



Final

**Accident Prevention Plan for Data Gap
Sampling of Groundwater Monitoring Wells
at Installation Restoration Site 32,
Groundwater in Area of Concern 1,
Soil in Area of Concern 6, and
Groundwater in Area of Concern 23 at
Installation Restoration Site 35, and Soil
Sampling at Kollmann Circle**

**Alameda Point
Alameda, California**

December 4, 2007

Prepared for:

**U.S. Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California**

Prepared by:

**SulTech, A Joint Venture of Sullivan Consulting Group and
Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California**

Prepared under:

**Naval Facilities Engineering Command
Contract Number N68711-03-D-5104
Contract Task Order 0130**

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FROM: 
Steven Bradley, Contract Manager

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Final Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Resotration Site 35, and Soil Sampling at Kollman Circle

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COORDINATION AND REVIEW - COMMENTS
SOUTHWESTNAVFACENGC COM 11012/1A (8-93)

Environmental Safety Engineer:
ALAN B. FREEMAN

COMMENTS BY: ALAN FREEMAN	CODE: 09SF	PHONE: 619-556-2193	DATE: 24 October 2007
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PROJECT TITLE AND LOCATION: DATA GAP SAMPLING IR SITES 32 & 35	TYPE OF REVIEW: APP & AHA
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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
1	Paragraph 5.0	Please include language that SulTech will review and approve subcontractor AHAs prior to submitting to Navy for acceptance.	The language stating that SulTech will review and approve subcontractor AHAs prior to submitting to the Navy has been added to Section 5.0.
2	Paragraph 7.0	<p>The language in the first paragraph has been in every Tetra Tech APP submittal and the same comment has been given to Tetra Tech. The APP is job specific and this language is irrelevant. You know by the scope of work what the schedule is so please re-write this paragraph accordingly!</p> <p>Please also provide a description of your deficiency tracking system and follow up procedures. Formal monthly audits shall be conducted in accordance with the Health and Safety Audit Program, what does that mean, will there be monthly inspections and if so by whom?</p>	<p>Daily, informal audits will be conducted by the on-site SulTech Site Safety Coordinator (SSC). The results of these will be included in the field logbook.</p> <p>At least one formal safety audit will be performed during the course of this project. This audit will be performed either by the Navy Health and Safety Officer (SulTech) or the Director of Health and Safety (SulTech).</p> <p>Any deficiencies noted during informal or formal audits will be entered into SulTech's Corrective/Preventive action database, and tracked through successful resolution. Information gained during these audits will also be shared with the entire company in order to reduce the likelihood of recurrence at other jobsites.</p> <p>There are no external inspections that are required to SulTech's knowledge.</p>
3	Paragraph 9.0	Accidents should also be reported to the Navy PM and ROICC NTR.	Text has been revised to indicate that all accidents will be reported to the Navy PM and ROICC NTR.

COORDINATION AND REVIEW - COMMENTS
SOUTHWESTNAVFACENCOM 11012/1A (8-93)

Environmental Safety Engineer:
ALAN B. FREEMAN

COMMENTS BY: ALAN FREEMAN	CODE: 09SF	PHONE: 619-556-2193	DATE: 24 October 2007
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PROJECT TITLE AND LOCATION: DATA GAP SAMPLING IR SITES 32 & 35	TYPE OF REVIEW: APP & AHA
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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
4	Paragraph 10.0	This Section does not address the EM 385-5-1 Appendix A Outline for Medical Support. Please provide responses to the information requested in this Section.	<p>As required by EM 385-1-1, SulTech will ensure that a minimum of two personnel on-site at all times have current certifications in CPR and First Aid. The two personnel on this site with current training are (Hannah Thompson and Eric Aspell). Other than rendering basic CPR and First Aid, these two employees are not expected to perform emergency medical duties.</p> <p>As per Navy guidance in the past, all emergency medical assistance will be gained from a non-Navy source. The closest hospital to the site is (Alameda General Hospital). Directions to this hospital are included in the site-specific health and safety plan, as well as contact numbers for both the hospital and ambulance services. SulTech personnel are instructed to perform a drive-by of the nearest hospital to ensure it is in operation and the route is well-mapped.</p>

COORDINATION AND REVIEW - COMMENTS
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PROJECT TITLE AND LOCATION: DATA GAP SAMPLING IR SITES 32 & 35	TYPE OF REVIEW: APP & AHA
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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
5	Paragraph 11.0	This Section does not address the EM 385-5-1 Appendix A Outline for Personal Protective Equipment. Please provide responses to the information requested in this Section.	<p>Levels of personal protective equipment (PPE) are determined through a multi-step process at SulTech. First, the project manager writes the APP, AHA, and site-specific HASP. Initial selection of PPE is performed during this step. After the initial development of these documents, corporate safety staff at SulTech review PPE selections and verify, in writing, that the proper PPE has been selected for the chemical and physical hazards present at the jobsite.</p> <p>The initial development of safety documents plus the corporate review serves as SulTech's hazard assessment. Corporate review is performed either by a Certified Industrial Hygienist (CIH), or by a safety professional working under CIH direction.</p> <p>Specific directions for employees to properly use, inspect and maintain PPE is explicitly stated in the APP.</p>

COORDINATION AND REVIEW - COMMENTS
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PROJECT TITLE AND LOCATION: DATA GAP SAMPLING IR SITES 32 & 35	TYPE OF REVIEW: APP & AHA
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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
6	Paragraph 12.0	What purpose does listing the SWP's have in relation to this section of Appendix A. If they provide information relevant to the subparagraphs listed then that should be discussed in this paragraph. In addition, where are these documents located and how does the Navy NTR get access to them?	<p>The purpose of listing the SWPs in this section is to provide an overview list of the applicable procedures for Sites 32 and 35. The Navy NTR can access the full SWPs in Appendix C.</p> <p>Additionally, it has been determined that the following plans are applicable to this site, based solely on EM 385-1-1 requirements:</p> <ul style="list-style-type: none"> • SWP 6-1 General Safe Work Practices • SWP 6-3 Safe Drilling Practices • SWP 6-11 Drum and Container Handling Practices • SWP 6-14 Spill and Discharge Control Practices • SWP 6-15 Heat Stress • SWP 6-16 Cold Stress • SWP 6-26 Use of Heavy Equipment

COORDINATION AND REVIEW - COMMENTS
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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE	
7	AHA – Mobilization & Demobilization	<p>This AHA should cover all Principal Steps if you are only using one. For example, drilling, decontamination, Investigated Derived Waste disposal, how is this handled?</p> <p>Will there be a temporary trailer used or mobile lab?</p> <p>Are there noise considerations, pinch point, slip trips or falls to be considered? If so they need to be included.</p> <p>Will there be hand tools used?</p>	<p>AHA 1.0, Mobilization and Demobilization, has been removed as a separate AHA and will be added to the other AHAs as a task step.</p> <p>Neither a temporary trailer nor a mobile lab will be used during the sampling event at Sites 32 and 35. The AHA did not cover these subjects for that reason.</p> <p>The other comments do not apply since the Mobilization and Demobilization AHA will be removed completely from the table.</p>	

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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
8	AHA – Utility Clearance	<p>Please provide copy of MSDS.</p> <p>What is maximum lifting limit for one person?</p> <p>Where and when will results be documented in site layout plan?</p> <p>Are there slips, trips and fall potentials?</p> <p>Will stakes be used to mark utility locations?</p> <p>Will hand tools be used?</p>	<p>The MSDS for (Aervoe) spray paint has been added to Attachment 2.</p> <p>Though the maximum safe lifting level has been determined to be 51 pounds, there will be no lifting involved in this task. "Lifting" will be removed from the potential hazards for the Underground Utilities Locating (UUL) AHA.</p> <p>Results of utility clearance will be clearly demarcated at the field site. The location of utilities will be discussed</p> <p>Slip, Trip, and Falls has been added to the potential hazards for the Underground Utilities Locating AHA.</p> <p>Stakes will not be used to mark utility locations and hand tools will not be used.</p>

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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE
9	AHA – Hollow Stem Auger	<p>This AHA does not demonstrate knowledge of the Principal Steps associated with drilling. It is hard to follow and understand. Here are a few examples.</p> <p>Are there slip, trip or fall hazards?</p> <p>Will inspections of boring locations be conducted?</p> <p>What about set up of drill rig is that a principal step?</p> <p>Potential for injury and Accidents Resulting in Death could be said about any step, you need to be specific.</p> <p>Please re-write this AHA and demonstrate your knowledge of the Principal Steps involved in Hollow Stem Auger Drilling including decontamination, boring hole closure and disposal of Investigated Derived Waste generated.</p> <p>In addition, there are specific inspections associated with this activity that should be identified.</p>	<p>The Hollow Stem Auger AHA has been revised to be more understandable, more specific, and more detailed. The revised AHA is included in Section 14 of this document.</p> <p>This AHA has been re-written to include specific inspections associated with this activity, decontamination procedures, boring hole closure procedures and disposal of Investigated Derived Waste.</p>

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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE	
10	AHA Soil Sampling	Why is drill rig safety listed here as training but not in the drilling activity? Will hand tools be used?	Drill rig safety is not a specific task but an overarching concern. The AHA has been revised to include hand auger.	
11	AHA – Groundwater Monitoring Well Installation	Are there potential fire hazards associated with this Activity? Why are there two different AHAs for this Activity?	There are no potential fire hazards associated with this activity. There are two different AHAs for this activity because one of them is for SulTech employees and the other AHA was from the SulTech subcontractor (Vironex). The second AHA has been noted as the "Subcontractor AHA".	
12	AHA- Groundwater Sampling	Where will samples be collected, i.e. opening well, is this not a Principal Step? Will there be water level measurements taken? Could there be hazards from insects under covers? Could there be atmospheric hazards from well vaults? Will there be generators, well pumps and hand tools used on this Activity?	Opening the well head has been added as a principal step. Water level measurements will be collected and has been added as a principal step. Insects under the well covers are a potential hazard and have been added to the AHA. There is no risk of atmospheric hazards or well vaults. There will be well pumps as part of this activity. The bladder pumps have been added in the equipment section of the AHA.	

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NO.	ACTIVITY OR WORKPLAN	COMMENTS	A-E RESPONSE	
13	AHA- Decon	<p>Removal of soil, etc. needs to be discussed either here or at the Activity where it is generated.</p> <p>Will pressure washers be used?</p> <p>Does equipment need to be inspected and certification of decontamination issued?</p>	<p>Decontamination will be addressed in each individual activity where it is needed. The 8.0 AHA Decontamination AHA has been removed.</p> <p>Pressure washers will be used during the drilling and has been added in this specific AHA as equipment for drilling and as a potential hazard.</p> <p>Equipment does not have to be inspected and certified of the decontamination issued, however, if the field manager does not approve of the decontamination techniques the subcontractors will be informed.</p>	
14	AHA- IDRW	<p>It's not clear which Activities will require this AHA, need to specify. Will hand tools and specifically electrical tools be used?</p>	<p>The activities in which this AHA is required has been specified in AHA Investigation Derived Waste Management. A drum wrench and the truck lift will probably be used, therefore, these two items have been addressed in the IDRW AHA.</p>	

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- C Safe Work Practices
- D Subcontractor Health and Safety Plans

Attachments

- 1 Employee Training/Qualifications
- 2 Material Safety Data Sheets

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- 1 Site Location Map
- 2 IR Site 35, AOC 1
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- 5 Kollmann Circle, Site 25

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- 1 Site-Specific Air Monitoring Requirements and Action Levels
- 2 Potential Chemical Hazards

ACRONYMS AND ABBREVIATIONS

§	Section
85 dBA	85 decibels on an A-weighted scale in slow response mode
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
AOC	Area of Concern
APP	Accident Prevention Plan
CFR	<i>Code of Federal Regulations</i>
CIH	Certified Industrial Hygienist
CPR	Cardiopulmonary resuscitation
CRZ	Contamination reduction zone
CSP	Certified Safety Professional
CTO	Contract Task Order
dBA	Decibels on an A-weighted scale
DEET	N, N-diethyl-m-toluamide
DPT	Direct Push Technology
EBS	Environmental Baseline Survey
EMR	Experience modification rate
EPA	U.S. Environmental Protection Agency
FID	Flame ionization detector
FS	Feasibility Study
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High efficiency particulate air
HSR	Health and safety representative
IDW	Investigation-derived waste
IR	Installation Restoration
IT	International Technology Corporation
LWCR	Lost workday case rate
MSDS	Material Safety Data Sheet
NHSO	Navy Health and Safety Officer
NIOSH	National Institute of Occupational Safety and Health
NTR	Navy Technical Representative

ACRONYMS AND ABBREVIATIONS (Continued)

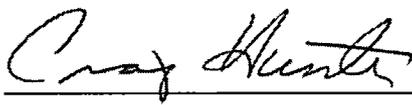
OHSR	Office health and safety representative
OM	Office manager
OSHA	Occupational Safety and Health Administration
OWS	Oil/water separator
PCB	Polychlorinated biphenyls
PID	Photoionization detector
PM	Project manager
PP	Proposed Plan
PPE	Personal protective equipment
ppm	Part per million
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
ROICC	Regional Officer in Charge of Construction
SAP	Sampling and Analysis Plan
SCBA	Self-contained breathing apparatus
SHSR	Subsidiary health and safety representatives
SSC	Site Safety Coordinator
SulTech	A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc.
SWMU	Solid Waste Management Unit
SWP	Safe work practice
TDS	Total dissolved solids
Tetra Tech	Tetra Tech EM Inc.
TLV	Threshold limit value
TOC	Total organic carbon
TPH	Total petroleum hydrocarbon
TRIR	Total recordable incident rate
TWA	Time-weighted average
UST	Underground storage tank
UXO	Unexploded ordnance
VOC	Volatile organic compound
WNV	West Nile Virus

Final

**Department of Navy
Contract No. N68711-03-D-5104
Accident Prevention Plan for Data Gap Sampling of
Groundwater Monitoring Wells at Installation Restoration Site 32,
Groundwater in Area of Concern 1, Soil in Area of Concern 6,
and Groundwater in Area of Concern 23
at Installation Restoration Site 35
Alameda Point, Alameda, CA**

REVIEW AND APPROVAL

We the undersigned have read and approve of the APP and HASP, and the applicable health and safety guidelines presented in this APP for on-site work activities at the installation restoration sites 32 and 35.

Name	Signature	Date
<u>David Brown</u> SulTech Health and Safety Representative		<u>12/4/2007</u>
<u>Craig Hunter</u> SulTech Project Manager		<u>12/4/2007</u>

This certifies that SulTech has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration Title 29 of the *Code of Federal Regulations*, Section 1910.132, and the U.S. Army Corps of Engineers Safety Manual, Publication Number EM 385-1-1.

Certified by

<u>David Brown</u> SulTech Technical Reviewer		<u>12/4/2007</u>
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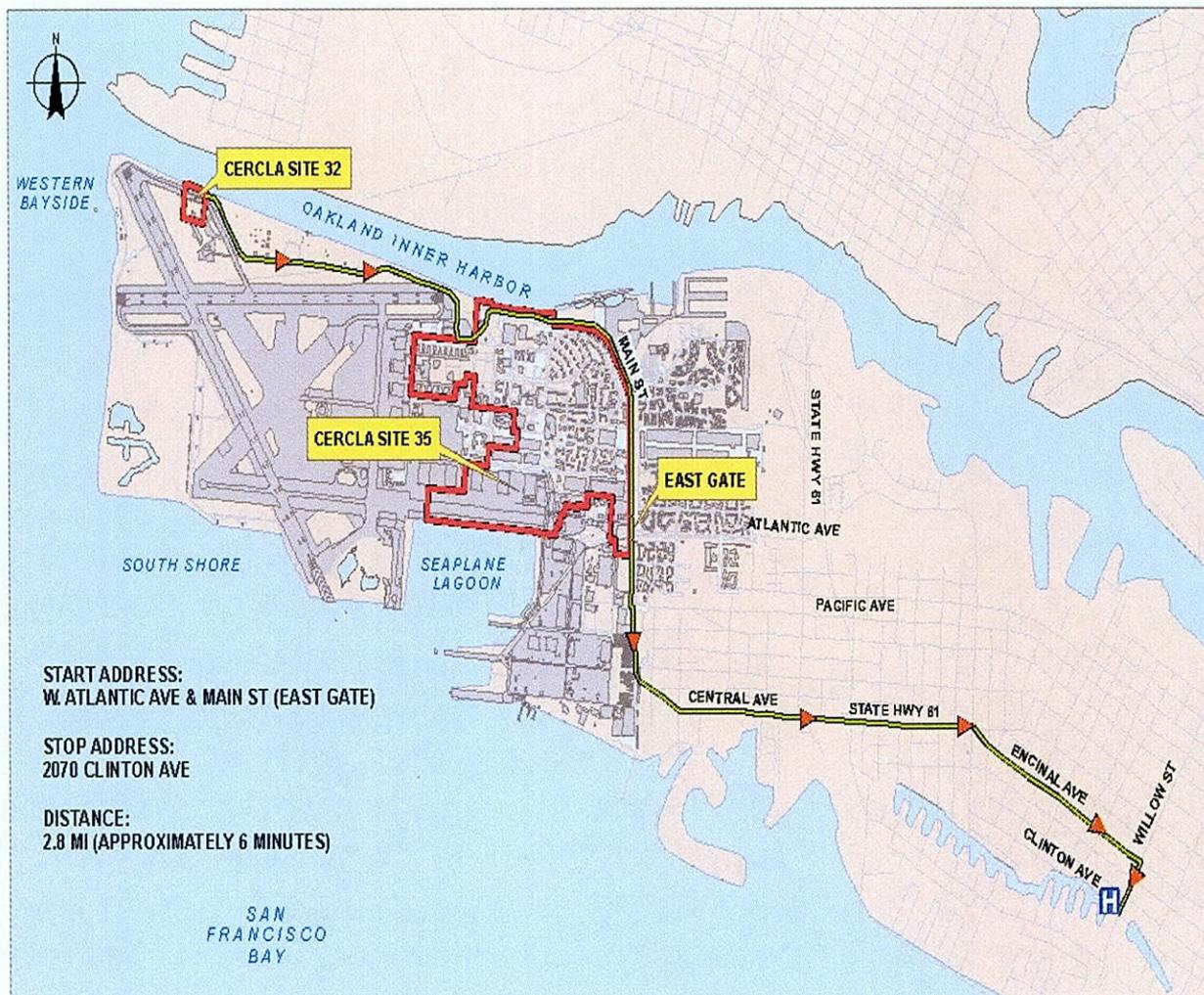
EMERGENCY INFORMATION

POST THIS PAGE ON-SITE EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Emergency Contact	Telephone No.
U.S. Coast Guard National Response Center	(800) 424-8802
California Poison Control System	(800) 222-1222
WorkCare	(800) 455-6155
Fire Department	911 or (510) 337-2100
Police Department	911 or (510) 337-8340
SulTech Personnel:	
Human Resource Development: Amy Clark	(626) 470-2516
Health and Safety Representative: Richard Ecord, CIH, CSP	(404) 225-5527
Navy Health and Safety Officer: David Brown	(619) 321-6722
Project Manager: Craig Hunter	(916) 853-4507
Field Project Manager: Doug Grant	(775) 448-9774
Site Safety Coordinator: Hannah Thompson	(415) 710-8467
Client Contact: Frances Fadullon, Navy Remedial Project Manager	(619) 532-0935
Subcontractors:	
Vironex	(925) 521-1490
Medical Emergency	
Hospital Name:	Alameda Hospital
Hospital Address:	2070 Clinton Ave. Alameda, CA
Hospital Telephone No.:	
Emergency –	911 or (510) 523-4357
General –	(510) 522-3700
Ambulance Telephone No.:	911 or (510) 523-4357
Route to Hospital: (see next page hospital route map)	
1) Head east along frontage road and exit the runway gate.	
2) LEFT (east) on W. Red Line Ave (0.3)	
3) RIGHT (south) on Pan Am Way St. (0.2)	
4) LEFT on W. Midway Ave. (0.4)	
5) RIGHT (south) on Main St. (0.6)	
6) RIGHT on Central Ave. (1.7)	
7) Continue on Encinal Ave (CA-61)	
8) Turn right on Chestnut St. (0.2)	
9) Turn left on Clinton Ave. (0.1)	

EMERGENCY INFORMATION (Continued)

POST THIS PAGE ON-SITE HOSPITAL ROUTE MAP



Source: Modified from Figure 1 Site Location Map (SulTech 2007).

1.0 INTRODUCTION

SulTech, a Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc., developed this Accident Prevention Plan (APP) and Site-Specific Health and Safety Plan (HASP) to outline procedures and information to meet the requirements applicable portions of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, dated November 3, 2003, which mandates that prior to initiation of work at the Navy installation job site, every prime Navy contractor shall develop and implement a written APP with appropriate appendices (e.g., Site Safety and Health Plan) for the specific work and hazards in accordance with the pertinent requirements and format of EM 385-1-1. This APP and HASP also presents information designed to comply with applicable provisions of 29 *Code of Federal Regulations* (CFR) Section (§) 1910.120 and other applicable Occupational Safety and Health Administration (OSHA) regulations. Due to the nature of work SulTech typically performs (environmental consulting, no construction), some requirements and provisions of EM 385-1-1 are not applicable.

The Navy has tasked SulTech to conduct soil and groundwater sampling and monitoring well installations at Installation Restoration (IR) Sites 32 and 35 at Alameda Point, Alameda, CA. The site-specific health and safety provisions in this document have been developed for use during soil and groundwater sampling and monitoring well installations at IR Sites 32 and 35. This document addresses items specified under the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and OSHA Title 29 of CFR, § 1910.120(b), "Final Rule." This APP and HASP will be available to (1) all on-site personnel who may be exposed to hazardous on-site conditions, including SulTech and subcontractor personnel participating in the sampling and monitoring well installation events, and (2) all site visitors, including regulatory agency representatives.

The purpose of this APP and HASP is to define requirements and designate protocols to be followed during soil and groundwater sampling and monitoring well installation events at IR Sites 32 and 35. All personnel on site, including SulTech and subcontractor employees and site visitors, must be informed of site emergency response procedures and any potential fire, explosion, health, or safety hazards associated with on-site activities. This APP summarizes potential hazards and defines protective measures planned for site activities. This plan is intended solely for use during proposed activities described in the corresponding Site-Specific HASP.

2.0 SITE BACKGROUND

The purpose of field activities at IR Site 32 is to obtain data to verify previous groundwater sampling results and to gather additional information to support remedial decisions. The data from IR Site 35 will be used to supplement the findings of the final Remedial Investigation/Feasibility Study (RI/FS) about remedy selection in the subsequent Proposed Plan (PP). The purpose of field activities at Area of Concern (AOC) 1, AOC 6, and AOC 23 of IR Site 35 is to assess groundwater quality in the vicinity of three oil/water separators (OWS) at AOC 1; to help approximate the western extent of polychlorinated biphenyls (PCB) in soil

contamination at AOC 6; and to evaluate the extent of volatile organic compounds (VOC) in groundwater at selected locations in AOC 23, based on results from samples collected previously (SulTech 2007).

The following sections describe IR Sites 32 and 35, the sites history, and activities planned for this project.

2.1 SITE DESCRIPTION

IR Site 32 is 5.8 acres (Figure 1). Most of IR Site 32 is open space covered with asphalt, gravel, weeds, and brush. Site features include a 75-foot-wide concrete taxiway along the northern portion of the site and two buildings on site (Buildings 594 and 82) which are located within a fenced compound in the southern portion of the site.

AOC 1 of IR Site 35 is an approximately 0.5-acre area in the south-central portion of Site 35, which occupies 75 acres in the northeast portion of Alameda Point (Figure 2). A small portion of Building 3 is located in the eastern portion of AOC 1. The remainder of AOC 1 consists of a landscaped area in the south and two paved areas: a kitchen area in the eastern portion, and a loading dock area in the western portion of the AOC (Bechtel 2007).

AOC 6 is a 0.2-acre area in the north-central portion of IR Site 35, which occupies 75 acres of Alameda Point (Figure 3). The site consists of a parking area, grassy open spaces where buildings were formerly located, and Building 553.

AOC 23 is a 15.2-acre area in the south-central portion of IR Site 35 in the northeastern portion of Alameda Point (Figure 4). AOC 23 was established to address contaminants in soil and groundwater in areas previously used for chemical storage or handling at eight Environmental Baseline Survey (EBS) parcels: EBS parcels 71, 72, 110, 121, 123, 124, 125, and 126. Complete site descriptions for each of the eight parcels can be found in the final RI report for IR Site 35 (Bechtel 2007). Proposed sampling at AOC 23 will occur within EBS Parcels 123 and 124.

2.2 SITE HISTORY

IR Site 32 historically contained two 1,000-gallon fiberglass underground storage tanks (UST) (594-1 and 594-2) that were located north of Building 594 and were used to store diesel fuel and gasoline. The two tanks were removed in 1994, and the soil around the tanks was excavated and backfilled. No documented releases of hazardous substances were reported to have occurred in the buildings or anywhere else on site.

AOC 1 of IR Site 35, EBS Parcel 43 (specifically, Building 3) was historically used for housing and barracks (Figure 2). Chemical storage in these residential buildings was minimal, and only minor stains were observed indoors during the EBS (International Technology Corporation [IT] 2001). Two grease pits, identified as OWS 063A and OWS 063C in the Solid Waste

Management Unit (SWMU) Report (SulTech 2005), were present outdoors in the rear kitchen area portion of Building 3. The grease pits were connected to part of the sanitary sewer system but were not known to have received any hazardous materials. During the EBS, grease and oil stains, possibly from cooking, were observed outdoors near OWS 063C (Bechtel 2007).

AOC 6 of IR Site 35 is completely within EBS Parcel 87 (Figure 3). Historical uses of EBS Parcel 87 included officers' quarters and housing (Building 85, demolished in 1968), an electrical substation (Building 553, still present and maintained by Alameda Power and Telecom), and a parking lot. Stains associated with vehicle parking are visible in the parking area. A portion of Building 85 was formerly located in AOC 6; Building 553 is entirely within AOC 6 (Bechtel 2007). The EBS reported that a transformer located on a fenced pad adjacent to the west side of Building 553 overheated and ruptured in 1986. An unknown quantity of PCB-containing oil sprayed from the transformer 15 feet west onto grass, trees, and fencing (IT 2001). The substation pad was removed prior to 1990 (Bechtel 2007). A cleanup was performed, and contaminated material was removed; however, no confirmation samples were collected.

EBS Parcel 123 is in the east-central portion of AOC 23 (Figure 4). EBS Parcel 123 was used as barracks, an aircraft ground support equipment shop, a switching substation, a field maintenance shop, a hazardous and flammable materials storehouse, an electrical substation, an industrial waste pump station, and for painting and sandblasting operations. The following chemicals were used or stored in buildings at the parcel: gasoline, fuels, diesel, oils, acetylene, argon, degreasing solution, fertilizer, solvents, corrosion inhibitors, break fluid, aluminum paint, and spray enamels. Building 263, an aircraft ground support equipment shop, was used historically to store oil, gasoline, diesel, and acetylene. Hazardous wastes, including flammables, corrosives, batteries, aerosols, paint, used rags, and used spill kits, were stored inside Building 98 and the building's fenced enclosure (Bechtel 2007). SWMU AOC 098 was used to store hazardous wastes, including petroleum products, corrosives, metals, asbestos, nonhalogenated organic compounds, solvents, lubricating oil, and corrosion inhibitors. SWMU AOC 098 is located inside Building 98 and was used as a 60-day temporary accumulation point where hazardous wastes were stored in 55-gallon drums on the concrete floor.

EBS Parcel 124 is in the central portion of AOC 23 and was historically used for lumber storage (Buildings 262 and 444), as a hazardous and flammable materials storehouse (Building 13), and for public works maintenance storage (Building 13). In general, hazardous wastes were stored in the southern half of Building 13, and hazardous materials were stored in the northern half. A portion of the parcel was used for sorting trash and scrap material (salvage and refuse) (Bechtel 2007).

2.3 PLANNED ACTIVITIES

The detailed scope of work for the field activities to be performed during the soil and groundwater sampling and monitoring well installation events for each AOC at IR Sites 32 and 35 and at Kollmann Circle will include but is not limited to the following tasks:

- Groundwater samples will be collected from five existing monitoring wells at IR Site 32. The groundwater samples will be analyzed for VOCs.
- Groundwater will be collected from six direct push boring locations from AOC 1 within IR Site 35. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, such as dissolved gases, sulfide, iron II, MN II, pH, total dissolved solids (TDS), and total organic carbon (TOC).
- Two soil samples will be collected from three soil boring locations (for total of six samples) from AOC 6 within IR Site 35. The soil samples will be analyzed for PCBs.
- Three monitoring wells will be installed and developed at AOC 23 within IR Site 35. Groundwater samples will be collected from each of the three newly installed wells. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, as discussed above.
- Two composite samples will be collected from three soil borings in the center of Kollmann Circle (see Figure 5). The first composite sample will include samples at 2 feet from all three soil borings and the second composite sample will include samples at 4 feet from all three soil borings. Additionally two composite samples will be collected from two soil borings on the west side of Kollmann Circle. The first composite sample will include samples at 2 feet from the two soil borings and the second composite sample will include samples at 4 feet from the two soil borings.

For each task to be performed under the listed scope of work, a detailed Activity Hazard Analysis (AHA) has been generated and is presented in Section 14.0 of this APP.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

SulTech is committed to providing our employees with a safe and healthful workplace. The principal elements of our program are founded on the requirements presented in the Health and Safety Policy presented below.

The following sections describe responsibilities, staff compliance, communication, hazard identification and evaluation, accident and illness investigation, abatement of hazards, training, and recordkeeping.

Sullivan International Group, Inc. Health and Safety Policy Statement

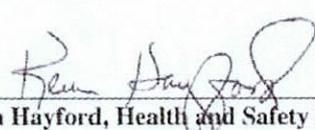
Sullivan International Group, Inc. personnel are the company's most important asset; therefore, the prevention of job-related injuries and illnesses takes precedence over other considerations. Sullivan International Group, Inc. policy is to provide and maintain a safe and healthful working environment and to follow practices that will safeguard employees and result in improved efficiency.

Safety is *everyone's* responsibility.

- *Management* is responsible for providing the resources necessary to maintain a safe working environment, for establishing health and safety policies, and for ensuring policy implementation.
- *Supervisors* are responsible for implementing health and safety policies and ensuring that day-to-day activities are conducted in a safe and healthy manner.
- *Employees* are responsible for adhering to established health and safety policies and for performing their tasks in a manner that does not endanger themselves, others, or property.



Steven E. Sullivan, Chief Executive Officer



Kevin Hayford, Health and Safety Program Manager



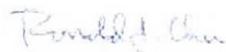


TETRA TECH EM INC. HEALTH AND SAFETY POLICY

Tetra Tech EM Inc., is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

The principal elements of our program are founded on the requirements that our managers and employees:

- Recognize a *personal responsibility* for their own health and safety and for actions that affect the health and safety of fellow employees.
- Integrate safety and health into *all aspects* of their work, with the well-being of employees as the primary concern in all activities.
- Comply with applicable *federal, state, and local regulations*, as well as with the Tetra Tech Inc. and our clients' *safety policies and procedures*.
- Take an *active role* in the Health and Safety Program by providing input and constructive criticism for improvements to the program.



Ron Chu
President



Richard L. Ecord Jr., CIH, CSP
Director, Health and Safety



Tetra Tech EM Inc.
January 2007



4.0 RESPONSIBILITIES AND LINES OF AUTHORITIES

The SulTech Site Safety Coordinator (SSC) has been appointed by the project manager and is responsible for field implementation of tasks and procedures contained in the HASP portion of the APP (see Section 15.0). The SSC has completed 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and subsequent 8-Hour Refresher training, 8-Hour Site Supervisor training, and First Aid/Cardiopulmonary Resuscitation (CPR) training in accordance with 29 CFR §1910.120. The SulTech SSC has primary responsibility for responding to and correcting emergency situations and for taking appropriate measures to ensure the safety of site personnel and the public—for example, evacuation of personnel from the site area. The SSC is also responsible for ensuring that corrective measures have been implemented, appropriate internal and Navy authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSC within the parameters of their scopes of work.

Personnel are required to immediately report all injuries, illnesses, spills, fires, and property damage to the SSC. The SSC must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed.

Management at SulTech has the authority and responsibility for implementing and maintaining this APP and HASP. Specifically, responsibilities are as follows:

- Field Project Manager (Doug Grant)
 - Provide leadership for the APP and HASP
 - Allocate adequate resources
 - Ensure that employees identify and eliminate unsafe conditions and practices
 - Ensure that employees understand and perform tasks safely
 - Ensure that all employees and visitors are advised of potential hazards and wear the required personal protective equipment (PPE)
 - Ensure that all subcontractors under their immediate and direct control are familiar with the site-specific hazards and comply with established safety rules
 - Correct unsafe conditions in a timely manner
- SSC (Hannah Thompson)
 - Develop APP and HASP policies and procedures in accordance with regulations
 - Implement the APP and HASP
 - Evaluate the effectiveness of the APP and HASP

- Navy Health and Safety Officer (NHSO) and subsidiary health and safety representatives (SHSR) (Dave Brown)
 - Coordinate the APP and HASP within the subsidiary or region
 - Maintain all APP and HASP files
 - Investigate all accidents to determine their root cause(s) and identify corrective actions
- Project managers (PM) (Craig Hunter)
 - Ensure development and implementation of the site-specific APP and HASP
 - Communicate specific training needs to the NHSO and SHSR
- Employees (Eric Aspell, Rob Easley)
 - Comply with established health and safety programs, site-specific APP and HASP, policies, and safe work practices (SWP)
 - Report unsafe acts or conditions and situations beyond his or her ability to correct to the HSR, NHSO, or PM immediately

5.0 SUBCONTRACTORS

SulTech-hired subcontractors (Vironex) personnel participating in work defined as “high hazard” by SulTech (drilling) have been pre-approved by SulTech to conduct the aforementioned tasks based on a thorough review of the subcontractor’s safety metrics. The review includes the subcontractor’s experience modification rate (EMR), total recordable incident rate (TRIR), and lost workday case rate (LWCR), as well as other pertinent subcontractor safety program elements. Additionally, SulTech will review and approve subcontractor AHAs prior to submitting the AHAs to the Navy for acceptance.

SulTech-hired subcontractor personnel participating in soil and groundwater sampling and monitoring well installation at IR Sites 32 and 35 are required to read and comply with all sections of the APP and HASP. Moreover, SulTech-hired subcontractors shall develop and deliver AHAs for each task performed in relation to this SulTech scope of work. Subcontractor AHAs are presented in Section 14.0 of this APP. Subcontractor HASPs are included in Appendix D. All subcontractor personnel entering the site must sign the Compliance Agreement (see Appendix A). Subcontractor personnel must comply with all applicable 29 CFR §1910.120 training, fit-testing, and medical surveillance requirements. Subcontractors are responsible for providing PPE required by this plan for their personnel and are directly responsible for the health and safety of their employees. Subcontractors who have not met OSHA training, medical surveillance, and PPE requirements are not permitted to enter areas where exposure to hazardous materials is possible.

This APP and HASP applies to all site activities and all personnel working at IR Sites 32 and 35. This APP and the associated HASP (see Section 15.0) enforcement shall be rigorous. Violators

of the HASP will be verbally notified upon first violation, and the violation will be noted by the SulTech SSC in a field logbook. Upon second violation, the violator will be notified in writing, and the SulTech project manager and the violator's supervisor will be notified. A third violation will result in a written notification and violator's eviction from the site. The written notification will be sent to human resources development and the Health and Safety Representative (HSR).

Personnel will be encouraged to report to the SSC any conditions or practices that they consider detrimental to their health or safety, or those they believe violate applicable health and safety standards. Such reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment will be encouraged to bring the matter to the immediate attention of the SSC for resolution. Job site activities presenting danger to life or limb should be stopped immediately, and reported to the SSC for resolution.

At least one copy of this APP and HASP will be available to all site personnel at all times. Minor changes in HASP (see Section 15.0) procedures will be discussed at the beginning of each work day by the SSC at the daily tailgate safety meeting. Significant plan revisions must be discussed with the HSR and project manager, and approved via the HASP amendment form.

6.0 TRAINING

All on-site personnel who may be exposed to hazardous conditions, including SulTech and subcontractor personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR §1910.120, "Hazardous Waste Operations and Emergency Response." Furthermore, all on-site personnel must satisfy any specialized training requirements that are presented in the AHA for tasks to be completed under this contract task order (CTO). All SulTech personnel qualification and training certification documentation is included in Attachment 1. All personnel and visitors entering the site will be required to review the HASP and sign the Compliance Agreement (see Appendix A), and site workers will be required to sign the Daily Tailgate Safety Meeting Form (see Appendix A).

Before on-site activities begin, the SulTech SSC will present a briefing for all personnel who will participate in on-site activities at IR Sites 32 and 35. The following topics will be addressed during the pre-work briefing:

- Names of the SSC and the designated alternate
- Site history
- Work tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site

- PPE, including type or types of respiratory protection to be used for work tasks
- Mandatory Training and Certification Requirements (HAZWOPER; HAZWOPER 8-Hr Refresher; Explosive Actuated Tools; Confined Space; Crane Operator; Vehicle Operation, and so forth)
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring upgrade or downgrade of level of protection
- Site control measures, including site communications, control zones, and SWPs
- Decontamination procedures
- Emergency communication signals and codes, including incident reporting procedures
- Environmental accident emergency procedures (in case contamination spreads outside the exclusion zone)
- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)
- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be identified and discussed during the pre-work briefing by the SSC.

Issues that arise during implementation of on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins, and will be documented in the Daily Tailgate Safety Meeting Form (see Appendix A). The tailgate safety meetings will be attended by all site workers, subcontractors and visitors, and conducted by the PM and/or SSC. Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

All emergency situations require follow-up and reporting. In addition to immediate reporting to the on-site SSC and/or PM, an Accident and Illness Investigation Report form (see Appendix A) must be completed, signed by the on-site PM, on-site SSC, and Office Manager (OM), and submitted to the SulTech HSR within 24 hours of an emergency situation. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that he/she may implement applicable elements of the process at other sites.

7.0 SAFETY AND HEALTH INSPECTIONS

Establishment of a generic inspection schedule applicable to all field sites is impractical because of the variability among sites and field activities performed by SulTech. Projects may range in duration from less than 1 day to several years or longer and the complexity and level of hazard may also vary greatly. Additionally, unexpected changes to the field schedule may occur. Daily, informal site safety inspections shall be conducted at IR Sites 32 and 35 by the SulTech SSC to ensure safe work areas and compliance with this HASP. Results of these site safety inspections will be recorded on a Field Audit Checklist (see Appendix A). At a minimum, at least one safety inspection documented on Form AF-1 will be completed for each AOC within IR Sites 32 and 35.

For general purposes, the SSC will be expected to perform daily inspections of work sites. The SSC qualifications and certifications are included in Attachment 1. Items of concern such as potential overhead hazards will be entered into the site field notebook. Formal, monthly field audits shall be conducted in accordance with the SulTech "Health and Safety Audit Program," and results will be recorded on the Field Audit Checklist (see Appendix A). Health and safety hazards resulting from the actions of subcontractors will be brought to their immediate attention for correction and also be noted in the field notebook. Violations by SulTech personnel will be brought to the attention of the PM. PMs are expected to visit sites on a periodic basis, especially at complex or long-term project sites, to evaluate site conditions and compliance with ongoing regulatory compliance programs and SWPs.

8.0 SAFETY HEALTH EXPECTATIONS, INCENTIVE, PROGRAMS, AND COMPLIANCE

SulTech personnel are expected to comply with all applicable health and safety standards and company policies. Clear and willful violations or disregard of established health and safety policies may result in disciplinary action up to and including employment termination in accordance with company policy. If an employee is found in noncompliance, the infraction shall be documented and placed in his or her personnel file. The OM is responsible for and authorized to cite employees for health and safety infractions. However, violations may be reported to the OM by other employees provided that documentation or substantiation of the violation is available. All infractions will be discussed with the employee, at which time he or she may provide evidence indicating lack of wrongdoing.

Health- and safety-related information will be communicated to employees through meetings, postings, written communications, and reporting of hazards.

Written communications to provide health and safety information may be distributed by various methods, including written programs and practices, HASPs, and advisories. Written programs and practices are available in the health and safety manual, which is available at the corporate intranet website.

