.

Walking and Work Surfaces

- Workroom floors shall be clean and, to the extent possible, dry.
- Drainage mats, platforms, or false floors should be used where wet processes are performed.
- Floors shall be free from protruding nails, splinters, holes, and loose boards or tiles.
- Permanent aisles or passageways shall be marked.
- Floor holes shall be protected by covers that leave no openings of more than one inch wide.
- Floor openings into which persons can accidentally walk shall be guarded by standard railing and toeboards.
- Open-sided floors, platforms, and runways higher than four feet shall be guarded by standard railings.
- Toeboards shall be used wherever people can pass below, or where hazardous equipment or materials are located below.

Warning Signs

All posted warning, safety, and security signs and barriers shall be observed. Additionally, Contractor shall provide warning signs, barriers, barricades, etc. wherever such protection is needed. Where signs and barricades do not provide adequate protection, particularly along a road, flagmen shall be used.

Regulatory References

- (a) *Standard Operating Safety Guides*, USEPA, November 1984
- (b) Title 29 of the Code of Federal Regulations, Part 1910 (29 CFR 1910), Occupational Safety and Health Standards (USDOL/OSHA), with special attention to Section .120, Hazardous Waste Operations and Emergency Response
- (c) Title 29 of the Code of Federal Regulations, Part 1926 (29 CFR 1926), Safety and Health Regulations for Construction (USDOL/OSHA), with special attention to Section 1926.65, Hazardous Waste Operations and Emergency Response

Contractors are expected to brief their employees on these requirements and enforce these rules with their employees. Earth Tech management may stop or suspend work at any time the Contractor fails to comply with Earth Tech rules and regulations.

Attachment C
Drill Rig Safety Guidelines

DRILL RIG SAFETY GUIDELINES

A. General Drilling Practices

Prior to the start of site work each day, the drilling subcontractor will inspect all drilling equipment. The inspection will be documented in the field records, and the records will be maintained at the site. The drilling equipment inspection must be repeated on a daily basis.

EARTH TECH will conduct geophysical clearance and determine the location of all underground utilities before the start of drilling operations. In addition to obtaining the utility locations from the client, EARTH TECH will make a utility survey of each drilling point. The utility survey shall include both magnetometer and ground-penetrating radar survey. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be kept in the EARTH TECH project trailer and confirmed to the drilling subcontractor.

Drill rig maintenance and safety is the responsibility of the drilling subcontractor. The following information is provided as general guidelines for safe practices during drilling activities, and installation of monitoring/extraction wells.

1. No food or beverage will be consumed or stored in the work area.
2. EARTH TECH will contact appropriate utilities agency to survey, mark, and flag locations of buried utility lines.
3. Maintain orderly housekeeping on and around the drill rig.
4. Store tools, materials, and supplies to allow safe handling by drill crew members. Proper storage on racks or sills will prevent spreading, rolling, or sliding.
5. Avoid storage or transportation of tools, materials, or supplies within or on the drill rig derrick.
6. Maintain working surfaces free of obstructions or potentially hazardous substances.
7. Store gasoline only in containers specifically designed or approved for such use.
8. Wear eye protection when chipping, chiseling or breaking material that presents risk of flying objects.

9. The departing driller should inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.
10. Fire fighting equipment should not be tampered with and should not be removed for other than the intended fire fighting purposes or for servicing.
11. If lubrication fittings are not accessible with guards in place, machinery should be stopped for oil and greasing.
12. Rigging material equipment for material handling should be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging should be removed from service.
13. The area around the derrick ladder should be kept clear to provide unimpeded access to the ladder.
14. Work areas and walkways should not be obstructed.
15. The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, or circulating fluids.

B. Moving Rig to Drilling Location

1. Inspect the route of travel before moving drill rig off-road. Note rocks, trees, erosion, and uneven surfaces.
2. Remove all passengers from the cab before moving drill rig onto rough or sloped terrain.
3. Engage multiple drive power trains (when available) on rig vehicle when mobilizing off-road.
4. Travel directly up or down grade on slopes when feasible. Avoid off-camber traverse approaches to drill sites.
5. Approach changes in grade squarely to avoid shifting loads or unexpected unweighting.
6. Use a spotter (person at grade) to provide guidance when vertical and lateral clearance is questionable.
7. Use hand brakes and block rigwheels when grades are steep.

DRILL RIG SAFETY GUIDELINES

8. Lower rig mast before moving rig.
9. Secure all loads to rig prior to off-road mobilization.
10. EARTH TECH will use geophysical techniques, or equivalent, to locate buried utility lines.

C. Raising Mast

1. Locate visually overhead and buried utilities prior to drilling operations.
2. Treat overhead electrical lines as if they were energized and maintain at least a 40-foot clearance.
3. EARTH TECH will contact appropriate utilities agency to manipulate and deactivate overhead service in areas that interfere with drilling operations. Do not attempt to handle utilities.
4. Stabilize and level each work site prior to drill rig setup.
5. The derrick must not be raised until the rig has been blocked, leveled, and chocked.
6. Note wind speed and direction to prevent overhead utility lines from contacting rig derrick. Allow at least a 20-foot clearance between rig mast and utility lines.

D. Hoisting Operations

1. Drillers should never engage the rotary clutch without watching the rotary table and ensuring it is clear of personnel and equipment.
2. Unless the draw works is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.
3. Drill pipe or casing should not be picked up suddenly.
4. Drill pipe should not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrick man has signaled that he may safely hoist the pipe.
5. During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller

should be on the rig floor and no one should be on the rig or derrick.

6. The brakes on the draw works of every drilling rig should be tested by each driller, when he comes on shift, to determine whether they are in good order. The brakes should be thoroughly inspected by a competent individual each week.
7. A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.
8. Workers should never stand near the well bore whenever any wire line device is being run.
9. Hoisting control stations should be kept clean and controls labeled as to their functions.
10. Inspect wire, rope, hoisting hardware, swivels, hooks, bearings, sheaves, guides, rollers, clutches, brakes for the following:
 - abrasions
 - breaks
 - wear
 - fatigue
 - corrosion
 - jamming
 - kinking.
11. Avoid the suspension of loads when hoist is unattended.
12. Prevent hoisting loads directly over field personnel.
13. Restrict hoisting operations during unfavorable environmental conditions such as rain or high winds.
14. Maintain safe hand distance from hoisting equipment (e.g., wire rope, hooks, pinch points) when slack is reduced.

E. Riding Hoisting Equipment

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

F. Cat Line Operations

DRILL RIG SAFETY GUIDELINES

1. Only experienced workers will be allowed to operate the cat head controls. The kill switch must be clearly labeled and operational prior to operation of the cat line.
2. The cat head area must be kept free of obstructions and entanglements.
3. The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.
4. Personnel should not stand near, step over, or go under a cable or cat line that is under tension.
5. Employees rigging loads on cat lines should:
 - Keep out from under the load
 - Keep fingers and feet where they will not be crushed
 - Be sure to signal clearly when the load is being picked up
 - Use standard visual signals only and not depend on shouting to coworkers
 - Make sure the load is properly rigged, since a sudden jerk in the cat line will shift or drop the load.

G. Pipe Handling

1. Pipe should be loaded and unloaded, layer by layer, with the bottom layer pinned or blocked securely on all four corners. Each successive layer should be effectively blocked or chocked.
2. Workers should not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.
3. Employees should be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.
4. Slip handles should be used to lift and move slips. Employees should not be permitted to kick slips into position.
5. When pipe is being hoisted, personnel should not stand where the bottom end of the pipe could whip and strike them.
6. Pipe stored in racks, catwalks, or on flatbed trucks should be chocked to prevent rolling.

H. Derrick Operations

1. The derrick climber should be used whenever climbing the derrick. Personnel on the derrick should be tied off, or otherwise protected from falling when working in an unguarded elevated position.
2. All stands of pipe and drill collars racked in a derrick should be secured with rope or otherwise adequately secured.
3. Tools, derrick parts, or materials of any kind should not be thrown from the derrick.
4. The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

I. Making and Breaking Joints

1. Tongs should be used for the initial making up and breaking of the joint. The rotary table should not be used for the initial breaking of a joint.
2. Employees making or breaking joints should not be permitted to stand within the arc of the tong handles when the tong pull line is under tension. Employees should handle the tongs only by the appropriate handles.
3. Employees should be trained in the safe use of spinning chains. Spinning chains should not be handled near the rotary table while it is in motion.

J. Drilling Operations

1. Begin auger borings slowly with the drive engine operating at low speed.
2. Establish a communication system between driller, helper, and geologist for responsibilities during drilling operations.
3. Engage auger to power coupling as recommended by manufacturer.
4. Restrict contact with power coupling or auger during rotation.
5. Prevent placing hands or feet under auger during rotation.

DRILL RIG SAFETY GUIDELINES

6. Prevent placing hands or feet under auger sections during hoisting over hard surfaces.
7. Avoid the removal of spoil cuttings with hands or feet.
8. Assure drill rig is in neutral and the augers are not rotating before cleaning augers.

Drill Rig Safety Inspection Checklist

Date _____ Equipment Model/Type _____
 Project # _____ Serial or License # _____
 Location _____ Owner/Operator _____

Place a (✓) in the "Yes" column if the requirement has been met. If a "No" is encountered, equipment must be removed from operation until the deficiency has been corrected. Describe deficiencies on page two of this form. Use the Comment column to note any additional information needed to certify the equipment.

Item Name	Requirement	Yes	No	Comment
Hydraulic systems controls and levers	No leak fittings or connections. Levers are in good operating condition. Fluid levels are full.			
Fuel, oil, water, and coolant lines	No leaks.			
Hoses	No leaks in hoses or connections. No signs of excessive wear, kinked or bent hoses.			
Gauges	Operational and visible to operator.			
Emergency kill switch and life line	Operational and accessible to operator.			
Shear pins	In place.			
Drive chains	No signs of excessive wear, broken or defective links.			
Parking brakes	Set and operational.			
Outriggers	No leaks. Set on pads (as necessary to avoid damage).			
Windshield Wipers	Operational.			
Lights (head, tail and running lights)	Operational and without cracked lenses.			
Back-up alarm	Operational, spotter used.			
Cables and ropes	No fraying, birdnesting, flattening, stretching. Must be braided or properly clamped at connections.			
Pulleys, drums and spools	No excessive wear or cracking.			
Derrick/Mast	Locked in position. Frame is not cracked or bent.			
Hoists	Properly spooled cable, rated to lift loads.			