Health and safety advisories may be issued by the SSC on a periodic basis. The advisories will provide up-to-date information on a variety of work-related health and safety issues. Employees are encouraged to contact the SSC if they have any questions or desire more information.

Employees are also encouraged to report dangerous conditions or specific health and safety concerns to the Office Health and Safety Representative (OHSR), HSR, or NHSO. Reporting may be made by telephone, e-mail, or interoffice mail. Additionally, the SulTech Health and Safety intranet site has a mechanism by which suggestions or concerns can be reported directly to the HSR. All reports will be kept confidential and may be made anonymously. The HSR will follow up on the issue with PMs, and the employee will be contacted to inform him or her of the resolution steps taken. In addition, OMs may elect to establish an anonymous suggestion box to encourage reporting of health and safety concerns. SulTech's policy is to encourage reporting and to not permit any retaliation against employees who report hazards or potential hazards or who make suggestions related to a safe work environment.

9.0 ACCIDENT REPORTING

All accidents involving near misses, injuries, or illnesses at IR Sites 32 and 35 must be immediately reported to the PM and the NHSO or HSR and the Navy PM and Regional Officer in Charge of Construction (ROICC) Navy Technical Representative (NTR), and documented on the Accident and Illness Investigation Report form (see Appendix A). The forms must be reviewed by the PM and the appropriate NHSO or SSC.

Hazardous work conditions or unsafe work practices will be corrected by SSC in a timely manner, both in the field and in the office. Upon discovery of an unsafe condition at a field site, the degree of hazard must be assessed and action may range from complete shutdown of the operation to phased correction. SulTech will shut down a project during which life threatening, severe environmental impact, or significant equipment or property damage conditions exist. Employees shall follow specific information for emergency response and PPE usage as described in the site-specific APP and associated HASP (see Section 15.0). The PM must be contacted regarding each incident.

10.0 MEDICAL SUPPORT

All SulTech and subcontractor personnel involved in on-site activities at the IR Sites 32 and 35 must participate in a health monitoring program as required by 29 CFR §1910.120(f). SulTech has established a health monitoring program under the direct supervision of a board-certified occupational medicine physician with WorkCare, Inc. of Orange, California. Under this program, SulTech personnel receive baseline and annual or biennial physical examinations consisting of the following:

- Complete medical and work history
- Physical examination

- Vision screening
- Audiometric screening
- Pulmonary function test
- Resting electrocardiogram
- Chest x-ray (required once every three years)
- Blood chemistry, including hematology and serum
- Urinalysis

For each employee, SulTech receives a copy of the examining physician's written opinion after post-examination laboratory tests have been completed; the SulTech employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR §1910.120[f][7]):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)
- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors potentially exposed to hazardous chemicals at IR Sites 32 and 35 must have health monitoring programs conducted by their own clinics in compliance with 29 CFR §1910.120(f), and must present evidence that their personnel are medically qualified prior to their entry to the job site. Any visitor or observer at the site will be required to provide records in compliance with 29 CFR 1910.120(f) before entering the site. In addition, at least two SulTech personnel trained in First Aid, CPR, and blood-borne pathogens criteria will be on site during field activities.

As a follow-up to an injury requiring care beyond basic first aid or to possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Such injuries and exposures must be reported to the HSR. Depending on the type of injury or exposure, follow-up testing, if required, must be performed

within 24 to 48 hours of the incident. The employer's medical consultant has responsibility to advise the type of test required to accurately monitor for exposure effects. The Accident and Illness Investigation Report form (see Appendix A) must be completed by the SulTech SSC in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining the recordability of the incident and for inclusion in SulTech's medical surveillance records.

11.0 PERSONAL PROTECTION REQUIREMENTS

The levels of personal protection to be used for work tasks at the AOC sites within IR Sites 32 and 35 have been selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

11.1 PROTECTIVE EQUIPMENT AND CLOTHING

Personnel will wear protective equipment when (1) site activities involve known or suspected atmospheric contamination; (2) site activities may generate vapors, gases, or particulates; or (3) direct contact with hazardous materials may occur. The anticipated levels of protection selected for use by field personnel during site activities is Level D. Section 14.0 presents the AHAs. Based on the anticipated hazard level, personnel will initially perform field tasks in Level D protection. If site conditions or the results of air monitoring performed during on-site activities warrant a higher level of protection, all field personnel will withdraw from the site, immediately notify the SulTech SSC, and wait for further instructions. Descriptions of equipment and clothing required for Level D, Level C, and Level B protection are provided below.

- Level D
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)(optional)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (such as latex or vinyl)(optional)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots (optional)
 - Safety glasses or goggles
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)

- Level C
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - Full- or half-face, air-purifying respirator with National Institute of Occupational Safety and Health (NIOSH)-approved cartridges to protect against organic vapors, dust, fumes, and mists (cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment [Form RP-2] in Appendix B)
 - Safety glasses or goggles (with a half-face respirator only)
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)

- Level B
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other)
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - NIOSH-approved, pressure-demand airline respirator with a 5-minute escape cylinder or self-contained breathing apparatus (SCBA)
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A-weighted scale)

11.2 REASSESSMENT OF PROTECTION LEVELS

PPE levels shall be upgraded or may be downgraded based on a change in site conditions or investigation findings. When a significant change in site conditions occurs, hazards will be reassessed. Some indicators of the need for reassessment are as follows:

- Commencement of a new work phase, such as the start of a significantly different sampling activity or work that begins on a different portion of the site

- A change in job tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations limiting the effectiveness of PPE
- Discovery of contaminants other than those previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 1)
- A change in work scope that affects the degree of contact with contaminated media

11.3 LIMITATIONS OF PROTECTIVE CLOTHING

PPE clothing ensembles designated for use during site activities have been selected to provide protection against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing provide protection against all types of chemicals. Permeation of a given chemical through PPE depends on the contaminant concentration, environmental conditions, physical condition of the protective garment, and resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

All site personnel will use the procedures presented below to obtain optimum performance from PPE.

- When chemical-protective coveralls become contaminated, don a new, clean garment after each rest break or at the beginning of each shift.
- Inspect all clothing, gloves, and boots both before and during use for the following:
 - Imperfect seams
 - Non-uniform coatings
 - Tears
 - Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
 - Swelling
 - Discoloration
 - Stiffness

- Brittleness
- Cracks
- Any sign of puncture
- Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above must be discarded.

11.4 RESPIRATOR SELECTION, USE, AND MAINTENANCE

Based on a review of known and potential chemical hazards present during work at AOC sites within IR Sites 32 and 35, SulTech will determine if respiratory protection is required at the site. The SSC will be responsible for filling out the Respiratory Hazard Assessment [Form RP-2] in Appendix B).

12.0 APPLICABLE SITE-SPECIFIC PLANS (PROGRAMS, PROCEDURES)

The following is a list of SWPs that will be implemented for the tasks to be conducted by SulTech personnel during the field activities at IR Sites 32 and 35:

- SWP 6-1 General Safe Work Practices
- SWP 6-3 Safe Drilling Practices
- SWP 6-11 Drum and Container Handling Practices
- SWP 6-14 Spill and Discharge Control Practices
- SWP 6-15 Heat Stress
- SWP 6-16 Cold Stress
- SWP 6-26 Use of Heavy Equipment

13.0 CONTRACTOR (SULTECH) INFORMATION

SulTech will conduct oversight of monitoring well installation activities performed by subcontractors. SulTech will collect soil samples and groundwater samples at IR Sites 32 and 35. The soil and groundwater sampling will include the following:

- Groundwater samples will be collected from five existing monitoring wells at IR Site 32. The groundwater samples will be analyzed for VOCs.

- Groundwater will be collected from six direct push boring locations from AOC 1 within IR Site 35. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, such as dissolved gases, sulfide, iron II, MN II, pH, TDS, and TOC.
- Two soil samples will be collected from three soil boring locations (for total of six samples) from AOC 6 within IR Site 35. The soil samples will be analyzed for PCBs.
- Three monitoring wells will be installed and developed at AOC 23 within IR Site 35. Groundwater samples will be collected from each of the three newly installed wells. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, as discussed above.

14.0 SITE-SPECIFIC HAZARDS AND CONTROLS

Detailed site-specific hazards and controls for the work being performed by SulTech and SulTech hired subcontractors are provided in the AHA below for each activity of the operation. The AHAs will be updated when more job information is known. Replacement pages of the modified AHAs will be included in the field and file copies of the APP and submitted to the Navy Remedial Project Manager. Handwritten changes will be made to the field copy if changes are determined in the field.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

1.0 Oversight of Utility Clearance

Task Description

This Activity Hazard Analysis (AHA) applies to the clearing of utilities before drilling and soil and groundwater sampling activities. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. SulTech will be conducting the oversight of the clearing of utilities at IR Sites 32 and 35.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none"> • Ensure driver is "authorized" per the SulTech Vehicle Safety Program • Practice defensive driving whenever traveling in a vehicle • Do not use cell phones while driving unless a hands-free device is used also • Valid state issued driver's license
Clear and mark utilities at each intrusive area	LOSS OF LIVES, HEALTH, AND PROPERTY	<ul style="list-style-type: none"> • Obtain and review all pertinent utility drawings • Contact Underground Surface Alert for utility clearance • Obtain all intrusive permits and made required contacts • Inspect locating equipment for calibration and proper working order • Mark utility locations on Figures 2, 3, and 4 • Use industry standard color code for utilities marking and/or flagging
	VEHICULAR TRAFFIC MAY PUT WORKERS IN PERIL	<ul style="list-style-type: none"> • Workers shall wear clearly visible safety vests • Use safety cones to alert oncoming traffic • Use spotters if traffic is nearby
	UTILITY MARKING PAINTS MAY EXPOSE WORKERS TO HARMFUL SOLVENTS	<ul style="list-style-type: none"> • Follow the manufacturer's use and safety instructions • Ensure the area is well ventilated • Follow material safety data sheet for the paint being used (Refer to Attachment 2) • Never point spray nozzles at people • Always use down spray nozzle spray cans



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

1.0 Oversight of Utility Clearance

Task Description

This Activity Hazard Analysis (AHA) applies to the clearing of utilities before drilling and soil and groundwater sampling activities. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. SulTech will be conducting the oversight of the clearing of utilities at IR Sites 32 and 35.

Task Steps	Potential Hazards	Actions
Investigation of utility routes, size, type, etc.	ASPHYXIATION	<ul style="list-style-type: none">• Never enter or open space which is a permit-required space or otherwise labeled area• Obtain proper permits and clearance requirements appropriate for entering
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none">• Work areas will be visually inspected and pre-existing slip, trip, and fall hazards will be marked, barricaded, or eliminated as feasible. Work areas will be kept neat and orderly. Proper illumination will be maintained in work areas. Inspect each work area for ground squirrel holes, other ruts, and obstructions. Visually inspect for soft soil
	BIOLOGICAL HAZARDS, SUCH AS INSECTS OR SPIDERS	<ul style="list-style-type: none">• Wear proper personal protective equipment, including gloves• Visually inspect all vaults and dark places for insects or spiders• Use flashlight in dark areas
Demobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

1.0 Oversight of Utility Clearance

Task Description

This Activity Hazard Analysis (AHA) applies to the clearing of utilities before drilling and soil and groundwater sampling activities. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. SulTech will be conducting the oversight of the clearing of utilities at IR Sites 32 and 35.

Task Steps	Potential Hazards	Actions
Equipment to be Used <ul style="list-style-type: none"> • Personal protection equipment <ul style="list-style-type: none"> – Hard hat – Long pants and shirts with sleeves – Safety vest • Safety cones • Marking paint • Flashlight • Crowbar 	Inspection Requirements <ul style="list-style-type: none"> • Driver Vehicle Inspection Report 	Training Requirements <ul style="list-style-type: none"> • 40 Hour Hazardous Waste Operations and Emergency Response



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license
Identify requirements prior to beginning of work	LOSS OF LIVES, HEALTH, AND PROPERTY	<ul style="list-style-type: none">• Obtain and review all pertinent utility drawings• Contact Underground Surface Alert for utility clearance• Obtain all intrusive permits and made required contacts• Inspect equipment per proper equipment checklist. Inspection shall be performed by a competent person• Complete and certify Machinery and Mechanized Equipment Certification Form• Utility locations marked on Figures 2, 3, and 4
	LACK OF TRACTOR/TRAILER INSPECTIONS, CITATIONS, TICKETS	<ul style="list-style-type: none">• Ensure driver has current license and training certificates or an affidavit from the company indicating such certifications





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Load truck with work supplies	LIFTING HEAVY OBJECTS IMPROPERLY COULD CAUSE BACK OR MUSCLE STRAIN	<ul style="list-style-type: none">• Pre-employment back evaluations are recommended for workers who may be at greater risk of developing lower back pain or lower back injury. This evaluation may be requested and may be performed by a local medical provider. Surveys shall be performed by persons qualified to identify and evaluate tasks that might result in injuries due to ergonomic hazards. The focus of the surveys will be operations that involve manually lifting and moving excessively heavy or asymmetric objects. Ensure that all workers are trained on proper lifting techniques.
Drive to (and from) sampling points	DRIVING WHERE THERE IS DRY VEGETATION WHICH COULD CATCH ON FIRE IF ALLOWED TO CONTACT THE VEHICLE'S MUFFLER FOR AN EXTENDED PERIOD OF TIME.	<ul style="list-style-type: none">• Use a spotter whenever backing up or turning the vehicle around. Observe for obstructions and ruts that could cause the vehicle to "jar" off berm. Drive slowly on berm to avoid generating dust. When parking the vehicle, ensure that there is no brush under the truck at the location where the truck is parked. Ensure that there is a fire extinguisher on the truck. Inspect for soft soil and spots along the road where edges have a potential to "give" way.
	COMMUNICATIONS IN AN EMERGENCY MAY BE WEAK DUE TO THE DISTANCE FROM THE MAIN ROADS.	<ul style="list-style-type: none">• Verify that cell phones work in the area. If they do not, use a radio that is communicating with someone near a phone that functions.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Survey site	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none">• Work areas will be visually inspected and pre-existing slip, trip, and fall hazards will be marked, barricaded, or eliminated as feasible. Work areas will be kept neat and orderly. Proper illumination will be maintained in work areas. Inspect each work area for ground squirrel holes, other ruts, and obstructions. Visually inspect for soft soil.
	FAILURE TO PROPERLY SURVEY SITE COULD CAUSE EXPOSURE TO GROUND HAZARDS	<ul style="list-style-type: none">• Ensure that ground has no hazards such as unstable soil on the slopes of berms. Ensure that the findings of the survey and controls for all potential hazards become part of this hazard analysis.
	FAILURE TO OBSERVE AND PREPARE FOR ENCOUNTERS WITH INSECTS, RODENTS, OR SNAKES COULD CAUSE INJURY TO THE WORKER.	<ul style="list-style-type: none">• Observe for insects, rodents, and snakes. Use a "tapping" stick if necessary in any brush area to flush out or expose snakes before walking in brushy areas. Use insect repellent as necessary. Observe for any possible bird habitation and avoid it if found.
Position truck for sampling	FAILURE TO POSITION TRUCK PROPERLY COULD CAUSE INJURY TO THE WORKER.	<ul style="list-style-type: none">• Use a spotter to position truck. Ensure that the truck is placed in "park," that the engine is turned off, and a chock is placed under a wheel to further prevent the truck from moving.
Required protective equipment	IF EMPLOYEES DO NOT WEAR THE REQUIRED PPE THEY COULD BE INJURED.	<ul style="list-style-type: none">• All workers will wear steel-toe boots with slip-resistant sole, hard hat, safety glasses, and a high-visibility vest or shirt. A life ring attached to a lifeline will be available in the truck.
	HEAT STRESS COULD OCCUR WHILE WORKING AND WEAR PPE.	<ul style="list-style-type: none">• Be sure to drink plenty of liquids such as water or Gatorade®. Take frequent rest breaks depending on the temperature and level of work effort.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Pre-survey area where HSA rig is going to drive over	VEHICLE COULD RUN OVER UNSTABLE GROUND OR HAZARDS. OVERHEAD WIRES.	<ul style="list-style-type: none">Mark all physical hazards. Weight of rig can be significant. Verify stability of all routes of travel. Inspect for any overhead wire that could come in contact with rig.
Pre-survey area to ensure that underground locator services have marked utilities and that as-built drawings have been reviewed	UNDERGROUND UTILITIES, IF BROKEN, COULD CAUSE RELEASE OF GAS OR WATER, ELECTROCUTION IF AN UNDERGROUND POWER LINE IS STRUCK, OR DAMAGE TO COMMUNICATION LINES.	<ul style="list-style-type: none">Verify that there are no utilities, especially PVC water lines that are often placed in concrete pads and lead shield electrical service lines. Review drawings and identify nearby utility connections, then locate and mark utilities. Underground Services Alert should have already been contacted and area marked based on previous site activities.
Drilling operations; inspection of drill rig	IMPROPER INSPECTION OF RIG COULD CAUSE WORKERS TO BE EXPOSED TO HAZARDS ASSOCIATED WITH OPERATING MECHANICAL DEVICES.	<ul style="list-style-type: none">Ensure that the rig and all associated equipment are inspected by a competent person and that the rig is in safe operating condition. Inspect equipment, including brakes, tire pressure, cables, and hydraulic and pneumatic hoses, before use and at start of each shift. Verify that there is a guard cage that can surround the rotating auger when the rig is in use. Tag and remove from service faulty or unsafe equipment. Verify that emergency shutdown systems (at least two) are clearly marked, and all site workers know where they are located. Verify that shutdown systems work properly when trip wires are pulled or pushed. An operator's manual must be available and reviewed prior to operation.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of drilling operations; set up work area and move rig into position	FAILURE TO REVIEW SITE LAYOUT PLAN COULD CAUSE EXPOSURE TO POTENTIAL HAZARDS SUCH AS ELECTROCUTION, DAMAGING OF UNDERGROUND UTILITIES, OR TIPPING RIG OVER IN UNSTABLE SOIL CONDITIONS.	<ul style="list-style-type: none">Do not move drill rig into any work area until a site layout plan has been completed and route of travel to any worksite has been assessed for hazards (overhead lines and stability of roads and ground). At the pre-activity safety briefing, discuss a site layout plan and analysis of route of travel, along with the AHAs. Use a spotter for positioning as necessary. Set brake and place wheel chocks under front wheels of mobile rig. Extend stabilizer jacks and ensure that footing is sound. Vehicle must be level to vertical and horizontal planes. Do not position wheels (loads) or rig over manholes, vaults, valve boxes, etc. Do not place rig within 15 feet of any overhead electrical lines. Be very careful about placing rig on berm. It must have complete ground stability and cannot be used other than on a stable flat ground.
	RIG COULD CONTACT OVERHEAD LINES, IF IT IS TRANSPORTED WITH RIG RAISED, CAUSING ELECTRIC SHOCK.	<ul style="list-style-type: none">Never move the rig when the mast is extended.
	VEHICLE MAY MOVE IF NOT PROPERLY SET UP.	<ul style="list-style-type: none">Use spotter to properly position vehicle. Set brakes and place wheel chocks under front wheels of mobile rig. Extend stabilizer jacks, and ensure that footing is sound. Ensure ground can support weight of unit and any outriggers. Use cribbing of specified size and strength as required by manufacturer, if necessary. Vehicle must be level to the vertical and horizontal planes.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of drilling operations; set up work area and move rig into position (continued)	WHEN RAISING RIG, RIG MAY NOT INSTALL PROPERLY DUE TO THE CONDITION OF THE RIG AND CONNECTING CABLES	<ul style="list-style-type: none"> Inspect all components of rig to determine its condition. Make all repairs before raising rig.
	WHEN RAISING RIG, MAST COULD COME IN CONTACT WITH, OR BE IN PROXIMITY TO, OVERHEAD POWER LINES CAUSING ELECROCUTION OF WORKERS	<ul style="list-style-type: none"> The mast and other equipment must be at least 15 feet from any overhead utility lines. Verify the voltage of any overhead power lines. If any lines are above 50 kV, the clearance distance must be greater. Refer to Engineer Manual 385-1-1, Section 11, Table 11-1 for clearance requirements for voltages above 50 kV.
	WORKER MAY BECOME PINNED BETWEEN RIG AND OTHER TRUCK COMPONENTS, OR WORKER COULD BE PINNED UNDER THE TRUCK IF RIG MUST BE SERVICED FROM UNDER THE TRUCK	<ul style="list-style-type: none"> When any part of the rig or equipment is in motion, worker will stand far enough away from the moving parts so that the worker is not pinned between the moving parts. Workers will not manually guide any moving part of the rig when it is raised up. Workers will not work under the rig or under the truck. If work must be done under the rig or truck, the drill crew supervisor will contact the Site Health and Safety Specialist to ascertain a safe method for lock-out of the equipment to ensure that adequate blocking is installed.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of drilling operations; set up work area and move rig into position (continued)	HIGH WINDS COULD DESTABILIZE RIG. MAST COULD ACT AS A CONDUCTOR DURING A THUNDERSTORM.	<ul style="list-style-type: none">• Check weather conditions and forecasts to determine if conditions are acceptable for use of the rig. Do not operate the rig if winds exceed manufacturer's recommended tolerances.
	EXCESSIVE NOISE EXPOSURE COULD CAUSE HEARING LOSS	<ul style="list-style-type: none">• When necessary, wear earplugs.
	PINCH POINTS.	<ul style="list-style-type: none">• Avoid placing hands close to moving machinery. Wear gloves, as appropriate.
	TRAFFIC IN AREA OF DRILLING COULD INJURE WORKERS BECAUSE VEHICLES FAIL TO SEE WORKERS OR WORKERS FAIL TO SEE THE VEHICLES	<ul style="list-style-type: none">• Wear high-reflective safety vests. Barricade and mark drilling sites for visibility. Use a flagger, if necessary, to direct traffic away from drilling areas.
Oversight of start up drill	UNQUALIFIED OPERATORS OR PERSONNEL ARE NOT BEING KNOWLEDGEABLE OF DRILLING HAZARDS COULD CAUSE INJURY OR DAMAGE TO DRILL	<ul style="list-style-type: none">• Ensure that personnel are trained in use of drilling equipment. Ensure that the operator has current certifications to operate the equipment. Ensure that a 20-pound dry chemical ABC fire extinguisher is readily available. Ensure that a spill control kit is available at drilling location. Ensure that there is a first aid kit, eyewash, and an emergency air horn nearby.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of start up drill (continued)	STARTUP OF UNIT WITHOUT GUARD CAGE AROUND AUGER COULD CAUSE A WORKER TO COME IN CONTACT WITH AUGER CAUSING INJURY OR DEATH	<ul style="list-style-type: none"> In no case will the auger be engaged without a guard "cage" placed around the auger.
	PRESSURIZED HYDRAULIC LINES COULD RUPTURE, CAUSING RELEASE OF HOT HYDRAULIC FLUID. HOT FLUID COULD IGNITE IF CONTACT IS MADE WITH AN ENGINE. HOT FLUID COULD BURN WORKERS. FLUID COULD CAUSE ENVIRONMENTAL CONTAMINATION	<ul style="list-style-type: none"> Inspect all hydraulic lines before placing rig in service. Any damaged hoses or connections must be replaced before unit is used. Immediately shut down equipment if lines rupture. Ensure that a 20-pound dry chemical ABC fire extinguisher is readily available. Ensure that a spill control kit is available at drilling location. If rupture occurs, berm the liquid to minimize the area over which the liquid spreads as quickly as possible. Ensure that all pressurized lines have whip checks.
	AIR HOSES OR HYDRAULIC HOSES UNDER PRESSURE COULD SUDDENLY RELEASE, WHIP, AND HIT WORKERS CAUSING SEVERE INJURY.	<ul style="list-style-type: none"> Do not disconnect air hoses and compressors until hose line has been bled. Visually inspect all connection of any lines under pressure. Use safety clamps to connect each side of connection to the other if the connection breaks. [The safety clamps will keep the hoses from whipping under the sudden release of pressure.] Tie back or attach hoses wherever possible to minimize the length of hose that could whip around if there is a sudden release of pressure.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

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Task Steps	Potential Hazards	Actions
Oversight of start up drill (continued)	STRAINS COULD RESULT FROM MANUALLY MOVING MATERIALS, EQUIPMENT, AND DRUMS.	<ul style="list-style-type: none">Personnel will be directed to use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help in moving bulky/heavy materials and equipment. Mechanical equipment will be used as much as possible. Use care when handling augers or drill rods. Avoid standing under any load. Do not lift more than 50 pounds without assistance.
	ATMOSPHERIC AND CONTACT HAZARDS FROM CHEMICAL AGENTS COULD BE PRESENT.	<ul style="list-style-type: none">Ambient air/visual monitoring will be used to verify selection of PPE. A material safety data sheet (MSDS) for any drilling fluids will be obtained/reviewed with workers. Decontaminate drilling equipment after use. Avoid exposure to dust. Use dust control as necessary and possible. PPE will be used. Drum and label all soil cuttings. Place contaminated PPE in a separate, properly labeled, drum. Discard other PPE, as approved by the Project Manager and Project Environmental Safety Manager. Do not place face or head over hole.
	SOMETIMES WORKERS USE PLASTIC SHEETING IN THE AREA WHERE THEY ARE DRILLING TO PROTECT THE SURROUNDING GROUND. THIS SHEETING BECOMES VERY SLIPPERY WHEN DRILLING MUDS ARE PLACED ON IT.	<ul style="list-style-type: none">Avoid using plastic sheeting, if possible. Many drillers today build a small bermed area where they place the drilling muds. It is easier to clean up the surface of the soil than to have workers slip on plastic sheeting. If plastic sheeting must be used, dig out a small depression, place the plastic on the ground, and cover it with the removed soil. This way, the plastic sheeting should not become too slippery, as it will be covered by the removed soil. [This creates a larger volume of soil to be disposed, but it is a safer method than working on slippery plastic.]



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of start up drill (continued)	THE MAST COULD BE USED TO LIFT OTHER OBJECTS AS IT IS BEING RAISED, CAUSING POTENTIAL FAILURE OF THE MAST.	<ul style="list-style-type: none"> Masts shall be used in a manner specified by the manufacturer and should never be loaded beyond their capacity.
	WORKERS COULD CLIMB DRILL MAST AND EXPOSE THEMSELVES TO A FALL HAZARD.	<ul style="list-style-type: none"> Climbing on the mast is not allowed.
	WORKERS COULD PLACE HANDS INTO MOVING PARTS OF THE RIG, OR LOOSE CLOTHING, JEWELRY OR LONG HAIR COULD BECOME ENTANGLED IN MOVING MACHINE PARTS, EITHER OF WHICH COULD INJURE A WORKER.	<ul style="list-style-type: none"> Chains, sprockets, and moving parts will be guarded. Workers will not wear loose clothing or any jewelry. Long hair will be bunched and tied off under the hard hat or will not be allowed on site. Workers will not place their hands or any part of their bodies between the drill auger or rod and the drill plate. Workers should never place themselves in positions where they could come in contact with the moving drill rods or augers. There must be a guard "cage" around the auger while it is operating. The operator will verbally alert all workers and visually ensure that all workers are clear of dangerous parts of equipment before starting or engaging equipment. Workers will avoid contact with any moving auger. Means will be provided to guard against employee contact with auger. [For example, barricade the perimeter of auger or use an electronic brake activated by a presence-sensing device.]



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of start up drill (continued)	WORKERS COULD INJURE THEMSELVES BY CLEANING THE AUGERS WHILE THEY ARE ROTATING.	<ul style="list-style-type: none">Augers will be cleaned only when they are stopped and in neutral. They will not be restarted until the worker has re-installed the auger guard "cage", given a verbal "all clear" to the operator, and the operator has visually determined that the worker is clear of the auger. Only long-handled shovels will be used to remove cuttings from the auger.
	WORKERS COULD TRIP OR FALL BY THE BOREHOLE.	<ul style="list-style-type: none">Cap and flag open boreholes. All open boreholes will be protected as any open excavation if they are left unattended.
	PINCH POINTS COULD BE PRESENT.	<ul style="list-style-type: none">Avoid placing hands close to moving machinery. Wear gloves, as appropriate. Keep constantly alert.
Oversight of the use of the auger drill rig	POTENTIAL FOR INJURY: Driver is not trained and/or not current in certification. Equipment has not been inspected. Equipment is operated improperly.	<ul style="list-style-type: none">Ensure driver is trained and current in certification. Ensure equipment is inspected as required by EM 385-1-1, 16A.2, and Cal-OSHA regulations. Operation Rules must be posted and followed (Required by Cal-OSHA regulations.) Also refer to the operator's manual which must be onsite.
Moving equipment into place between ground intrusion points	EQUIPMENT COULD HIT SOMEONE OR SOMETHING	<ul style="list-style-type: none">Use spotters when positioning equipment. Ensure spotters know how to communicate with operator.
	MOVING EQUIPMENT/CRUSHING DAMAGE	<ul style="list-style-type: none">Travel at slow speeds when people are walking near equipmentWear safety vests when around moving equipmentMaintain a safe distance from moving equipment



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of the set up of the auger drill rig	ACCIDENTS RESULTING IN DEATHS, INJURIES, AND PROPERTY DAMAGE	<ul style="list-style-type: none"> • Don't restrict fire lanes or traffic lanes without approval • Don't set up equipment that would impede or block access to emergency equipment or devices, such as fire hydrants, valves, fire alarm stations, etc • Don't place heavy equipment over manholes, vaults, valve boxes, and similar underground structures
Oversight of the towering up	PINCH POINTS/CRUSHING DAMAGE	<ul style="list-style-type: none"> • Use caution around moving equipment • Wear leather work gloves
	POWER LINES/ELECTROCUTION	<ul style="list-style-type: none"> • Look up for clearance before towering up • Remain 100 feet from power lines
	TREES/FALLING BRANCHES	<ul style="list-style-type: none"> • Keep out from under trees where possible • Trim tree branches when necessary • Wear hard hats and steel toed boots
Oversight of the breaking ground	AUGER SKIPPING/CRUSHING DAMAGE	<ul style="list-style-type: none"> • Start rotation slowly • Wear steel toe boots
	SPINNING AUGER/CATCHING-STRANGULATION	<ul style="list-style-type: none"> • Place a drilling cage around exposed rotating equipment • Maintain a safe distance • Do not wear loose clothing; tie back long hair • Two emergency shut off switches on rig, one on either side of auger
	FLYING DEBRIS OR CUTTINGS/EYE DAMAGE	<ul style="list-style-type: none"> • Wear safety glasses



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of the breaking ground (continued)	LOSS OF HEARING	<ul style="list-style-type: none">• Wear adequate hearing protection (ear muffs [preferred] or ear plugs)• Consider rule of thumb for implementing ear protection; if you cannot talk to someone one arm's length away without raising your voice, wear ear protection.
	UNDERGROUND UTILITIES/GAS LEAK-ELECTROCUTION-DAMAGE	<ul style="list-style-type: none">• Hand auger to avoid breaking utility lines
	LIFTING AUGER SECTIONS/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none">• Lift with knees and in pairs• Wear hard hats and steel-toed boots
Oversight of the soil boring	SPINNING AUGER/CATCHING-STRANGULATION	<ul style="list-style-type: none">• Place a drilling cage around all exposed rotating equipment• Maintain a safe distance• Do not wear loose clothing; tie back long hair
	FLYING DEBRIS OR CUTTINGS/EYE DAMAGE	<ul style="list-style-type: none">• Wear safety glasses
	LOSS OF HEARING	<ul style="list-style-type: none">• Wear adequate hearing protection (ear muffs [preferred] or ear plugs)• Consider rule of thumb for implementing ear protection; if you cannot talk to someone one arm's length away without raising your voice, wear ear protection.
	VAPORS INHALATION	<ul style="list-style-type: none">• Use photoionization detector (PID) or flame ionization detector (FID) to monitor soil





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of the soil boring (continued)	UNDERGROUND UTILITIES/GAS LEAK-ELECTROCUTION-DAMAGE	<ul style="list-style-type: none"> • Proceed with caution • Look for markings and flags of utilities on pavement and grass • Use a utility locator
	LIFTING AUGER SECTIONS/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Lift with the knees and in pairs • Wear steel toe boots
Decontaminate equipment using pressure washer	FAILURE TO CONTAIN WATER COULD CAUSE EXPOSURE TO THE ENVIRONMENT	<ul style="list-style-type: none"> • Contain all water and collect into 55-gallon drums as required by the Sampling and Analysis Plan (SAP)
	WATER SPRAY INTO EYE	<ul style="list-style-type: none"> • Wear protective safety glasses
Disposal of IDW	PINCH POINTS AND FLYING DEBRIS/EYE DAMAGE	<ul style="list-style-type: none"> • Avoid placing hands near the rim of the 55 gallon drum when closing it up. Wear leather work gloves, as appropriate. • Wear protective safety glasses.
	HANDLING DRUMS COULD CAUSE INJURY TO WORKERS	<ul style="list-style-type: none"> • Follow safe drum handling procedures. Refer to an existing AHA for drum handling.
Demobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none"> • Ensure driver is "authorized" per the SulTech Vehicle Safety Program • Practice defensive driving whenever traveling in a vehicle • Do not use cell phones while driving unless a hands-free device is used also • Valid state issued driver's license



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of the removal and cleaning of augers	SPINNING AUGER/CATCHING-STRANGULATION	<ul style="list-style-type: none">• Maintain a safe distance• Do not wear loose clothing; tie back long hair• Two emergency shut off switches on rig, one on either side of auger
	FLYING DEBRIS OR CUTTINGS/EYE DAMAGE	<ul style="list-style-type: none">• Wear safety glasses
	LIFTING AUGER SECTIONS/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none">• Lift with the knees and in pairs• Wear steel-toe boots
Oversight of the backfilling of borehole	GROUT MIX/INHALATION	<ul style="list-style-type: none">• Remain upwind when mixing grout
	SPLASHING GROUT/EYE DAMAGE	<ul style="list-style-type: none">• Wear safety glasses
	LIFTING GROUT BAGS/CRUSHING AND BACK STRAIN	<ul style="list-style-type: none">• Lift with the knees and in pairs• Wear steel toe boots





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Equipment to be Used	Inspection Requirements	Training Requirements
Vehicles – pickup trucks	INSPECT VEHICLES DAILY AND BEFORE USE. USE THE EQUIPMENT SAFETY CHECKLIST FOUND IN THE BASE WIDE PLAN.	<ul style="list-style-type: none"> Only Department of Motor Vehicles-licensed personnel will operate vehicles.
Equipment – boring equipment, boring rods, drill rig	INSPECT EQUIPMENT BEFORE EACH USE FOLLOWING THE MANUFACTURERS' REQUIREMENTS. DOCUMENT INSPECTION FORM OR IN A LOGBOOK.	<ul style="list-style-type: none"> Specific training for use of boring and sampling equipment, HSA, etc. will be provided or if training has been completed, documentation shall be provided.
Hand tools – basic screwdrivers, hammers, pliers, etc.	INSPECT HAND TOOLS BEFORE EACH USE FOLLOWING MANUFACTURERS' REQUIREMENTS.	<ul style="list-style-type: none"> Personnel must have reviewed operators' manual and have been trained on power tools. Only qualified person will operate generator or compressor, if used.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

2.0 Oversight of Hollow Stem Auger Drilling

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of drilling operations; drilling will be conducted by subcontractors. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Equipment to be Used	Inspection Requirements	Training Requirements
<ul style="list-style-type: none">• Personal protection equipment<ul style="list-style-type: none">– Steel toe boots– Hard hat– Safety vest– Safety glasses– Nitrile gloves/leather work gloves• Drill rig• PID or FID• Pressure Washer	<p>SAFETY INSPECTION CHECKLIST FOR CONSTRUCTION EQUIPMENT.</p> <p>ADDITIONAL REQUIREMENTS MAY BE PROVIDED BY THE SUBCONTRACTOR.</p>	40-Hour Hazardous Waste Operations and Emergency Response



Subcontractor AHA	IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)
	Analyzed by: Hannah Thompson, November 16, 2007, SulTech
	3.0 Hollow Stem Auger Drilling

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

COMPANY/PROJECT NAME or ID/LOCATION (City, State)	DATE	NEW	REVISED
Vironex, Inc. / 5292 Pacheco Blvd., Pacheco CA 94553	10/1/07		X

WORK ACTIVITY

Direct Push Technology (DPT) : Well Installation

DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY	POSITION/TITLE
John McAssey	Regional Manager	Jose Suarez	Safety Officer
Tim McGinty	Operations Manager		
Jeff Baker	Regional Safety Officer		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

X	Reflective Vest		Goggles		Air Purifying	X	Gloves
X	Hard Hat		Face Shield		Respirator		Other
	Lifeline/Harness	X	Hearing Protection		Supplied Respirator		Neoprene (Rubber) Safety Boots w/ Steel Toes
X	Safety Glasses	X	Safety Shoes (Steel-Toe Boots)		PPE Clothing (Tyvek, Nomex, and Dominator)		

**Subcontractor
AHA**

IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

3.0 Hollow Stem Auger Drilling

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

¹ JOB STEPS	² POTENTIAL HAZARDS	³ CRITICAL ACTIONS TO MITIGATE HAZARDS
1. Ensure boring locations have been cleared and marked by USA. Check for overhead and subsurface utilities	Hitting subsurface and/or overhead utilities, electrocution, explosion, product release, property damage, and interruption of services.	Ensure Client has called USA 72 hours prior to drilling and has an active ticket number. Do not drill until all utilities are accounted for. Do not accept any substitutes for USA clearance.
2. Mobilize with proper equipment and supplies. During inclement weather insure to wear safety vest over outer most layer of clothing.	Delay or improper performance of work due to improper equipment on site.	Make sure crews are properly informed of their responsibilities for equipment and supplies.
3. Review specific site safety plan before demobilizing to site and during tailgate meeting upon arrival of site.	Consider worst case scenario (include weather conditions).	Review all plans with co-workers. Document any additional hazards not listed in site safety plan. All co-workers sign the safety plan.
4. Set up any necessary traffic control.	Damage caused by DPT rig while accessing set-up location.	Ensure a clear pathway to DPT borings. Provide guidance to driver to place DPT rig. Visually inspect rig (fire extinguisher on board, no oil or fluid leaks, hoses secured, and rig on stable surface for sampling).
5. Set up exclusion zone(s) and workstations	Injury or exposure to public or other onsite personnel. Slip and fall hazards to workers.	Implement exclusion zone set-up. Work stations set up with clear paths to and from rig.
6. Commence DPT – HAS Drilling.	Physical hazards from DPT rig; back strain, heat or cold stress, eye injury, hearing damage, exposure to chemical, slip and fall, equipment failure.	Use proper operating and lifting techniques. Use proper PPE (see Vironex JSA for PPE). Keep working area clear of tripping and slipping hazards. Perform periodic visual inspection of rig and augers.
7. Advance Hollow Stem Augers – HAS cutting tools	Exposure to contaminants, Airborne particles, pinch points and moving parts.	Wear Nitrile/Latex gloves and safety glasses. Review fire and explosive hazards in the MSDS. If needed follow fire fighting procedures in MSDS. Wear eye protection to avoid particles in eyes. Be aware of DPT rig at all times, keep hands and feet clear of moving parts.



**Subcontractor
AHA**

IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

3.0 Hollow Stem Auger Drilling

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

¹ JOB STEPS	² POTENTIAL HAZARDS	³ CRITICAL ACTIONS TO MITIGATE HAZARDS
8. Collection of sub-surface soil samples	Moving parts, Exposure to contaminants, and exposure to contaminants above the permissible exposure level.	Wear all appropriate PPE, (see Vironex JSA for PPE), be aware of position of DPT rig at all times, even during logging procedures. Be aware of all soil vapor parts and proper use. Continuously check of any vapor leaks. Wear Nitrile/Latex gloves and safety glasses. Review fire and explosive hazards in MSDS. If needed, upgrade to Level C-PPE.
9. Installation of well	Pinch points, Slip/Trip/Fall Hazards, Lifting Strains.	Use hoist cable when retracting augers, neatly stack all well supplies to be used in well construction, use chain vise grips to secure PVC well material when lowering the PVC to depth, use proper lifting techniques.
10. Setting Well screen material	Lifting strain, opening bags of sand, slips / trips/ fall hazards.	At all time use proper lifting techniques, use spring loaded blade to open sand bags, stand close to well head while pouring in screen sand, maintain a clean and orderly work site to avoid possible slip/trip and fall hazards.
11. Setting Well Boxes	Foot injury, Slip / Trips / Fall Hazards, Lifting strain.	Use proper tools to excavate the well boxhole (shovel & digging bar), wear safety glasses and work gloves, neatly stage concrete and well boxes, keep shovels and digging bar in safe out-of-the-way location, Use proper lifting technique.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

4.0 Soil Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of soil samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license
Set up sampling area	INJURY FROM DRILL RIG MOVING PARTS	<ul style="list-style-type: none">• Set up away from drill rig• Stay clear of all moving parts of drill rig• Place a drilling cage around all exposed rotating equipment (including augers)• Remove or bind all loose clothing• Wear proper PPE: Steel-toe boots, hard hat, safety glasses and Nitrile gloves
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none">• Visually inspect both sampling area and path to drill area for obstructions• Ensure all debris has been removed
Sample collection and analysis	SLICE WOUNDS FROM CUTTING CORE TUBES	<ul style="list-style-type: none">• Use a safe blade saw and sample-core splitter• Saw down onto firm surface• Have one person hold core firmly while second person saws
	VAPORS INHALATION	<ul style="list-style-type: none">• Use PID or FID to monitor soil
	DEBRIS IN EYES	<ul style="list-style-type: none">• Wear proper PPE: safety glasses and Nitrile gloves





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

4.0 Soil Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of soil samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Cap ends of sample tube section with caps and Teflon® sheets	PINCH FINGERS	<ul style="list-style-type: none"> Steady the tube against a firm surface Wear proper PPE: safety glasses and Nitrile gloves
Clean work area between core arrivals	SPLASH BACK FROM WATER	<ul style="list-style-type: none"> Wear proper PPE: safety glasses and Nitrile gloves
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none"> Dispose of all broken plastic shards
	DEBRIS IN EYES	<ul style="list-style-type: none"> Wear proper PPE: safety glasses and Nitrile gloves
Hand Auger	BACK STRAIN	<ul style="list-style-type: none"> Make sure that use the knees and full body while using the Hand auger
	PINCH POINTS and HAND BLISTERING	<ul style="list-style-type: none"> Wear proper leather work gloves
	FOOT DAMAGE WHILE DRIVING THE HAND AUGER TO BREAK GROUND	<ul style="list-style-type: none"> Wear proper steel toe boots to prevent foot injury and always be aware of where the hand auger is moving
Store samples in coolers, and load coolers and waste water and soil (IDW) into vehicle	IMPROPERLY CLOSED CONTAINERS	<ul style="list-style-type: none"> Ensure container is closed by visual and hand inspection
	BACK SPRAIN	<ul style="list-style-type: none"> Lift with knees and use proper lifting technique
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none"> Ensure all debris has been removed



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

4.0 Soil Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of soil samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Decontaminate equipment using potable water and alconox solution	FAILURE TO CONTAIN WATER COULD CAUSE EXPOSURE TO THE ENVIRONMENT	<ul style="list-style-type: none">• Contain all water and collect into 55-gallon drums as required by the SAP
	WATER SPRAY INTO EYE	<ul style="list-style-type: none">• Wear protective safety glasses
	CONCENTRATED SOAP MAY BE IRRITATING TO THE SKIN	<ul style="list-style-type: none">• Wear Nitrile gloves• Follow manufacturers use instructions
	SPIILLS AND SPLASHES	<ul style="list-style-type: none">• Wear Nitrile gloves• Use splash guard if necessary• Wear eye protection
Demobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

4.0 Soil Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of soil samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Equipment to be Used <ul style="list-style-type: none">• Personal protection equipment<ul style="list-style-type: none">– Steel toed boots– Safety vest– Nitrile gloves– Safety glasses• Safety/utility knife• PID or FID	Inspection Requirements <ul style="list-style-type: none">• Drill Rig Safety• PID test• PPE check• Safety inspection checklist for construction equipment• Additional requirements may be provided by the subcontractor.	Training Requirements <ul style="list-style-type: none">• 40 Hour Hazardous Waste Operations and Emergency Response• Proper opening and closing of 55 gallon drums



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

5.0 Oversight of Groundwater Monitoring Well Installation

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the installation of groundwater monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license
Oversight of the set up of the installation area	INJURY FROM DRILL RIG MOVING PARTS	<ul style="list-style-type: none">• Set up away from drill rig• Stay clear of all moving parts of drill rig• Place a drilling cage around all exposed rotating equipment (including augers)• Remove or bind all loose clothing• Wear proper PPE: Steel-toe boots, hard hat, safety glasses and Nitrile gloves
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none">• Visually inspect both sampling area and path to drill area for obstructions• Ensure all debris has been removed
Oversight of the Assembling of the well casing and lowering into existing hole	PINCH POINTS/CRUSHING DAMAGE	<ul style="list-style-type: none">• Wear leather work gloves• Remain alert while assembling casing





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

5.0 Oversight of Groundwater Monitoring Well Installation

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the installation of groundwater monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of the pouring of sand and bentonite chips for pack and seal	BENTONITE OR DUST/INHALATION	<ul style="list-style-type: none"> • Remain upwind when pouring sand and bentonite
	LIFTING GROUT BAGS/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Lift with the knees and with assistance if needed
Oversight of the grout overseal	GROUT MIX/INHALATION	<ul style="list-style-type: none"> • Remain upwind when mixing grout
	SPLASHING GROUT/EYE DAMAGE	<ul style="list-style-type: none"> • Wear Safety glasses
	LIFTING GROUT BAGS/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Lift with knees and with assistance if needed and wear steel toed boots.
Oversight of the installing the monument or vault and cap well	PINCH POINTS/CRUSHING DAMAGE	<ul style="list-style-type: none"> • Remain alert while installing monument or vault –wear leather gloves
	LIFTING MONUMENT OR VAULT/ CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Lift with knees and use proper lifting technique—weather leather gloves and steel-toe boots



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

5.0 Oversight of Groundwater Monitoring Well Installation

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the installation of groundwater monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Decontaminate equipment using potable water and alconox solution	FAILURE TO CONTAIN WATER COULD CAUSE EXPOSURE TO THE ENVIRONMENT	<ul style="list-style-type: none">• Contain all water and collect into 55-gallon drums as required by the SAP
	WATER SPRAY INTO EYE	<ul style="list-style-type: none">• Wear protective safety glasses
	CONCENTRATED SOAP MY BE IRRITATING TO THE SKIN	<ul style="list-style-type: none">• Wear Nitrile gloves• Follow manufacturers use instructions
Demobilization	SPILLS AND SPLASHES	<ul style="list-style-type: none">• Wear Nitrile gloves• Use splash guard if necessary• Wear eye protection
	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

5.0 Oversight of Groundwater Monitoring Well Installation

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the installation of groundwater monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Equipment to be Used <ul style="list-style-type: none"> • Personal protection equipment <ul style="list-style-type: none"> – Steel toed boots – Safety vest – Nitrile gloves – Safety glasses – Leather work gloves • Safety/utility knife • PID or FID 	Inspection Requirements <ul style="list-style-type: none"> • Drill Rig Safety • PID test • PPE check • Safety inspection checklist for construction equipment • Additional requirements may be provided by the subcontractor. 	Training Requirements <ul style="list-style-type: none"> • 40 Hour Hazardous Waste Operations and Emergency Response • Proper opening and closing of 55 gallon drums.

Subcontractor AHA	IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)
	Analyzed by: Hannah Thompson, November 16, 2007, SulTech
	6.0 Groundwater Monitoring Well Installation

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

COMPANY/PROJECT NAME or ID/LOCATION (City, State)	DATE	NEW	REVISED
Vironex, Inc. / 5292 Pacheco Blvd., Pacheco CA 94553	10/1/07		X

WORK ACTIVITY

Direct Push Technology (DPT) : Well Installation

DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY	POSITION/TITLE
John McAssey	Regional Manager	Jose Suarez	Safety Officer
Tim McGinty	Operations Manager		
Jeff Baker	Regional Safety Officer		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

X	Reflective Vest		Goggles		Air Purifying	X	Gloves
X	Hard Hat		Face Shield		Respirator		Other
	Lifeline/Harness	X	Hearing Protection		Supplied Respirator		Neoprene (Rubber) Safety Boots w/ Steel Toes
X	Safety Glasses	X	Safety Shoes (Steel-Toe Boots)		PPE Clothing (Tyvek, Nomex, and Dominator)		



Subcontractor AHA	IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)
	Analyzed by: Hannah Thompson, November 16, 2007, SulTech
	6.0 Groundwater Monitoring Well Installation

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

¹ JOB STEPS	² POTENTIAL HAZARDS	³ CRITICAL ACTIONS TO MITIGATE HAZARDS
1. Ensure boring locations have been cleared and marked by USA. Check for overhead and subsurface utilities	Hitting subsurface and/or overhead utilities, electrocution, explosion, product release, property damage, and interruption of services.	Ensure Client has called USA 72 hours prior to drilling and has an active ticket number. Do not drill until all utilities are accounted for. Do not accept any substitutes for USA clearance.
2. Mobilize with proper equipment and supplies. During inclement weather insure to wear safety vest over outer most layer of clothing.	Delay or improper performance of work due to improper equipment on site.	Make sure crews are properly informed of their responsibilities for equipment and supplies.
3. Review specific site safety plan before demobilizing to site and during tailgate meeting upon arrival of site.	Consider worst case scenario (include weather conditions).	Review all plans with co-workers. Document any additional hazards not listed in site safety plan. All co-workers sign the safety plan.
4. Set up any necessary traffic control.	Damage caused by DPT rig while accessing set-up location.	Ensure a clear pathway to DPT borings. Provide guidance to driver to place DPT rig. Visually inspect rig (fire extinguisher on board, no oil or fluid leaks, hoses secured, and rig on stable surface for sampling).
5. Set up exclusion zone(s) and workstations	Injury or exposure to public or other onsite personnel. Slip and fall hazards to workers.	Implement exclusion zone set-up instructions of SSP. Work stations set up with clear paths to and from rig.
6. Commence DPT – HAS Drilling.	Physical hazards from DPT rig; back strain, heat or cold stress, eye injury , hearing damage, exposure to chemical, slip and fall, equipment failure.	Use proper operating and lifting techniques. Use proper PPE (see Vironex JSA for PPE). Keep working area clear of tripping and slipping hazards. Perform periodic visual inspection of rig and augers.

**Subcontractor
AHA**

IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

6.0 Groundwater Monitoring Well Installation

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

¹ JOB STEPS	² POTENTIAL HAZARDS	³ CRITICAL ACTIONS TO MITIGATE HAZARDS
7. Advance Hollow Stem Augers – HAS cutting tools	Exposure to contaminants, airborne particles, pinch points, and moving parts.	Wear Nitrile/Latex gloves and safety glasses, Review fire and explosive hazards in the MSDS. If needed follow fire fighting procedures in MSDS. Wear eye protection to avoid particles in eyes. Be aware of DPT rig at all times, keep hands and feet clear of moving parts.
8. Collection of sub-surface soil samples	Moving parts, exposure to contaminants, and exposure to contaminants above the permissible exposure level.	Wear all appropriate PPE (see Vironex JSA for PPE), be aware of position of DPT rig at all times, even during logging procedures. Be aware of all soil vapor parts and proper use, continuously check of any vapor leaks. Wear Nitrile/Latex gloves and safety glasses. Review fire and explosive hazards in MSDS. If needed upgrade to Level C-PPE.
9. Installation of well	Pinch points, slip / trips / fall hazards, lifting strains.	Use hoist cable when retracting augers, neatly stack all well supplies to be used in well construction, use chain vise grips to secure PVC well material when lowering the PVC to depth, use proper lifting techniques.
10. Setting Well screen material	Lifting strain, opening bags of sand, slip / trips/ fall hazards.	At all time use proper lifting techniques, use spring loaded blade to open sand bags., stand close to well head while pouring in screen sand, maintain a clean and orderly work site to avoid possible slip/trip and fall hazards.
11. Setting Well Boxes	Foot injury, slip / trips / fall hazards, lifting strain.	Use proper tools to excavate the well boxhole (shovel & digging bar), wear safety glasses and work gloves, neatly stage concrete and well boxes, keep shovels and digging bar in safe out – of – the – way location, Use proper lifting technique.





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

7.0 Oversight of Well Development

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the development of monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none"> • Ensure driver is "authorized" per the SulTech Vehicle Safety Program • Practice defensive driving whenever traveling in a vehicle • Do not use cell phones while driving unless a hands-free device is used also • Valid state issued driver's license
Oversight of the setting up of well development area	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none"> • Wear proper PPE: Steel-toe boots, hard hat, safety glasses and Nitrile gloves • Visually inspect both sampling area and path to drill area for obstructions • Ensure all debris has been removed
	LIFTING OF HEAVY EQUIPMENT	<ul style="list-style-type: none"> • Lift with knees and use proper lifting technique • Wear steel-toe boots
Oversight of the handling of surge block	LIFTING SURGE BLOCK/CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Wear steel-toe boots • Wear leather work gloves • Lift with the knees and with assistance, if needed
	VAPORS INHALATION	<ul style="list-style-type: none"> • Use PID or FID to monitor soil
	WATER IN EYES	<ul style="list-style-type: none"> • Wear proper PPE: safety glasses and Nitrile gloves
Oversight of the manual surging of well	SPLASH BACK FROM WATER	<ul style="list-style-type: none"> • Wear proper PPE: safety glasses and Nitrile gloves
	LIFTING SURGE BLOCK IN WELL CASING/CRUSHING AND BACK STRAIN	<ul style="list-style-type: none"> • Lift with the knees and with assistance if needed • Wear steel toe boots • Wear leather work gloves



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

7.0 Oversight of Well Development

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the development of monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Oversight of manually bailing of groundwater	SPLASH BACK FROM WATER	<ul style="list-style-type: none">• Wear proper PPE: safety glasses and Nitrile gloves
	LIFTING BAILER/CRUSHING AND BACK STRAIN	<ul style="list-style-type: none">• Lift with knees and use proper lifting technique• Wear steel-toe boots and leather work gloves
Decontaminate equipment using potable water and alconox solution	FAILURE TO CONTAIN WATER COULD CAUSE EXPOSURE TO THE ENVIRONMENT	<ul style="list-style-type: none">• Contain all water and collect into 55-gallon drums as required by the SAP
	WATER SPRAY INTO EYE	<ul style="list-style-type: none">• Wear protective safety glasses
	CONCENTRATED SOAP MAY BE IRRITATING TO THE SKIN	<ul style="list-style-type: none">• Wear Nitrile gloves• Follow manufacturers use instructions
Demobilization	SPILLS AND SPLASHES	<ul style="list-style-type: none">• Wear Nitrile gloves• Use splash guard if necessary• Wear eye protection
	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

7.0 Oversight of Well Development

Task Description

This Activity Hazard Analysis (AHA) applies to the oversight of the development of monitoring wells. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by oversight of each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Equipment to be Used <ul style="list-style-type: none"> • Personal protection equipment <ul style="list-style-type: none"> – Steel toed boots – Safety vest – Nitrile gloves – Safety glasses • Well Development Equipment • Buckets with lids • 55 gallon drums • Safety/utility knife • PID or FID 	Inspection Requirements <ul style="list-style-type: none"> • PPE check • Safety inspection checklist for construction equipment • Additional requirements may be provided by the subcontractor. 	Training Requirements <ul style="list-style-type: none"> • 40 Hour Hazardous Waste Operations and Emergency Response • Proper opening and closing of 55 gallon drums

Subcontractor AHA	IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)
	Analyzed by: Hannah Thompson, November 16, 2007, SulTech
	8.0 Well Development

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

COMPANY/PROJECT NAME or ID/LOCATION (City, State)	DATE	NEW	REVISED
Vironex, Inc. / 5292 Pacheco Blvd., Pacheco CA 94553	11/21/07		X

WORK ACTIVITY

Well Installation

DEVELOPMENT TEAM	POSITION/TITLE	REVIEWED BY	POSITION/TITLE
John McAssey	Regional Manager	Jose Suarez	Safety Officer
Tim McGinty	Operations Manager		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

X	Reflective Vest		Goggles		Air Purifying	X	Gloves
X	Hard Hat		Face Shield		Respirator		Other
	Lifeline/Harness		Hearing Protection		Supplied Respirator		Neoprene (Rubber) Safety Boots w/ Steel Toes
X	Safety Glasses	X	Safety Shoes (Steel-Toe Boots)		PPE Clothing (Tyvek, Nomex, and Dominator)		



**Subcontractor
AHA**

IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

8.0 Well Development

SUBCONTRACTOR JOB SAFETY ANALYSIS (REVISED OCTOBER 07)

¹ JOB STEPS	² POTENTIAL HAZARDS	³ CRITICAL ACTIONS TO MITIGATE HAZARDS
1. Mobilize with proper equipment and supplies.	Delay or improper performance of work due to improper equipment on site.	Make sure crews are properly informed of their responsibilities for equipment and supplies.
2. Review specific site safety plan and tailgate meeting upon arrival of site.	Consider worst case scenario (include weather conditions).	Review all plans with co-workers. Document any additional hazards not listed in site safety plan. All co-workers sign the safety plan.
3. Set up any necessary traffic control.	Damage caused by DPT rig while accessing set-up location.	Ensure a clear pathway to well. Provide guidance to driver to place rig. Visually inspect rig (fire extinguisher on board, no oil or fluid leaks, hoses secured, and rig on stable surface for sampling).
4. Set up exclusion zone(s) and workstations.	Injury or exposure to public or other onsite personnel. Slip and fall hazards to workers.	Implement exclusion zone set-up instructions of SSP. Work stations set up with clear paths to and from rig.
5. Visually clear the proposed well development location.	Surface and over head obstructions.	Visually inspect area for utilities and obstructions.
6. Set up development rig and equipment near well and commence pressure grouting activities.	Physical hazards from rig; back strain, heat or cold stress, eye injury, hearing damage, exposure to chemical, slip and fall, equipment failure.	Use proper operating and lifting techniques. Use proper PPE (see Vironex JSA for PPE). Keep working area clear of tripping and slipping hazards. Perform periodic visual inspection of rig.
7. Decontaminate tools	Cross-contamination from previous hole.	Decontaminate tools pressure grouting equipment after each well to ensure proper operation of equipment for next well and/or prior to leaving site.
8. Dispose purge and decon water.	Back strain, exposure to contaminants, improper use of equipment, improper storage or disposal.	Use proper equipment to transport waste (drum dolly, pumps). Wear PPE in accordance with SSP. Client must properly label drums.
9. Clean site/demobilize	Traffic. Nuisance or safety hazards left on site.	Use buddy system as necessary to remove traffic control. Leave site clean of refuse and debris. Clearly mark/barricade borings that need later topping off or curing.



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

9.0 Groundwater Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of groundwater samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless using a hands-free device• Valid state issued driver's license
Set up sampling area	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none">• Wear proper PPE: Steel-toe boots, hard hat, safety glasses and Nitrile gloves• Visually inspect both sampling area and path to drill area for obstructions• Ensure all debris has been removed
	LIFTING OF HEAVY EQUIPMENT	<ul style="list-style-type: none">• Lift with knees and use proper lifting technique• Wear steel toe boots
Opening up the well head	VAPORS INHALATION	<ul style="list-style-type: none">• Use PID or FID to monitor groundwater
	WATER IN EYES	<ul style="list-style-type: none">• Wear proper PPE: safety glasses and Nitrile gloves
	PINCH POINTS	<ul style="list-style-type: none">• Be aware of where to not place hands and fingers
Water level measurements	INSECTS UNDER WELL COVER	<ul style="list-style-type: none">• Check to make sure there are no harmful insects under the well cover.
	VAPORS INHALATION	<ul style="list-style-type: none">• Use PID or FID to monitor groundwater
	WATER IN EYES	<ul style="list-style-type: none">• Wear proper PPE: safety glasses and Nitrile gloves



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

9.0 Groundwater Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of groundwater samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Sample collection and analysis	VAPORS INHALATION	<ul style="list-style-type: none"> • Use PID or FID to monitor soil
	WATER IN EYES	<ul style="list-style-type: none"> • Wear proper PPE: safety glasses and Nitrile gloves
	WOUNDS FROM BROKEN SAMPLE CONTAINERS AND SAMPLE VIALS	<ul style="list-style-type: none"> • Handle glass containers carefully • Dispose of all broken shards immediately
Clean work area between core arrivals	SPLASH BACK FROM WATER	<ul style="list-style-type: none"> • Wear proper PPE: safety glasses and Nitrile gloves
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none"> • Visually inspect sampling area and path for obstructions and equipment
Store samples in coolers, and load coolers and waste water and soil (IDW) into vehicle	IMPROPERLY CLOSED CONTAINERS	<ul style="list-style-type: none"> • Ensure containers are closed by visual and hand inspection
	BACK SPRAIN	<ul style="list-style-type: none"> • Lift with knees and use proper lifting technique
	SLIPS, TRIPS, AND FALLS	<ul style="list-style-type: none"> • Ensure all debris has been removed and that path is not obstructed
Decontaminate equipment using potable water and alconox solution	FAILURE TO CONTAIN WATER COULD CAUSE EXPOSURE TO THE ENVIRONMENT	<ul style="list-style-type: none"> • Contain all water and collect into 55-gallon drums as required by the SAP
	WATER SPRAY INTO EYE	<ul style="list-style-type: none"> • Wear protective safety glasses
	CONCENTRATED SOAP MAY BE IRRITATING TO THE SKIN	<ul style="list-style-type: none"> • Wear Nitrile gloves • Follow manufacturers use instructions
	SPILLS AND SPLASHES	<ul style="list-style-type: none"> • Wear Nitrile gloves • Use splash guard if necessary • Wear eye protection



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

9.0 Groundwater Sampling

Task Description

This Activity Hazard Analysis (AHA) applies to the collection of groundwater samples. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training.

Task Steps	Potential Hazards	Actions
Demobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none">• Ensure driver is "authorized" per the SulTech Vehicle Safety Program• Practice defensive driving whenever traveling in a vehicle• Do not use cell phones while driving unless a hands-free device is used also• Valid state issued driver's license
Equipment to be Used	Inspection Requirements	Training Requirements
<ul style="list-style-type: none">• Personal protection equipment<ul style="list-style-type: none">– Steel toed boots– Safety vest– Nitrile gloves– Safety glasses• Groundwater Sampling Equipment• Bladder pumps• Buckets with lids• 55 gallon drums• Safety/utility knife• PID or FID	<ul style="list-style-type: none">• PID test• PPE check	<ul style="list-style-type: none">• 40 Hour Hazardous Waste Operations and Emergency Response• Proper opening and closing of 55 gallon drums





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

10.0 Oversight of Investigation-Derived Waste Management

Task Description

This Activity Hazard Analysis (AHA) applies to the handling of IDW. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. This Activity is required for the following activities: (1) Hollow Stem Auger; (2) Soil Sampling; (3) G.W. Well installation; (4) Well Development; and (5) Groundwater Sampling.

The following information was derived from the Safe Work Practices "Drum and Container Handling Practices". Please refer to SWP no. 6-11 for more information, found in Appendix C.

Task Steps	Potential Hazards	Actions
Mobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none"> • Ensure driver is "authorized" per the SulTech Vehicle Safety Program • Practice defensive driving whenever traveling in a vehicle • Do not use cell phones while driving unless a hands-free device is used also • Valid state issued driver's license
Ensure all lids are secured on all waste receptacles before sending to IDW area	SPILLS FROM UNSECURED LIDS	<ul style="list-style-type: none"> • Ensure lids are completely closed by visual and hand inspection
Lift IDW receptacles into truck or vehicle that will transport it to the IDW area	BACK SPRAINS	<ul style="list-style-type: none"> • Lift with knees and use proper lifting technique
Place IDW receptacles in secured area in vehicle	IDW RECEPTACLES MAY SLIDE DURING TRANSPORT	<ul style="list-style-type: none"> • Ensure receptacles are placed in flat, secured area of vehicle • Use rope or bungee cords
Drive slowly and cautiously to IDW area	IDW MAY SPILL WHILE DRIVING	<ul style="list-style-type: none"> • Drive with caution and always within posted speed limits or slower
Survey IDW containers (55 gallon steel drums)	PLACING IDW INTO THE IMPROPER DRUM	<ul style="list-style-type: none"> • Read all labels thoroughly • Ensure the drum being used is the correct one • Inform field team leader if improper drum was used



IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

10.0 Oversight of Investigation-Derived Waste Management

Task Description

This Activity Hazard Analysis (AHA) applies to the handling of IDW. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. This Activity is required for the following activities: (1) Hollow Stem Auger; (2) Soil Sampling; (3) G.W. Well installation; (4) Well Development; and (5) Groundwater Sampling.

The following information was derived from the Safe Work Practices "Drum and Container Handling Practices". Please refer to SWP no. 6-11 for more information, found in Appendix C.

Task Steps	Potential Hazards	Actions
Opening the drum	USING SPARKING TOOLS MAY IGNITE VAPORS CAUSING A FIRE	<ul style="list-style-type: none">• Combustible compounds are not anticipated in this field event• Use only open containers that are confirmed for this field activity
	DRUMS CONTAINING UNKNOWN MATERIAL, RADIOACTIVE MATERIAL, OR EXHIBIT PRESSURE BUILDUP	<ul style="list-style-type: none">• Do not open drums if content is unknown or radioactive, or if drums exhibit pressure buildup
Empty IDW receptacles into the appropriate 55-gallon drum	SPLASHING MAY CAUSE EXPOSURE AND CONTAMINATION	<ul style="list-style-type: none">• Wear proper PPE: gloves and eye protection• Pour liquid IDW slowly
	BACK SPRAINS MAY OCCUR FROM IMPROPER LIFTING	<ul style="list-style-type: none">• Lift with knees and use proper lifting techniques
Close lid on drum or container and lock	IMPROPERLY CLOSED CONTAINERS	<ul style="list-style-type: none">• Ensure container is closed by visual and hand inspection
	IMPROPER USE OF DRUM SEALERS AND WRENCH	<ul style="list-style-type: none">• Provide proper tools and training in opening and sealing steel drums





IR Sites 32 and Site 35 ACTIVITY HAZARD ANALYSIS (AHA)

Analyzed by: Hannah Thompson, November 16, 2007, SulTech

10.0 Oversight of Investigation-Derived Waste Management

Task Description

This Activity Hazard Analysis (AHA) applies to the handling of IDW. It has been developed and approved by the Director of Health and Safety for SulTech. The AHA contains potential hazards posed by each major step in this task, lists procedures to control hazards, and presents required safety equipment, inspections, and training. This Activity is required for the following activities: (1) Hollow Stem Auger; (2) Soil Sampling; (3) G.W. Well installation; (4) Well Development; and (5) Groundwater Sampling.

The following information was derived from the Safe Work Practices "Drum and Container Handling Practices". Please refer to SWP no. 6-11 for more information, found in Appendix C.

Task Steps	Potential Hazards	Actions
Demobilization	VEHICULAR ACCIDENT	<ul style="list-style-type: none"> • Ensure driver is "authorized" per the SulTech Vehicle Safety Program • Practice defensive driving whenever traveling in a vehicle • Do not use cell phones while driving unless a hands-free device is used also • Valid state issued driver's license
Equipment to be Used	Inspection Requirements	Training Requirements
<ul style="list-style-type: none"> • Personal protection equipment <ul style="list-style-type: none"> – Steel toed boots – Safety vest – Nitrile gloves – Safety glasses • Wrench suited for sealing drums • Truck Lift 	<ul style="list-style-type: none"> • PPE check • Safety inspection checklist for construction equipment • Additional requirements may be provided by the subcontractor. • Check that the truck lift is operating well and that the operator knows how to operate the lift. 	<ul style="list-style-type: none"> • 40 Hour Hazardous Waste Operations and Emergency Response • Proper opening and closing of 55-gallon drums

15.0 HEALTH AND SAFETY PLAN

**Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32,
Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area
of Concern 23 at Installation Restoration Site 35
Alameda Point, Alameda, CA**

**Prepared for
U.S. Department of Navy
Base Realignment and Closure Program Management Office West
San Diego, California**

Contract No.	:	N68711-03-D-5104
Contract Task Order No.	:	0130
Date Prepared	:	November 16, 2007
Prepared by	:	SulTech (Hannah Thompson)
SulTech Project Manager	:	Craig Hunter
Telephone No.	:	(916) 953-4507
Client Contact	:	Frances Fadullon, Navy Remedial Project Manager
Telephone No.	:	(619) 532-0935

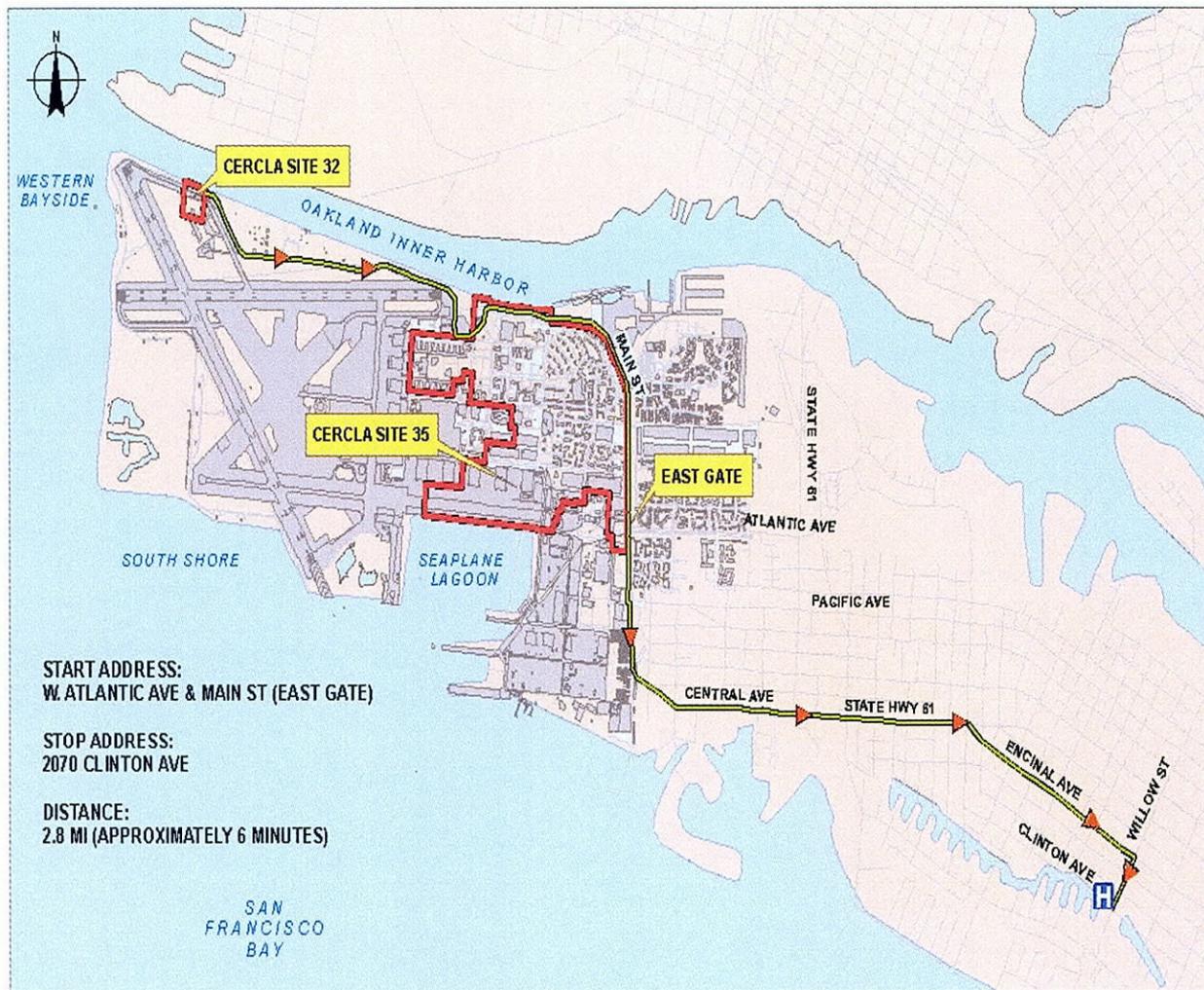
EMERGENCY INFORMATION

POST THIS PAGE ON-SITE EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Emergency Contact	Telephone No.
U.S. Coast Guard National Response Center	(800) 424-8802
California Poison Control System	(800) 222-1222
WorkCare	(800) 455-6155
Fire Department	911 or (510) 337-2100
Police Department	911 or (510) 337-8340
SulTech Personnel:	
Human Resource Development: Amy Clark	(626) 470-2516
Health and Safety Representative: Richard Ecord, CIH, CSP	(404) 225-5527
Navy Health and Safety Officer: David Brown	(619) 321-6722
Project Manager: Craig Hunter	(916) 853-4507
Field Project Manager: Doug Grant	(775) 448-9764
Site Safety Coordinator: Hannah Thompson	(415) 710-8467
Client Contact: Frances Fadullon, Navy Remedial Project Manager	(619) 532-0935
Subcontractors:	
Vironex	(925) 521-1490
Medical Emergency	
Hospital Name:	Alameda Hospital
Hospital Address:	2070 Clinton Ave. Alameda, CA
Hospital Telephone No.:	
Emergency –	911 or (510) 523-4357
General –	(510) 522-3700
Ambulance Telephone No.:	911 or (510) 523-4357
Route to Hospital: (see next page hospital route map)	
10) Head east along frontage road and exit the runway gate.	
11) LEFT (east) on W. Red Line Ave (0.3)	
12) RIGHT (south) on Pan Am Way St. (0.2)	
13) LEFT on W. Midway Ave. (0.4)	
14) RIGHT (south) on Main St. (0.6)	
15) RIGHT on Central Ave. (1.7)	
16) Continue on Encinal Ave (CA-61)	
17) Turn right on Chestnut St. (0.2)	
18) Turn left on Clinton Ave. (0.1)	

EMERGENCY INFORMATION (CONTINUED)

POST THIS PAGE ON-SITE HOSPITAL ROUTE MAP



Source: Modified from Figure 1 Site Location Map (SulTech 2007).

15.1 HEALTH AND SAFETY PERSONNEL AND PLAN ENFORCEMENT

This section describes responsibilities of project personnel, summarizes requirements for subcontractors and visitors who wish to enter IR sites 32 and 35, and discusses HASP enforcement.

15.1.1 Project Personnel

The following personnel and organizations are associated with planned activities at the site. The organizational structure will be reviewed and updated as necessary during the course of the project.

Name/Title	Responsibility	Telephone No.
Client Representative:		
Frances Fadullon	Navy Remedial Project Manager	(619) 532-0935
SulTech Personnel:		
Craig Hunter	Project Manager	(916) 853-4507
Richard Ecord, CIH	HSR	(404) 225-5527
Dave Brown	SulTech Navy Health and Safety Officer	(619) 321-6722
Doug Grant	Field Project Manager	(775) 448-9764
Hannah Thompson	Site Safety Coordinator (SSC)	(415) 710-8467
Subcontractor 1 Co. Name:		
Vironex	Drilling	(925) 521-1490

The SulTech project manager, field manager, SSC, and HSR will be responsible for implementation and enforcement of the provisions of this HASP. Their duties and the expectations for SulTech employees are described in the following sections.

15.1.1.1 Project Manager and Field Manager

The SulTech project manager (Craig Hunter) has ultimate responsibility for ensuring implementation of the requirements set forth in this HASP. Some of this responsibility may be achieved through delegation to site-dedicated personnel who report directly to the project manager. The project manager shall regularly confer with site personnel regarding safety and health compliance.

The SulTech field manager (Doug Grant) will oversee and direct field activities and has day-to-day responsibility for ensuring implementation of the HASP. Subcontractor compliance with the HASP shall be monitored by the field manager. The field manager will report directly to the project manager any health and safety-related issues.

15.1.1.2 Site Safety Coordinator

The SulTech SSC (Hannah Thompson) is appointed by the project manager and will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring the signing of the Daily Tailgate Safety Meeting Form and the Compliance Agreement (see Appendix A) by all personnel working on site. The SSC will have advanced field work experience and be familiar with health and safety requirements specific to the project. The SSC will also maintain the Daily Site Log (see Appendix A).

15.1.1.3 Health and Safety Representative

The SulTech HSR (Richard Ecord, CIH, CSP) is responsible for administration of the company health and safety program. The HSR will act in an advisory capacity to project managers and site personnel for project-specific health and safety issues. The SulTech project manager will establish a liaison between officers and representatives of the department of Navy and the HSR on matters relating to health and safety.

15.1.1.4 SulTech Employees

SulTech employees are expected to fully participate in implementing the site HASP by obtaining necessary training, attending site safety meetings, always wearing designated PPE, complying with site safety and health rules, and advising the SulTech SSC of health and safety concerns at the site.

15.1.1.5 Subcontractors

Subcontractor personnel directly contracted by SulTech at IR Sites 32 and 35 will be required to read and comply with all sections of this plan. All subcontractor personnel entering the site must sign the Compliance Agreement (see Appendix A). Subcontractor personnel must comply with all applicable 29 CFR §1910.120 training, fit testing, and medical surveillance requirements, as specified in the subcontractors site-specific health and safety plan and associated activity hazard analyses. Subcontractors are responsible for providing PPE required by this plan for their personnel (see Section 15.4.1, Protective Equipment and Clothing) and are directly responsible for the health and safety of their employees.

15.1.1.6 Visitors

All site visitors will be required to read the HASP and sign the Compliance Agreement (see Appendix A). Visitors will be expected to comply with relevant OSHA requirements. Visitors will also be expected to provide their own PPE required by the HASP. Visitors who have not met OSHA training, medical surveillance, and PPE requirements are not permitted to enter areas where exposure to hazardous materials is possible.

15.1.2 Health and Safety Plan Enforcement

HASP enforcement at IR sites 32 and 35 shall be rigorous. Violators of the HASP will be verbally notified upon first violation, and the violation will be noted by the SulTech SSC in a field logbook. Upon second violation, the violator will be notified in writing, and the SulTech project manager and the violator's supervisor will be notified. A third violation will result in a written notification and violator's eviction from the site. The written notification will be sent to human resources development and the HSR.

Personnel will be encouraged to report to the SSC any conditions or practices that they consider to be detrimental to their health or safety or those they believe are in violation of applicable health and safety standards. Such reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment are encouraged to stop work and bring the matter to the immediate attention of the SSC for resolution.

At least one copy of this HASP will be available to all site personnel at all times. Minor changes in HASP procedures will be discussed at the beginning of each work day by the SSC at the daily tailgate safety meeting. Significant plan revisions must be reviewed and approved by the HSR, and discussed project manager.

15.2 PLANNED ACTIVITIES

Field activities to be performed by SulTech during the soil and groundwater sampling and monitoring well installation events include the following tasks:

- Groundwater samples will be collected from five existing monitoring wells at IR Site 32. The groundwater samples will be analyzed for VOC.
- Groundwater will be collected from six direct push boring locations from AOC 1 within IR Site 35. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, such as dissolved gases, sulfide, iron II, MN II, pH, TDS, and TOC.
- Two soil samples will be collected from three soil boring locations (for total of six samples) from AOC 6 within IR Site 35. The soil samples will be analyzed for PCB.
- Three monitoring wells will be installed and developed at AOC 23 within IR Site 35. Groundwater samples will be collected from each of the three newly installed wells. The groundwater samples will be analyzed for VOCs, and monitored natural attenuation parameters as discussed above.
- Two composite samples will be collected from three soil borings in the center of Kollmann Circle (see Figure 5). The first composite sample will include samples at 2 feet from all three soil borings and the second composite sample will include samples

at 4 feet from all three soil borings. Additionally two composite samples will be collected from two soil borings on the west side of Kollmann Circle. The first composite sample will include samples at 2 feet from the two soil borings and the second composite sample will include samples at 4 feet from the two soil borings.

15.2.1 Site-Specific Hazard Evaluation

Field activities and physical features of the site may expose field personnel to a variety of hazards. This section provides information on potential hazards related to site activities and the nature of hazardous material impacts. Potential chemical and physical hazards related to site activities are discussed below.

15.2.2 Chemical Hazards

Chemicals that may be present at the site are listed in Table 2. These chemicals pose various physical, chemical, and toxicological hazards. Potential routes of exposure include dermal (skin) contact, inhalation, and ingestion. The chemicals may also contaminate equipment, vehicles, instruments, and personnel. The overall health threat from exposure to these chemicals is uncertain because (1) actual concentrations that personnel could be exposed to cannot be predicted, (2) the actual duration of exposure is unknown, and (3) the effects of low-level exposure to a mixture of chemicals cannot be predicted. However, SulTech believes that the potential for high-level exposure is limited.

Specific information on potential chemical hazards at the site is provided in Table 2, including exposure limits, anticipated exposure routes, and toxic characteristics.