Drill Rig Safety Inspection Checklist

Item Name	Requirement	Yes	No	Comment
Safety equipment	Safety harness, fire extinguisher, flares, safety reflectors, first aid kit, grounding wire for fueling, and spill response equipment (for fueling and repairs).			
Guards	Power take-offs (PTOs) and all rotating parts designed with guards. Guards must have warning labels.			
Miscellaneous (as applicable)	Diverter systems; auger and head seals; cyclones; grout plant guards; etc. (list): • • •			

DEFICIENCIES (Explain all negative response and list corrective actions; all deficiencies must be corrected before the rig is entered into service):

- 1.
- 2.
- 3.
- 4.
- 5.

Other Repairs or Routine Maintenance

Inspection Conducted and Certified by:
(Owner/Operator)

Signature

Date

Print Name: _____

Checklist Reviewed by:
(Earth Tech SSO or FM)

Signature

Date

Print Name: _____

Direct Push Rig Safety Certification

Date _____ Equipment Model/Type _____
 Project # _____ Serial or License # _____
 Location _____ Owner/Operator _____

Place a (✓) in the "Yes" column if the requirement has been met. If a "No" is encountered, equipment must be removed from operation until the deficiency has been corrected. Describe deficiencies on page two of this form. Use the Comment column to note any additional information needed to certify the equipment.

Item Name	Requirement	Yes	No	Comment
Hydraulic systems controls and levers	No leak fittings or connections. Levers are in good operating condition. Fluid levels are full.			
Fuel, oil, water, and coolant lines	No leaks.			
Hoses	No leaks in hoses or connections. No signs of excessive wear, kinked or bent hoses.			
Gauges	Operational and visible to operator.			
Emergency kill switch and life line	Operational and accessible to operator.			
Shear pins	In place.			
Drive chains	No signs of excessive wear, broken or defective links.			
Parking brakes	Set and operational.			
Outriggers	No leaks. Set on pads (as necessary to avoid damage).			
Windshield Wipers	Operational.			
Lights (head, tail and running lights)	Operational and without cracked lenses.			
Back-up alarm	Operational, spotter used.			
Cables and ropes	No fraying, birdnesting, flattening, stretching. Must be braided or properly clamped at connections.			
Pulleys, drums and spools	No excessive wear or cracking.			
Derrick/Mast	Locked in position. Frame is not cracked or bent.			
Hoists	Properly spooled cable, rated to lift loads.			
Safety equipment	Safety harness, fire extinguisher, flares, safety reflectors, first aid kit, grounding wire for fueling, and spill response equipment (for fueling and repairs).			

Direct Push Rig Safety Certification

Item Name	Requirement	Yes	No	Comment
Guards	Power take-offs (PTOs) and all rotating parts designed with guards. Guards must have warning labels.			
Miscellaneous (as applicable)	Diverter systems; auger and head seals; cyclones; grout plant guards; etc. (list): <ul style="list-style-type: none"> • • • 			

DEFICIENCIES (Explain all negative response and list corrective actions; all deficiencies must be corrected before the rig is entered into service):

- 1.
- 2.
- 3.
- 4.
- 5.

Other Repairs or Routine Maintenance

Inspection Conducted and Certified by:
(Owner/Operator)

Signature _____ Date _____

Print Name: _____

Checklist Reviewed by:
(Earth Tech SSO or FM)

Signature _____ Date _____

Print Name: _____

**Attachment D
Task Hazard Analyses**

TASK NAME

GEOPHYSICAL SURVEYING

TASK DESCRIPTION

Personnel will perform preliminary, non-intrusive observations, surveying and geophysical surveying. The purpose of these activities will be to assess the need for environmental sampling and to identify the techniques to be performed.

CHEMICAL EXPOSURE HAZARDS

None

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

Heat Stress Prevention (Section 4.6)
Slips, Trips, Falls, and Protruding Objects (Section 6.1)

ADDITIONAL SAFETY CONSIDERATIONS

None

MONITORING PROCEDURES

No monitoring required.

TASK NAME

CONCRETE CORING

TASK DESCRIPTION

Sampling inside buildings or beneath foundation structures may require the removal of obstructing concrete. A large-diameter core barrel will be placed at the sampling site and rotated to cut through the concrete. The concrete "cap" is then removed, exposing the subsurface. During concrete coring water is typically applied to remove heat generated by coring machine, and to reduce dust emission levels.

CHEMICAL EXPOSURE HAZARDS

None

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Face Shield
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses
- Hearing protection

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise
- Flying debris

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- Slips, Trips, Falls, and Protruding Objects (Section 6.1)
- Hazardous Noise Environments (Section 6.2)

ADDITIONAL SAFETY CONSIDERATIONS

- Following completion of coring an assessment will be made of VOC emissions from the hole.