The Material Safety Data Sheets (MSDS) included in Attachment 2 to this APP/HASP summarize health and safety information for hazardous materials that will be brought to the site, such as laboratory reagents, decontamination solutions, and sample preservatives. These materials are as follows:

- Alconox
- Hydrochloric acid (sample container preservative)
- Sulfuric acid (sample container preservative)

15.2.3 Physical Hazards

Physical hazards associated with site activities present a potential threat to on-site personnel. Dangers are posed by, but not limited to, heavy equipment, utility and power lines, slippery surfaces, unseen obstacles, noise, heat, cold, and poor illumination.

Injuries resulting from physical hazards can be avoided by using SWPs and employing caution when working with machinery. Specific SWPs applicable to IR Sites 32 and 35 are listed in Section 15.7.5 and are provided in Appendix C of this APP/HASP. To ensure a safe workplace, the SSC will conduct and document regular safety inspections and will make sure that all SulTech workers and visitors are informed of any potential physical hazards related to the site. Physical hazards that have been identified at this site include the following:

- Vehicular traffic
- Uneven ground or pavement
- Lifting of heavy equipment
- Pinch points
- Moving parts on machinery (such as auger drill rig)
- Heat stress or cold stress

In terms of heat stress, SulTech employees will have drinking water accessible to them in their field vehicles. Additionally, in terms of basic sanitation provisions, restrooms will be available in nearby buildings.

15.2.4 Biological Hazards

Many of the planned site activities will occur outside in areas that are not improved or maintained. As a result, the potential for encountering natural hazards exists. Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. The following information is provided as a precaution to help recognize and avoid these types of hazards.

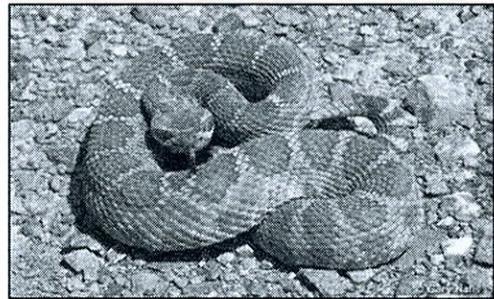
The on-site SSC shall screen the area for biological hazards during the initial site visit and shall discuss any problems with Navy personnel. Multiple biological hazards are present at Alameda Point. The most common hazards anticipated are discussed below. Refer to SWP 6-17, "Biohazards," for additional information (see Appendix C).

15.2.4.1 Snakes

Several types of poisonous snakes are indigenous to this region. One measure to prevent snake bites is for the field team to have a basic understanding of these reptiles as summarized below. The following snakes may be encountered at Alameda Point.

Northern Pacific Rattlesnake – Venomous, venom potentially dangerous to humans

Size – Adults 15-36 inches long, (38-91 centimeters [cm]) sometimes up to 48 inches (121 cm) with 60 inches (151 cm) being the longest.



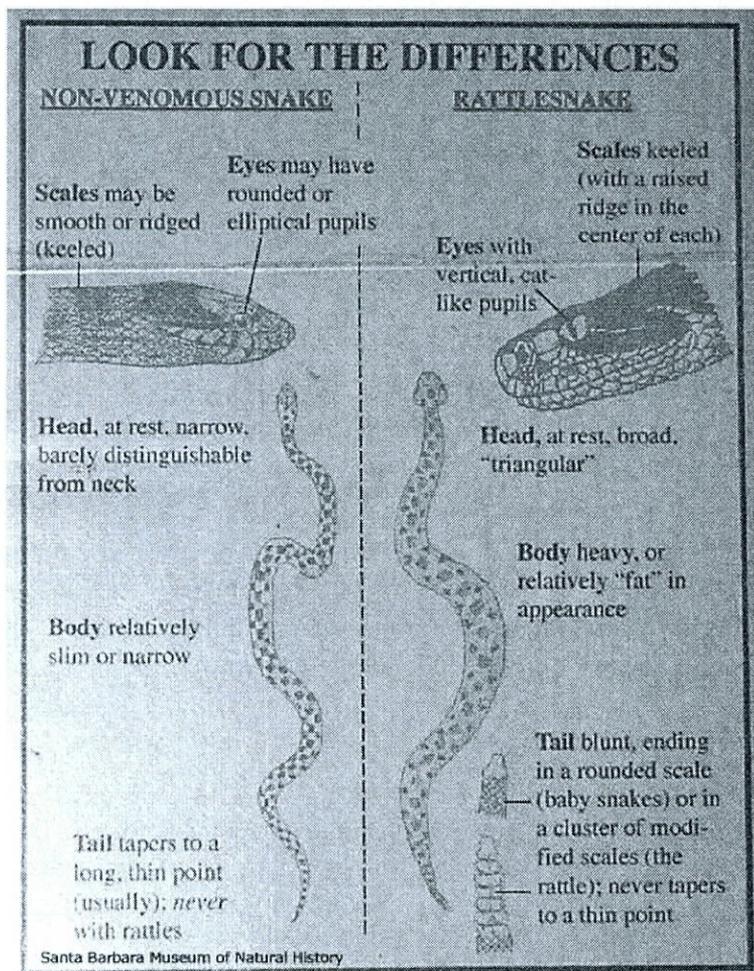
Appearance – A heavy-bodied, venomous pit viper, with a thin neck and a large triangular head. Pupils are vertical and cat-like. A rattle on the end of the tail, consisting of loose interlocking segments. A new rattle segment is added each time the skin is shed. Heat sensing pits on the sides of the head help the snake to locate prey by their warmth. Long, hollow, movable fangs connected to venom glands inject a very toxic venom which quickly immobilizes prey. The snake can control the amount of venom injected and the fangs are replaced if broken. Bites on humans are potentially dangerous without immediate medical treatment. Even a dead snake can bite and inject venom if the jaws reflexively open when they are touched.

Behavior – The snake is primarily nocturnal and crepuscular during periods of excessive daytime heat, but also active during daylight when the temperature is more moderate. Not active during cooler periods in winter. In colder areas, it is known to den in burrows, caves, and rock crevices, sometimes in large numbers, and sometimes with other snake species.

Prey is found while the snake is actively moving, or by ambush, where the snake waits near lizard or rodent trails, striking at and releasing passing prey. The snake then follows the trail of the envenomated animal and swallows it whole.

When alarmed, a rattlesnake shakes its tail back and forth. The movement rubs the rattle segments together producing a buzzing sound which serves as a warning. Juveniles are born with only a silent button at the end of the tail.

Habitat – Inhabits rocky hillsides, talus slopes and outcrops, rocky stream courses, rocky areas in

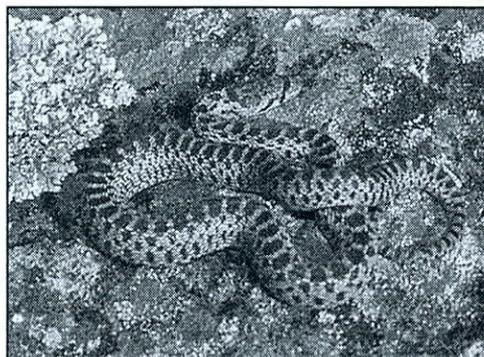


grasslands, mixed woodlands, montane forests, pinyon juniper, sagebrush. Sea level to around 11,000 feet above mean sea level.

The chart above describes how to distinguish between poisonous and non-poisonous snakes.

Pacific Gophersnake – Nonvenomous, considered harmless to humans

Size – Adults of this species can be 2.5-7 feet long (76-213 cm) but most of this subspecies are from 4.5-5 feet (137-152 cm). Hatchlings are fairly long, and may exceed 20 inches (51 cm) in length.

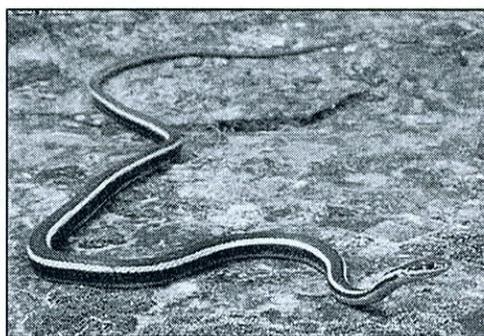


Appearance – A large snake with heavily keeled scales, a narrow head that is slightly wider than the neck, and a protruding rostral scale on the tip of the snout. Ground color is straw or tan, with large dark chocolate blotches or saddles along the back and smaller gray spots on the sides. The back of the neck is dark brown. A striped morph is also found, especially in Solano County near Davis. The underside is cream to yellowish with dark spots. Often there is a reddish color on the top, especially near the tail.

Alameda Striped Racer (*Alameda Whipsnake*) – Nonvenomous, considered harmless to humans

Size – Adults are generally 3-4 feet (91-122 cm) long and occasionally reach 5 feet (152 cm). Hatchlings are about 13 inches (33 cm) long.

Appearance – A fast-moving snake with a long thin body and tail, a broad elongated head, large eyes, a slender neck, and smooth scales. Dark brown to black with a wide orange solid stripe on each side extending from the back of the eye to or beyond the vent. The stripes are “broad, 1 and 2 half-scale rows wide.” The underside is cream tapering to orange or pink toward the tail.

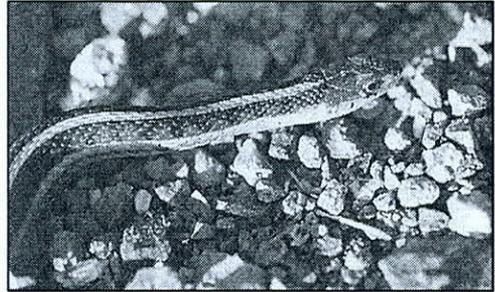


Behavior – Diurnal, often seen actively foraging in the daytime with head and forward part of the body held up off the ground searching for prey with its acute vision. Climbs vegetation and seeks shelter in burrows, rocks, or woody debris. Very fast-moving and alert, quickly fleeing when threatened, this snake is difficult to get close to. Like most *Masticophis* this snake will strike repeatedly and bite viciously when threatened or handled.

California Red-Sided Gartersnake – Nonvenomous but has toxins in its saliva, but its bite is considered harmless to humans.

Size – Adults of this species measure 18-55 inches (46-140 cm) in length, but the average size is under 36 inches (91 cm).

Appearance – A medium-sized snake with a head barely wider than the neck and keeled dorsal scales. Ground color is dark olive to black. The dorsal stripe is wide and well-defined, and yellowish to bluish in color. Light stripes along the lower sides are not very distinct, often blending in with the color of the belly. There are red bars alternating with the ground color along the sides above the lateral stripes. The head is red or orange-colored. The underside is bluish gray, sometimes very blue north of the San Francisco Bay area and may have some dark coloring. The eyes are relatively large compared with other gartersnake species.



Behavior – Primarily active during daylight. A good swimmer and will often escape into water when threatened. When first handled, typical of gartersnakes, this snake often releases cloacal contents and musk, and strikes. The species *T. sirtalis* is capable of activity at lower temperatures than other species of North American snake.

Range – Ranges from Humboldt County south, along the coast ranges (excluding much of the San Francisco peninsula) and east of the San Francisco Bay to just below the Monterey Bay.

Diablo Range Gartersnake – Nonvenomous, considered harmless to humans

Size – *Thamnophis atratus* is 18-40 inches (46-102 cm) long. Most snakes encountered are generally 18-28 inches (46-71 cm) long. Neonates are 7-10 inches (18-25 cm).

Appearance – A medium-sized slender snake with a head barely wider than the neck and keeled dorsal scales. Ground color is gray, brown, or black. A distinct yellow or orange stripe is on the back, and a light stripe is along the lower part of each side on the 2nd and 3rd scale rows. There may be small alternating dark spots on the sides, most noticeable on juveniles. The throat is white or yellow, sometimes bright yellow. The underside is bluish or greenish, sometimes with pink or yellow marks.



Habitat – Creeks, streams, small lakes and ponds, in woodland, brush and forest, and grassy ecotones. Seems to prefer shallow rocky creeks and streams. When found in muddy ponds, rocky outcrops usually are nearby.

Snake Avoidance Measures

Avoidance is the first line of defense. If you see them, do not harass them, attempt to capture, move, or otherwise disturb them. Leave them alone!

- Do not pick up ground cover, as this is a potential nesting area.
- Stick to well-used trails and wear over-the-ankle boots and loose-fitting long pants. Avoid tall grass, weeds, and heavy underbrush which snakes commonly frequent. If these areas cannot be avoided, wear snake chaps.
- Be observant in open, sunny areas, as snakes are cold-blooded and need to “sun themselves” to regulate their body temperature.
- Do not put your hands where you cannot see.
- Step on logs and rocks, never over them, and be especially careful when climbing rocks. Snakes will also crawl along buildings and doorways as the building or logs offer protection on one side. Examine the area carefully before entering buildings (stepping over doorway threshold plates) not regularly used and maintained.

If a rattlesnake is encountered, personnel should slowly and quietly back away from the snake and should then inform all personnel at the site of its location. Personnel shall not attempt to move or kill a snake because certain species of rattlesnake are protected under state and federal laws.

Snakebite Control Measures

Initial efforts will be directed to avoid, where possible, nesting and territorial areas. However, should field personnel come in contact with these animals and receive a bite, the following actions are necessary:

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering medical aid to provide prompt and correct antidotes.
- Immobilize the bite victim to the extent possible. Physical exertion can mobilize the toxins (if poisonous varieties) from the bite point systemically through the body.
- The venom should be wiped off the skin because it will affect the skin.
- Apply a pressure wrap (for extremities), just above and over the bite area using whatever is available (an article of clothing)— with a couple wraps of the pressure wrap in place over the bite area to limit movement and restrict toxins from leaving the site of the bite.
- Seek medical attention immediately, and notify the SSC and project manager.

15.2.4.2 Insects and Spiders

The avoidance measures listed above for snakes (Section 15.2.4.1) will also be employed for other natural hazards such as bees, wasps, hornets, mosquitoes, fire ants, ticks and spiders, etc. Before initial assignment on the project, personnel with known allergic responses to insect stings shall make their field team leader and SSC aware of this condition. These personnel shall also carry an antidote kit if so advised by their physician. The SSC shall confirm that the antidote kit is accessible and shall notify the emergency medical service providers in the event of any incident.

The principle hazards of concern associated with these biological hazards are as follows:

Insect Bites and Stings

Insect bites and stings may be difficult to control. However, in an effort to minimize this hazard, the following control measures will be implemented where possible:

- Commercially available bug sprays and repellents will be used whenever possible – Pesticides analytical screening includes chlordane, endrin, lindane, methoxychlor, toxaphene, and heptachlor. Products such as DEET (N, N-diethyl-m-toluamide) should not be applied directly to the skin due to potential irritation. This product, when permitted for use, should be applied over clothing articles.
- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn. This will also aid in insect control by providing a barrier between the field person and the insects and will aid in visual recognition of crawling insects against the lighter background. Pant legs should be secured to the work-boots using duct tape to prevent access by ticks.
- Clothing/limited body checks for ticks and other crawling insects should be conducted upon exiting heavily vegetated areas. SulTech personnel, visitors, and subcontractors should perform a more detailed check of their bodies when showering in the evening. Ticks prefer moist areas of the body and will migrate to those locations.

Bees, Wasps and Hornets

Bees, hornets, yellow jackets, wasps, and mosquitoes can sting or bite. Though irritating and uncomfortable, in most cases insect bites or stings are harmless. However, insect bites can cause allergic reactions in some people.

- If stung, remove the stinger by scraping a card across the wound (do not squeeze).
- Wash the area with warm, soapy water.

- Apply a cold compress to control swelling.
- Take aspirin for pain and an antihistamine, as needed, for minor itching and swelling.
- If you experience a body-wide reaction, severe local swelling, especially around the face or neck, or have difficulty breathing, call 911 immediately.
- The specialists at the Poison Center are available to help if a bite or sting occurs.

Fire Ants

Fire ants present a unique situation when working outdoor in many states including California. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The bite injects venom that causes an extreme burning sensation. Pustules form, and can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock, and in extreme cases, unconsciousness and death.

Tick and Mosquito Transmitted Illnesses and Diseases

Ticks are normally found in wooded and bushy areas. There are no wooded and bushy areas at either IR Site 32 or at IR Site 35.

Mosquitoes have also been identified in the transmission of Lyme's disease. In addition, mosquitoes have been identified in the transmission of West Nile Virus (WNV). WNV is a potentially serious illness. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. The easiest and best way to avoid WNV is to prevent mosquito bites. When you are outdoors, use insect repellent containing a U.S. Environmental Protection Agency (EPA)-registered active ingredient (DEET, picaridin [KBR 3023], or oil of lemon eucalyptus [PMD]). Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours. Get rid of mosquito breeding sites by emptying standing water from buckets and barrels. People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito.

- Approximately 80 percent of people (about 4 out of 5) who are infected with WNV will not show any symptoms at all.
- Up to 20 percent of the people who become infected have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach, and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks.
- About 1 in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness, and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

There is no specific treatment for WNV infection. In cases with milder symptoms, people experience symptoms such as fever and aches that pass on their own, although even healthy people have become sick for several weeks. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care. Milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately.

Black Widow

Black widow spiders generally live in trash, closets, attics, woodpiles, garages, and other dark places. They are found throughout California. Only the female spider is dangerous to humans.

The female black widow spider has a round, glossy black abdomen one-half inch in diameter with an orange-red hourglass marking her belly.

Her painful bite results in redness and warmth at the site as well as muscle cramps, twitching, rigid abdomen, difficulty breathing, weakness, headache, nausea, and vomiting.

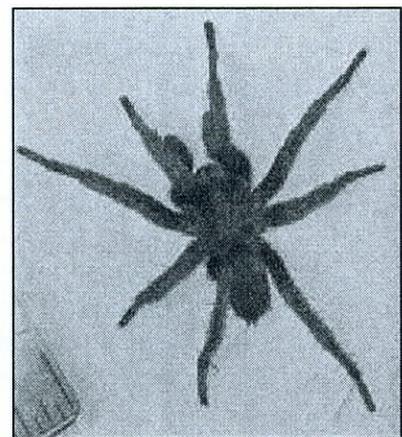


The male black widow spider is solid in color, and his bite is not venomous.

If bitten, wash the area with warm, soapy water and call the Poison Center immediately

Wolf Spider

Wolf spiders are commonly found in California. They are large hairy spiders, up to 3 to 4 inches across. They are a mottled gray-brown color, which helps them hide in sand, gravel, leaves, and other debris. Female wolf spiders carry their young on their backs. Except for one group, wolf spiders do not spin webs. They tend to burrow into the earth and hide. They are aggressive, come after their prey, and are fast runners. Because of their impressive size and aggressiveness, wolf spiders can easily incite panic.



- Bites from a wolf spider can cause pain, redness, and swelling.
- The large jaws/fangs can cause a tear in the skin as they bite.

- Swollen lymph glands may develop.
- The skin area at the bite may turn black.
- Swelling and pain can last up to 10 days.

15.2.4.3 Vermin

Rats, mice, squirrels, and rabbits are carriers of disease. The most serious diseases associated with these species include rabies, plague, and Hantavirus. Where vermin are identified in work areas, the SSC shall be immediately notified. Vermin bites shall be immediately reported, and medical care shall be obtained.

Currently, cases of Hantavirus have been reported in 26 states, including all regions of the United States, as well as parts of Canada. Cases of Hantavirus have been associated with activities that bring humans into contact with rodent excreta (droppings or urine) and saliva. Activities that may bring humans into contact with the etiologic agents causing infection include the following situations:

- Working in areas of field crops
- Occupying previously vacant cabins, buildings, or outhouses
- Cleaning outbuildings
- Disturbing rodent-infested areas
- Visiting areas where rodent populations have increased
- Entering into crawlspaces or other potentially rodent-infested areas

This disease may be transmitted through broken skin, contact with conjunctivae, ingestion of contaminated food or water, or inhalation of aerosols. Humans may be infected when infective saliva or excreta are inhaled as aerosols produced directly from rodents. The disease may also be transmitted when fresh or dried materials contaminated by rodent excreta are disturbed. Personnel should not perform work in abandoned buildings or enclosed areas contaminated with rodent droppings, debris, or nesting sites. The HSR should be contacted for further guidance.

Workers shall be advised that if a fever or respiratory illness develops within 45 days of the potential exposure, they should seek medical attention and inform the physician of potential Hantavirus exposure.

15.2.4.4 Wild (Feral) Dogs

Wild dogs may attack and may also carry rabies. Their presence shall be promptly reported to the SSC. Use of dog repellent is authorized for personnel who receive training in its safe use.

15.3 TRAINING REQUIREMENTS

All on-site personnel who may be exposed to hazardous conditions, including SulTech and subcontractor personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR § 1910.120, "Hazardous Waste Operations and Emergency Response." All personnel and visitors entering the site will be required to review this HASP and sign the Compliance Agreement (see Appendix A), and site workers will be required to sign the Daily Tailgate Safety Meeting Form (see Appendix A).

Before on-site activities begin, the SulTech SSC will present a briefing for all personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the SSC and the designated alternate
- Site history
- Work tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including type or types of respiratory protection to be used for work tasks
- Training requirements
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring upgrade or downgrade of level of protection
- Site control measures, including site communications, control zones, and SWPs
- Decontamination procedures
- Emergency communication signals and codes
- Environmental accident emergency procedures (in case contamination spreads outside the exclusion zone)

- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)
- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing.

Issues that arise during implementation of on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins and will be documented in the Daily Tailgate Safety Meeting Form (see Appendix A). Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

15.4 PERSONAL PROTECTION REQUIREMENTS

The levels of personal protection to be used for work tasks at the IR Site 32 and 35 have been selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

15.4.1 Protective Equipment and Clothing

Personnel will wear protective equipment when (1) site activities involve known or suspected atmospheric contamination; (2) site activities may generate vapors, gases, or particulates; or (3) direct contact with hazardous materials may occur. Based on the anticipated hazard level, personnel will initially perform field tasks in Level D protection. If site conditions or the results of air monitoring performed during on-site activities warrant a higher level of protection, all field personnel will withdraw from the site, immediately notify the SulTech SSC, and wait for further instructions. Descriptions of equipment and clothing required for Level D, Level C, and Level B protection are provided below.

- Level D
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)(optional)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (such as latex or vinyl)(optional)

- Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots (optional)
 - Safety glasses or goggles
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A weighted scale)
- Level C
 - Coveralls or work clothes, if applicable
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other), if applicable
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - Full- or half-face, air-purifying respirator with NIOSH-approved cartridges to protect against organic vapors, dust, fumes, and mists (cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment [Form RP-2] in Appendix B)
 - Safety glasses or goggles (with a half-face respirator only)
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A weighted scale)
- Level B
 - Chemical-resistant clothing (such as Tyvek® or Saranex® coveralls)
 - Outer gloves (neoprene, nitrile, or other)
 - Disposable inner gloves (latex or vinyl)
 - Boots with steel-toe protection and steel shanks
 - Disposable boot covers or chemical-resistant outer boots
 - NIOSH-approved, pressure-demand airline respirator with a 5 minute escape cylinder or SCBA
 - Hard hat (face shield optional)
 - Hearing protection (for areas with a noise level exceeding 85 decibels on the A weighted scale)

15.4.2 Reassessment of Protection Levels

PPE levels shall be upgraded or may be downgraded based on a change in site conditions or investigation findings. When a significant change in site conditions occurs, hazards will be reassessed. Some indicators of the need for reassessment are as follows:

- Commencement of a new work phase, such as the start of a significantly different sampling activity or work that begins on a different portion of the site
- A change in job tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations limiting the effectiveness of PPE
- Discovery of contaminants other than those previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 1)
- A change in work scope that affects the degree of contact with contaminated media

15.4.3 Limitations of Protective Clothing

PPE clothing ensembles designated for use during site activities have been selected to provide protection against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing provide protection against all types of chemicals. Permeation of a given chemical through PPE depends on the contaminant concentration, environmental conditions, physical condition of the protective garment, and resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

All site personnel will use the procedures presented below to obtain optimum performance from PPE.

- When chemical-protective coveralls become contaminated, don a new, clean garment after each rest break or at the beginning of each shift
- Inspect all clothing, gloves, and boots both before and during use for the following:
 - Imperfect seams
 - Non-uniform coatings

- Tears
- Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
 - Swelling
 - Discoloration
 - Stiffness
 - Brittleness
 - Cracks
 - Any sign of puncture
 - Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above must be discarded.

15.4.4 Respirator Selection, Use, and Maintenance

SulTech and subcontractor personnel will not be using respiratory protection for any scheduled activities at IR Sites 32 and 35.

15.5 MEDICAL SURVEILLANCE

The following sections describe SulTech's medical surveillance program, including health monitoring requirements, site-specific medical monitoring, and medical support and follow-up requirements. Procedures documented in these sections will be followed for all activities at IR sites 32 and 35, and Kollmann Circle. Additional requirements are defined in the SulTech "Health and Safety Manual."

15.5.1 Health Monitoring Requirements

All SulTech and subcontractor personnel involved in on-site activities at IR Sites 32 and 35 must participate in a health monitoring program as required by 29 CFR §1910.120(f). SulTech has established a health monitoring program with WorkCare, Inc., of Orange, California. The program is overseen directly by a board-certified, occupational medicine physician. Under this program, SulTech personnel receive baseline and annual or biennial physical examinations consisting of the following:

- Complete medical and work history

- Physical examination
- Vision screening
- Audiometric screening
- Pulmonary function test
- Resting electrocardiogram
- Chest x-ray (required once every 3 years)
- Blood chemistry, including hematology and serum
- Urinalysis

For each employee, SulTech receives a copy of the examining physician's written opinion after post-examination laboratory tests have been completed; the SulTech employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR §1910.120[f][7]):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)
- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors must have health monitoring programs conducted by their own clinics in compliance with 29 CFR §1910.120(f). Any visitor or observer at the site will be required to provide records in compliance with 29 CFR §1910.120(f) before entering the site.

15.5.2 Site-Specific Medical Monitoring

For activities at IR sites 32 and 35, there are no site-specific medical monitoring requirements for the site.

15.5.3 Medical Support and Follow-Up Requirements

As a follow-up to an injury requiring care beyond basic first aid or to possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Such injuries and exposures must be reported to the SSC and HSR. Depending on the type of injury or exposure, follow-up testing, if required, must be performed within 24 to 48 hours of the incident. It will be the responsibility of the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects. The Accident and Illness Investigation Report form (see Appendix A) must be completed by the SulTech Project Manager in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining the recordability of the incident and for inclusion in SulTech's medical surveillance records.

15.6 ENVIRONMENTAL MONITORING AND SAMPLING

Environmental monitoring or sampling will be conducted to assess personnel exposure levels as well as site or ambient conditions and to determine appropriate levels of PPE for work tasks. The following sections discuss initial and background air monitoring, personal monitoring, ambient air monitoring, monitoring parameters and devices, use and maintenance of survey equipment, thermal stress monitoring, and noise monitoring. Site-specific air monitoring requirements and action levels are provided in Table 1.

15.6.1 Initial and Background Air Monitoring

If appropriate, initial air monitoring of the work area will be performed before a work task begins. This monitoring will be performed using real-time field survey instrumentation. Air will also be monitored at the beginning of each workday to identify any potentially hazardous situation that might have developed during off-shift periods. For IR sites 32 and 35, initial and background air monitoring will be completed for the chemical compounds presented in Table 2.

Operations at the site may result in variable background levels of airborne compounds. Airborne compounds may be released from vehicles, blowing dust, material transfers, and so on. These sources can complicate evaluation of contaminant emissions during project tasks. Therefore, several upwind and pre-work measurements will be taken to assess contributions to airborne contamination by other potential sources.

15.6.2 Personal Monitoring

The employees working closest to a source of contamination have the highest likelihood of exposure to airborne contaminant concentrations that may exceed established exposure limits. Therefore, selective monitoring of the workers who are closest to a source of contaminant generation will be conducted during site activities. Personal monitoring shall be conducted in

the breathing zone and, if a worker is wearing respiratory protective equipment, outside the face piece.

15.6.3 Ambient Air Monitoring

Most tasks will require monitoring of the general work area or ambient site conditions. Ambient monitoring will generally be conducted using direct-reading survey instrumentation, compound-specific instruments, or detector tubes.

Initial ambient air monitoring will be performed as a minimum requirement when any of the situations listed below arise.

- Work begins on a different portion of the site
- Contaminants other than those previously identified are encountered
- A different type of operation is initiated (for example, well installation is initiated after drilling activities)
- Workers handle leaking containers or work in areas with obvious liquid contamination (for example, spill or lagoon areas)
- Obvious lithologic changes are noticed during drilling activities
- Workers experience physical difficulties

Periodic ambient air monitoring will be performed at the frequency listed in Table 2.

15.6.4 Monitoring Parameters and Devices

The following sections below briefly describe the use and limitations of instruments used to monitor for organic vapors, combustible atmospheres, percent oxygen, external exposure to radiation, and particulates. Site-specific air monitoring requirements and action levels are listed in Table 2.

All monitors will be calibrated in accordance with manufacturer recommendations and standard industrial hygiene practice before and after each period of use. Calibration results along with air monitoring data will be recorded in the field logbook.

15.6.4.1 Organic Vapors

A direct-reading organic vapor monitor, such as a flame ionization detector (FID) or photo-ionization detector (PID), will be used to determine the presence of VOCs. Table 2 specifies the

instrument that will be used for the project. The concentrations of individual VOCs of concern cannot usually be determined using the instrument because the detector responds to the total VOC mixture.

Known Chemical Names

The known VOCs at IR Sites 32 and 35 include: chlorobenzene, toluene, 1,2-Dichloroethylene (1,2-DCE), TCE, and Vinyl Chloride. Air monitoring will be conducted using a PID.

Combustible Atmospheres

Due to the nature of the work at IR sites 32 and 35, no areas exist where SulTech employees are expected to be exposed to combustible atmospheres, thus no air monitoring for combustible atmospheres will be conducted.

Percent Oxygen

Due to the nature of the work at IR Sites 32 and 35, no areas exist where SulTech employees are expected to be exposed to oxygen-deficient atmospheres, thus no air monitoring for percent oxygen will be conducted.

External Exposure to Radiation

No external radiological hazards are known to exist at IR Sites 32 and 35, thus monitoring for radiological exposure will not be conducted.

Particulates

No particulate-generating activities are planned at IR sites 32 and 35 or expected to be occurring while SulTech personnel are on-site, thus air monitoring for particulates will not be conducted.

15.6.5 Use and Maintenance of Survey Equipment

All personnel using field survey equipment must have training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by individuals familiar with the devices before their use on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. The equipment maintenance logbook for each instrument will be kept in that instrument's case. For rented monitoring equipment, repairs and maintenance will be conducted by the rental company. Results of routine calibration will be recorded in the field logbook.

Air monitoring equipment (such as combustible gas indicators, oxygen meters, and PIDs) will be calibrated before work begins. Only basic maintenance (such as changing batteries) will be performed by on-site personnel. Any additional maintenance or repairs will be performed by a trained service technician.

15.6.6 Thermal Stress Monitoring

Heat stress and cold stress are common and serious threats at hazardous waste sites. SWPs 6-15 and 6-16 discuss heat and cold stress, respectively, and include monitoring methods appropriate for the season and location of work (see Appendix C). Physiological monitoring will be conducted if ambient temperatures reach 70 degrees Fahrenheit or above and site workers are required to wear semi-permeable or impermeable protective clothing.

15.6.7 Noise Monitoring

In most cases, high noise levels at a work site are caused by heavy equipment, such as drill rigs and backhoes, or sources associated with the work site, such as factory equipment and vehicles. When noise levels at IR sites 32 and 35 are suspected to equal or exceed an 8-hour time-weighted average (TWA) of 85 decibels on an A-weighted scale in slow response mode (85 dBA), the SulTech SSC will evaluate the work area to characterize the noise source and exposure levels. A sound level meter may be used for the evaluation but a noise dosimeter is recommended for documenting full-shift noise exposures. If neither instrument is available, the SSC may use a simple rule-of-thumb test to determine whether noise levels exceed 85 dBA. The test requires the SSC to determine how loud he or she must speak to be heard at an arm's length from another person. If the SSC must raise his or her voice to be heard, the average noise level likely exceeds 85 dBA.

If employees are exposed to noise levels that exceed the action level of 85 dBA, hearing protection must be worn. The protectors will be ear plugs or muffs that must provide sufficient attenuation to limit noise exposure to less than 85 dBA. The SSC will supervise use of hearing protectors at the work site as necessary. Table 2 lists the monitoring device and action levels to be used.

15.7 SITE CONTROL

Site control is an essential component in HASP implementation. The following sections discuss measures and procedures for site control, such as on-site communications, site control zones, site access control, site safety inspections, and SWPs.

15.7.1 On-Site Communications

Successful communication between field teams and personnel in the support zone is essential. In non-combustible atmospheres, the following communication systems will be available during site activities:

- Cellular telephones
- Compressed air horn

The hand signals listed below will be used by site personnel in emergency situations, in combustible atmospheres, or when verbal communication is difficult.

<u>Signal</u>	<u>Definition</u>
Hands clutching throat	Out of air or cannot breathe
Hands on top of head	Need assistance
Thumbs up	Okay, I am all right, or I understand
Thumbs down	No or negative
Arms waving upright	Send backup support
Gripping partner's wrist	Exit area immediately

15.7.2 Site Control Zones

To control the spread of contamination and employee exposures to chemical and physical hazards, on-site work areas may be divided into an exclusion zone, a contamination reduction zone (CRZ), and a support zone. Access to the exclusion zone and CRZ will be restricted to authorized personnel. Any visitors to these areas must present proper identification and be authorized to be on site. The SSC will identify work areas that visitors or personnel are authorized to enter and will enforce site control measures.

The following sections describe the exclusion zone, the CRZ, and the support zone as well as procedures to be followed in each.

15.7.2.1 Zone 1: Exclusion Zone

An exclusion zone includes areas where contamination is either known or likely to be present or, because of work activity, has the potential to cause harm to personnel. Unless specified in Section 15.7.2, the perimeter of the exclusion zone and an appropriate radius around work task areas will be demarcated by a physical barrier, such as barricade tape or traffic cones, to restrict access. A daily roster with the date of each person's entrance into the exclusion zone; the person's name, signature, and organization; and the time of entry and exit will be kept for all

personnel working in the zone. Visitors will not be permitted to enter the exclusion zone without proper qualifications, equipment, and SSC authorization. Work tasks that may require establishment of an exclusion zone include the following:

- Groundwater samples will be collected from five existing monitoring wells at IR Site 32. The groundwater samples will be analyzed for VOCs.
- Groundwater will be collected from six direct push boring locations from AOC 1 within IR Site 35. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, such as dissolved gases, sulfide, iron II, MN II, pH, TDS, and TOC.
- Two soil samples will be collected from three soil boring locations (for total of six samples) from AOC 6 within IR Site 35. The soil samples will be analyzed for PCBs.
- Three monitoring wells will be installed and developed at AOC 23 within IR Site 35. Groundwater samples will be collected from each of the three newly installed wells. The groundwater samples will be analyzed for VOCs and monitored natural attenuation parameters, as discussed above.

15.7.2.2 Zone 2: Contamination Reduction Zone

A formally established CRZ is not required for IR sites 32 and 35. The CRZ will contain facilities to decontaminate personnel and portable equipment. A steam-cleaning area for decontamination of heavy equipment and vehicles may be established at a location readily accessible from work areas. Equipment decontamination procedures are described in Section 15.8. Visitors will not be permitted to enter the decontamination zone without proper qualifications and SSC authorization.

15.7.2.3 Zone 3: Support Zone

A support zone may consist of any uncontaminated and non-hazardous part of the site. The support zone should be situated in an area generally upwind of any exclusion zone whenever possible. Site visitors not meeting training, medical surveillance, and PPE requirements must stay in the support zone.

15.7.3 Site Access Control

The study area at IR sites 32 and 35 are bounded by the Oakland Inner Harbor on the north side. Access to the IR site 32 is controlled by surrounding fencing with a restricted entrance gate. Access to IR site 35 is not controlled; signs will be posted at IR Site 35 stating that visitors are not allowed near the work area.

15.7.4 Site Safety Inspections

Periodic site safety inspections shall be conducted by the SulTech SSC to ensure safe work areas and compliance with this HASP. Results of the site safety inspections will be recorded in the field logbook or on a Field Audit Checklist (see Appendix A).

15.7.5 Safe Work Practices

Various SWPs are applicable to IR sites 32 and 35. These SWPs are included in Appendix C to this APP/HASP. SWPs denoted with a check-mark apply to work performed at IR sites 32 and 35:

- SWP 6-1 General Safe Work Practices
- SWP 6-2 Control of Hazardous Energy Sources (Lockout/Tagout)
- SWP 6-3 Safe Drilling Practices
- SWP 6-4 Excavation Practices
- SWP 6-5 Working Over or Near Water
- SWP-6-6 Hot Work Practices
- SWP 6-7 Special Site Hazards
- SWP 6-8 Safe Electrical Work Practices
- SWP 6-9 Fall Protection Practices
- SWP 6-10 Portable Ladder Safety
- SWP 6-11 Drum and Container Handling Practices
- SWP 6-12 Shipping Dangerous Goods
- SWP 6-13 Flammable Hazards and Ignition Sources
- SWP 6-14 Spill and Discharge Control Practices
- SWP 6-15 Heat Stress
- SWP 6-16 Cold Stress
- SWP 6-17 Biohazards
- SWP 6-18 Underground Storage Tank Removal Practices
- SWP 6-19 Working Safely with Hydrazine
- SWP 6-20 Working Safely with Benzene
- SWP 6-21 Radiation Safety Practices
- SWP 6-22 Hydrographic Data Collection
- SWP 6-23 Permit-Required Confined Space

- SWP 6-24 Non-Permit-Required Confined Space
- SWP 6-25 Oil and Petroleum Distillate Fuel Product Hazards
- SWP 6-26 Use of Heavy Equipment
- SWP 6-27 Respirator Cleaning Procedures
- SWP 6-28 Safe Work Practices for Use of Air Purifying Respirators
- SWP 6-29 Respirator Qualitative Fit Testing Procedures
- SWP 6-32 Safe Work Practice for Sampling Anthrax Contamination in Buildings

15.8 DECONTAMINATION

Decontamination is the process of removing or neutralizing contaminants on personnel or equipment. When properly conducted, decontamination procedures protect workers from contaminants that may have accumulated on PPE, tools, and other equipment. Proper decontamination also prevents transport of potentially harmful materials to uncontaminated areas. Personnel and equipment decontamination procedures are described in the following sections.

15.8.1 Personnel Decontamination

When appropriate to the chemical hazards present at IR sites 32 and 35, personnel decontamination will be limited by using disposable PPE.

Used, disposable PPE will be collected in sealable containers and will be disposed of in accordance with procedures described in the sampling and analysis plan (SulTech 2007). Personnel decontamination procedures may be modified as necessary while on site.

15.8.2 Equipment Decontamination

Decontamination of all drilling, sampling, and field monitoring equipment used during site activities will be required. Decontamination of on-site heavy equipment and sampling equipment will follow procedures defined in the site's sampling and analysis plan (SulTech 2007).

15.8.2.1 Heavy Equipment

Heavy equipment, such as drilling and excavating vehicles, will be decontaminated at a designated location in the decontamination zone. Gross decontamination will be performed using a cleaning brush to loosen debris, and steam-cleaning with a high-pressure steam spray. If equipment still has soil on it after steam-cleaning, an appropriate cleaning brush will be used to further loosen debris, and the equipment will be steam-cleaned again. All wastewater generated

from decontamination activities will be collected and stored in 55-gallon drums until proper disposal is arranged.

15.8.2.2 Sampling Equipment

Sampling equipment, such as split spoons, will be decontaminated before and after each use as described below.

- Scrub the equipment with a brush in a bucket containing Liquinox[®] or Alconox[®] solution and distilled water.
- Triple-rinse the equipment with distilled water, and allow it to air-dry.
- Reassemble the equipment, and place it on plastic or aluminum foil in a clean area. If aluminum foil is used, wrap the equipment with the dull side of the aluminum foil toward the equipment.

15.9 EMERGENCY RESPONSE PLANNING

This section describes emergency response planning procedures to be implemented for IR Sites 32 and 35. It is consistent with local, state, and federal disaster and emergency management plans and is designed to comply with applicable provisions of 29 CFR §1910.38. The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting.

15.9.1 Pre-Emergency Planning

During the pre-work briefing and daily tailgate safety meetings, all on-site employees will be trained in and reminded of the provisions of Section 11.0, site communication systems, and site evacuation routes. The emergency response provisions will be reviewed on a regular basis by the SulTech SSC and will be revised, if necessary, to ensure that they are adequate and consistent with prevailing site conditions.

15.9.2 Personnel Roles and Lines of Authority

The SulTech SSC has primary responsibility for correcting emergency situations and for taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSC is also responsible for ensuring that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

For work at IR sites 32 and 35, it has been determined that the SulTech SSC shall communicate directly with (Frances Fadullon, (619) 532-0935) in the case of emergency.

Individual subcontractors are required to cooperate with the SSC, within the parameters of their scopes of work.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSC. The SSC must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed. No SulTech employees will be responding to any emergency. SulTech personnel will evacuate the area, notify the SulTech PM and SSC and Navy RPM and ROICC/NTR and contact outside assistance who will respond to an emergency. The local fire or emergency response department will be supplied with a copy of this HASP before site work begins.

15.9.3 Emergency Recognition and Prevention

Table 2 lists potential on-site chemical hazards, and Section 14.0 provides information on the hazards associated with the different tasks planned for the site. On-site personnel will be made familiar with this information and with techniques of hazard recognition through pre-work training and site-specific briefings.

15.9.4 Evacuation Routes and Procedures

In the event of an emergency that necessitates evacuation of a work task area or the site, the SulTech SSC shall contact all nearby personnel using the on-site communications discussed in Section 15.7.1 to advise the personnel of the emergency. The personnel will proceed along site roads to a safe distance upwind from the hazard source. The personnel will remain in that area until the SSC or an authorized individual provides further instructions.

15.9.5 Emergency Contacts and Notifications

The emergency information before Section 15.0 of this HASP provides names and telephone numbers of emergency contact personnel. In the event of a medical emergency, personnel will notify the appropriate emergency organization and will take direction from the SulTech SSC. In the event of a fire, explosion, or spill at the site, the SSC will notify Frances Fadullon and will follow procedures discussed in Section 15.9.

15.9.6 Hospital Route Directions

Before performing any site activities, SulTech personnel will conduct a pre-emergency hospital run to familiarize themselves with the route to the local hospital. A map showing the hospital route is provided in the emergency information before Section 15.0 of this HASP.

15.9.7 Emergency Medical Treatment Procedures

A person who becomes ill or injured during work tasks may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered prior to patient transport. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing in the person in clean coveralls or wrapping in a blanket). First aid should be administered until an ambulance or paramedics arrive. All injuries and illnesses must be reported immediately to the SulTech project manager and HSR. Two SulTech employees who are trained and certified in adult first Aid/CPR and the blood-borne pathogens standard as codified by 29 CFR 1910.1030, will be on-site at all times.

Any person transported to a clinic or hospital for chemical exposure treatment will be accompanied by information on the chemical he or she has been exposed to at the site, if possible. Table 2 contains this information.

15.9.8 Protective Equipment Failure

If any worker in the exclusion zone experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the exclusion zone. Re-entry to the exclusion zone will not be permitted until (1) the protective equipment has been repaired or replaced, (2) the cause of the equipment failure has been determined, and (3) the equipment failure is no longer considered to be a threat.

15.9.9 Fire or Explosion

In the event of a fire or explosion on-site, the local fire department will be immediately summoned. The SulTech SSC or a site representative will advise the fire department of the location and nature of any hazardous materials involved. Appropriate provisions of Section 11.0 will be implemented by site personnel.

15.9.10 Weather-Related Emergencies

Site work shall not be conducted during severe weather conditions, including high-speed winds or lightning. In the event of severe weather, field personnel will stop work, secure and lower all equipment (for example, drilling masts), and leave the site.

Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat and cold stress treatment will be administered as described in SWPs 6-15 and 6-16, respectively (see Appendix C).

15.9.11 Spills or Leaks

In the event of a severe spill or a leak, site personnel will follow the procedures listed below.

- Evacuate the affected area and relocate personnel to an upwind location.
- Inform the SulTech SSC, a SulTech office, and a site representative immediately.
- Locate the source of the spill or leak, and stop the flow if it is safe to do so.
- Begin containment and recovery of spilled or leaked materials.
- Notify appropriate local, state, and federal agencies.

Additional information on spill and leak control is presented in SWP 6-14 (see Appendix C). No SulTech employee will be responding to control a spill or leak. SulTech employees will evacuate the area and notify the SulTech PM and SSC and Navy RPM and ROICC/NTR, and contact local emergency officials in case of an emergency.

15.9.12 Emergency Equipment and Facilities

The following emergency equipment will be available on site:

- First aid kit
- Eye wash (portable) (ANSI-Z358.1-1004)
- Fire extinguisher
- Mobile telephone
- Drums

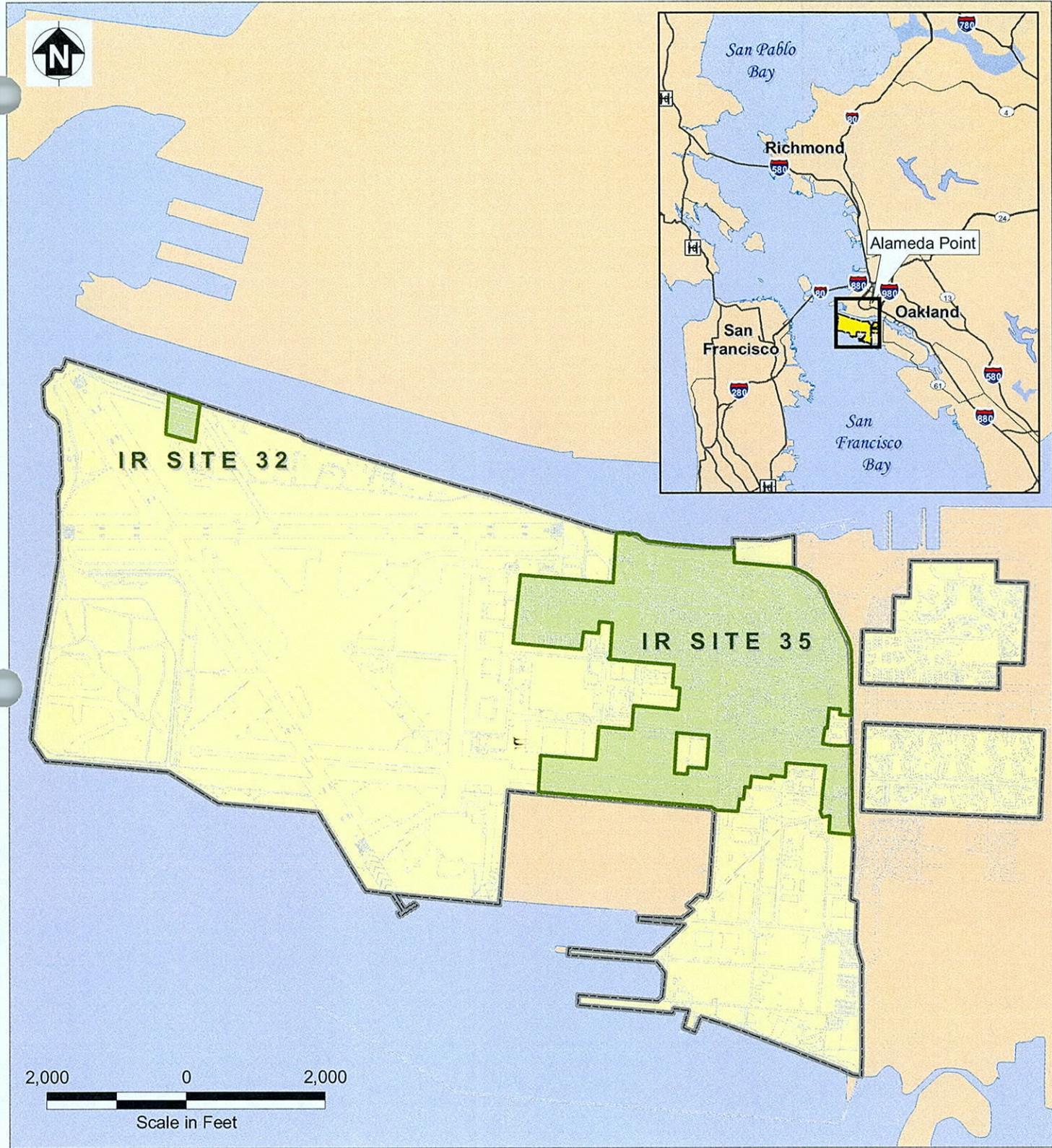
15.9.13 Reporting

All emergency situations require follow-up and reporting. An employee involved in an incident shall immediately report the incident to the local SulTech Office Health and Safety Representative, Regional Safety Officer, or HSR via phone. The Accident and Illness Investigation Report form (see Appendix A) must be completed by the SulTech project manager and submitted to the SulTech HSR within 24 hours of an emergency situation. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that she may implement applicable elements of the process at other sites.

16.0 REFERENCES

- 29 CFR 1910.120, "OSHA Hazardous Waste Operations and Emergency Response"
- U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, November 3, 2003
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- DOL. 2007. Title 29, Part 1926, Subpart D, Section 65, Safety and Health Regulations for Construction" HAZWOPER OSHA.
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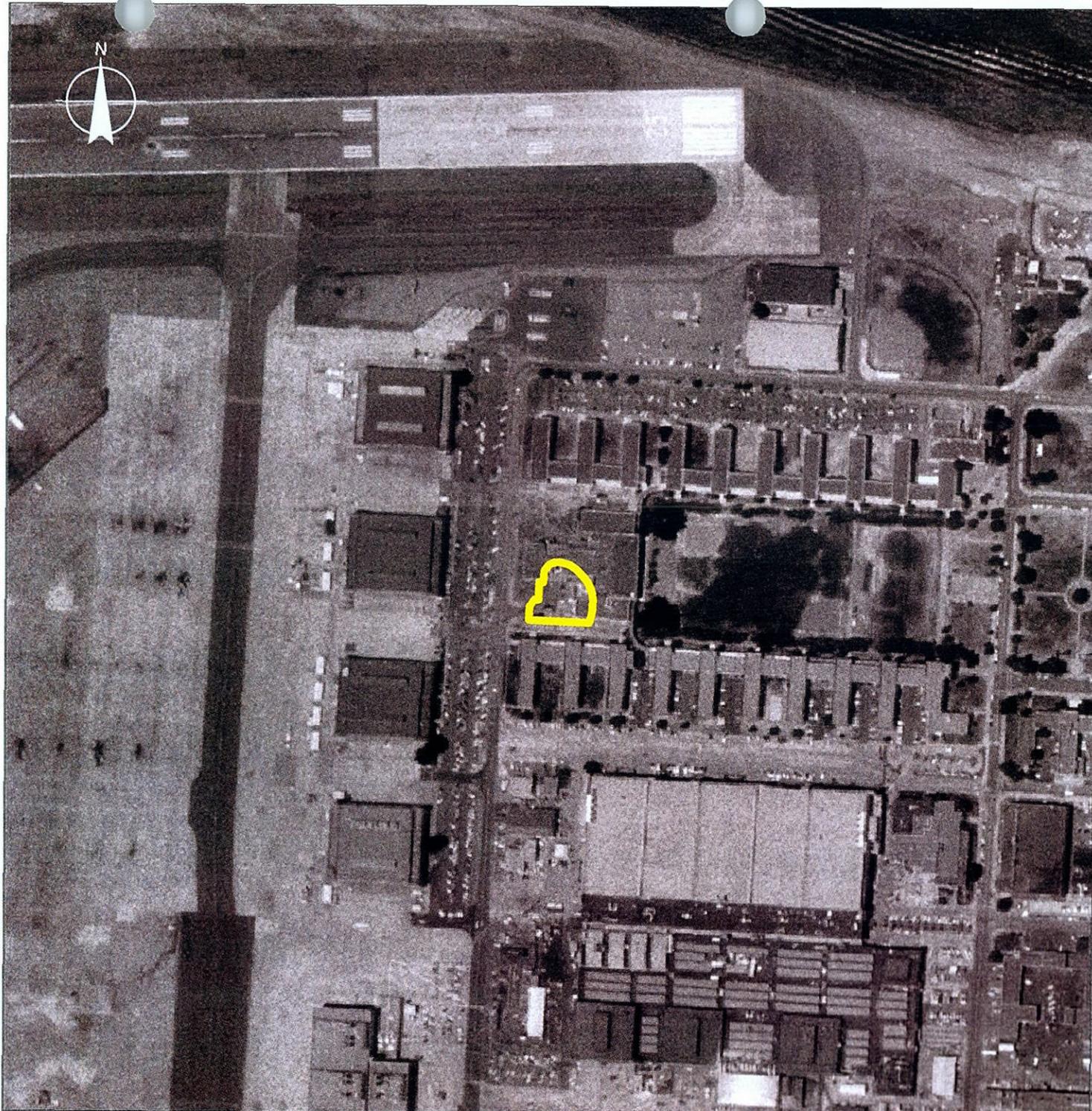
FIGURES



-  Roads and Buildings
-  IR Sites 32 and 35 Boundaries
-  Facility Boundary



Alameda Point
U.S. Navy, BRAC PMO West, San Diego, CA
FIGURE 1
SITE LOCATION MAP
 Accident Prevention Plan for Data Gap Sampling
 of Groundwater Monitoring Wells at Installation
 Restoration Site 32, Groundwater in Area of Concern 1,
 Soil in Area of Concern 6, and Groundwater in Area of
 Concern 23 at Installation Restoration Site 35



LEGEND

 Area of Concern (AOC) 1

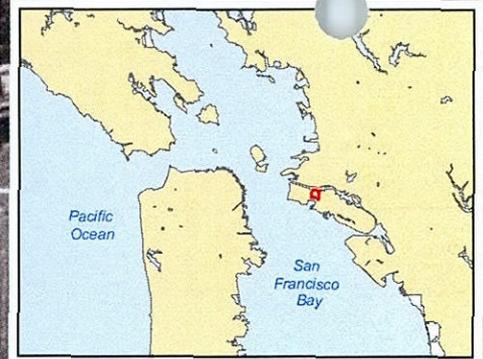


250 125 0 250 Feet

Alameda Point, Alameda, CA
U.S. Department of the Navy, BRAC PMO West, San Diego, CA

FIGURE 2
IR SITE 35, AOC 1

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35



LEGEND

 Area of Concern (AOC) 6

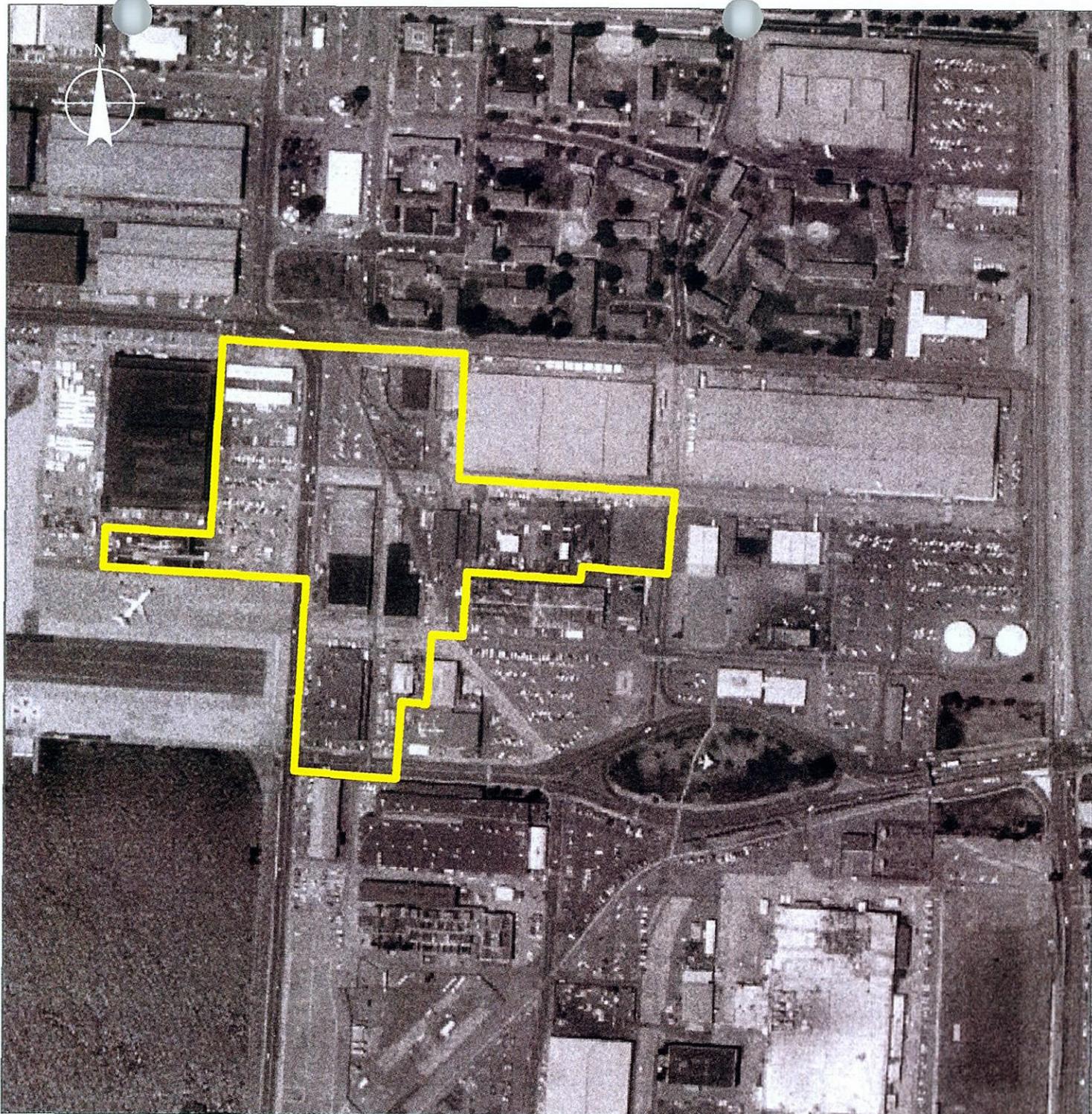


200 100 0 200 Feet

Alameda Point, Alameda, CA
U.S. Department of the Navy, BRAC PMO West, San Diego, CA

FIGURE 3
IR SITE 35, AOC 6

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35



LEGEND

 Area of Concern (AOC) 23



200 100 0 200 Feet

Alameda Point, Alameda, CA
U.S. Department of the Navy, BRAC PMO West, San Diego, CA

FIGURE 4
IR SITE 35, AOC 23

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35



Alameda Point, Alameda, California
 U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5

**KOLLMANN CIRCLE
 SITE 25**

- ⊙ Proposed Sample Location
- Dark-Colored Soil
- Storm Sewer Line
- Road or Runway
- Building/Structure
- Site Feature
- Water

TABLES

TABLE 1: SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical or Hazard	Task	Monitoring Device	Action Level	Monitoring Frequency	Action
VOCs					
Chlorobenzene	Soil boring, groundwater sampling	PID; MultiRae Plus; GEM 2000, TVA 1000	Background to 5 ppm	Every 30 to 60 minutes	Use Level D PPE.
			5 to 100 ppm	Every 30 minutes	Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			> 100 ppm	Every 15 minutes	Stop work and evacuate area; implement vapor suppression controls
Toluene	Soil boring, groundwater sampling	PID; MultiRae Plus; GEM 2000, TVA 1000	Background to 5 ppm	Every 30 to 60 minutes	Use Level D PPE.
			5 to 100 ppm	Every 30 minutes	Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			> 100 ppm	Every 15 minutes	Stop work and evacuate area; implement vapor suppression controls
1,2-Dichloroethylene (1,2-DCE)	Soil boring, groundwater sampling	PID; MultiRae Plus; GEM 2000, TVA 1000	Background to 5 ppm	Every 30 to 60 minutes	Use Level D PPE.
			5 to 100 ppm	Every 30 minutes	Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			> 100 ppm	Every 15 minutes	Stop work and evacuate area; implement vapor suppression controls
TCE	Soil boring, groundwater sampling	PID; MultiRae Plus; GEM 2000, TVA 1000	Background to 5 ppm	Every 30 to 60 minutes	Use Level D PPE.
			5 to 100 ppm	Every 30 minutes	Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			> 100 ppm	Every 15 minutes	Stop work and evacuate area; implement vapor suppression controls

TABLE 1: SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS (CONTINUED)

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical or Hazard	Task	Monitoring Device	Action Level	Monitoring Frequency	Action
VOCs (Continued)					
Vinyl Chloride	Soil boring, groundwater sampling	PID; MultiRae Plus; GEM 2000, TVA 1000	Background to 5 ppm	Every 30 to 60 minutes	Use Level D PPE.
			5 to 100 ppm	Every 30 minutes	Use Level C PPE (unless specific chemicals are identified and evaluated using detector tube)
			> 100 ppm	Every 15 minutes	Stop work and evacuate area; implement vapor suppression controls

Notes:

- PEL Permissible Exposure Limit for time weighted average (TWA) exposure (OSHA)
- PID Photoionization Detector
- ppm parts per million
- STEL Short Term Exposure Limit
- TCE Trichloroethylene
- TLV Threshold limit value for TWA exposure (ACGIH)
- VOC Volatile organic compound



TABLE 2: POTENTIAL CHEMICAL HAZARDS

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical and Medium	Exposure Limit and IDLH Level	Maximum Detected concentration (mg/kg or µg/L)	Exposure Route	Toxic Characteristics
Arsenic (Soil and Groundwater)	PEL (inorganic) = 0.01 mg/m ³ PEL (organic) = 0.2 mg/m ³ STEL = NE TLV = 0.01 mg/m ³ IDLH = 5 mg/m ³	45.5 (soil) 41.5 (groundwater)	Inhalation Ingestion Skin Absorption	Acute: Gastrointestinal pain; cough; loss of appetite; itching; skin eruptions; and irritation of the eyes, nose, and throat Chronic: Dermatitis, especially when exposed to fumes; may affect the eyes, respiratory tract, and lungs, resulting in pneumoconiosis
Chlorobenzene (Groundwater)	PEL = 10 ppm STEL = NE TLV = 10 ppm IDLH = 1,000 ppm	290 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Redness and inflammation of eyes, runny nose, sore throat, skin irritation, headache, dizziness, incoherence, and respiratory problems Chronic: Eyes, nose, skin, and nervous system
Toluene (Groundwater)	PEL = 50 ppm* STEL = 150 ppm TLV = 50 ppm IDLH = 500 ppm	0.39 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes, nose, and throat; fatigue, weakness; confusion; euphoria; dizziness; incoherence; and respiratory problems Chronic: CNS, liver, kidneys, skin, eyes, and respiratory system
1,2-Dichloroethylene (1,2-DCE) (Groundwater)	PEL = 200 ppm TLV = 200 ppm IDLH = 1,000 ppm	25 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes and respiratory system, and CNS depression Chronic: Eyes and respiratory system

TABLE 2: POTENTIAL CHEMICAL HAZARDS (CONTINUED)

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical and Medium	Exposure Limit and IDLH Level	Maximum Detected concentration (mg/kg or µg/L)	Exposure Route	Toxic Characteristics
TCE (Groundwater)	PEL = 25 ppm STEL = 100 ppm TLV = 50 ppm IDLH = 1,000 ppm CARC	5.5 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes and skin; headaches; vertigo; vision disturbances; fatigue; giddiness; tremors; sleepiness; nausea; vomiting; cardiac arrhythmia; tingling, inflamed skin; and liver damage Chronic: Eyes, respiratory system, liver, heart, CNS and skin CARC: Potential occupational carcinogen (NIOSH); A5- Not suspected as a human carcinogen (ACGIH)
Vinyl chloride (Groundwater)	PEL = 1 ppm STEL = 5 ppm TLV = 1 ppm IDLH = NE CARC	11 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Weakness, abdominal pain, GI bleeding, enlarged liver, pallor, bluish skin color on extremities, and frostbite (liquid) Chronic: Respiratory system, liver, lymphatic system, CNS, blood, and liver cancer CARC: Potential occupational carcinogen (NIOSH); A1 confirmed human carcinogen (ACGIH)
PAHs (Soil) (Coal Tar Pitch Volatiles) Target compounds include benzo(a)pyrene, dibenzo(a,h)-anthracene, and phenanthrene	PEL = 0.2 mg/m ³ STEL = NE TLV = 0.2 mg/m ³ IDLH = 80 ppm CARC	5.8 (soil)	Skin absorption Ingestion	Acute: Inflamed skin; bronchitis; lung, kidney, and skin cancer Chronic: Respiratory system, skin, bladder, and kidneys CARC: Potential occupational carcinogen (NIOSH); A1 confirmed human carcinogen (ACGIH)



TABLE 2: POTENTIAL CHEMICAL HAZARDS (CONTINUED)

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical and Medium	Exposure Limit and IDLH Level	Maximum Detected concentration (mg/kg or µg/L)	Exposure Route	Toxic Characteristics
TPH-g (groundwater) (as gasoline)	PEL = 300 ppm STEL = 500 ppm TLV = 300 ppm IDLH = NE	680 (groundwater)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes, mucus membrane; skin burns, inflamed skin, confusion, depression. Chronic: Eyes, skin, respiratory system, CNS, lungs, kidneys, cardiovascular system (CVS), pancreas
TPH-d (as diesel fuel) (soil)	PEL = NE STEL = NE TLV = 200 mg/m ³ IDLH = NE	38 (soil)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes, skin, nose, and throat; confusion; inflamed skin; burning sensation in chest; and chemical pneumonia from aspirated liquid Chronic: Eyes, skin, respiratory system, and CNS
TPH-mo (as mineral oil mist) (soil)	PEL = 5 mg/m ³ STEL = 0.2 mg/m ³ TLV = 5 mg/m ³ IDLH = 2500 mg/m ³ CARC	460 (soil)	Inhalation Skin absorption	Acute: Skin irritation; if liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis Chronic: Repeated or prolonged contact with skin may cause dermatitis CARC: Poorly refined: A2-Suspected Human Carcinogen; Highly refined: A4-Not Classifiable as a Human Carcinogen (ACGIH)
TPH-Jet Fuel (soil)	PEL = NE STEL = NE TLV = 200 mg/m ³ IDLH = NE	2.2 (soil)	Inhalation Skin absorption Ingestion	Acute: Irritated eyes, skin, nose, and throat; confusion; inflamed skin; burning sensation in chest; and chemical pneumonia from aspirated liquid Chronic: Eyes, skin, respiratory system, and CNS

TABLE 2: POTENTIAL CHEMICAL HAZARDS (CONTINUED)

Accident Prevention Plan for Data Gap Sampling of Groundwater Monitoring Wells at Installation Restoration Site 32, Groundwater in Area of Concern 1, Soil in Area of Concern 6, and Groundwater in Area of Concern 23 at Installation Restoration Site 35, Alameda Point, Alameda, CA

Chemical and Medium	Exposure Limit and IDLH Level	Maximum Detected concentration (mg/kg or µg/L)	Exposure Route	Toxic Characteristics
42% and 54% Aroclors, respectively (Soil)	PEL = 1 and 0.5 mg/m ³ TLV = 1 and 0.5mg/m ³ IDLH = 5 mg/m ³	0.5 (soil)	Skin absorption Inhalation	Acute: Irritated eyes; chloroacne Chronic: Eyes, skin, liver, reproductive system, pituitary gland

Notes:

- ACGIH American Conference of Governmental Industrial Hygienists
- CARC Carcinogen classification
- CNS Central Nervous System
- IDLH Immediately dangerous to life or health
- NIOSH National Institute for Occupational Safety and Health
- PEL Permissible exposure limit
- ppm parts per million
- REL Recommended exposure limit
- TLV Threshold limit value

Sources:

- ACGIH. "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.
- National Institute for Occupational Safety and Health. 2005. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.



APPENDIX A
SULTECH FIELD FORMS

- Accident and Illness Investigation Report
- Compliance Agreement
- Daily Site Log
- Daily Tailgate Safety Meeting Form
- Field Audit Checklist

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
 Subsidiary Health and Safety Representative

Prepared by: _____

cc: _____
 Workers Compensation Administrator

Position: _____

Project name: _____

Office: _____

Project number: _____

Telephone number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Office: _____

Home address: _____

Gender: M F No. of dependents: _____

Marital status: _____

Home telephone number: _____

Date of birth: _____

Occupation (regular job title): _____

Social security number: _____

Department: _____

Date of Accident: _____

Time of Accident: _____ a.m. p.m.

Time Employee Began Work: _____

Check if time cannot be determined

Location of Incident

Street address: _____

City, state, and zip code: _____

County: _____

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

Information About the Incident

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

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

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

What was the injury or illness? Describe the part(s) of the body affected and how it was affected. Be more specific than "hurt," "pain," or "sore." Examples include "Strained back"; "Chemical burn, right hand"; and "Carpal tunnel syndrome, left wrist".

Describe the Object or Substance that Directly Harmed the Employee: Examples include "Concrete floor"; "Chlorine"; and "Radial arm saw". If this question does not apply to the incident, write "Not applicable."

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

Was employee performing regular job duties? Yes No

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

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

Witness (Attach additional sheets for other witnesses.)

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Medical Treatment Required? Yes No First aid only

Name of physician or health care professional: _____

If treatment was provided away from the work site, provide the information below.

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Was the employee treated in an emergency room? Yes No

Was the employee hospitalized over night as an in-patient? Yes No

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

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

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

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

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

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

Printed Name of Injured Employee

Telephone Number

Signature of Injured Employee

Date

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

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

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)**To Be Completed by the Subsidiary Health and Safety Representative****Classification of Incident:** Injury Illness**Result of Incident:**

- First aid only
 Days away from work
 Remained at work but incident resulted in job transfer or work restriction
 Incident involved days away and job transfer or work restriction
 Medical treatment only

No. of days away from work: _____

Date employee left work: _____

Date employee returned to work: _____

No. of days placed on restriction or job transfer: _____

OSHA-Recordable Case Number _____

To Be Completed by Human Resources

Social security number: _____

Date of hire: _____

Date of hire for current job: _____

Wage information: \$ _____ per Hour Day Week Month

Position at time of hire: _____

Current position: _____

Shift hours: _____

State in which employee was hired: _____

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

Temporary job end date: _____

To Be Completed during Report to Workers Compensation Carrier

Date reported: _____

Reported by: _____

Confirmation number: _____

Name of contact: _____

Field office of claims adjuster: _____



DAILY TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Job Number: _____

Client: _____ Site Location: _____

Scope of Work: _____

Safety Topics Presented

Planned Field Activities for the Day: _____

Protective Clothing/Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Special Equipment: _____

Decontamination Procedures: _____

Other: _____

Emergency Procedures: _____

Hospital: _____ Phone: _____ Ambulance Phone: _____

Hospital Address and Route: _____

Employee Questions/Comments: _____

Attendees

Name (Printed)	Signature

Meeting Conducted By:

Name (Printed) / Signature

Name (Printed) / Signature

Site Safety Coordinator

Project Field Manager

FIELD AUDIT CHECKLIST

Project Name: _____ Project No.: _____

Field Location: _____ Completed by: _____

Project Manager: _____ Site Safety Coordinator: _____

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

FIELD AUDIT CHECKLIST (Continued)

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

Note: NA = Not applicable

Auditor's Signature

Site Safety Coordinator's Signature

Date

APPENDIX B
RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)

Note: This assessment form will be finalized when site air monitoring data are collected and evaluated. Until the assessment is completed, air purifying respirator cartridges will be disposed of every 8 hours.



TETRA TECH, INC.
RESPIRATORY HAZARD ASSESSMENT

Project Name:			Project No.:		
Location:			Project Manager:		
Type: <input type="checkbox"/> Baseline <input type="checkbox"/> Reassessment		Date:		Valid for ____ days	
Job/Task Description:				<input type="checkbox"/> Routine <input type="checkbox"/> Escape	
Hazard Identification and Source:		Workplace Factors:		User Factors:	
		Temperature: _____		Work rate: _____	
		Humidity: _____		Protective clothing: _____	
		Other: _____		Other: _____	
Chemical:					
PEL:					
ACGIH TLV:					
Form (part/gas/vapor):					
IDLH:					
Eye Irritant (Y/N):					
Skin Absorption(Y/N):					
Monitoring (Y/N) :*					
Frequency:					
Maximum Concentration Estimated:**					
* Monitoring Method:			Respirator Type:		
<input type="checkbox"/> PID <input type="checkbox"/> NIOSH method: _____ <input type="checkbox"/> FID <input type="checkbox"/> Vapor badge: _____ <input type="checkbox"/> Detector tube: _____ <input type="checkbox"/> Other: _____			<input type="checkbox"/> Half-face disposable Brand: _____ <input type="checkbox"/> Half-face reusable Brand: _____ <input type="checkbox"/> Full-face Brand: _____ <input type="checkbox"/> Air-supplied airline Brand: _____ <input type="checkbox"/> Air-supplied SCBA Brand: _____ <input type="checkbox"/> PAPR Brand: _____ <input type="checkbox"/> ESCBA Brand: _____		
** If concentrations exceed the immediately dangerous to life and health (IDLH) value, use air-supplied systems.			Vapor and Gas Cartridge Exchange:		
			ESLI: <input type="checkbox"/> Yes <input type="checkbox"/> No		
			Exchange frequency: _____		
Cartridge/Filter Selection			Basis for Exchange Frequency		
<input type="checkbox"/> N100 <input type="checkbox"/> R100 <input type="checkbox"/> P100 <input type="checkbox"/> N99 <input type="checkbox"/> R99 <input type="checkbox"/> P99 <input type="checkbox"/> N95 <input type="checkbox"/> R95 <input type="checkbox"/> P95 <input type="checkbox"/> Organic vapor <input type="checkbox"/> Acid gas <input type="checkbox"/> Ammonia <input type="checkbox"/> Mercury <input type="checkbox"/> Formaldehyde <input type="checkbox"/> Combo: _____ <input type="checkbox"/> Other: _____			<input type="checkbox"/> Manufacturer's data <input type="checkbox"/> Workplace simulations <input type="checkbox"/> Experimental methods <input type="checkbox"/> AIHA "Rules of Thumb" <input type="checkbox"/> Predictive modeling <input type="checkbox"/> Analogous chemical structure <input type="checkbox"/> OSHA Regulation: _____ <input type="checkbox"/> Other: _____		
Completed by _____ Date _____			Reviewed by _____ Date _____		

RESPIRATORY HAZARD ASSESSMENT (Continued)

DEFINITIONS AND ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ESLI	End of service life indicator
FID	Flame ionization detector
IDLH	Immediately dangerous to life and health
NIOSH	National Institute for Occupational Safety and Health
N100/99/95	Non-oil-proof particulate filter
OSHA	Occupational Safety and Health Administration
P100/99/95	Oil-proof particulate filter
PEL	Permissible exposure limit
PID	Photoionization detector
PPE	Personal protective equipment
R100/99/95	Oil-resistant particulate filter
SCBA	Self-contained breathing apparatus
TLV	Threshold limit value

Note: This form must be reviewed by a regional health and safety representative or subsidiary health and safety representative (or designee) only and must be attached to the site-specific health and safety plan once completed. A copy must also be placed in the project files.

APPENDIX C
SAFE WORK PRACTICES

- SWP 6-1 General Safe Work Practices
- SWP 6-3 Safe Drilling Practices
- SWP 6-11 Drum and Container Handling Practices
- SWP 6-14 Spill and Discharge Control Practices
- SWP 6-15 Heat Stress
- SWP 6-16 Cold Stress
- SWP 6-26 Use of Heavy Equipment



**SULTECH, A JOINT VENTURE OF
SULLIVAN CONSULTING GROUP AND TETRA TECH EM INC.
HEALTH AND SAFETY MANUAL
VOLUME III**

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1

ISSUE DATE: JULY 1998

REVISION NO.: 1

Disclaimer: This safe work practice (SWP) is the property of Tetra Tech, Inc. (Tetra Tech), and its subsidiaries and joint ventures. Any reuse of the SWP without Tetra Tech's permission is at the sole risk of the user. The user will hold harmless Tetra Tech for any damages that result from unauthorized reuse of this SWP. Authorized users are responsible for obtaining proper training and qualification from their employer before performing operations described in this SWP.

GENERAL SAFE WORK PRACTICES

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

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

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- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.
- Establish appropriate support, contamination reduction, and exclusion zones.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).
- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all SulTech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.
- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.
- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

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HEALTH AND SAFETY MANUAL
VOLUME III**

SAFE WORK PRACTICES (SWP)

SAFE DRILLING PRACTICES

SWP NO.: 6-3

ISSUE DATE: JULY 1998

REVISION NO.: 1

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SAFE DRILLING PRACTICES

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

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

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

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

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

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- Maintain adequate clearance of the drill rig and mast from overhead transmission lines. The minimum clearance is 25 feet unless special permission is granted by the utility company. Call the local utility company for proper clearance.
- Only qualified and licensed personnel should operate drill rigs.
- Workers should not assume that the drill rig operator is keeping track of their exact location. Workers should never walk directly behind or beside heavy equipment without the operator's knowledge.
- Workers should maintain visual contact with drill rig operators at all times.
- When an operator must maneuver equipment in tight quarters, the presence of a second person is required to ensure adequate clearance. If much backing is required, two ground guides will be used: one in the direction the equipment is moving, and the other in the operator's normal field of vision to relay signals.
- Auger sections and other equipment are extremely heavy. All lifting precautions should be taken before moving heavy equipment. Appropriate equipment, such as chains, hoists, straps, and other equipment, should be used to safely transport heavy equipment too heavy to safely lift.
- Proper personal lifting techniques will be used. Workers should lift using their legs, not their backs.
- Workers will not use equipment they are not familiar with. This precaution applies to heavy as well as light equipment.
- All personnel not essential to work activities will be kept out of the work area.
- Workers will be aware of their footing at all times.
- Workers will remain alert at all times.

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

- Shut down machinery before repairing or lubricating parts (except parts that must be in motion for lubrication).
- Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.
- Keep drill rigs in the exclusion zone until work has been completed. Such equipment should then be decontaminated within the designated decontamination area.

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- Engage parking brakes when equipment is not in use.
- Implement an ongoing maintenance program for all tools and equipment. All tools and moving equipment should be inspected regularly to ensure that parts are secured, are intact, and have no cracks or areas of weakness. The equipment must turn smoothly without wobbling and must operate in accordance with manufacturer specifications. Defective items should be promptly repaired or replaced. Maintenance and repair logs will be kept.
- Store tools in clean, secure areas to prevent damage, loss, or theft.

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HEALTH AND SAFETY MANUAL
VOLUME III**

SAFE WORK PRACTICES (SWP)

DRUM AND CONTAINER HANDLING PRACTICES

SWP NO.: 6-11

ISSUE DATE: JULY 1998

REVISION NO.: 1

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DRUM AND CONTAINER HANDLING PRACTICES

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

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

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

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

1.0 INSPECTION

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

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

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

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

2.0 OPENING

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

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

3.0 SAMPLING

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

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

4.0 OVERPACKING

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

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

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

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

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

5.0 STAGING

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

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

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SAFE WORK PRACTICES (SWP)

SPILL AND DISCHARGE CONTROL PRACTICES

SWP NO.: 6-14

ISSUE DATE: JULY 1998

REVISION NO.: 1

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sultech swp 6-14_spill_and_discharge_control_practices.doc

SPILL AND DISCHARGE CONTROL PRACTICES

This safe work practice (SWP) provides contingency measures for spills and unintentional discharges from handling and transporting hazardous materials. Spill and discharge control practices should follow specific procedures to ensure the safety of responders and bystanders and to limit environmental impacts.

1.0 GENERAL PROCEDURES

Immediate action should be taken to control and contain any spill following the general guidelines below:

- Unnecessary people should be kept away from the spill or discharge.
- The hazardous area should be isolated.
- If the spill or discharge creates a hazardous situation or results in injury or an environmental release, the emergency procedures of the HASP should be implemented. Emergency response telephone numbers, designated contacts, and special reporting procedures are presented in the HASP.
- Personnel should stay on the upwind side of the spill or discharge.
- Entry into a confined space or low area where liquids or vapors may accumulate should be avoided.
- Sources of ignition should be eliminated if the spill or discharge involves combustible materials.
- Drains, manholes, waterways, sewers, and the like should be identified and covered or protected.
- The spill should be controlled or absorbed using appropriate media or devices.
- When the spill or discharge is fully contained and under control, spill or discharge material should be collected.
- Following cleanup, the spill area should be evaluated by collecting soil samples and screening the area with air monitoring instruments.