MONITORING PROCEDURES

Removal of the concrete cap after coring may result in the release of trapped VOCs. To prevent personnel exposure during subsequent work a PID will be used to assess these emissions immediately after removal from the cap. The PID inlet will be placed at the center point of the hole, level with the surrounding concrete surface. If VOC levels exceed 25 ppm personnel will move at least 15 feet from the hole and allow ventilation to occur for at least 15 minutes. The monitoring procedure should then be completed. If adequate clearance cannot be obtained after one hour the cap should be replaced and sealed using plastic and the H&SP should be contacted for guidance.

TASK NAME

MANUAL SAMPLING (SURFACE SOIL AND DEBRIS SAMPLES)

TASK DESCRIPTION

Soil samples will be manually collected from the surface using pre-cleaned disposable trowels and placed into 16-ounce glass jars (except for samples to be analyzed for volatile analytes, which will be collected in accordance with Method 5035). This technique presents no significant potential for airborne release of contaminants since no significant soil disturbance occurs.

CHEMICAL EXPOSURE HAZARDS

- VOCs (solvents) (skin contact)
- Petroleum hydrocarbon fuels (skin contact)
- PAHs (skin contact)
- Heavy Metals (skin contact)
- PCBs (skin contact)
- Pesticides (skin contact)
- Herbicides (skin contact)

Note: No data is available to indicate which, if any, contaminants may be present.

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses

Note: When handling environmental samples personnel will wear Ansell Edmont Solvex gloves or Best Safety N-Dex gloves.

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- Heat Stress Prevention (Section 4.6)
- Slips, Trips, Falls, and Protruding Objects (Section 6.1)

ADDITIONAL SAFETY CONSIDERATIONS

None

MONITORING PROCEDURES

No monitoring required.

TASK NAME

HAND AUGER SAMPLING (NEAR-SURFACE SOIL AND SUBSURFACE SOIL SAMPLES)

TASK DESCRIPTION

A hand auger will be used to collect near-surface/subsurface soil samples to depths of approximately 5 feet. Hand augering involves the manual placement and insertion (turning) of a small auger blade. Soil is displaced by the blade, creating a hole which allows access to soils located below the ground surface. Because only small volumes of soil is disturbed the potential for airborne release of contaminants when performing this work is minimal.

CHEMICAL EXPOSURE HAZARDS

- VOCs (solvents) (skin contact)
- Petroleum hydrocarbon fuels (skin contact)
- PAHs (skin contact)
- Heavy Metals (skin contact)
- PCBs (skin contact)
- Pesticides (skin contact)
- Herbicides (skin contact)

Note: No data is available to indicate which, if any, contaminants may be present.

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses

Note: When handling environmental samples, personnel will wear Ansell Edmont Solvex gloves or Best Safety N-Dex gloves.

OTHER SAFETY EQUIPMENT

- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- Heat Stress Prevention (Section 4.6)
- Slips, Trips, Falls, and Protruding Objects (Section 6.1)
- Hand and Portable Power Tools (Section 6.6)

ADDITIONAL SAFETY CONSIDERATIONS

None

MONITORING PROCEDURES

No monitoring required.

Evaluated by: Bart Dawson, RES

Date: December 2002

TASK NAME

DIRECT PUSH SAMPLING (SUBSURFACE SOIL, GROUNDWATER OR SOIL GAS SAMPLES)

TASK DESCRIPTION

Direct push techniques allow collection of subsurface soil, groundwater and soil gas samples at depths which are not practical using hand augering. Direct push involves the insertion of metal "push rods" into the soil by the use of a hydraulic ram assembly. As depths increase additional rods can be added to provide a continuous run. The direct push probe can be fitted with a variety of sample probes to allow collection of soil in the subsurface environment, or collection of groundwater or soil vapor through a Teflon tube connected to a sampling mechanism at the surface. At the conclusion of direct push sampling procedure the push rods are withdrawn, and the hole can be sealed using grout or allowed to collapse naturally.

Direct push "drilling" produces little to no spoils, regardless of the depths obtained (soil is compressed to the sides of the hole rather than removed along an auger. For this reason, direct push techniques present little potential for the airborne release of contaminants as the rods are advanced or withdrawn.

CHEMICAL EXPOSURE HAZARDS

- VOCs (solvents) (skin contact)
- Petroleum hydrocarbon fuels (skin contact)
- PAHs (skin contact)
- Heavy Metals (skin contact)
- PCBs (skin contact)
- Pesticides (skin contact)
- Herbicides (skin contact)

Note: No data is available to indicate which, if any, contaminants may be present.

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses

Note: When handling environmental samples or removing push rods, personnel will wear Ansell Edmont Solvex gloves or Best Safety N-Dex gloves.

OTHER SAFETY EQUIPMENT

- Hand/face washing supplies (One 5-gallon bucket, soap, paper towels).
- Equipment decontamination supplies.
- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- Heat Stress Prevention (Section 4.6)
- Slips, Trips, Falls, and Protruding Objects (Section 6.1)
- Heavy Machinery (Section 6.3)
- Underground Utilities (Section 6.4)
- Drill Rig Safety Guidelines (Attachment C)

ADDITIONAL SAFETY CONSIDERATIONS

- A *Direct Push Rig Safety Checklist* (Attachment C) must be completed for each rig prior to the start to work.