2.0 SOLIDS

If the spill or discharge material is solid and nonreactive, the material should be scooped up and placed in a suitable and compatible container until the disposal method has been determined.

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3.0 LIQUIDS

If liquid is discharged, the following general procedures apply:

- The point of discharge should be immediately identified and measures taken to eliminate further discharges by uprighting or patching containers, transferring contents, or other appropriate methods.
- Any discharged liquids or sludge should be removed or retrieved.
- Discharged materials should be cleaned up with absorbent materials or devices.
- Spent absorbent material should be placed into storage or disposal containers.

4.0 REPORTING

In some instances, a release may require reporting to government agencies. If a reportable quantity is released (this quantity is stated on the Material Safety Data Sheet) or human health or the environment is threatened, appropriate national, state, and local administering agency personnel should be notified. The timeframe for notification may vary from agency to agency. Notification may be required immediately or within 24 hours, depending on the type, location, and amount of released material. The appropriate agency to report spills to should be determined during HASP development.

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SAFE WORK PRACTICES (SWP)

HEAT STRESS

SWP NO.: 6-15

ISSUE DATE: JULY 1998

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REVISION NO.: 2 (ECORD, JULY 2007)

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HEAT STRESS

This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

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TABLE 1
HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	<ul style="list-style-type: none"> • Painful muscle cramps, especially in legs and abdomen • Faintness • Profuse perspiration 	<ul style="list-style-type: none"> • Move affected worker to cool location • Provide sips of liquid such as Gatorade® • Stretch cramped muscles • Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	<ul style="list-style-type: none"> • Weak pulse • Rapid and shallow breathing • General weakness • Pale, clammy skin • Profuse perspiration • Dizziness • Unconsciousness 	<ul style="list-style-type: none"> • Move affected worker to cool area • Remove as much clothing as possible • Provide sips of cool liquid or Gatorade® (only if conscious) • Fan the person but do not overcool or chill • Treat for shock • Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	<ul style="list-style-type: none"> • Dry, hot, and flushed skin • Constricted pupils • Early loss of consciousness • Rapid pulse • Deep breathing at first, and then shallow breathing • Muscle twitching leading to convulsions • Body temperature reaching 104 °F or higher 	<ul style="list-style-type: none"> • Immediately transport victim to medical facility • Move victim to cool area • Remove as much clothing as possible • Reduce body heat promptly by dousing with water or wrapping in wet cloth • Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface • Protect patient during convulsions

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TABLE 2

SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

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To monitor the level of an employee's heat stress, the following should be measured:

- **Heart Rate:** Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- **Oral Temperature:** Use a disposable oral thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

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SAFE WORK PRACTICES (SWP)

COLD STRESS

SWP NO.: 6-16

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COLD STRESS

This safe work practices (SWP) describes situations where cold stress is likely to occur and discusses procedures for the prevention and treatment of cold-related injuries and illnesses. Cold conditions may present health risks to employees during field activities. The two primary factors that influence the risk potential for cold stress are temperature and wind velocity. Wetness can also contribute to cold stress. Other factors that increase susceptibility to cold stress include age (very young or old), smoking, alcohol consumption, fatigue, and wet clothing. Hypothermia can occur at temperatures above freezing if the individual has on wet or damp clothing or is immersed in cold water. The combined effect of temperature and wind can be evaluated using a wind chill index as shown in Table 1.

Bare flesh and body extremities that have high surface area-to-volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures. Because cold stress can create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form of cold stress. Table 2 provides information on frostbite and hypothermia, the two most common forms of cold-related injuries.

Training is an essential component of cold stress prevention. Employees are instructed to recognize and treat cold-related injuries during 8-hour health and safety refresher and first aid training courses. When working in cold environments, specific steps should be taken to lessen the chances of cold-related injuries. These include the following:

- Protecting of exposed skin surfaces with appropriate clothing (such as face masks, handwear, and footwear) that insulates, stays dry, and blocks wind
- Shielding the work area with windbreaks to reduce the cooling effects of wind
- Providing equipment for keeping workers' hands warm by including warm air jets and radiant heaters in addition to insulated gloves
- Using adequate insulating clothing to maintain a body core temperature of above 36 °C
- Providing extra insulating clothing on site
- Reducing the duration of exposure to cold
- Changing wet or damp clothing as soon as possible

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During periods of extreme cold (10 °F or less) workers should use the buddy system to ensure constant protective observation.

Specific monitoring criteria are not established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia (see Table 1) in themselves as well as in coworkers. All instances of cold stress should be reported to the site safety coordinator.

Work schedules may be adjusted and warm-up regimes imposed as needed to deal with temperature and wind conditions.

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TABLE 1

**COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED
 AS EQUIVALENT TEMPERATURE**

Estimated Wind Speed (in miles per hour - mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	<i>LITTLE DANGER</i> in less than 1 hour with dry skin; maximum danger from false sense of security			<i>INCREASING DANGER</i> from freezing of exposed flesh within 1 minute				<i>GREAT DANGER</i> that flesh may freeze within 30 seconds				

Trench foot may occur at any point on this chart.

Source: Modified from American Conference of Governmental Industrial Hygienists. 1997.
 "Threshold Limit Values for Chemical Substances and Physical Agents."

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TABLE 2
COLD STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Frostbite	Freezing of body tissue, usually the nose, ears, chin, cheeks, fingers, or toes	<ul style="list-style-type: none"> • Pain in affected area that later goes away • Area feels cold and numb • Incipient frostbite (frostnip) - skin is blanched or whitened and feels hard on the surface • Moderate frostbite - large blisters • Deep frostbite - tissues are cold, pale, and hard 	<ul style="list-style-type: none"> • Move affected worker to a warm area • Immerse affected body part in warm (100 to 105 °F) water—not hot! • Handle affected area gently; do not rub • After warming, bandage loosely and seek immediate medical treatment
Hypothermia	Exposure to freezing or rapidly dropping temperatures	<ul style="list-style-type: none"> • Shivering, dizziness, numbness, weakness, impaired judgment, and impaired vision • Apathy, listlessness, or sleepiness • Loss of consciousness • Decreased pulse and breathing rates • Death 	<ul style="list-style-type: none"> • Immediately move affected person to warm area • Remove all wet clothing and redress with loose, dry clothes • Provide warm, sweet drinks or soup (only if conscious) • Seek immediate medical treatment

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SAFE WORK PRACTICES (SWP)

USE OF HEAVY EQUIPMENT

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ISSUE DATE: JULY 1998

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USE OF HEAVY EQUIPMENT

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

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

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

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APPENDIX D
SUBCONTRACTOR HEALTH AND SAFETY PLANS

- Vironex, Inc. Health & Safety Program



Health & Safety Program

Introduction

Safety Program Goals

Vironex's objective is to have a health and safety program that will reduce injuries and illnesses to the greatest extent possible.

Our commitment to safety will be communicated to employees orally, by directions and statements, written in this manual, and by example.

General Safety

Section 1

The following safety rules have been established and must be followed by all employees. Failure to follow any company safety rule may result in disciplinary action up to and including termination.

1. General Safety Rules

- 1.1. Regional Managers and Drillers are responsible for implementing these policies by insisting that employees observe and obey all rules and regulations necessary to maintain a safe work place and safe work habits and practices.
- 1.2. All injuries and illnesses, no matter how minor, must be reported at once.
- 1.3. Jewelry, rings, bracelets, watch chains, key chains, etc., shall not be worn. Jewelry can catch in equipment causing serious accidents such as the loss of fingers or hands.
- 1.4. Before using a ladder, make sure it is in good condition, with the proper safety feet, and is free from cracks, broken rungs, or other defects. When there is any danger of the ladder slipping, have another worker support the ladder.
- 1.5. Never use makeshift or defective equipment or tools. All defective tools must be exchanged or repaired.
- 1.6. Do not attempt to lift push or pull objects that are too heavy for you. ASK FOR HELP or use a mechanical lifting device when appropriate. Learn to lift the right way to avoid injury: bend your knees; keep your back as upright as possible; then lift with your legs. If you are uncertain about the lift, stop and get help.
- 1.7. Shut down all machinery before cleaning, adjusting, or repairing it. Lockout procedures should be followed when performing these types of procedures.
- 1.8. Never operate any mobile equipment unless you have been properly trained in its use and have permission from your Regional Manager or the driller.
- 1.9. Never touch any rotating machinery or tool.
- 1.10. Learn the location and proper use of fire fighting equipment.
- 1.11. If you see someone working in an unsafe manner, warn and advise them, if necessary contact your Regional Manager or the driller.
- 1.12. Protect your feet and head by keeping your boots and hard hat in good condition (especially the soles of the boots and the liner of the hard hat).
- 1.13. Always obey all warning signs, instructions, and notices, they will help you to prevent accidents.
- 1.14. If you don't know the safe way to do some thing, stop and find out. Don't guess.
- 1.15. Maintain good housekeeping practices. Clean up all waste and eliminate any dangers in the work area.
- 1.16. Suitable clothing and footwear must be worn at all times. Personal protective equipment (hardhats, respirators, and eye protection) shall be worn whenever needed.

- 1.17. Employees will participate in all safety meetings conducted by their Regional Manager, and should participate in safety training offered by clients and general contractors.
- 1.18. Horseplay, and other acts, which may have an adverse impact on safety or the well being of other employees, will not be tolerated.
- 1.19. Employees shall not be permitted to work when their ability or alertness is so impaired by fatigue, illness, or other causes that it might expose the employee or others to injury.
- 1.20. No alcohol or illegal drugs will be permitted on company property or on any job site.
- 1.21. Employees shall not bring or be in possession of any weapons while working or when representing the company.
- 1.22. Employees must ensure that all guards and other protective devices are in position and correctly adjusted, and must report deficiencies promptly to the Regional Manager.
- 1.23. Employees must not handle or tamper with any electrical equipment, machinery, or air or water lines unless in the scope of their duties and have received specific instructions to perform the job safely.
- 1.24. Replacement parts and equipment must conform to the manufacturers specifications.
- 1.25. Never disable or bypass any shut down device
- 1.26. Never operate the drill unless all guards are in place and properly secured
- 1.27. Never operate the drill if any mechanical defect or safety feature is not functioning properly
- 1.28. Never operate a drill rig or other hazardous equipment alone.
- 1.29. Employees shall not be permitted on job sites without proper updated HAZWOPER certification and current medical surveillance certification.

2. First Aid

2.1. General

- 2.1.1. First aid is vitally important due to the often-remote locations of many drill sites. Often the only person available to offer first aid will be a co-worker
- 2.1.2. At least one member of the drill crew must be trained in first aid and CPR. Particular emphasis should be given to training in the recognition and treatment of electric shock, heart attack, stroke, broken bones and snakebite. Teaching should be on a person to person basis and can not just be reading a manual.
- 2.1.3. Well-stocked first aid kits are provided on each drill rig. It is the responsibility of the driller or Regional Manager to ensure that the first aid kit is properly maintained and fully stocked. If the kit is not fully stocked the contact the main office to obtain sufficient replacement first aid supplies.
- 2.1.4. Emergency numbers and the address of the nearest hospital should also be readily available.
- 2.1.5. If there is a risk of employees' eyes or body being exposed to harmful chemicals or other materials eye wash and/or shower facilities should be provided.

2.2. Hypothermia

- 2.2.1. If someone has both frostbite and hypothermia, treatment of the hypothermia should occur first. Hypothermia should be treated medically. If medical treatment is not immediately available, the following steps should be taken:
 - 2.2.2. Take the injured person indoors immediately.
 - 2.2.3. Remove cold, wet clothing, and replace it with warm, dry clothing.
 - 2.2.4. If the person is not breathing or does not have a pulse, call for emergency medical assistance. If you are properly trained to perform cardiopulmonary resuscitation (CPR) administer this technique and continue until medical assistance arrives or instructs you otherwise.
 - 2.2.5. Do not allow the person to drink alcohol, caffeine, take any drugs, or nicotine products.
 - 2.2.6. If the victim is unconscious and needs to be moved, immobilize the neck.
 - 2.2.7. Do not try to re-warm the extremities (arms and legs), this could lead to heart failure.
 - 2.2.8. Avoid rapid re-warming of the victim with hot water or massaging, if performed improperly, this could damage the tissue. Only trained personnel should re-warm the victim.

2.3. Frostbite

- 2.3.1. Frostbite typically occurs to body tissue in the extremities, such as on the ears, toes, feet, fingers or hands. As the unprotected body tissue is exposed to temperatures below 32 degrees Fahrenheit, the tissue temperature decreases and frostbite may develop. Frostbite has three different stages. They are frostnip, superficial frostbite, and deep frostbite.
- 2.3.2. Frostnip: causes the feeling of “pins and needles” to the affected area and results in the skin becoming soft and white in color.
- 2.3.3. Superficial Frostbite: causes the skin surface to feel numb, frozen, and form clear, fluid-filled blisters. The blisters are actually ice crystals forming inside the skin cells.
- 2.3.4. Deep Frostbite: causes the damaged tissue to swell, blood vessels to clot, and sometimes leads to gangrene. This occurs due to the decay and death of the affected body tissue when the oxygen supply is obstructed.
- 2.3.5. Frostnip usually does not result in permanent damage and may be treated by simply blowing warm air on the injured area or applying warm water. Superficial and deep frostbite should be medically treated. If medical care is not immediately available, the following steps should be taken:
- 2.3.6. Transfer the injured person indoors immediately.
- 2.3.7. Remove wet clothing.
- 2.3.8. Warm the affected area in warm (not hot), water or apply warm towels.
- 2.3.9. Do not use dry heat, such as a heating blanket or pad.
- 2.3.10. Do not rub the affected area.
- 2.3.11. Do not break the blisters; this may result in infection.
- 2.3.12. Offer the injured person warm liquids if he/she is conscious and not vomiting.
- 2.3.13. See a doctor as soon as possible.

2.4. Frostbite and Hypothermia Prevention Tips

- 2.4.1. Body heat retention is the number one way to avoid cold weather injuries. The following prevention tips are key during cold weather exposure:
- 2.4.2. Wear dry, layered clothing, covering all body areas, including the head.
- 2.4.3. Take frequent breaks; the cold increases the chances for exhaustion.
- 2.4.4. Avoid alcohol, sedatives, and nicotine.
- 2.4.5. Keep clothing dry, dry clothing is twenty times warmer than wet clothing.
- 2.4.6. Keep blankets readily accessible.
- 2.4.7. When possible acclimatize to warmer temperatures. Quick changes in temperature may further complicate the condition.

2.5. Heat Stress

- 2.5.1. Alternating work and rest periods in a cool area can help you avoid heat stress. If possible, heavy work should be scheduled during the cooler parts of the day and appropriate protective clothing should be worn. Drillers should be able to recognize early signs of heat stress and should interrupt their work if they are extremely uncomfortable.
- 2.5.2. Early signs of heat stroke include:

- 2.5.3. Sweating stops and the body can no longer rid itself of excess heat .
- 2.5.4. Mental confusion, delirium, loss of consciousness, convulsions or coma.
- 2.5.5. Body temperature of 106 degrees F or higher.
- 2.5.6. Hot dry skin that may be red, mottled, or bluish.
- 2.5.7. Heat exhaustion is a result of loss of fluids through sweating when someone has failed to drink enough fluids or take in enough salt or both. The worker with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher.
- 2.5.8. Treatment is usually simple: the victim should rest in a cool place and drink an electrolyte solution (a beverage used by athletes to quickly restore potassium, calcium, and magnesium salts). Severe cases involving victims who vomit or lose consciousness may require longer treatment under medical supervision.
- 2.5.9. A few suggestions include:
 - 2.5.9.1. Drinking plenty of water – as much as a quart per worker per hour.
 - 2.5.9.2. Alternating work and rest periods with longer rest periods in a cool area.
 - 2.5.9.3. Remember that heat stress can be avoided if proper precautions are followed. Before you go to the job site, remember to fill your water container and maintain the water in a sanitary condition. If you forget to bring water to the job site, take a break and purchase bottled water or an electrolyte drink.

3. Long Hair & Loose Clothing

- 3.1. While there are no requirements banning long hair, you must maintain it to prevent injury. Depending on the length you may need to do more than just keep the hair tied back. If there is a potential for it to become caught even after tying the hair back, you should keep your hair under your hard hat. If this is not possible, you may have to wear a hair net to keep it out of the way.
- 3.2. A more common hazard for drillers and machinery hazards is loose clothing. This not only refers to keeping your shirt tucked in but also wearing the appropriate clothing on the job. Baggy shirts, winter scarves, or even bulky winter jackets can present a hazard. These items can easily be caught by machinery, pulling you into the equipment.
- 3.3. This is not to suggest that you need to be uncomfortable on the job by wearing tight clothing. However, you will need to put some thought into the type of clothes worn.
- 3.4. Long sleeve shirts should have the cuffs buttoned. Rolling the sleeves up may present the opportunity to have the sleeve caught in machinery. Depending on the situation you may need to wear short sleeve shirts to prevent this hazard from occurring.
- 3.5. Never wear anything around your neck like a scarf or tie when working around machinery. Obviously drillers don't wear ties on the job, but if you notice someone in the shop doing this you may want to point out the hazard.
- 3.6. Coats used on the job site should be evaluated as well. Down filled coats are warm but may not be appropriate. Many of these types of coats have sleeves that are bulky and can easily be caught in machinery. Coats made with an appropriate liner can keep you just as warm and many have an outer shell made of leather or a tightly woven fabric. These types of materials are less likely to be caught in machinery when compared to a down jacket. However, just because it is a more appropriate jacket for drilling doesn't mean that it cannot be caught. You still have to keep an eye out for these hazards
- 3.7. Injuries from being caught by machinery vary widely. The more fortunate ones end up with contusions or broken bones. The less fortunate end up with amputations or even death. Sometimes the hazards that can cause these types of injuries are not readily apparent. As a result, you will need to keep an eye out for other workers as well as yourself. In addition, don't be offended if another employee tells you that your hair or clothes are presenting a hazard. It may save you a lot of pain and suffering if they do make you aware of it

4. Severe Weather

You will need to know the types of severe weather that can affect your area. Be aware of different weather conditions if you travel beyond your normal area of operation.

4.1. Tornado

- 4.1.1. If you drill in an area with prevalent tornado activity you will know that these can be spawned from a thunderstorm and can move over the ground at speeds of 30-60 miles an hour. The winds generated by a tornado can reach 200 miles an hour.
- 4.1.2. The potential consequences of being involved are well known to us all. If severe weather has been forecast, someone should monitor a local radio station for up-dates on weather warnings. Tornadoes can strike with little warning, often you may not have time to drive to a safe area.
- 4.1.3. In such circumstances when a tornado has been sighted you should seek shelter immediately, if there is none you should lie face down in a ditch or other low spot and cover your head.
- 4.1.4. When seeking shelter you should go to a basement, crawlspace, or cellar immediately. If these types of areas are not available, seek shelter in an internal room, preferably one without windows, such as a closet.
- 4.1.5. Do not come out of the shelter until you are certain the danger has passed.

4.2. Lightning

- 4.2.1. The danger of lightning is greater just before the storm breaks. In many cases lightning will precede rain. So, do not wait until it starts raining to suspend drilling activities. If you see lightning or hear thunder, safety measures should be implemented immediately. These measures should include:
 - 4.2.1.1. Lower the mast of the drill rig before lightning occurs in the vicinity. If lightning is occurring in the vicinity, leave the drill rig alone and seek appropriate shelter.
 - 4.2.1.2. Take refuge in a vehicle or a nearby building.
- 4.2.2. If outdoors:
 - 4.2.2.1. Avoid proximity to water, high ground, and open spaces.
 - 4.2.2.2. Avoid contact with metal objects including power tools, augers, drill rod, the drill rig, shovels, or other similar materials.
 - 4.2.2.3. If caught in an open area without refuge, crouch down in a ditch or lie flat on the ground.
 - 4.2.2.4. Try to keep some distance from trees and other workers.
- 4.2.3. If indoors:
 - 4.2.3.1. Stay away from doors and windows.
 - 4.2.3.2. Do not use the telephone (lightning may strike exterior phone lines).
 - 4.2.3.3. Turn off and unplug computers and power tools.
 - 4.2.3.4. Suspend work activities for at least 30 minutes following the last observed lightning or thunder.

- 4.2.4. If injured, a qualified person should apply first aid and the victim should seek medical attention immediately.

5. Work Environment

- 5.1. All work areas including job sites must be kept clean and orderly.
- 5.2. Floor and work surfaces must be kept dry and slip resistant, any spills should be cleaned up as quickly as possible.
- 5.3. Dust and other combustible material should be removed as soon as possible to reduce the risk of fire.
- 5.4. Bins and other waste receptacles should be covered, particularly those used for oily rags.
- 5.5. Floor holes and openings must be protected with covers or guards.
- 5.6. Fire extinguishers must be kept accessible.
- 5.7. Exits should never be blocked, and must be unlocked during working hours
- 5.8. All aisles and doorways must be kept clear of obstructions.
- 5.9. All vehicles and mechanical equipment must be inspected each day.
- 5.10. All walkways and aisles must be kept clear and unobstructed.
- 5.11. Electric cords should not cross walkways where they could be a tripping hazard.
- 5.12. Wet floors should be marked with caution signs.
- 5.13. Extra care should be taken if fork trucks or other vehicles use walkways.
- 5.14. Changes in floor height must be plainly marked.
- 5.15. Any low ceilings must be marked with warnings.
- 5.16. Any walkways more than 30 inches above the ground must have guardrails installed.

6. Fire Exposures

6.1. Storage Practices

- 6.1.1. Accumulation of waste materials, scrap, cardboard and packing materials should be limited and discarded when practical.
- 6.1.2. Extra care should be taken when disposing of rags and cloths contaminated with oils and solvents. Storing these materials may cause their spontaneous ignition.
- 6.1.3. Extinguishers must be serviced, maintained and tagged every year. They must be placed where they are readily accessible, they should not be moved unless they are in use.
- 6.1.4. Fire doors and shutters must be unobstructed, and kept in good condition.
- 6.1.5. If sprinklers are installed controls and water pressure should be checked periodically.
- 6.1.6. Portable fire extinguishers are located accessibly throughout the facility. These are recharged and serviced regularly, the date of the last inspection is indicated on the tag attached to each extinguisher.
- 6.1.7. Training on the correct use of extinguishers will be given to all employees.
- 6.1.8. Management must be notified of any damage to fire protection equipment.
- 6.1.9. Employees must report fires, smoke, or potential fire hazards to the Fire Department immediately.
- 6.1.10. Every employee must play a part in minimizing the possibility of fire such as keeping combustibles separated from ignition sources, following no smoking rules, and avoiding needless accumulations of combustible materials.
- 6.1.11. The Regional Manager or driller is responsible for notifying management of changes in operations that alter the risk of fire and may require a change in the fire protection provisions.
- 6.1.12. Containers must be clearly labeled as to their contents.
- 6.1.13. Fire Fighting Equipment
 - 6.1.13.1. Equipment may include automatic sprinklers, detectors and alarms, fire doors, fire extinguishers and hoses.
- 6.1.14. Fire Exits
 - 6.1.14.1. Corridors must not be used for storage they should allow continuous unobstructed access to exits and not contain combustible materials. Even temporary storage of furniture, equipment, supplies, or other items permitted in exit ways.
- 6.1.15. Mechanical Equipment Rooms
 - 6.1.15.1. Equipment rooms containing boilers, compressors, filters, electrical equipment, must be separated from other areas of a building by fire-resistant walls and doors, these fire doors must never be left open.
 - 6.1.15.2. Mechanical equipment rooms and fan rooms must never be used for storage.
- 6.1.16. No Smoking
 - 6.1.16.1. Smoking is not permitted in any area where "No Smoking" signs are posted.

6.2. Special Hazards

- 6.2.1. Store gasoline, oil, paint, and thinners in the correct containers and away from sources of ignition such as water heaters and welding equipment.
- 6.2.2. Combustible dust should be removed by vacuuming rather than sweeping or blowing.
- 6.2.3. Fuel and gas cylinders should be stored separated by 20 feet or a fire resistant barrier.
- 6.2.4. Smoking will not be permitted where hazardous materials are stored and used.
- 6.2.5. Portable Heaters
 - 6.2.5.1. These devices may not be used without approval of management.

6.3. Flammable and Combustible Materials

- 6.3.1. Do not keep excessive quantities of flammables. If you do smoke, take special care to properly dispose of cigarette butts and matches.
- 6.3.2. Fires need fuel and a source of ignition, if these are removed these and the chance of a fire is reduced. Never create sources of ignition near flammables or combustibles. Sources of ignition may consist of electrical sparks, heat, friction, or open flames, such as cigarette butts.
- 6.3.3. A fire on a drill rig could destroy the rig, but also injure employees, injure a third party, damage other property, and cause loss of business. The following suggestions will help to reduce the chances of fire on the rig and when handling flammable liquids:
 - 6.3.3.1. Repair all damaged or leaking hydraulic and fuel lines.
 - 6.3.3.2. Check battery and ignition cable for shorts.
 - 6.3.3.3. Avoid welding and hot cutting in the field, this type of work should be done at the shop except in an emergency.
 - 6.3.3.4. When refueling generators, pumps and other equipment allow the equipment to cool first, use funnels and spouts to avoid spills, do not over fill tanks.
 - 6.3.3.5. Smoking should not be permitted within 25 feet of any refueling operation.
 - 6.3.3.6. Store fuels and other flammable liquids in approved containers, these should never be left on an unattended rig.
 - 6.3.3.7. Keep the area around the drill rig clear of flammable materials such as dry grass and trash.
 - 6.3.3.8. Ensure that multipurpose fire extinguishers are always readily available during any refueling operation.
- 6.3.4. Flammables are easier to ignite due to a lower flash point. The flash point is the temperature at which enough vapor is given off by a flammable liquid to form a mixture with air that will ignite in the presence of an ignition source, such as a spark or open flame. Flammable liquids are defined as having a flash point below 100°F. Examples of flammables are gasoline, isopropyl alcohol, propane, acetylene, etc. Flammable liquids are known as Class I Liquids and are categorized as follows:
 - 6.3.5. Class IA - Flash point below 73°F. with a boiling point below 100° F.
 - 6.3.6. Class IB - Flash point below 73°F. with a boiling point at or above 100°F.
 - 6.3.7. Class IC - Flash point at or above 73°F. and below 100°F.

- 6.3.8. Combustible liquids are a little harder to ignite but should still be handled with caution. Combustibles will vigorously burn and are defined as having a flash point between 100° and 200°F. Examples of combustible liquids are motor oil and hydraulic oil. Combustible liquids are known as Class II and III Liquids. They are subdivided as follows:
 - 6.3.9. Class II - Flash point at or above 100°F. and below 140°F.
 - 6.3.10. Class IIIA - Flash point at or above 140°F.
 - 6.3.11. Class IIIB - Flash point at or above 200°F.
- 6.3.12. Combustibles can also be in solid form. Examples of combustible materials are paper, wood, cardboard, and cloth. Plastic may be either flammable or combustible. Typically flammable plastics are in the liquid form while the combustible plastics are in the solid form. In either case, plastics can significantly add to a fire's intensity since they typically burn at a higher temperature than materials such as paper or wood. In addition, many plastics will flow when they are on fire, spreading the fire over a larger area. This combination can make fighting a plastic fire much more difficult.
- 6.3.13. Flammable and combustible liquids are extremely hazardous. Always remember to use extreme caution and:
- 6.3.14. Read Material Safety Data Sheets (MSDS) and warning label instructions (before using any chemical).
- 6.3.15. Use and store flammable liquids in closed containers in temperature-controlled areas.
- 6.3.16. Avoid sparks and flames.
- 6.3.17. Prohibit smoking around flammable liquids.
- 6.3.18. Only approved containers and tanks are to be used for flammable and combustible liquids.
- 6.3.19. To prevent static sparks flammable liquids must be grounded and bonded when being dispensed.
- 6.3.20. Storage rooms for flammable and combustible liquids must have explosion-proof lights.
- 6.3.21. Storage rooms for flammable and combustible liquids should have adequate ventilation.
- 6.3.22. Safe practices and standards must be followed when using, handling or storing liquefied petroleum gas.
- 6.3.23. Liquefied petroleum storage tanks should be guarded to prevent damage from vehicles and shall be marked with no smoking signs.
- 6.3.24. Suitable fire extinguishers must be mounted within 75 ft. outside of flammable liquid storage areas and within 10 ft. of any inside flammable liquid storage area.
- 6.3.25. Flammable or combustible liquids must be kept in and dispensed from safety cans.
- 6.3.26. All spills of flammable or combustible liquids must be cleaned up immediately.
- 6.3.27. Storage tanks are equipped with emergency vents that will relieve excessive internal pressure in event of fire exposure.
- 6.3.28. Class A Combustibles
- 6.3.29. These include wood, paper, cloth, rubber, plastics, etc.
- 6.3.30. Fires in any of these fuels can be extinguished with water as well as other agents specified for Class A fires.
- 6.3.31. Class B Combustibles

- 6.3.32. These include flammable and combustible liquids such as oils, greases, solvents, tars, oil-base paints, lacquers, and flammable gases, and flammable aerosols.
- 6.3.33. Flammable-liquid fires are best extinguished by excluding the air around the burning liquid using Carbon dioxide, ABC multipurpose dry chemical, or Halon.
- 6.3.34. Use only approved containers, tanks, equipment, and apparatus for storing, handling, and use of Class B combustibles.
- 6.3.35. Liquids must be dispensed from tanks, drums, and barrels, using approved pumps.
- 6.3.36. Vapors should not be allowed to reach any source of ignition, such as heating equipment, electrical equipment, open flame, mechanical or electrical sparks, etc.
- 6.3.37. Never store, handle, or use Class B combustibles in areas normally used for egress.
- 6.3.38. Quantities of flammable liquids over ten gallons must be stored in approved storage cabinets or rooms.
- 6.3.39. Other types of Fire
- 6.3.40. Other combustible materials, including electrical equipment, oxidizing chemicals, fast-reacting or explosive compounds, and flammable metals, require specialized fire safety and extinguishing.

6.4. Spraying Operations

- 6.4.1. Before spraying ensure that ventilation is adequate, and that the area is free from combustible materials.
- 6.4.2. If spraying is being carried out in an enclosed area there should be no ignition source (including operating motors, radios, or other electrical devices) within 20 feet.
- 6.4.3. If a flammable liquid is being used in the spraying operation, explosion proof lighting and wiring must be provided.
- 6.4.4. Over-spray and clogged ventilation filters must be cleaned up on a regular basis. The frequency of such operation will depend on the amount of spraying operations completed.
- 6.4.5. Emergency equipment such as an appropriate fire extinguisher and sprinkler system will be needed.
- 6.4.6. Appropriate respiratory protective equipment must be used.
- 6.4.7. Spraying operations should limit the amount of chemicals released into the atmosphere through the use of appropriate filtering systems.
- 6.4.8. Over-spray may damage property such as parked cars, buildings or even the environment. Adequate precautions should be taken to eliminate or minimize this exposure.

7. Welding, Cutting & Brazing

- 7.1. Welding, cutting or brazing equipment may be used only by authorized and trained employees.
- 7.2. Equipment must be checked regularly to ensure that it is in good condition and free from defects.
- 7.3. Cylinders, valves, couplings, hoses, and regulators must be kept free of grease and oil.
- 7.4. Hoses are color coded – red for acetylene, green for oxygen and black for inert gas and air.
- 7.5. Before moving cylinders, regulators must be removed and protective caps placed over valves unless the cylinders are secured on special trucks.

- 7.6. When arc welding the welder must not wrap the electrode cable around the body.
- 7.7. All used tanks, drums and other containers must be thoroughly cleaned to remove any contaminants before welding or cutting commences.
- 7.8. All appropriate personal protective equipment must be used when welding or cutting.
- 7.9. Extra precautions are required for any welding or cutting in confined spaces.

8. Compressed Gas Cylinders

- 8.1. Compressed gas cylinders on occasion may be used for drilling operations. However it must be stressed that each cylinder, whether full or empty, has the potential of becoming a bomb or rocket if not handled and used in a safe and cautious manner.
- 8.2. Make sure you know the dangers of the gas you are working with.
- 8.3. Never accept acetylene cylinders that have been kept in a horizontal position.
- 8.4. Never assume that hoses and other fittings that have been used with one type of gas can be used with another type.
- 8.5. Never use a wrench or hammer to open a cylinder if it is fitted with a hand wheel.
- 8.6. Keep protective caps on all cylinders in storage.
- 8.7. Ensure that cylinders are stored with similar gases, upright and secured in position with chains or cables.
- 8.8. Make sure appropriate fire extinguishers are located in close proximity to areas where cylinders are stored or used.
- 8.9. Oxygen must be stored 20 feet from combustibles or flammables or must be separated from them by a 5-foot fire-resisting barrier.
- 8.10. Oxygen cylinders and their fittings must be kept free of grease and oil.
- 8.11. Never use oxygen instead of compressed air or compressed air instead of oxygen.
- 8.12. Keep full and empty cylinders separated.
- 8.13. Protect cylinders from sudden temperature increases, and extreme weather such as ice and direct sun. They should be stored where they are protected from heat, and unauthorized persons
- 8.14. Never drop, bang, roll, drag or slide cylinders when moving them, even if they are considered to be empty. Rolling along the bottom rim is acceptable.
- 8.15. Close cylinder valves if the cylinder is not in use, even for a short period of time.
- 8.16. Never store cylinders within areas with out adequate ventilation, such as a job-box, trunk of a vehicle, or other confined area.
- 8.17. If transporting compressed gases make sure that they are secured in an upright position and that an appropriate warning label is displayed on the vehicle.
- 8.18. All cylinders must be clearly labeled to show the contents.

- 8.19. Cylinders of liquefied fuel gas must be stored and transported so that the pressure relief valve is in contact with the vapor space in the cylinder.

9. Compressed Air

- 9.1. In the shop or laboratory compressed air pressure should be restricted to 30psi by pressure limiting nozzles. For operating equipment and tools the pressure may be up to 100psi.
- 9.2. If compressed air is used for cleaning or drying, eye protection must be used.
- 9.3. Only specially designed compressed air systems may be used to provide breathing air.
- 9.4. Compressed air must never be used to clean clothing or applied to the body, death can result from compressed air entering the body.

10. Machine Guarding

- 10.1. All employees must be properly trained before operating any machinery.
- 10.2. The Regional Manager and drillers must ensure that machinery is operated safely.
- 10.3. Equipment and machinery must receive regular safety inspections.
- 10.4. All machines should have a power shut off device within reach of the operator, this must enable the machine to be locked in the off position.
- 10.5. Non current carrying metal parts of machinery must be bonded and grounded.
- 10.6. Guards must be used to cover power transmission areas on equipment.
- 10.7. Guards are needed where injury is possible from rotating parts, nip points, cutting, shearing, forming, and punching mechanisms. Since the auger may not be easily guarded, additional caution must be taken to prevent contact with the auger.
- 10.8. Types of guards include barrier guards enclosing the dangerous parts, interlocked devices, moving barriers, two-hand control devices, and sensing devices. These devices shall not be disengaged or tampered with.
- 10.9. The purpose of the guard is to prevent contact with any dangerous parts of machinery.
- 10.10. Guards should be checked regularly, and kept in place at all times.

11. Hand Tools / Electrical Safety

- 11.1. The correct tool must be used for the job, if you are not familiar with a particular tool do not use it and ask your Regional Manager for the necessary training. Do not use the tool until you have been properly trained.
- 11.2. Tools shall only be used in a manner for which they were designed.
- 11.3. Employees will be provided with hand and power tools that are in good working condition. If you are concerned about the condition of the tool, ask your Regional Manager for assistance.
- 11.4. Damaged or faulty tools must not be used; they must be reported to a Regional Manager
- 11.5. All guards and other safety devices including personal protective equipment must be in place before a tool is used.

11.6. Employees may not use powder-actuated tools unless they have been trained and licensed.

11.7. Only authorized qualified personnel are permitted to repair tools.

12. Tool Maintenance

12.1. Every employee is responsible for ensuring that tools and equipment are in good condition.

12.2. Any tools that have developed mushroom heads must be repaired or replaced.

12.3. Broken or damaged handles must be repaired or replaced.

12.4. Damaged wrenches must be discarded.

12.5. Tools should be stored in a dry and secure box or cabinet.

13. Chain Saws

13.1. If chain saws are used to clear trees and other vegetation from a drill site extra precautions must be taken.

13.2. Read all operating instructions.

13.3. Personal protective equipment must be used.

13.4. Never allow the saw's blade to touch any thing except the material being cut.

13.5. Turn the saw off before transporting it.

13.6. Avoid kickback injuries by standing out of the chain line.

14. Portable Power Tools

14.1. Check the condition of the tool's cable/power cord and general condition before beginning to use the device.

14.2. Unless double insulated all power tools must be properly grounded and tested, all tests should be documented.

14.3. Extension cords used with portable electrical tools and equipment must be the three-wire type, and be grounded, the ground pin must never be removed.

14.4. Any joints or splices must have insulation equivalent to the cable – tape should not be used.

14.5. Electrical cords should ideally be suspended so as not to block or hang in walkways, doorways or work areas, they should not be laid on floors unless there is no alternative.

14.6. In wet areas, such as on construction sites and in other potentially wet areas, the risk of shock is greater, use extreme caution.

14.7. Approved ground fault circuit interrupters (GFCIs) or an assured grounding conductor program must be used.

14.8. Use tools with three wire plugs, ensure that connections are tight.

- 14.9. Before making repairs or adjustments disconnect the tool from the power source, discharge any stored energy, lock and tag out the device, and test the device to ensure it has been properly locked out.

15. Electrical

15.1. General

- 15.1.1. Employees must report any electrical hazards that they become aware of.
- 15.1.2. Multiple plug adapters are prohibited.
- 15.1.3. All power cords must be in good condition
- 15.1.4. The use of metal ladders or other conductive equipment is not permitted where there is a danger of contacting electrical conductors or energized equipment.
- 15.1.5. All circuit breakers and disconnect switches must be labeled to indicate the equipment or circuits they control.
- 15.1.6. Unused openings in any electrical equipment or fitting must be closed to prevent contact with live parts.
- 15.1.7. Employees working regularly near energized electrical apparatus should be trained in CPR.

15.2. Electrical Outlets

- 15.2.1. Before use – check for damaged connections, bare wires, cracked outlets, and damaged faceplates. If any damage is noted, have an electrician complete the necessary repairs.
- 15.2.2. During use - ensure that the plug fits snugly in the socket.
- 15.2.3. Removing – pull at the plug not on the cord, pulling the cord can break wires, loosen connections, and damage the plug and outlet.
- 15.2.4. Three pin plugs are designed to protect you. Never bend or remove the third pin to fit a two-hole outlet.

16. Ladders

- 16.1. Make sure the ladder is set up appropriately and read all warnings and other literature on their safe use.
- 16.2. When using straight or extension ladders follow the 4 to 1 rule. This rule simply states that the distance of the base of the ladder to the wall or structure being climbed should be one fourth of the height of the ladder. This should reduce the chance of the ladder falling.
- 16.3. All ladders should be equipped with safety feet which provide a slip resistant base.
- 16.4. When using stepladders, never climb higher than the second highest step or stand on the top of the ladder.
- 16.5. Ladders that are not fixed should be tied off at the top with a rope or other suitable material. This will help prevent the ladder from shifting while you climb.
- 16.6. When working in areas where electricity may be present never use aluminum or other ladders made from conductive materials. Wood or fiberglass ladders should be used in their place.

- 16.7. Prior to climbing a ladder make sure it is in usable condition. Check the rungs and rails for cracks. Never use a cracked ladder. If grease or oil is found on the ladder, clean the ladder prior to its use.
- 16.8. If a ladder is to be discarded do not simply throw it in the garbage. Others may remove the ladder for use and become injured. When discarding a ladder, destroy it by cutting the rungs the entire length of the ladder. Simply cutting it in half only produces two small ladders.
- 16.9. Never place a ladder on top of a box or chair. This will only increase the likelihood of a fall. If the ladder isn't long enough, the solution is simple, get a longer ladder.
- 16.10. When climbing a ladder have both hands available and always face front. Do not try to carry tools or supplies while climbing a ladder. These items should be safely hoisted to the work area with a rope.
- 16.11. Never use chairs or boxes in place of a ladder. If the job requires the use of a ladder, take the time to find one.
- 16.12. Only one person should be on a ladder at a time.
- 16.13. When working off of a ladder, do not over reach beyond the rail of the ladder. If your waist passes the rails you are likely to fall. Remember, if you can't easily reach the area get off the ladder and move it to a safe position.

17. Fall Protection

- 17.1. If work must be completed on the mast of the drill rig, attempts to lower the mast first should be completed.
- 17.2. Fall protection is required when working at levels of 6 feet or higher
- 17.3. Fall protection should consist of a full body harness and a lanyard, safety nets, or a guardrail system
- 17.4. Positioning belts are no longer acceptable fall protection devices.
- 17.5. If a fall occurs while using a lanyard or full body harness, the fall protection device shall be taken out of service. Manufacturer guidelines should then be followed to determine if the fall protection device should be destroyed. Do not reuse the device until a qualified inspector can make this determination.
- 17.6. Employees shall be properly trained on the proper use of the fall protection devices prior to their use.

18. Material Handling

18.1. Lifting and Moving

- 18.1.1. Whenever possible mechanical devices should be used to lift and move objects and equipment.
- 18.1.2. Employees must not lift heavy or bulky objects without help.
- 18.1.3. All aisles and doorways must be kept clear of obstructions.
- 18.1.4. All material handling equipment must be inspected each day.

18.2. Instructions for Manual Lifting

- 18.2.1. If manual lifting can not be avoided the following rules must be followed:
- 18.2.2. Inspect the object to be lifted for hazards including sharp edges, slippery surfaces etc.
- 18.2.3. Consider use of gloves.
- 18.2.4. Check that the route for carrying the load is free of obstructions.
- 18.2.5. Make a test lift to ensure that the load can be lifted comfortably, if not obtain assistance.
- 18.2.6. Ensure sound footing with feet at shoulder width, with one foot slightly in front of the other.
- 18.2.7. Bend the knees or squat, keeping the back as straight as possible.
- 18.2.8. Grip the object and begin the lift by straightening the knees.
- 18.2.9. Carry the load close to the body.
- 18.2.10. Avoid twisting or jerky movements.
- 18.2.11. Lower the load by reversing these steps.

19. Industrial Trucks/Forklifts

- 19.1. Only trained employees may operate lifting devices, such as fork lifts, pallet jacks, or other similar devices. Before any employee operates a forklift they must meet the OSHA training requirements. If you have not been tested both in a written and behind the wheel capacity, it is likely that you do not meet the requirements for a Forklift Operator. If you are uncertain on your training status, check with your Regional Manager.
- 19.2. Only trained personnel may operate the specific class of lift truck on which they have been trained.
- 19.3. All manufacturer safety procedures must be followed.
- 19.4. As a minimum, Industrial Truck and Forklift training must cover the following:
 - 19.4.1. Operating instructions,
 - 19.4.2. warnings and precautions
 - 19.4.3. Differences from automobile
 - 19.4.4. Controls and instrumentation
 - 19.4.5. Engine or motor operation

- 19.4.6. Steering and maneuvering
 - 19.4.7. Visibility
 - 19.4.8. Vehicle capacity and stability
 - 19.4.9. Vehicle inspection and maintenance that the operator will be required to perform
 - 19.4.10. Refueling/Charging/ Recharging batteries
 - 19.4.11. Operating limitations
 - 19.4.12. Surface conditions
 - 19.4.13. Composition and stability of loads
 - 19.4.14. Load manipulation, stacking, un-stacking
 - 19.4.15. Pedestrian traffic
 - 19.4.16. Narrow aisles and restricted areas
 - 19.4.17. Operating on ramps and sloped surfaces
 - 19.4.18. Potentially hazardous environmental conditions
 - 19.4.19. Operating in closed environments or other areas where poor ventilation or maintenance could cause carbon monoxide or diesel exhaust buildup
- 19.5. Re-training is required every
- 19.5.1. 3 years,
 - 19.5.2. after Unsafe operation , Accident or near-miss, Evaluation indicates need, Different type of equipment introduced , Workplace condition changes
- 19.6. Each truck must be equipped with a warning horn.
- 19.7. Brakes including the parking brake should be checked regularly.
- 19.8. Care must be taken when operating fork trucks inside buildings to ensure that dangerous gases and fumes do not accumulate to harmful concentrations.
- 19.9. Forklifts must be inspected prior to each shift to ensure that they are working correctly.
- 19.10. Lifting devices must be inspected regularly.
- 19.11. Rated load capacities must not be exceeded.
- 19.12. Employees must not pass under a raised load.
- 19.13. Lifting equipment must not be used for carrying passengers.
- 19.14. Suspended loads should never be left unattended, if the lift can not be continued the load must be lowered.
- 19.15. Any items loaded on trucks must be secured to prevent shifting in transit.
- 19.16. Dock plates or other suitable devices such as automatic dock leveling devices must be used.

19.17. Wheel chocks must be used when loading trailers.

OSHA Regulations

Section 2

20. Hazard Communication

20.1. Purpose

- 20.1.1. This policy is to inform you that Vironex, Inc. is complying with the OSHA Hazard Communication Standard, title 29 Code of Federal Regulations 1910.1200, by compiling a hazardous chemical list, using material safety data sheets (MSDS), ensuring that containers are labeled, and providing you with training.
- 20.1.2. This program applies to all work operations at Vironex, Inc. where you may be exposed to hazardous substances under normal working conditions or during an emergency.
- 20.1.3. Jose Suarez, Safety Manager, is the program coordinator, and has overall responsibility for the program. The program coordinator will review and update the program as necessary and copies of the written program may be obtained at your request.
- 20.1.4. Under this program, you will be informed of the contents of the Hazard Communication Standard, the hazardous properties of the chemicals with which you work, safe handling procedures and measures to take to protect yourself from these chemicals

20.1.5. List of Hazardous Chemicals

- 20.1.6. The safety manager will make a list of the hazardous chemicals and related work practices used in the facility, and will update the list as necessary. Vironex's list of chemicals identifies those used in our drilling, manufacturing, and process areas. This list identifies the corresponding MSDS for each chemical. A master list of these chemicals will be maintained by each office Regional Safety Manager, and is available from the program coordinator

20.2. Material Safety Data Sheets (MSDS)

- 20.2.1. MSDS's provide specific information on the chemicals that you use. The Regional Manager, will maintain a binder in his/her office with an MSDS for every substance on the list of hazardous chemicals. The MSDS will be a fully completed OSHA form or equivalent. The plant manager will ensure that each work site maintains an MSDS for hazardous materials in that area. MSDS's will remain readily available to you at your workstation during your shift.
- 20.2.2. Jose Suarez, Safety Manager is responsible for acquiring and updating MSDS's. He will contact the chemical manufacturer or vender if additional research is necessary or if an MSDS has not been supplied with an initial shipment. The coordinator must clear all new procurements for the company. A master list of MSDS's is available from the Delaware headquarters office.

20.3. Labels and Other Forms of Warning

- 20.3.1. The Regional Manager will ensure that all hazardous chemicals in the shop are properly labeled and updated as necessary. Labels should list at least the chemical identity, appropriate hazard warnings and the name and address of the manufacturer, importer, or other responsible party.
- 20.3.2. The Regional Manager will refer to the corresponding MSDS to assist you in verifying label information. The Regional Manager will check to make sure that all containers are properly labeled when they are shipped or transported.
- 20.3.3. If within a work area there are a number of stationary containers that have similar contents and hazards, signs, placards, process sheets, batch tickets, operating procedures or other similar materials will be posted on them to convey the hazard information. On our stationary process equipment, regular process sheets, batch tickets and similar written materials will be substituted for container labels. These written materials will be made readily available to you during your work shift.
- 20.3.4. If you transfer chemicals from a labeled container to a portable container that is intended only for your immediate use, no labels are required on the portable container.

20.4. Non - Routine Tasks

- 20.4.1. When you are required to perform hazardous non-routine tasks, entering confined spaces, etc., a special training session will be conducted to inform you of the hazardous chemicals to which you might be exposed and the proper precautions to take to reduce or avoid exposure.

20.5. Training

- 20.5.1. Everyone who works with or is potentially exposed to hazardous chemicals will receive initial training on the Hazard Communication Standard and in the safe use of those hazardous chemicals. Whenever a new hazard is introduced, additional training will be provided.
- 20.5.2. Regular safety meetings will also be used to review the information presented in the initial training. The Regional Manager will be trained regarding hazards and appropriate protective measures, so they will be available to answer questions from employees and provide daily monitoring of safe work practices.
- 20.5.3. The training plan will emphasize these items:
- 20.5.4. Summary of the Standard in this written program
 - 20.5.4.1. Chemical and physical properties of hazardous materials (i.e.; flash point, reactivity) and methods that can be used to detect the presence or release of chemicals (including chemicals in pipes.), and physical hazards of chemicals (i.e.: potential for fire, explosion, etc.).
 - 20.5.4.2. Health hazards, including signs and symptoms associated with exposure to chemicals and any medical condition known to be aggravated by exposure to the chemical.
 - 20.5.4.3. Procedures to protect against hazards (i.e.: personal protective equipment required, work practices and methods to ensure proper use in handling of chemicals and procedures for emergency response) and work procedures to follow to ensure protection when cleaning hazardous chemical spills and leaks.
 - 20.5.4.4. Where MSDS's are located, how to read and interpret the information on both labels and MSDS's and how employees may obtain additional hazard information.

20.5.5. The Regional Manager will review Vironex's employee-training program and advise upper-management on training or retraining needs. Retraining is required when a hazard changes or when a new hazard is introduced into the workplace, but it will be company policy to provide training regularly in safety meetings to ensure the effectiveness of the program.

20.5.6. As part of the assessment of the training program, the Regional Manger will obtain input from employees regarding the training they have received and their suggestions for improving it.

20.6. Contractor Employees

20.6.1. The Safety Manager, upon notification by the responsible Regional Manager, will advise outside contractors of any chemical hazards that may be encountered in the normal course of their work on the premises. Items communicated will include the labeling system in use, the protective measures to be taken, and the safe handling procedures to be used. The Regional Manager also will notify these individuals of the location and availability of the MSDS's.

20.6.2. In addition, every contractor brining chemicals on site must provide Vironex, Inc. with appropriate hazard information on these substances, including the labels used and the precautionary measures to be taken in working with these chemicals.

20.7. Additional Information

20.7.1. All employees can obtain further information on the Hazard Communication Standard, applicable MSDS's and chemical information lists from the Delaware headquarters office.

21. Personal Protective Equipment

When exposures cannot be controlled by engineering or administrative means, the use of Personal Protective Equipment (PPE) may be necessary. Wearing PPE is not only a good idea but it is the law. Therefore, Regional Managers and drillers must ensure that the proper PPE is used. Personal protective equipment includes but is not limited to eye protection, foot protection, respiratory protection, hearing protection, head protection, gloves, and special clothing.

21.1. Responsibilities

- 21.1.1. Employees will be advised of the personal protective equipment needed. However, on occasion you may be confronted with a situation where PPE is needed, thus the employee may need to use their own judgement in determining when PPE is required.
- 21.1.2. Vironex will provide all PPE. However, you may use your own PPE if it meets the minimum protection requirements.
- 21.1.3. All employees are required to inform their Regional Manager when employee-owned PPE is being used. The employer reserves the right to require employees to use company-owned PPE.
- 21.1.4. Although the Regional Manager or driller will ensure that appropriate personal protective equipment is being used. It is the employee's responsibility to wear the PPE when needed and to report any PPE defects or damage to the Regional Manager.
- 21.1.5. Personal protective equipment must be used by all personal including management and visitors in designated areas.

21.2. Protective Footwear

- 21.2.1. Safety boots are required for all employees involved with drilling operations and whenever there is a risk of foot injuries.
- 21.2.2. Safety footwear must have steel toes or caps, and must have soles that will prevent slipping on wet, loose, or smooth surfaces, and should resist penetration by sharp objects.
- 21.2.3. All foot protection must meet the requirements of ANSI Z 41.1.

21.3. Head Protection

- 21.3.1. Head protection is required if you are working in areas where there is a potential for injury from falling objects. Therefore, hard hats are required for all employees involved in drilling operations including the driller, the helper, and any other individuals working at the site. Significant injuries can occur from falling debris, or items that may swing on ropes or cables, such as pulling plates or hammer weights.
- 21.3.2. In order for the hard hat to be effective, it must not only be worn when working but it must be worn in the proper manner.
- 21.3.3. If the hard hat is equipped with a bill, the bill should be facing forward to provide protection to the forehead.
- 21.3.4. Hard hats shall not be worn backwards.
- 21.3.5. A daily inspection of the hard hat should identify that there are no cracks or scrapes that could affect its performance.
- 21.3.6. In addition, the internal webbing should be in good condition and should be appropriately installed.
- 21.3.7. If the hard hat is damaged or worn to the extent that it may no longer provide the degree of protection needed, the hard hat should be replaced.

- 21.3.8. Hard hats older than 5 years old should be replaced.
- 21.3.9. All head protection must meet the requirements of ANSI Z 89.1.
- 21.3.10. Additional hard hats should be made available for visitors.

21.4. Protective Gloves

- 21.4.1. Various types of protective gloves are available and should be selected based on the job being completed.
- 21.4.2. Cloth gloves - commonly used and provide protection from slivers and abrasions.
- 21.4.3. Leather gloves - provide protection from sparks, some heat and from rough material.
- 21.4.4. Rubber gloves - provide protection from water, solvents, and a variety of chemicals.
- 21.4.5. With each type of hand protection there are limitations that should be understood. The selection of the most appropriate type of hand protection should be completed for each type of job performed. Remember that sometimes it may be best to not wear any hand protection. Gloves with large cuffs or other material that can become easily caught should not be used near rotating machinery. All gloves should fit appropriately and should be easily removed.

21.5. Eye Protection

- 21.5.1. Eye protection is required when there are exposures from flying particles or other debris, such as liquid chemicals, acids or caustic liquids. As a result, eye protection should be worn when these exposures would normally be expected.
- 21.5.2. Safety glasses must meet the American National Standards Institute (ANSI) Z87.1 requirements. This standard requires the safety glasses to meet minimum levels of protection. In addition, the safety glasses should fit snugly and should not interfere with the movements of the wearer, be durable, capable of being disinfected and easily cleaned, and should be kept clean and in good repair.
- 21.5.3. If you wear corrective lenses, do not make the assumption that your prescription glasses protect you as well as safety glasses. Most prescriptions do not meet the ANSI Z87.1 requirements unless they have been designed to do so. Safety glasses will have impact resistant frames, lenses, and side shields. If you do not have prescription safety glasses options available to you include:
 - 21.5.4. Using safety glasses with protective lenses providing optical correction,
 - 21.5.5. Using goggles worn over corrective glasses without disturbing the adjustment of the glasses, or
 - 21.5.6. Using goggles that incorporate corrective lenses mounted behind the protective lenses.
- 21.5.7. Scratched or pitted lenses may reduce the your vision and should be replaced. Such damage may also cause the glasses to break.
- 21.5.8. If the manufacturer's recommendations allow, using a non-abrasive soap and warm water can provide thorough cleaning. Any defective parts should be replaced. Always follow the manufacturer guidelines on the cleaning of the safety glasses.
- 21.5.9. Employees involved in welding, burning and cutting operations must use welding hoods. The use of safety glasses under welding hoods is required.
- 21.5.10. Employees should not wear contact lenses while completing any work process. Exposure to flying particles, radiation from welding, or chemicals can cause significant or permanent damage to the eyes.

21.6. Respiratory Protection

- 21.6.1. Respirators may be required when the potential to be exposed to harmful levels of dusts, fumes, mists, sprays, vapors, gases, fog or smoke is likely to occur. As a result a determination on the need to wear respirators should be made by a Regional Manager or driller. Any employee that has a concern on the necessity of wearing respirators should stop work until a determination has been made.
- 21.6.2. If you are required to wear a respirator, a medical questionnaire should be completed and may require you to have a pulmonary exam.
- 21.6.3. Employees assigned to wear a respirator shall be provided with a respirator for their exclusive use. The respirator should be available for use even on those job sites where harmful levels of air contaminants are not anticipated.
- 21.6.4. Any employee found removing their respirator within a hazardous area is required to relate the circumstance of the incident to his or her Regional Manager and may be subject to immediate dismissal.
- 21.6.5. Each employee assigned to wear a respirator must undergo a fit test. Fit testing shall conform to the respirator manufacturers' specifications. OSHA requires that all respirators be properly fit-tested using a quantitative or qualitative fit test when initially assigned to a user and at least annually thereafter.
- 21.6.6. The new classes of non-powered particulate respirators require new decision logic for selection of the proper respirator. The selection process for using the new particulate classification is outlined as follows:
 - 21.6.7. The selection of N, R, and P series filters depends on the presence or absence of oil particles, as follows:
 - 21.6.7.1. if no oil particles are present in the work environment, use a filter of any series (i.e., N, R, or P series).
 - 21.6.7.2. if oil particles (e.g., lubricants, cutting fluids, glycerine, etc.) are present, use an R or P series filter. Note: N-series filters cannot be used if oil particles are present.
 - 21.6.7.3. if oil particles are present and the filter is to be used for more than one work shift, use only a P-series filter.
- 21.6.8. All respirators shall be inspected and cleaned regularly. The respirator inspection shall include an inspection for dirt, residue, cracks, tears, or holes. Make sure the face-piece is not distorted, that the headband is still elastic, and that the clips are working properly. Cartridge holder threads shall not be worn or cracked. Cartridge or filters shall not be dirty, cracked, or dented.
- 21.6.9. Respirator maintenance requires daily cleaning and disinfecting. Due to the potential damaging effects caused by cleaning and disinfecting, our guideline is to follow the manufacturer specifications.

21.7. Hearing Protection

- 21.7.1. Employees will be provided with information and training on preventing exposure to potentially harmful noise levels. This will include the effects of noise on health and the correct use of personal protective equipment. All employees working in areas where noise levels exceed acceptable standards (85 dbA) will be provided with hearing protection. Hearing protection is mandatory at noise levels at or above 90 dbA for an 8-hour-time-weighted average.
- 21.7.2. Exposure to noise from the drill rig engine, the sample hammer, compressors, radios, or other sources of noise can cause temporary or permanent hearing loss. To minimize this exposure, it is recommended that hearing protection be worn whenever the drill rig is in operation. Remember that noise reduction is possible through limiting the number of devices producing noise.

21.7.3. Earplugs and earmuffs should be cleaned daily. Earplugs may require replacement to prevent infections. Keep in mind that all hearing protection is not alike. Some hearing protection devices can work better than others can. Thus, you should choose the type most suited for your exposure level and the type of work being performed.

21.7.4. Hearing protection can reduce your exposure to noise. However, proper protection is not possible if you do not wear it properly or if it is not worn consistently. Hearing protection is made available at no cost to our employees.

21.8. Other Personal Protective Equipment

21.8.1. For certain drilling operations additional personal protective equipment may be required. When drilling close to a highway reflective clothing will be required. If drilling is being conducted in ground contaminated with chemicals or radiation special protective clothing and equipment will be needed. Management and the client will determine the level of specialized personal protective equipment.

22. Bloodborne Pathogens Exposure Control Plan

22.1. Overview

22.1.1. In accordance with the OSHA Bloodborne pathogens Standard, 1910.1030, the following exposure control plan has been developed.

22.1.2. While we do not anticipate exposure to human blood, human blood components or items containing human blood we want our employees to be aware of and take every precaution necessary to prevent exposure.

22.1.3. Vironex, Inc. does not designate or require any individuals as first aid responders, unless required under other standards by OSHA.

22.1.4. The purpose of our exposure control plan is to reduce our employees exposure to bloodborne pathogens.

22.2. Exposure Determination

22.2.1. Those employees who are required by Vironex to be trained in administering first aid may come in contact with human blood or other potentially infectious materials (OPIM).

22.3. Methods of Compliance

22.3.1. Universal Precautions will be utilized in the handling of all human blood and OPIM's.

22.4. Engineering Controls

22.4.1. Within the office, hand sinks are located in all departments and are readily accessible to all employees who have the potential for exposure.

22.4.2. When on a job site, washing facilities may not be readily accessible. Therefore, employees should wash their hands with antiseptic hand cleaner. Hand washing must still take place as soon as possible after exposure.

22.4.3. Additional controls should be completed in the following manner.

22.4.3.1. Employees will wash their hands and any other exposed skin with soap and hot water immediately or as soon as possible after contact with blood or OPIM, for 15 seconds, in a manner causing friction on both inner and outer surfaces of the hands.

- 22.4.3.2. Employees will be provided with antiseptic hand cleaner and paper towels when hand washing is not feasible. However, hand washing must still take place as soon as possible after exposure.
- 22.4.3.3. Eating, drinking, smoking, applying cosmetics or lip balm and handling contact lenses is prohibited in work areas where there is the potential for exposure to bloodborne pathogens.
- 22.4.3.4. If professional medical attention is required, a local ambulance will be the first choice, a personal car will be the second. If a personal car is taken, impervious material should be used to prevent contamination of the vehicle.
- 22.4.3.5. New employees or employee being transferred to other sections will receive training about any potential exposure from the section manager.

22.5. Personal Protective Equipment

- 22.5.1. All personal protective equipment used while completing work for Vironex, Inc. will be provided without cost to employees. Personal protective equipment will be chosen based on the anticipated exposure to blood or OPIM. The protective equipment will be considered appropriate only if it does not permit blood or OPIM to pass through or reach the employees' clothing, skin, eyes, mouth, or other mucous membranes under normal conditions of use.

22.6. Disposal of Contaminated Items and Communication of Hazard

- 22.6.1. Employees must:
 - 22.6.1.1. Use bleach to disinfect any blood or OPIM.
 - 22.6.1.2. Apply the bleach with single-use gloves and allow to sit for 15 minutes.
 - 22.6.1.3. Place any single-use gloves that have been contaminated in a biohazard garbage bag and cover.
- 22.6.2. Regulated waste should be placed in appropriate containers, label and dispose of in accordance with applicable state, federal and local laws.
- 22.6.3. Employees will be warned of biohazard bags by labels attached to the disposal bags. Labels used will be orange-red and marked with the work BIOHAZARD or the biohazard symbol.

22.7. Housekeeping

- 22.7.1. Maintaining our work areas in a clean and sanitary condition is an important part of our Bloodborne Pathogens Exposure Control Plan. Employees must decontaminate working surfaces and equipment with an appropriate disinfectant after completing procedures involving blood or OPIM. All equipment, environmental surfaces and work surfaces shall be decontaminated immediately or as soon as feasible after contamination.
- 22.7.2. Employees must clean and disinfect when surfaces become contaminated and after any spill of blood or OPIM.
- 22.7.3. Employees will use a solution of one part bleach to ten parts water for cleaning and disinfecting.
- 22.7.4. Working surfaces and equipment will be routinely cleaned, disinfected and maintain.

- 22.7.5. Potentially contaminated broken glass will be picked up using mechanical means, such as dust pan and brush, tongs, etc.
- 22.7.6. Universal precautions will be followed when handling soiled laundry.
- 22.7.7. Laundry contaminated with blood or OPIM will be handled as little as possible. Employees who handle contaminated laundry will utilize personal protective equipment to prevent contact with blood or OPIM from coming into contact skin or street clothes.
- 22.7.8. Contaminated clothing will remain on the premises, or will be sent directly to a laundry facility for cleaning. Employees will be given the option of reimbursement for the cost of contaminated clothing and the clothing will be disposed.

22.8. Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-Up

- 22.8.1. Vironex, Inc. shall make available within 10 days of possible exposure, pending our being aware of the exposure, the Hepatitis B vaccine and vaccination series to all employees who have occupational exposure.
- 22.8.2. An exposure incident is any contact of blood or OPIM's with non-intact skin or mucous membranes. Any employee having an exposure incident shall contact their Regional Manager or human resource manager immediately. All employees who have an exposure incident will be offered a confidential post-exposure evaluation and follow-up in accordance with the OSHA standard. This includes a visit to a physician selected by the employer. The health care professional written opinion will be provided to the employee within 15 days of the evaluation.

22.9. Training

- 22.9.1. Training is provided at the time of initial assignment to tasks where occupational exposure may occur, and that it shall be repeated within twelve months of the previous training. Training is tailored to the education and language level of the employee, and offered during the normal work shift. The training will be interactive and cover the following:
 - 22.9.1.1. A copy of the standard and an explanation of its contents;
 - 22.9.1.2. A discussion of the epidemiology and symptoms of bloodborne diseases;
 - 22.9.1.3. An explanation of the modes of transmission of bloodborne pathogens;
 - 22.9.1.4. An explanation of the our Bloodborne Pathogen Exposure Control Plan
 - 22.9.1.5. The recognition of tasks that may involve exposure;
 - 22.9.1.6. An explanation of the use and limitations of methods to reduce exposure, for example engineering controls, work practices and personal protective equipment;
 - 22.9.1.7. Information on the types, use, location, removal, handling, decontamination, and disposal of PPE;
 - 22.9.1.8. An explanation of the basis of selections of PPE;
 - 22.9.1.9. Information on the Hepatitis B vaccination, including efficacy, safety, method of administration, benefits, and that it will be offered free of charge;

22.9.1.10. Information on the appropriate actions to take and persons to contact in an emergency involving blood or OPIM;

22.9.1.11. An explanation of the procedures to follow if an exposure incident occurs, including the method of reporting and medical follow-up;

22.9.1.12. Information on the evaluation and follow-up required after an employee exposure incident;

22.9.1.13. An explanation of the signs, labels, and color coding systems.

22.9.2. The person conducting the training shall be knowledgeable in the subject matter.

22.9.3. Medical records shall be maintained in accordance with OSHA Standards. These records shall be kept confidential, and must be maintained for at least the duration of employment plus 30 years.

23. Lockout Tagout

23.1. This is also known as the Control of Hazardous Energy, its purpose is to ensure that machinery and equipment is locked out before any maintenance or repair work is carried out on it. This will prevent employees from being injured by any unexpected energizing, start-up or other release of energy that could occur and cause an injury.

23.2. All equipment and machinery is required to be locked out to prevent employees from operating it accidentally or inadvertently while it is being serviced or repaired by another employee. Any stored energy such as hydraulic, pneumatic or mechanical must be released before the equipment is locked out. Appropriate employees will have keyed safety locks to use for locking out.

23.3. Employees should not attempt to operate machinery or equipment that has been locked out.

23.4. The locking out must apply to all energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, gravity and thermal. The energy must be disconnected, drained, or otherwise controlled before the equipment can be locked out.

23.5. After equipment has been locked out it must be tested to ensure that it de-energized and can not be started.

23.6. Except in management authorized circumstances only the person locking out a machine or equipment may remove the lock and re-energize it.

24. Hazardous Waste Site Operations

24.1. The site-training program is designed to ensure that workers receive the training they need to work safely hazardous waste sites.

24.2. Site safety and health training requirements are based on the job hazard assessments.

24.3. Employees who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

24.4. Specific Site Health and Safety Program

24.4.1. The following items will be maintained in our site specific health and safety plan for hazardous waste site operations:

- 24.4.1.1. Training for site workers
- 24.4.1.2. Site briefings for visitors and workers
- 24.4.1.3. Initial HAZWOPER training (40 or 24 hr)
- 24.4.1.4. Supervised Field Experience
- 24.4.1.5. Management and supervisor training
- 24.4.1.6. Training certification
- 24.4.1.7. Emergency response training*
- 24.4.1.8. Refresher training
- 24.4.1.9. Equivalent training
- 24.4.1.10. Training records

24.5. Initial training

- 24.5.1. Initial training requirements are based on a worker's potential for exposure and compliance with the requirements of 29 CFR 1910.120(e)(3).
- 24.5.2. Personnel at this site must successfully complete 40-hour initial HAZWOPER training consistent with the requirements of 29 CFR 1910.120(e)(3)(i) in order to work in contaminated areas. In addition, such personnel provide documentation of having received 3 days of supervised field experience applicable to this site, or receive three days of supervised field experience at this site.

25. Confined Spaces

25.1. General

- 25.1.1. Employees entering confined spaces are at increased risk of injury or death due to hazards such as entrapment, engulfment, and harmful atmospheric conditions.
- 25.1.2. Before any employee enters into a confined space the following must be ensured:
- 25.1.3. All moving equipment including agitators must be locked out.
- 25.1.4. All sources of hazardous or corrosive materials must be blocked off using valves or other means.
- 25.1.5. Atmospheric tests must be conducted to check oxygen, toxicity, and explosivity.
- 25.1.6. Standby employees must be available offer assistance if necessary including life lines to remove the person from the confined space, CPR, and first aid.
- 25.1.7. Definitions : A confined space is an enclosed area that:
 - 25.1.7.1. Has restricted means of entry or exit,
 - 25.1.7.2. That is large enough to enter and perform work,
 - 25.1.7.3. And that is not designed for continuous occupancy.
 - 25.1.7.4. Includes vaults, tanks, pits, and crawl spaces.
 - 25.1.7.5. Often employees working in such spaces are at risk of exposure to injury from entrapment, engulfment, and hazardous atmospheric conditions.
- 25.1.8. A permit required confined space is a space with hazards such that a permit is required for entry. It contains or has the potential to contain a hazardous atmosphere, contains a material with potential for engulfing an entrant, internal configuration may cause an entrant to be trapped, contains other recognized serious safety or health hazards.

25.2. Requirements of the Standard

- 25.2.1. Employers must evaluate the workplace to determine if there are any confined spaces, and if so if they are permit required. If they are permit required spaces employees must be informed as to their existence location and danger. Warning signs must be posted on them.
- 25.2.2. DANGER – PERMIT REQUIRED CONFINED SPACE - Authorized Entrants Only
- 25.2.3. If employees are required to enter the space a written permit space program must be developed and communicated to employees.
- 25.2.4. If the employer can show by inspection and monitoring that the only hazard is an actual or potential hazardous atmosphere which can be made safe by continuous forced ventilation alone, they may be exempted from certain requirements including permits.
- 25.2.5. The internal atmosphere must always be tested, initially for oxygen, then for flammable gases and vapors, and then for potential air contaminants, before any employee may enter.

25.2.6. If employee entry into confined spaces is to be allowed a written permit required confined space program must be developed and implemented.

25.3. Hazardous conditions include:

25.3.1. An atmosphere containing less than 19.5% oxygen, usually the result of displacement by other gases (normal air contains 20.9% oxygen).

25.3.2. Presence of flammable gases and vapors such as methane, ethane, propane, gasoline, and alcohol.

25.3.3. Toxic gases and vapors such as hydrogen sulfide, nitrogen dioxide, 1,1,1 trichloroethane, and methylene chloride.

25.4. Hazard Prevention

25.4.1. Every precaution must be taken to prevent oxygen deficiency or other hazardous situation this will initially involve engineering methods including general and local exhaust ventilation, or substitution of harmful materials. When these controls are not effective respiratory protection may be used.

25.4.2. Written procedures covering identification, testing and entry into a confined space that may have an oxygen deficiency must be established and approved by management. Monitoring equipment, alarms, warning lights, and signs must be in place wherever there is a potentially oxygen deficient atmosphere.

25.4.3. The following steps must be followed before a confined space is entered:

25.4.3.1. An entry permit must be issued to the employee by a Regional Manager.

25.4.3.2. Air quality in the space must be tested for oxygen level and toxic or flammable contaminants.

25.4.3.3. Ventilation and purging must be provided when possible.

25.4.3.4. Any supply lines leading to the confined space must be isolated to prevent a hazardous condition from developing.

25.4.3.5. All electrical equipment, pressure systems, mechanical equipment, and piping must be locked out.

25.4.3.6. In addition if hazardous gases are present in the space that must be entered these additional procedures must be followed:

25.4.3.7. Personal protective equipment, including air supplied respirator, harness and lifeline must be worn.

25.4.3.8. One or more people with respirators must remain outside the space, constant communication must be maintained with those employees in the confined space.

26. Drilling Safety

26.1. General

- 26.1.1. This section covers the control of safety hazards on and around the drill site, hazards encountered when travelling to or from the drill site, and hazards involved in maintaining drilling equipment.
- 26.1.2. Each drill crew must have a designated safety supervisor, usually the driller, all other employees must follow the driller's instructions.

26.2. Housekeeping

- 26.2.1. Tools equipment and supplies must be stored in suitable locations at the drill site so they can be safely handled and will not fall on a crewmember or the public.
- 26.2.2. Equipment and tools should not be stored or transported in or on the drill mast (derrick).
- 26.2.3. Augers, casings, rods and pipe must be stacked on racks or sills to prevent rolling or sliding.
- 26.2.4. All work areas, platforms and walkways clear of all obstructions, ice, and grease or mud that could cause a trip or fall.

26.3. Maintenance

- 26.3.1. When performing maintenance on the drill rig or other equipment follow these guidelines:
- 26.3.2. Always wear safety glasses.
- 26.3.3. Before adjusting, lubricating or repairing the rig or fittings shut down the drill rig engine. Prevent accidental starting by removing the ignition key.
- 26.3.4. Before working under the rig lower the jacks and/or block the wheels, and ensure that handbrakes are set.
- 26.3.5. Before beginning maintenance or repairs on the hydraulic equipment release all pressure from the system. Use caution when opening drain plugs and radiator caps that may be under pressure.
- 26.3.6. Never climb the mast (derrick), if maintenance is necessary the mast (derrick) should be lowered and the engine stopped.
- 26.3.7. Never use gasoline for cleaning around the drill rig.
- 26.3.8. Never weld or cut near a fuel tank.
- 26.3.9. If guards, covers or caps have been removed for maintenance ensure that they are replaced.

26.4. Preparing the Work Area

- 26.4.1. Before drilling the work area should be as clear and level as possible, drilling should not begin if there are obstructions, trees or the ground is unstable.

26.5. Start Up

- 26.5.1. Before starting the engine ensure that brakes are set, gears boxes are in neutral, hoist controls are disengaged and that all other controls are in the correct positions and that the cathead rope is not on the cathead.
- 26.5.2. Ensure that bore hose locations have been marked by the Client. Verify that the bore hole location is free and clear of subsurface utilities and/or structures. The Client is solely responsible for ensuring that each location has been cleared of subsurface utilities and/or structures.

26.6. Drilling

- 26.6.1. Never drive the drill rig with the mast (derrick) raised.
- 26.6.2. Before raising the mast (derrick) check for any overhead obstruction.
- 26.6.3. Every one except the driller should be clear of the rig when the mast (derrick) is raised.
- 26.6.4. Leveling jacks or solid cribbing must be in place before raising the mast (derrick).
- 26.6.5. Avoid standing on the elevated deck of the drill rig while it is in operation.
- 26.6.6. The operator must shift the transmission controlling the rotary drive and the feed lever to neutral before leaving the control area. Before leaving the drill area, the drill must be shut down.
- 26.6.7. Tools must never be thrown or dropped.
- 26.6.8. If drilling in an enclosed area ensure that exhaust fumes will not accumulate.
- 26.6.9. Keep boots free of mud and grease, when standing on the drill platform make use of handholds.
- 26.6.10. In freezing weather do not touch metal with bare hands.
- 26.6.11. Cover and protect unattended bore-holes to prevent falls.
- 26.6.12. During an electrical storm stop drilling and move to a safe area away from the drill rig.

26.7. Augers

- 26.7.1. The driller must ensure that the helper is well away from the auger column and that the auger fork is removed before rotation begins.
- 26.7.2. Wear the correct equipment, avoid loose clothing and hair that could become entangled with the auger. No cuffs on pants, no unbuttoned shirts, no loose sleeves, belts, or pocket flaps, work gloves should not be loose, have large cuffs or loose straps.
- 26.7.3. Check all safety devices – trip wires, shut-offs, are the guards in place and working correctly.
- 26.7.4. Keep area around the drill clear of debris, and as clean as possible, make use of any platforms, keep excess pipe and connections in the storage rack, not on the ground.
- 26.7.5. Clean mud and grease off boots before stepping onto a drill platform, always use railings and hand holds.
- 26.7.6. Do not use over long pins or bolts for coupling, only use the manufacturers recommended method for securing the auger to the power coupling.

- 26.7.7. When the auger is rotating stay well clear of it, never reach behind or around it, never touch the coupling or the auger with hands a wrench or with any other tool.
- 26.7.8. Never remove earth or debris from rotating augers. They should be cleaned only when the rig is in neutral and they have stopped rotating.
- 26.7.9. Never leave the drill rig controls unless the transmission and feed lever are in neutral.
- 26.7.10. Before leaving the immediate vicinity of the rig the drill engine should be shut down.
- 26.7.11. Move auger cuttings using a long handled shovel when the auger has come to a complete stop, never use hands or feet to complete this task.
- 26.7.12. Follow the established system when connecting and disconnecting auger sections, and when inserting or removing the auger fork.
- 26.7.13. Use the tool hoist to handle auger sections when possible.
- 26.7.14. Never place any part your body under an auger section; take particular care of hands and feet.

26.8. Transporting the Drill Rig

- 26.8.1. Only licensed and authorized personnel are permitted to operate the vehicle.
- 26.8.2. Be aware of the mast (derrick) overhang and travelling height, particular care is needed when approaching other vehicles, and structures. Be particularly careful with canopy roofs at service stations, hotels, and other commercial buildings.
- 26.8.3. Never drive with the mast (derrick) in the raised or partially raised position.

26.9. Electrocutation on the Drilling Rig

- 26.9.1. The most frequent cause of job related deaths in the drilling industry is electrocution caused by contacting overhead power lines with the mast (derrick) of the drill rig. Drilling can safely be conducted in areas where there are overhead power lines but certain precautions must be taken.
- 26.9.2. Assume that all wires are live and dangerous.
- 26.9.3. Always keep adequate clearance from electric wires in accordance with state and local regulations as well as manufacturers guidelines.
- 26.9.4. At least 10 feet of clearance must be allowed.
- 26.9.5. The following are the minimum distances that must be maintained from overhead electrical lines:
 - 26.9.5.1. 10 ft. at 50 kilovolts
 - 26.9.5.2. 10 ft. plus 0.4 in. for each kilovolt above 50 kilovolts
 - 26.9.5.3. twice the length of the line insulator
 - 26.9.5.4. never less than 10 ft
- 26.9.6. Never drill under or near overhead wires.
- 26.9.7. Contact the Power Company to determine the kilovolts in an electrical line.
- 26.9.8. Insulate all handles that are used to operate the rig.
- 26.9.9. Rig driver should always jump clear when exiting the cab, and not swing from it.
- 26.9.10. Remember – the operator in the cab is generally unaware that an overhead wire has been contacted.

26.9.11. If the drill rig does contact overhead wires follow these safety guidelines:

26.9.12. Keep every one away from the rig. Do not touch any part of the equipment or attempt to enter or leave the cab.

26.9.13. Have someone call the Power Company and the Fire Department immediately requesting assistance.

26.9.14. Do not touch any one who may be in contact with the current, unless life is threatened.

26.9.15. If a rescue is attempted use a dry, clean non-conductive material, such as a polypropylene rope to remove the victim, keep as far away as possible. Only touch the victim when well away. **WARNING: Use of a manila rope or wooden pole may conduct electricity. Under certain circumstances even generally non-conductive materials may conduct electricity.**

26.9.16. If the victim is unconscious when removed, consider administering first aid and CPR if you have been properly trained and designated.

26.10. Fire on the Rig

26.10.1. A drilling rig can be totally destroyed by a fire, but the losses due to employee injuries, third party injuries, property damage, or a loss of business can be even greater.

26.10.2. The following will help to reduce the risk of fire:

26.10.2.1. Preventive maintenance –including:

26.10.2.1.1. Repair all leaking or worn hydraulic and fuel lines.

26.10.2.1.2. Check ignition wiring.

26.10.2.2. Check battery and cables for shorts.

26.10.3. Do not weld in the field except in an emergency.

26.11. Set Up and Equipment Security:

26.11.1. Remove all combustibles from the area including grass, trash etc.

26.11.2. Remove all gas cans and other containers flammable liquid.

26.11.3. Refuel pumps, compressors and generators with care:

26.11.4. No smoking within 25 feet.

26.11.5. Use funnels and spouts to reduce spillage.

26.11.6. Shut off equipment and allow it to cool before refueling.

26.11.7. Keep a Class B or multipurpose fire extinguisher in the refueling area.

26.11.8. Do not over fill tanks.

26.11.9. Use only approved containers for fuels.

26.12. Drillers must be familiar with the operation of fire extinguishers. The best type to have available would be an all-purpose (Class ABC) extinguisher, several should be available on each rig.