MONITORING PROCEDURES

No monitoring required.

TASK NAME

HOLLOW-STEM AUGER SAMPLING (SUBSURFACE SOIL AND GROUNDWATER SAMPLES)

TASK DESCRIPTION

Hollow-Stem Auger (HSA) techniques allow collection of subsurface soil and groundwater samples, and is capable of operating over a greater range of depths and through more types of subsurface obstacles than direct push techniques. In HSA, auger bits (similar to, though larger than, those in hand augering) are advanced by mechanical means (a drill rig), additional auger can be attached to the auger "flight" as depths are advanced. Soils removed by the auger collect at the surface as spoils, which must be collected and disposed of. This technique allows for the collection of subsurface soil and groundwater samples by the downhole insertion of sampling tools, and auger holes can be converted for long-term groundwater sampling through the construction of a groundwater monitoring well. At the conclusion of an HSA sampling event the hole is typically sealed by the use of grout or a similar material, unless a monitoring well is constructed.

The removal of significant spoils, and the vapor migration space provided by the hollow auger stem can allow significant emissions of vapor-phase contaminants (in the vent that volatile contaminants are present). Dusts from the surface spoils (entrained by wind on the site) dusts released by augering can produce significant concentrations of contaminated aerosols where soils have been impacted by subsurface contamination.

CHEMICAL EXPOSURE HAZARDS

- VOCs (inhalation & skin contact)
- Petroleum hydrocarbon fuels (inhalation & skin contact)
- PAHs (inhalation & skin contact)
- Heavy Metals (inhalation & skin contact)
- PCBs (inhalation & skin contact)
- Pesticides (inhalation & skin contact)
- Herbicides (inhalation & skin contact)

Note: No data is available to indicate which, if any, contaminants may be present.

PPE

Level D Ensemble (Section 7.1.2)

- Hard Hat
- Short Sleeve Shirt
- Full-length Pants
- Safety-toe Boots
- Safety Glasses
- Hearing protection (muffs/plugs)

Note: When handling environmental samples or removing push rods, personnel will wear Ansell Edmont Solvex gloves or Best Safety N-Dex gloves.

OTHER SAFETY EQUIPMENT

- Hand/face washing supplies (One 5-gallon bucket, soap, paper towels).
- Equipment decontamination supplies.
- First aid kit (located in vehicle)
- Fire extinguisher (located in vehicle)

PHYSICAL HAZARDS

- Slips, trips, falls, and protruding objects
- Hazardous Noise Environments
- Heavy Machinery (HSA Drill Rig)
- Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- Heat Stress Prevention (Section 4.6)
- Slips, Trips, Falls, and Protruding Objects (Section 6.1)
- Hazardous Noise Environments (Section 6.2)
- Heavy Machinery (Section 6.3)
- Underground Utilities (Section 6.4)
- Drill Rig Safety Guidelines (Attachment C)

ADDITIONAL SAFETY CONSIDERATIONS

- A *Drill Rig Safety Certification* form (Attachment C) must be completed for each rig prior to initiating drilling work.

MONITORING PROCEDURES

See next page.

evaluated by: Bart Dawson, RES

Date: December 2002

HSA AIR MONITORING PROCEDURES

Parameter	Zone Location and Monitoring Interval	Response Level (Above Background)	Response Activity
VOCs (total by PID)	Breathing Zone, every 30 minutes during HSA drilling activities	< 5 units	Continue work in required PPE and continue monitoring.
		5-15 units (sustained for more than 5 minutes)	Continue work in required PPE, continue monitoring, and use benzene detector tubes.
		15-50 units (sustained for more than 5 minutes)	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		> 50 units (sustained for more than 5 minutes)	Cease work, exit, and contact the H&SP and PM.
Benzene (by Colorimetric Tube)	Breathing zone, where indicated by VOC readings	No color change	Continue work activities.
		Noticeable color change up to 10 ppm	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		>10 ppm	Cease work, exit the area, and contact the SSO and PM.
VOCs (total by PID)	Edge of Exclusion Zones, every 30 minutes during HSA drilling activities	< 10 units	Continue work in required PPE, monitor air, and implement engineering controls.
		> 10 units (sustained for more than 5 minutes)	Continue mitigation measures and contact the SSO.
Aerosols (total by aerosol monitor)	Breathing zone every 30 minutes during HSA drilling activities	< 3 mg/m ³	Continue work in Level D, continue monitoring, and continue dust suppression measures
		3 – 15 mg/m ³	Contact the SSO, upgrade dust suppression measures, upgrade PPE to Level C (P100 cartridge).
		>15 mg/m ³	Cease activities and re-evaluate dust suppression measures; contact the H&SP

TASK NAME

POTHOLING ACTIVITIES

TASK DESCRIPTION	CHEMICAL EXPOSURE HAZARDS
<p>In some instances, it is desirable to directly observe subsurface soil/debris. Potholing allows this through the digging of a small excavation to the desired depth. A backhoe or other excavator is used, and excavated soils are placed adjacent to the pothole for use during backfilling. Because the walls of an open excavation can collapse no entry of a pothole is not permitted.</p> <p>Because potholing is a highly intrusive technique, significant emissions of vapor or aerosol phase contaminants can occur.</p>	<ul style="list-style-type: none"> • VOCs (inhalation & skin contact) • Petroleum hydrocarbon fuels (inhalation & skin contact) • PAHs (inhalation & skin contact) • Heavy Metals (inhalation & skin contact) • PCBs (inhalation & skin contact) • Pesticides (inhalation & skin contact) • Herbicides (inhalation & skin contact) <p>Note: No data is available to indicate which, if any, contaminants may be present.</p>

PPE	OTHER SAFETY EQUIPMENT	PHYSICAL HAZARDS
<p>Modified Level D Ensemble (Section 7.1.2)</p> <ul style="list-style-type: none"> • Hard Hat • Short Sleeve Shirt • Full-length Pants • Safety-toe Boots • Safety Glasses <p>Note: The excavator operator can utilize the Level D PPE ensemble.</p>	<ul style="list-style-type: none"> • Hand/face washing supplies (One 5-gallon bucket, soap, paper towels). • Equipment decontamination supplies. • First aid kit (located in vehicle) • Fire extinguisher (located in vehicle) 	<ul style="list-style-type: none"> • Slips, trips, falls, and protruding objects • Hazardous Noise Environments • Heavy Equipment (backhoe) • Engulfment • Heat Stress

APPLICABLE OPERATIONAL SAFETY PROCEDURES	ADDITIONAL SAFETY CONSIDERATIONS
<ul style="list-style-type: none"> • Heat Stress Prevention (Section 4.6) • Slips, Trips, Falls, and Protruding Objects (Section 6.1) • Hazardous Noise Environments (Section 6.2) • Heavy Machinery (Section 6.3) • Underground Utilities (Section 6.4) • Excavation Safety (Section 6.5) • Heavy Equipment Certification (Attachment E) 	<ul style="list-style-type: none"> • A <i>Heavy Equipment Safety Certification</i> form (Attachment E) must be completed for each rig prior to initiating drilling work.

MONITORING PROCEDURES

See next page.

POTHOLING AIR MONITORING PROCEDURES

Parameter	Zone Location and Monitoring Interval	Response Level (Above Background)	Response Activity
VOCs (total by PID)	Breathing Zone, every 30 minutes during HSA drilling activities	< 5 units	Continue work in required PPE and continue monitoring.
		5-15 units (sustained for more than 5 minutes)	Continue work in required PPE, continue monitoring, and use benzene detector tubes.
		15-50 units (sustained for more than 5 minutes)	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		> 50 units (sustained for more than 5 minutes)	Cease work, exit, and contact the H&SP and PM.
Benzene (by Colorimetric Tube)	Breathing zone, where indicated by VOC readings	No color change	Continue work activities.
		Noticeable color change up to 10 ppm	Contact the SSO, implement mitigation measures, upgrade PPE to Level C (organic vapor cartridge).
		>10 ppm	Cease work, exit the area, and contact the SSO and PM.
VOCs (total by PID)	Edge of Exclusion Zones, every 30 minutes during HSA drilling activities	< 10 units	Continue work in required PPE, monitor air, and implement engineering controls.
		> 10 units (sustained for more than 5 minutes)	Continue mitigation measures and contact the SSO.
Aerosols (total by aerosol monitor)	Breathing zone every 30 minutes during HSA drilling activities	< 3 mg/m ³	Continue work in Level D, continue monitoring, and continue dust suppression measures
		3 – 15 mg/m ³	Contact the SSO, upgrade dust suppression measures, upgrade PPE to Level C (P100 cartridge).
		>15 mg/m ³	Cease activities and re-evaluate dust suppression measures; contact the H&SP

Attachment E
Heavy Equipment Certification

PURPOSE

The purpose of this procedure is to present the minimum safety performance requirements for the operation of heavy equipment on Earth Tech CLEAN projects. CTO Managers are responsible for ensuring all equipment is certified and that the attached Machinery and Mechanized Equipment form has been submitted to the Navy.

GENERAL REQUIREMENTS

Subcontractor equipment shall comply with all applicable requirements for motor vehicles and material handling heavy equipment contained in 29 CFR 1926 Subpart O, and the latest *U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, Section 16 - Machinery and Mechanized Equipment* (attached). Heavy equipment includes, but is not limited to, drill rigs, front end loaders, backhoes, trackhoes, bulldozers, forklifts, and similar equipment used for the implementation of the project Statement of Work.

EQUIPMENT SAFETY INSPECTIONS

The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all inclusive. Equipment on-site are subject to the requirements found in Section 16 of *U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1*.

1. All machinery and mechanized equipment will be certified to be in safe operating condition by a competent individual seven days prior to onsite operation. The certification form (provided hereinafter) is valid for a period of one year, for the project specified. Submit the completed form through the Program Management Office.
2. Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.
3. Inspections shall include, but are not limited to: all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.
4. Drill rigs and related support equipment and vehicles shall be inspected by the driller in charge on a daily basis. These inspections shall be recorded on the Daily Drill Rig Checklist (included within the Drill Rig Safety Guidelines in Appendix C); or on equivalent subcontractor forms. Appendix C contains Earth Tech's Drill Rig Safety Guidelines and shall be used when the subcontractor does not have inspection procedures in place.
5. The Daily Drill Rig Inspection will be enforced by the on-site health and safety representative, Field Manager, or designee.
6. Exhaustive preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or the Subcontractor's internal policies, schedules, and equipment SOPs.
7. Machinery and mechanized equipment shall be operated only by designated qualified persons.
8. Records of tests and inspections shall be maintained at the site by the contractor, and shall be made available upon request of the designated authority, and shall become part of the official project file.
9. Equipment not found to be in safe operating condition, or when a deficiency which affects the safe operation of the equipment, shall immediately be taken out of service and its use prohibited until safe conditions have been corrected.

HEAVY EQUIPMENT CERTIFICATION REQUIREMENTS

10. All equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
11. Equipment with an obstructed rear view must have an audible alarm that sounds when equipment is moving in reverse.

MACHINERY AND MECHANIZED EQUIPMENT CERTIFICATION FORM

TO: Contracting Officer

DATE:

FROM: Earth Tech, Inc.

CONTRACT NO.: N62742-94-D-0048

CTO No.: _____ CTO Title: _____

1. This form provides certification of machinery and mechanized equipment to be used on the referenced contract task order (CTO) for the following work:

Description of equipment work:	
Project Site:	
Subcontractor providing equipment:	
Address:	
Dates (duration) of equipment work:	

2. Inspection and certification of machinery and mechanized equipment, as required by *U.S. Army Corps of Engineers, EM 385-1-1, "Safety and Health Requirements Manual," Section 16 - Machinery and Mechanized Equipment*, has been made prior to, but within seven calendar days advance of, use on the project site. Re-certification will be required for equipment that is used on the project site for more than one year.

	Identification of equipment (make, model, serial no.)	Date of Certification
1		
2		
3		

3. The above listed equipment has been inspected and tested as indicated above, and is **CERTIFIED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:**

Name		Title	
Company			
Signature		Date	

4. If there are any questions regarding this certification, please contact the following Earth Tech representative: _____.

Copy to: PACNAVFACENCOM Code 00K
COTR (LRPM)
NTR (RPM)
CTO Files

Attachment F
HSP/APP Cross Reference

Earth Tech Health and Safety Plan/USACE APP Cross-Reference Table

The following cross-reference table provides information concerning the correspondence between Earth Tech's *Health and Safety Plan (HSP) for Preliminary Assessment of Locations of Concern, Environmental Baseline Survey, Former Marine Corps Air Station, El Toro, California* and the Accident Prevention Plan (APP) outline found in Appendix A of the USACE Environmental Regulation 385-1-1. The format, content, procedures and requirements in this HSP are directed solely to meet the on-site needs of Earth Tech's field workers and subcontractors who will be performing the work activities addressed in the HSP. Consequently, the document does not address any non site-specific safety performance requirements or programs, except to specify site/task-level site implementation in the work force. Nor does the HSP attempt to duplicate or reproduce any of Earth Tech's Corporate Environmental, Safety and Health Program requirements or information, except where specifying site-specific implementation needs¹. APP outline elements which are not site specific, and are only addressed in Earth Tech's Corporate Environmental, Safety and Health Program (rather than the HSP), are so indicated.

USACE Accident Prevention Plan Requirement	ET Health and Safety Plan Section
1. SIGNATURE SHEET.	An Approval page is located at the front of the HSP. The CLEAN CTO Manager and Health and Safety Manager provide signed approval of the FINAL (not Draft) version of the HSP.
2. BACKGROUND INFORMATION. List the following:	
a. contractor;	HSP Cover and Section 1.
b. contract number;	HSP Cover and Section 1.
c. project name;	HSP Cover and Section 1.
d. brief project description, description of work to be performed, and location (map);	HSP Section 3. Significant additional information is found in the Work Plan prepared for each CTO and available on the work site at all times.
e. contractor accident experience (provide information such as EMR, OSHA 200 Forms, corporate safety trend analyses);	This information is not site/project specific, and hence is not included as part of site-specific health and safety documents.
f. listing of phases of work and hazardous activities requiring activity hazards analyses.	HSP Section 3.2
3. STATEMENT OF SAFETY AND HEALTH POLICY.	HSP Section 1.1.
4. RESPONSIBILITIES AND LINES OF AUTHORITIES.	
a. Identification and accountability of personnel responsible for safety – at both corporate and project level.	HSP Section 2.
b. Lines of authority.	HSP Section 2.
5. SUBCONTRACTORS AND SUPPLIERS. Provide the following:	
a. identification of subcontractors and suppliers (if known);	Subcontractor selection has not yet been performed.
b. means for controlling and coordinating subcontractors and suppliers;	Earth Tech Corporate Environmental, Safety and

¹ Earth Tech's Corporate Environmental, Safety and Health Program documentation was provided to PACDIV and accepted as part of the CLEAN Contract award process. Since these Programs are not site-specific they are not included as part of the CTO's work planning document submittals.

USACE Accident Prevention Plan Requirement	ET Health and Safety Plan Section
	Health Program documentation.
c. safety responsibilities of subcontractors and suppliers.	HSP Attachment B, General Safety Rules for Subcontractors
6. TRAINING.	
a. List subjects to be discussed with employees in safety indoctrination.	HSP Section 4.2.
b. List mandatory training and certifications, which are applicable to this project and any requirements for periodic retraining/recertification.	HSP Section 4.1
c. Identify requirements for emergency response training.	None required.
d. Outline requirements (who attends, when given, who will conduct etc.) for supervisory and employee safety meetings.	HSP Section 4.2.2
7. SAFETY AND HEALTH INSPECTIONS. Provide details on:	
a. who will conduct safety inspections, when inspections will be conducted, how the inspections will be recorded, deficiency tracking system, follow-up procedures, etc;	Earth Tech's site audit policies are part of our Corporate Environmental, Safety and Health Program documentation, and so are not included in this HSP.
b. any external inspections/certifications which may be required.	HSP Attachment C, <i>Drill Rig Safety Guidelines</i> , and Attachment E, <i>Heavy Equipment Certification</i> .
8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE.	
a. The company's written safety program goals, objectives, and accident experience goals for this contract should be provided.	This information is part of Earth Tech's Corporate Environmental, Safety and Health Program, and are not included in this HSP.
b. A brief description of the company's safety incentive programs (if any) should be provided.	Earth Tech has no employee safety incentive program for the CLEAN Program.
c. Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified.	Earth Tech's policies regarding worker noncompliance are part of our Corporate Environmental, Safety and Health Program documentation, and are not included in this HSP.
d. Provide written company procedures for holding managers and supervisors accountable for safety.	Earth Tech's policies regarding manager accountability for safety performance are part of our Corporate Environmental, Safety and Health Program documentation, and are not included in this HSP.
9. ACCIDENT REPORTING. The contractor shall identify who shall complete the following, how, and when:	
a. exposure data (man-hours worked);	Not applicable.
b. accident investigations, reports and logs;	HSP Section 4.7.
c. immediate notification of major accidents.	HSP Section 4.7
10. MEDICAL SUPPORT. Outline on-site medical support and off-site medical arrangements.	HSP Section 8.6.
11. PERSONAL PROTECTIVE EQUIPMENT. Outline procedures for conducting hazard assessments and written certifications for use of personal protective equipment.	Hazard assessment information can be found in HSP Section 5.0 and the Task Hazard Analyses found in Attachment D. PPE ensemble and equipment

USACE Accident Prevention Plan Requirement	ET Health and Safety Plan Section
	requirements are specified in Section 7.1. Task-specific PPE requirements are specified in the Task Hazard Analyses found in Attachment D.
12. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (as applicable).	
a. hazard communication program (01.B.04);	Earth Tech's Hazard Communication policies are part of our Corporate Environmental, Safety and Health Program documentation. Additional details are found in HSP Section 4.2.3.
b. emergency response plans:	
- procedures and tests (01.E.01)	HSP Section 8.0
- spill plans (01.E.01, 06.A.02)	Not applicable.
- firefighting plan (01.E.01, 19.A.04)	Not applicable. Earth Tech policy is to notify professional fire response agencies immediately in the event of fire. We do not perform fire fighting activities.
- posting of emergency telephone numbers (01.E.04)	HSP Section 8.0, Table 8-2
- wildfire prevention plan (09.K.01)	Not applicable.
- man overboard/abandon ship (19.A.04)	Not applicable.
c. layout plans (04.A.01);	Not applicable.
d. respiratory protection plan (05.E.01);	Not applicable.
e. health hazard control program (06.A.02);	Task Hazard Analyses found in Attachment D.
f. lead abatement plan (06.B.05 & specifications);	Not applicable.
g. asbestos abatement plan (06.B.05 & specifications);	Not applicable.
h. abrasive blasting (06.H.01);	Not applicable.
i. confined space (06.I);	Not applicable.
j. hazardous energy control plan (12.A.07);	Not applicable.
k. critical lift procedures (16.C.17);	Not applicable.
l. contingency plan for severe weather (19.A.03);	Not applicable.
m. access and haul road plan (22.I.10);	Not applicable.
n. demolition plan (engineering and asbestos surveys) (23.A.01);	Not applicable.
o. emergency rescue (tunneling) (26.A.05);	Not applicable.
p. underground construction fire prevention and protection plan (26.D.01);	Not applicable.
q. compressed air plan (26.I.01);	Not applicable.
r. formwork and shoring erection and removal plans (27.B.02);	Not applicable.
s. lift slab plans (27.D.01);	Not applicable.
t. blasting plan (29.A.01);	Not applicable.
u. diving plan (30.A.13);	Not applicable.
v. plan for prevention of alcohol and drug abuse (Defense Federal Acquisition Regulation Supplement Subpart 252.223.7004, Drug-Free Force).	Earth Tech's Drug and Alcohol Abuse policies are part of our Corporate Human Resources and Environmental, Safety and Health Program documentation. These requirements are not included in this HSP.