27. Hoists

- 27.1. Ensure that all connections and fittings are installed and used in accordance with manufacturer instructions.
- 27.2. Do not use tool hoists for moving objects away from the drill rig, or for moving a stuck vehicle.
- 27.3. If tools or other materials can not be moved using the hoist, the hoist line should be disconnected and the tools connected directly to the drill feed mechanism. Hydraulic leveling jacks should not be used for added pull.
- 27.4. Loads should be applied smoothly and steadily.
- 27.5. Never use frozen ropes.
- 27.6. Replace worn sheaves, bearings, guides and rollers.
- 27.7. Know the working load of the equipment and never exceed it.
- 27.8. Always wear gloves when handling wire ropes.
- 27.9. Never guide rope on drums with hands.
- 27.10. Never leave a hoisted load unattended.
- 27.11. Never hoist a load over a person.

28. Wire Rope Inspections

- 28.1. Wire ropes shall be removed from service when any of the following conditions exists:
 - 28.1.1. Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay
 - 28.1.2. Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires
 - 28.1.3. Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires
 - 28.1.4. Reduction from nominal diameter of more than three sixty-fourths inch for diameters up to and including three-fourths inch; one-sixteenth inch for diameters seven-eighths to 1 1/8 inches; and three thirty-seconds inch for diameters 1 1/4 to 1 1/2 inches.
- 28.2. While the manufacturer guidelines should be followed, consider these additional safety suggestions:
 - 28.2.1. Visually inspect wire ropes each week or when they have not been used for several days.
 - 28.2.2. Look for broken wires, abrasion, reduction in diameter, corrosion, damage from heat, jamming, bird caging, kinking, or wire protrusion. If you note any fatigue or damage, consider a thorough inspection and determine if the wire rope should be taken out of service.

29. Cable Fasteners

- 29.1. When cable fasteners (crosby type), are used the u-bolt should be on the dead end of the rope. The saddle should be on the live end of the rope. If the cable fasteners are installed incorrectly, they may fail causing the load to drop. Severe injury or even death may occur as a result.



- 29.2. Once the cable fasteners have been installed, they should be inspected. The u-bolt nuts should be tightened immediately after initial load carrying use and at frequent intervals thereafter.
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- 29.3. Other fittings such as hooks, shackles, or rings that have been damaged or show excessive wear should be replaced immediately.
- 29.4. Remember that care should be taken to prevent the rope from turning around sharp corners on fittings or on the load. Using the wire rope in this manner may result in damaging the rope, which may lead to its failure.

30. Utilities

No drilling should begin until the location of all utilities above and below ground is known. All boring/sample locations must be marked by the Client. A boring/sample locations must be cleared of subsurface utilities and/or structures by the Client, prior to commencement of drilling operations.

30.1. Underground

- 30.1.1. If drilling is being done in a developed area and there are no overhead wires, there is a strong likelihood that there are buried utilities. Other indications are fire hydrants, electrical boxes, and manhole covers. Before any drilling, the local utility company or underground utility locating service must be contacted by the Client. Utilities will typically be marked with stakes, paint or flags.
- 30.1.1.1. Red indicates power lines,
 - 30.1.1.2. blue indicates water,
 - 30.1.1.3. green indicates sewer,
 - 30.1.1.4. yellow indicates gas or steam,
 - 30.1.1.5. orange telephone or communication.
- 30.1.2. Never assume that all underground utilities follow the same route, or that they follow property boundaries.
- 30.1.3. Never attempt to drill before all utilities have been identified and marked by the Client. A metal detector will not provide a good indication of buried utilities, as not all utilities will be detected.

- 30.1.4. Location services typically require 1 to 3 days notice. Care should be taken to ensure that the utility markers are not disturbed, if this is likely utilities should be marked on a map or photographs of the site should be taken.

30.2. Overhead

- 30.2.1. Extreme caution must be taken when the drill rig will be used in the vicinity of overhead electrical power lines.
- 30.2.2. If overhead power lines are close to drill sites it must be assumed that the lines are live and dangerous.
- 30.2.3. Take particular care if the lines are sagging.
- 30.2.4. If safe clearance is in question the utility company should be contacted and requested to raise or de-energize the lines.
- 30.2.5. Before raising the mast (derrick) on any rig walk around the drill rig. If there are overhead lines within 100 feet the utility company should be notified before drilling begins.
- 30.2.6. Drilling should not be considered if there are power lines within 10 feet of the proposed drill location.
- 30.2.7. The following are the minimum distances that must be maintained from overhead electrical lines:
 - 30.2.7.1. 10 ft. at 50 kilovolts
 - 30.2.7.2. 10 ft. plus 0.4 in. for each kilovolt above 50 kilovolts
 - 30.2.7.3. twice the length of the line insulator
 - 30.2.7.4. never less than 10 ft

31. Road Work

- 31.1. The exposure of a worker being hit is the greatest when placing or removing work zone equipment. Extra caution should be used when dealing with road work zones. Workers need to be alert, have proper training, and use the proper work zone equipment.
- 31.2. Wear appropriate clothing that will not interfere with the ability to safely perform your job and that will offer a high degree of visibility.
- 31.3. When working in or along roadways employees shall wear an orange or reflective vest. Make every opportunity to be seen.
- 31.4. Only those employees who have successfully passed the flagger training shall be allowed to perform this function.
- 31.5. When working in road work zones or in areas where vehicle traffic can be anticipated, the use of warning signs, safety cones, and/or barricades shall be used and when required meet the minimum State requirements for road work safety.
- 31.6. Be aware of your location. Don't work outside of the work area designated for drilling activities. In addition make sure hand tools and other debris will not interfere with the driver's ability to safely pass your work zone.
- 31.7. If possible, try to position the drill rig and support vehicle in such a manner that the equipment provides protection against on coming vehicles. This should be considered only if it can be achieved without interfering with traffic flow or increasing the degree of hazard.

32. Working Over or Near Water

- 32.1. It is an OSHA requirement that any employee working over water and the potential of drowning exists, shall be provided with U.S. Coast Guard-approved life jacket or buoyant work vests.
- 32.2. This can present an additional hazard of wearing a bulky life jacket while drilling since loose straps or other material could inadvertently become caught in the rotating equipment. Thus, additional precautions must be taken to ensure that spinning equipment does not come in contact with any type of loose clothing.
- 32.3. If you are working over water and will be wearing a life jacket, it must be inspected before and after each use to ensure it is in good condition and free of defects, which would alter their strength or buoyancy. Obviously, defective life jackets must not be used.
- 32.4. In addition, when working in these areas ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. On larger drilling jobs where more than one crew is needed, the distance between ring buoys shall not exceed 200 feet. In addition, at least one lifesaving skiff (small boat) shall be immediately available at locations where drillers are working over or adjacent to water.

32.5. Drillers working in areas where they are constantly protected by guardrail systems, nets, or body belt/harness systems are considered to be adequately protected from the danger of drowning and are not required to wear life jackets or buoyant work vests. However, drillers working in these areas and are not constantly protected from falling into the water are required to wear life jackets or buoyant work vests. Since most drillers won't have the luxury of being protected by guardrails, nets, or full body harnesses, it is likely that they will be required to wear a life jacket.

33. Site Security

- 33.1. Here are some key points to provide assistance to eliminate theft of tools and/or equipment on a job site:
 - 33.1.1. Maintain an on-going inventory of all tools and equipment .
 - 33.1.2. Mark tools and equipment with an ID number. The company name should be present on any equipment and tools that will be used at a job site.
 - 33.1.3. Keep tools and equipment securely locked in the trucks when not in use. If left at the job site overnight, secure all equipment and tools locked in a storage box.
 - 33.1.4. Always keep trucks locked when unattended.
 - 33.1.5. Park equipment (that will be left overnight) centrally in a well-lighted and secure area of the job site.
 - 33.1.6. Disable equipment that must be stored in an unsecured area.
 - 33.1.7. Keep any storage of valuable equipment to a minimum at all job sites.
 - 33.1.8. Remove any equipment or tools from the job site when no longer needed.
 - 33.1.9. Any theft or vandalism should be reported immediately to the Regional Manager and follow-up with a police report.
 - 33.1.10. Maintain records of any security incidents.

34. Visitors

- 34.1. While we do not anticipate having visitors on our job sites we do need to be prepared for them when they arrive. Therefore, there are some basic rules to follow when visitors are present.
- 34.2. Visitors must check in with the general contractor or with the office prior to visiting our site. It is common courtesy to have them aware of the visitors presence so that any additional safety measures can be reviewed prior to their arrival on site.
- 34.3. All visitors must wear the appropriate personal protective equipment.
- 34.4. The driller must keep the visitor away from the hazardous areas on the drill rig.
- 34.5. When the visitor is present document the purpose of the visit, the time and duration of the visit, and their name, title, and employer name. If possible try to obtain a business card. Documenting these items may be necessary to determine the purpose of the visitor's intent.

Commercial Motor Vehicles

Section 4

35. Driving

35.1. Introduction

- 35.1.1. Vironex, Inc. believes that a key component in the success of the company is to have safe drivers. Since the public and our customers observe our drivers daily it is important that our drivers operate their vehicles and conduct themselves in a professional manner at all times.
- 35.1.2. Our intent is to outline some key requirements of safely operating our vehicles. The rules outlined in this document are in no way conclusive and cannot guarantee your safety. Your knowledge and common sense will play an important role in the safe handling of our vehicles. Use this section as a quick reference on a variety of areas affecting the safe performance of the vehicles.
- 35.1.3. Those requirements set fourth by the Department of Transportation (DOT), the State, or Local Police shall take precedence over these rules. As a professional driver you should take the time to make yourself familiar with these requirements. If you have any questions on the following information or the safe operation of the company vehicle, please contact your Regional Manager immediately.

35.2. General Driver Rules

- 35.2.1. Vironex, Inc. requires that an operator hold a valid driver's license for the class of vehicle that he or she is authorized to operate. Persons intending to operate a company vehicle are required to successfully meet or exceed the State requirements and those outlined in this manual.
- 35.2.2. Vehicles shall only be used for company purposes unless otherwise approved by the Regional Manager. Drivers using vehicles for personal use may be subject to disciplinary action up to and including termination.
- 35.2.3. Only authorized drivers shall be allowed to drive our company vehicles. Unauthorized drivers or other employees shall not be allowed to operate a company vehicle.
- 35.2.4. Passengers are not allowed unless authorized by management.
- 35.2.5. Do not pick up hitchhikers.
- 35.2.6. Misuse of company vehicles may result in disciplinary action up to and including termination and drivers may be held financially responsible for any accident.
- 35.2.7. All drivers of Company vehicles are responsible for reporting any damage or deficiency. A pre-trip inspection is required. Forms for the completion of the pre-trip inspection are provided and should be used accordingly. Any damage or defects should be clearly outlined on this form and immediately reported to your Regional Manager. Failure to report unsafe vehicle conditions can result in an accident.
- 35.2.8. Employees operating or riding in company-furnished vehicles, or personal vehicles on official company business, are required to wear safety belts at all times. The driver should instruct any passengers to fasten their safety belts before operating the vehicle.
- 35.2.9. Leaving the scene of an accident while operating a commercial motor vehicle or using the vehicle when committing a felony may result in disciplinary action up to and including termination.
- 35.2.10. Never drive with the source of motive power disengaged from the driving wheels except when such disengagement is necessary to stop or to shift gears.

35.3. Hours of Service

- 35.3.1. Drivers are not allowed to drive:
- 35.3.2. More than 10 hours following 8 consecutive hours off duty; or
- 35.3.3. For any period after having been on duty 15 hours following 8 consecutive hours off duty.
- 35.3.4. Or when:
- 35.3.5. Having been on duty 60 hours in any 7 consecutive days if you do not work every day of the week or
- 35.3.6. Having been on duty 70 hours in any period of 8 consecutive days if you do not work every day of the week

35.4. Drugs and Alcohol

- 35.4.1. Use of drugs or alcohol while on the job is strictly prohibited.
- 35.4.2. You shall not use alcohol, have any measured alcohol concentration or detected presence of alcohol, or be under the influence of alcohol, within 4 hours before going on duty or operating a commercial motor vehicle.
- 35.4.3. You shall not drive a commercial motor vehicle with a blood alcohol concentration of 0.04 percent or more.
- 35.4.4. You shall not drive a commercial motor vehicle under the influence of a controlled substance, an amphetamine, a narcotic drug, a formulation of an amphetamine, or a derivative of a narcotic drug.
- 35.4.5. Use of over the counter medicines shall be reported to your Regional Manager. The use of over-the-counter drugs, which may cause drowsiness, should be used with caution.
- 35.4.6. Prescription drugs, which may cause drowsiness or affect your ability to operate a motor vehicle, should be reported to your Regional Manager.

35.5. Driver Qualifications

- 35.5.1. Employees operating commercial vehicles must meet the following criteria at a minimum.
 - 35.5.1.1. All drivers must be at least 20 years old.
 - 35.5.1.2. Drivers must be able to read and speak the English language sufficiently to converse with the general public, to understand highway traffic signs and signals in the English language, to respond to official inquiries, and to make entries on reports and records.
 - 35.5.1.3. Drivers must be capable of safely operating the type of commercial motor vehicle he/she is assigned.
 - 35.5.1.4. Can determine whether if the cargo transported has been properly located, distributed, and secured and understands procedures for securing cargo
 - 35.5.1.5. All Drivers must be physically qualified to drive a commercial motor vehicle.
 - 35.5.1.6. All drivers must maintain a valid commercial motor vehicle operator's license issued only from one State or jurisdiction.
 - 35.5.1.7. All new drivers must provide a list of violations or the certificate as required.

35.6. Pre Employment Physicals and Drug Tests

- 35.6.1. All drivers must submit to a pre-employment physical and drug screen as required by the DOT. All drivers shall undergo testing for alcohol and controlled substances as a condition of employment prior to being used unless the driver has met the exceptions listed under section §382.301 of the Federal Motor Carrier Safety Regulations (FMCSR).
- 35.6.2. Every driver shall submit to random alcohol and controlled substance testing as required under section §382.305 of the FMCSR.
- 35.6.3. Upon reasonable suspicion drivers are subject to drug and alcohol testing and will be based on specific, coexisting observations concerning the appearance, behavior, speech or body odors of the driver.
- 35.6.4. Post accident testing for alcohol and controlled substances in each surviving driver will be completed under the following circumstances:
 - 35.6.4.1. Employees performing safety-sensitive functions with respect to the vehicle, if the accident involved the loss of human life; or
 - 35.6.4.2. When the driver receives a citation under State or local law for a moving traffic violation arising from the accident, if the accident involved:
 - 35.6.4.2.1. Bodily injury to any person who, as a result of the injury, immediately receives medical treatment away from the scene of the accident; or
 - 35.6.4.2.2. One or more motor vehicles incurring disabling damage as a result of the accident, requiring the motor vehicle to be transported away from the scene by a tow truck or other motor vehicle.
- 35.6.5. Return to duty testing will be completed in accordance with the DOT requirements. Before a driver is allowed to return to duty the driver must undergo a return-to-duty alcohol and controlled substance test with a result indicating an alcohol concentration of less than 0.02 and a verified negative result for controlled substances use.
- 35.6.6. If it is determined that a driver is in need of assistance in resolving problems associated with alcohol misuse and/or use of controlled substances, the driver will be subject to unannounced follow-up alcohol and/or controlled substances testing as directed by a substance abuse professional.

35.7. Pre-Trip Inspections

- 35.7.1. Vironex's drivers are a valuable asset to the success of our organization. In order to protect this asset and ensure that each driver is provided with a safe operating vehicle, each driver is required to inspect his or her vehicle for defects. The DOT requires that drivers complete a pre-trip inspection of their vehicle at the beginning of each day or shift.
- 35.7.2. Safe driving consists of about 5% safe vehicle maintenance and 95% safe driver performance. Therefore, the safest vehicle on the road is not necessarily the one with all of the latest technology but the one with the defensive driver.
- 35.7.3. You can normally expect our vehicles to be in good mechanical condition, however, you should run a basic vehicle check on every vehicle before you drive it.
- 35.7.4. Before driving a commercial motor vehicle, the driver shall:
 - 35.7.4.1. Be satisfied that the motor vehicle is in safe operating condition.

- 35.7.4.2. Review the last vehicle inspection report.
- 35.7.4.3. Sign the report, only if defects or deficiencies were corrected since the last vehicle inspection report.
- 35.7.4.4. Our vehicles shall not be driven unless the driver has satisfied himself/herself that the following parts and accessories are in good working order.
 - 35.7.4.4.1. Check vehicle condition prior to operation.
 - 35.7.4.4.2. Check headlights and taillights.
 - 35.7.4.4.3. Check turn indicators right and left, front and rear.
 - 35.7.4.4.4. Check brakes.
 - 35.7.4.4.4.1. If brake pedal travels more than 1 ½” on first depression vehicle should be sent in for repairs. Check with your Regional Manager for proper procedures.
 - 35.7.4.4.4.2. You should check brakes for pull to the right or left
 - 35.7.4.4.4.3. Check parking brakes.
 - 35.7.4.4.5. Check for excessive steering wheel play. More than one/eighth turn should be considered unsafe.
 - 35.7.4.4.6. Check instrument panel with the engine running.
 - 35.7.4.4.6.1. Oil light
 - 35.7.4.4.6.2. Generator/Alternator
 - 35.7.4.4.6.3. Water temperature, etc.
 - 35.7.4.4.6.4. Brake light
 - 35.7.4.4.7. Sound the horn.
 - 35.7.4.4.8. Check windshield, windows and mirrors.
 - 35.7.4.4.9. Windshield wipers.
 - 35.7.4.4.10. Check fuel level.
 - 35.7.4.4.11. Check safety belts.
 - 35.7.4.4.12. Check for flares/reflectors.
 - 35.7.4.4.13. Check seat adjustment.
 - 35.7.4.4.14. Check tires for wear and correct pressure.
 - 35.7.4.4.15. Check coupling devices

35.7.5. If you find any serious defects as a result of your inspection, don't operate the vehicle.

35.8. Post-Trip Inspection

35.8.1. Every driver shall prepare a report in writing at the completion of each day's work on each vehicle operated

35.8.2. The report shall identify the vehicle and list any defect or deficiency discovered by or reported to the driver which would affect the safety of operation of the vehicle or result in its mechanical breakdown.

35.8.3. If no defect or deficiency is discovered by or reported to the driver, the report shall so indicate.

35.8.4. In all instances, the driver shall sign the report. On two-driver operations, only one driver needs to sign the driver vehicle inspection report, provided both drivers agree as to the defects or deficiencies identified.

35.8.5. If a driver operates more than one vehicle during the day, a report shall be prepared for each vehicle operated.

35.8.6. The following items are to be inspected as a minimum:

35.8.7. Service brakes including trailer brake connections

35.8.8. Parking (hand) brake

35.8.9. Steering mechanism

35.8.10. Lighting devices and reflectors

35.8.11. Tires

35.8.12. Horn

35.8.13. Windshield wipers

35.8.14. Rear vision mirrors

35.8.15. Coupling devices

35.8.16. Wheels and rims*

35.8.17. Emergency equipment*

35.8.18. *These items are not required as a part of the pre-trip inspection but are required as a part of a post trip inspection.

35.8.19. Prior to requiring or permitting a driver to operate a vehicle, repairs to any defect or deficiency listed on the post-trip inspection report, which would be likely to affect the safety of operation of the vehicle, must be completed.

35.8.19.1. The original post-trip inspection report listing any defect or deficiency must show that the defect or deficiency has been repaired or that repair is unnecessary before the vehicle is operated again.

35.8.19.2. The original post-trip inspection report, the certification of repairs, and the certification of the driver's review must be maintained on file for three months from the date the written report was prepared.

35.8.20. Cargo

35.8.21. All cargo must be secured in such a manner that the cargo will remain secured on the vehicle. This includes augers, drill rod, tooling, bentonite, rope, cables, and any other materials being transported.

35.8.22. When carrying cargo that may shift sideways in transit, the cargo must either be securely blocked or braced against the sides or sideboards of the vehicle or be secured to ensure that movement of the cargo will not occur.

35.8.23. The vehicle's tailgate, tailboard, doors, tarpaulins, its spare tire and other equipment used in its operation, and the means of fastening vehicle's cargo must be secured.

35.9. Vehicle Accidents

35.9.1. General Rules

35.9.2. Any accident involving Company vehicles (included private, rented, or leased vehicles used on official Company business) must be reported to the driver's Regional Manager prior to the end of the work shift.

35.9.3. If the driver is unable to make a report, another employee who knows the details of the accident must make the report.

35.9.4. It is our policy that employees should not admit to responsibility for vehicle accidents occurring while on official business. It is important that such admissions, when appropriate, be reserved for the company and its insurance carrier.

35.9.5. The law requires that each driver involved in a vehicle accident must show his/her license on request by the other party. Be sure to obtain adequate information on the drivers involved as well as on the owner of the vehicles. Names, addresses, driver's license numbers, vehicle descriptions, and registration information are essential.

35.9.6. In addition, a description of damages is needed for completion of accident reports. If the accident is investigated by off-site police agencies, request that a copy of the police report be sent to our office, or obtain the name and department of the investigating officer.

35.9.7. In case of collision with an unattended vehicle (or other property), you are required by law to notify the other party and to exchange information pertaining to the collision. If you are unable to locate the other party leave a note attached to, the vehicle (or other property) giving your name, address, and vehicle license number.

35.9.8. A printed card titled "Vehicle Accident Reporting Kit" is kept in each vehicle to assist in collecting required information.

35.9.9. Accident Investigations

35.9.10. If you have been involved in an accident Vironex, Inc. will incur some loss as a result. However, a professional driver will know that the extent of damage can be significantly reduced if a successful accident investigation is completed. As a result we have established the following guidelines.

35.9.11. The driver of any company vehicle involved in an accident must complete a Vehicle Accident Investigation Report and submit it to his/her Regional Manager within one workday of the accident. The Regional Manager should interview the driver and complete the Regional Managers portion of the report.

35.9.12. Within two workdays of the accident, the completed form and vehicle must be sent to Vironex's insurance adjuster.

35.9.13. Conducting the Investigation

35.9.13.1. The investigation is not conducted to place blame. A professional truck driver knows that the intent of the investigation is to gather the facts surrounding the incident to prevent reoccurrence. Therefore, it is in everyone's best interest to provide a serious effort to gather the facts.

35.9.14. Driver Assistance in the Accident investigation

35.9.14.1. Naturally, the investigation should be completed as soon as possible. The following list of items may be used to keep things in perspective and assist you in the completion of a thorough investigation:

35.9.15. First, make sure you are all right. If not, seek medical attention immediately.

35.9.16. If you are all right, check on the others involved in the incident. You should make sure those in need receive prompt medical attention and that no further harm to others can occur. If medical attention is needed, contact the police or call 911.

35.9.17. Once things have calmed down a little, make sure that no further damage can occur. Without endangering yourself, remove debris from the roadway if it may endanger other vehicles or pedestrians.

35.9.18. Cooperate with the police at all times.

35.9.19. When exchanging information with others involved in the incident, provide information that appears on your driver's license and insurance identification card.

35.9.20. **DO NOT ADMIT RESPONSIBILITY OR WRONG DOING.** Vironex, Inc. or the insurance carrier, should handle any admission of responsibility or wrong doing.

35.9.21. If the situation permits, try to gather the facts surrounding the incident. Take notes on the names of the individuals in the vehicle including their addresses and telephone numbers.

35.9.22. Document the extent of damage, new and old, to other vehicles and property affected in the incident.

35.9.23. If you have a camera, take as many photos of the scene and try to take photos of the driver and any passengers in the other vehicles involved in the incident. The use of a camera can quickly document the facts about the scene and can prevent any misleading statements like over-exaggeration of damage or the actual number of persons in the vehicle. **DO NOT GIVE THE CAMERA TO ANYONE OTHER THAN YOUR EMPLOYER.**

35.9.24. Report all findings to your Regional Managers and complete an accident investigation report.

35.10. **Defensive Driving Techniques**

35.10.1. Drive Defensively

35.10.2. Concentrate on your driving and try not to get distracted.

35.10.3. Always obey all traffic control devices and traffic laws.

35.10.4. Be a courteous driver.

35.10.5. Be aware and keep alert. Even though you follow the laws, realize others may not.

35.10.6. Recognize that you share the road with others whether they are walking, bicycling or driving. Avoid looking at any one thing for more than a few seconds.

35.10.7. Watch for vehicles coming from alleys or parking places when driving in a business district. Always give yourself enough time and space to do what you need to do safely. Never follow another vehicle too closely. Remember trucks cannot stop as quickly as other vehicles and will react differently under different situations. Take your time and slow down!

35.10.8. Be more careful and increase your following distance at night, during bad weather conditions, rush hour, and during maneuvers such as lane changes and when approaching intersections.

35.10.9. Do not drive when you are tired.

35.10.10. Always obey a law enforcement officer's orders or directions. Their directions take priority over a traffic light or stop sign.

35.11. **Before Starting the Engine**

35.11.1. Make sure you are positioned comfortably in the driver's seat.

35.11.2. Make sure you and all passengers are properly buckled up.

35.11.3. Check mirrors and check again for anything in your path. As a driver, you have at least two blind spots: to the left rear and right rear of the vehicle. Adjust the left outside mirror to see the left edge of the vehicle when seated in a normal driving position. Adjust the right outside mirror, to permit a clear view of the right rear edge of the vehicle.

35.11.4. Check the blind spots before every lane change.

35.11.5. Be familiar with the type of braking system in the vehicle. If you are unsure refer to the owner's manual or ask your Regional Manager.

35.12. **Controlling Your Speed**

35.12.1. You must drive at a "careful and prudent" speed in all driving conditions. You must drive at a speed that allows you always to stop within the clear distance ahead. This speed is never faster than the posted speed limit. Depending on conditions, it may be slower than the posted speed limit. Anticipate trouble ahead. Be ready to stop safely.

35.13. **Look Down the Road 12 Seconds**

35.13.1. This rule means you should be looking ahead of the vehicle about 12 seconds' worth of travel time down the road. To estimate this distance, choose a fixed object near the road ahead and begin counting, "one thousand one, one thousand two..." until the front of your vehicle passes the object. If you have not counted to "one thousand twelve," you should be looking farther ahead.

35.13.2. A defensive driver anticipates problems ahead and is prepared to react in time. Keep a safe distance behind another vehicle. Under poor and/or slippery driving conditions, allow even more time.

35.14. **Signaling**

35.14.1. Signaling is a legal requirement and a courtesy. Before stopping, turning or changing lanes, see if it is safe. Then communicate to other drivers by giving the required signal, either using your left hand and arm or your vehicle's electric turn signal, at least 100 feet ahead of where you plan to turn. In heavy traffic or on freeways, signal sooner so drivers behind you have time to adjust their speed or position. Make sure your turn signal light stops flashing after you turn.

35.14.2. The proper hand and arm signals are:

35.14.3. Left arm and hand bent up for a right turn

35.14.4. Left arm and hand straight out for a left turn

35.14.5. Left arm and hand bent down for slow or stop

35.15. **Yielding**

35.15.1. Most crashes occur at intersections. Always remember: Any time you are not sure what other drivers are going to do, let them go first.

35.15.2. When approaching intersections without traffic signals or signs, or four-way stop intersections, yield to the driver on the right if you reach the intersection at the same time as another vehicle. Yield to any vehicle that reaches an intersection before you.

35.15.3. When making left turns, you must give the right-of-way to pedestrians and oncoming traffic.

35.15.4. When approaching an intersection with a yield sign, slow down before reaching the intersection, then yield the right-of-way to any vehicle in the intersection and to cross traffic. Stop if necessary.

35.16. Yielding In Other Circumstances

35.16.1. Before entering an intersection, always check cross traffic. Prepare to stop and yield the right-of-way to a vehicle coming from the left or right or pedestrians in the intersection.

35.16.2. You must also yield when directed by a uniformed police officer and when directed by flag people at construction sites.

35.16.3. You must yield for vehicles in a funeral procession.

35.16.4. You must stop and yield the right-of-way when entering a highway from an alley, private road or driveway and before turning on a red light.

35.16.5. When entering a traffic circle you must yield the right-of-way to drivers already in the circle. When entering an intersection at dusk, sunrise or sunset, use extra care as other drivers may have difficulty seeing you.

35.17. Turning at Intersections

35.17.1. As you approach an intersection, look for traffic signals and lane markings.

35.17.2. Look and plan ahead. Be alert for pedestrians and vehicles that may “run” or crowd a red light. Allow time and space to make your turn safely.

35.17.3. When turning left at an intersection, check cross traffic and yield to oncoming traffic and pedestrians.

35.17.4. When turning right at an intersection, check the road you are turning onto for pedestrians and other vehicles.

35.17.5. After turning left onto a one-way street, stay in the left lane until you can change lanes safely.

35.17.6. If you come to an intersection where you cannot see clearly because of trees or buildings, stop at the intersection and edge forward slowly.

35.17.7. If you have entered an intersection when the signal light changes, complete your turn. Do not try to back up to clear the intersection.

35.18. Right Turns on Red Lights

35.18.1. Unless a sign tells you not to turn or if it is against state law, you may turn right at a red light. However, when turning you must come to a complete stop. Yield to pedestrians and approaching traffic. Make sure after you look to the left for approaching vehicles and pedestrians and that you also check again for pedestrians in front of you before turning. Then, turn carefully.

35.19. Some Left Turns on Red Lights

- 35.19.1. Unless a sign tells you not to turn or if it is against state law, you may turn left on a red light when entering a one-way street from another one-way street, but you must first stop and yield to cross traffic. You may also make a left turn from a two-way street onto a one-way street with traffic going in the same direction as the turn. Yield first to pedestrians and approaching traffic.

35.20. Passing

- 35.20.1. When passing other vehicles always check your side-view mirrors for any overtaking traffic. Use your turn signal to indicate your intentions. Check blind spots to see if you can safely move from your lane without interfering with traffic.
- 35.20.2. It is illegal to exceed the speed limit to pass. When about to pass a vehicle on a divided highway, move into the passing lane well before passing.

35.21. Passing on the Left

- 35.21.1. On a two or three-lane road with traffic moving in both directions, you may pass on the left when overtaking another vehicle if there are no signs or other markings prohibiting passing, and it can be done safely. Passing another vehicle on the left is prohibited when:
- 35.21.1.1. You must cross a solid yellow line;
 - 35.21.1.2. There is a “no passing” sign;
 - 35.21.1.3. Approaching a hill or curve where your view is obstructed;
 - 35.21.1.4. Your view is obstructed within 100 feet of a bridge, viaduct or tunnel;
 - 35.21.1.5. Oncoming traffic is close enough so you would interfere with the safe operation of the approaching vehicle or the vehicle being passed
 - 35.21.1.6. You cannot see clearly ahead.
- 35.21.2. When passing or preparing to pass another vehicle by using the center lane of a three-lane road, always use extreme caution. Approaching vehicles may also be preparing to pass. If you and an approaching vehicle move into the center lane at the same time, a serious crash could occur.
- 35.21.3. After passing another vehicle, return to the right lane when there is enough room to return safely. One rule of thumb is to return to your lane when it is possible to see both headlights and the pavement in front of the vehicle you passed. Do not try to pass more than one vehicle at a time or follow too closely when another vehicle is passing slower traffic.

35.22. Passing on the Right

- 35.22.1. When two or more lanes of traffic move in the same direction, passing other vehicles in either lane is allowed. However, slower moving vehicles should always stay in the lane farthest to the right except when preparing to make a left turn.
- 35.22.2. When driving in the right lane, passing another vehicle should be done cautiously, as the driver of the other vehicle may not see you and may turn into your path. Passing on the right of another vehicle by crossing the solid white line that marks the edge of the roadway is prohibited, even if the shoulder is paved.

35.23. Passing Parked Vehicles

- 35.23.1. When driving past parked vehicles, watch for vehicles that may pull out in front of you. Look for clues such as a person in the driver’s seat, exhaust coming from a tailpipe, illuminated brake lights, a flashing turn signal, illuminated backup lights or, at parallel parking areas, a vehicle’s front wheels turning out. Watch for a vehicle door being opened in front of you. Also, watch for pedestrians or bicyclists trying to cross the road between parked vehicles.

35.24. Passing Vehicles in Slow-Moving Traffic Lanes

35.24.1. In some areas, with a long or steep grade, a slow-moving traffic lane may be provided to allow vehicles unable to maintain the speed limit to travel without blocking traffic. These slower-moving vehicles should move into the designated traffic lane, allowing other vehicles to pass them in the second lane.

35.25. Freeway Driving

35.25.1. Freeways are our safest roads. Traffic flows in the same direction. There are no stops or intersections. Pedestrians, small motorcycles 125 cc or less, mopeds, bicycles, all-terrain vehicles and slow-moving vehicles are not allowed on freeways.

35.25.2. A freeway is entered on an entrance ramp. Often, an exit ramp will be next to the entrance ramp. Look for "Do Not Enter" and "Wrong Way" signs and speed limit signs. The entrance ramp usually merges into an acceleration lane allowing you to increase your speed to match freeway traffic speed.

35.25.3. Signal and check for freeway traffic by using the vehicle's side-view mirrors. Choose a safe space to enter, then blend into traffic. Traffic on the freeway has the right-of-way so do not always count on other drivers to let you in front of them.

35.25.4. On a two-lane freeway drive in the right lane except when passing, exiting to the left, allowing another vehicle to merge onto the freeway or when the lanes are fully occupied with heavily congested traffic.

35.25.5. On a freeway with three or more lanes of travel in the same direction, passenger cars may drive in any lane. A commercial vehicle with a gross vehicle weight of more than 10,000 pounds, a truck tractor or a combination vehicle with trailer must stay in either of the two lanes farthest to the right, unless otherwise designated.

35.25.6. Merge signs are placed near freeway entrances to alert you to traffic entering the freeway. Always watch for vehicles merging onto the freeway. Adjusting your speed and/or moving safely into another lane will allow drivers to enter the freeway smoothly and safely.

35.25.7. Always watch for drivers who suddenly slow down when approaching an exit or swerve into the exit lane unexpectedly.

35.26. Leaving a Freeway

35.26.1. Most freeway exits have a special deceleration lane to slow down in when exiting the freeway. Look ahead for exit ramp signs you want and the lane you must use. Check in front, behind and to the side for traffic. Signal your intention early, then move into the proper lane.

35.26.2. Avoid slowing down on the freeway when exiting. Wait until you are fully in the deceleration lane before reducing your speed, then slow down gradually. Many ramps have sharp curves, so it is important to obey the posted exit ramp speed limit.

35.26.3. If you miss your exit ramp, never back up, turn around or use a median crossover. Instead, drive to the next exit. Get back on the freeway and return to the exit you want. Never use the crossover lane in the median. It is only for emergency and Department of Transportation vehicles.

35.27. Fatigue

35.27.1. One of the greatest dangers in freeway driving is fatigue. On long trips a driver can become sleepy or hypnotized by the constant hum of the wind, tires and engine. If necessary, take a break. Do not rely on coffee or "stay awake" drugs.

35.27.2. If you feel tired, stop and rest for a ten-minute break at least every two hours. Pull off the highway at the next exit. Find a motel or rest area and relax. If you must drive, keep shifting your eyes from one area of the road to another. Keep checking the mirrors. Look at objects near and far, left and right.

35.28. Parking Your Vehicle

- 35.28.1. Crashes sometimes occur because people did not park their vehicles properly or carefully. Whenever you park and leave the vehicle, always turn off the engine and set the parking brake. Take the keys and lock your vehicle. Do not rely on the transmission to hold your vehicle in place.
- 35.28.2. Getting out of a vehicle on the street side can be dangerous. Watch for bicycles, motorcycles, mopeds or other vehicles that might be passing. Check the mirrors before opening the door on the street side since others may not see you. When returning to a vehicle, face oncoming traffic as you approach its street side door.

35.29. Parking on a Hill

- 35.29.1. To park on a hill, turn the tires so that if the unattended vehicle starts to roll, it moves into the curb. Always use the parking brake. You cannot expect the transmission to hold the vehicle on a hill.

35.30. Parking Violations

- 35.30.1. Communities may pass parking ordinances for local streets that are stricter than state law.
- 35.30.2. Vironex, Inc. holds their driver's responsible for any parking tickets.
- 35.30.3. The following is a partial list of "no parking laws."
- 35.30.4. Never Park:
 - 35.30.4.1. Where "no stopping," "no standing," "no parking" and "no parking at any time" signs are posted
 - 35.30.4.2. Within 500 feet of a fire or a crash
 - 35.30.4.3. In a space reserved for the handicapped
 - 35.30.4.4. Within 15 feet of a fire hydrant;
 - 35.30.4.5. Within 20 feet of a fire station driveway on the same side of the street or, when marked, within 75 feet of the driveway on the other side of the street;
 - 35.30.4.6. Within 50 feet of the nearest rail of a railroad crossing;
 - 35.30.4.7. In front of any driveway, alley, theater, emergency exit or fire escape;
 - 35.30.4.8. Next to a road where you block the view of drivers turning at an intersection;
 - 35.30.4.9. More than 12 inches from the curb;
 - 35.30.4.10. Within 30 feet of a stop sign, traffic light or a flashing beacon, including a warning sign;
 - 35.30.4.11. On the pavement of a highway outside city or village limits, if there is a highway shoulder;
 - 35.30.4.12. On a bridge or overpass, under a bridge or in a tunnel;
 - 35.30.4.13. On a sidewalk or in front of a public or private driveway;
 - 35.30.4.14. Within an intersection or crosswalk;
 - 35.30.4.15. Within 20 feet of a marked crosswalk or 15 feet of the intersection if there is no crosswalk;
 - 35.30.4.16. On the street-side of a legally parked vehicle (double parking);
 - 35.30.4.17. In a manner which obstructs delivery of mail to a rural mailbox.

35.31. Vehicle Theft

Vironex, Inc. Health and Safety Program

- 35.31.1. Park in a lighted area, be aware of your surroundings, and who is around the vehicle in parking lots and while driving.
- 35.31.2. Close all windows, keep expensive goods and receipts out of sight.
- 35.31.3. Remove the keys and lock the vehicle when you are unloading or away from the truck.
- 35.31.4. To report auto theft, telephone the office immediately.

35.32. Hijacking Prevention Tips

- 35.32.1. In a hijacking, one or more people take a vehicle from the owner by force. Sometimes, they stage a minor rear-end incident called a “bump and run” at a traffic light or stop sign. When the driver gets out to inspect the damage, one person robs the driver while the other steals the vehicle. If you are confronted with this situation, stay in your car. Wait for police or drive to an area where help is available.
- 35.32.2. When driving, keep doors and windows locked.
- 35.32.3. Stay alert for danger.
- 35.32.4. Choose the safest route to any destination.
- 35.32.5. Always have keys ready when returning to the truck.
- 35.32.6. While you are still outside the truck, check the interior for possible intruders.
- 35.32.7. If someone acting suspiciously approaches the vehicle, try to drive away or sound the horn.
- 35.32.8. In case of danger, stay inside the locked car.
- 35.32.9. If you are in trouble, use a radio or cellular telephone if available.
- 35.32.10. If a carjacker wants the vehicle, give it up without a fight. A truck can be replaced, but personal safety is priceless.
- 35.32.11. Get a good description of the carjacker(s).

35.33. Driver Attitude and Safety

- 35.33.1. Driving can be a reflection of one’s emotional maturity. The emotionally mature person is generally a better driver. When operating a motor vehicle a good driver emphasizes:
 - 35.33.1.1.1. responsibility and courtesy.
 - 35.33.1.1.2. foresight.
 - 35.33.1.1.3. controlled attention.
 - 35.33.1.1.4. good judgement.
- 35.33.2. Immature people are generally poor drivers because they are unable to control their emotions. They allow their frustrations to turn to anger, thus creating a hazard.
- 35.33.3. Mechanical failure typically accounts for only 5% of all accidents while human factors cause approximately 95% of traffic accidents. Many accidents are caused by:
 - 35.33.3.1. Poor seeing habits
 - 35.33.3.2. Driving under the influence
 - 35.33.3.3. Poor Attitude
 - 35.33.3.4. Lack of control
 - 35.33.3.5. Lack of knowledge
 - 35.33.3.6. Poor physical condition
 - 35.33.3.7. Incorrect Lane Usage

35.33.4. The inside lane (the number one lane) is the most dangerous lane. It has the highest ratio of fatal traffic accidents. A minor distraction can cause a vehicle to cross over painted lane markers. The opposing vehicle is only a few inches away which may contribute to a head on collision. In addition, when people make left turns they cross into the oncoming lane, which may further contribute to collisions. Consider the following when making a left hand turn:

35.33.5. When preparing to make a left turn, have your turn indicator on and keep your wheels straight.

35.33.6. If you get rear-ended you will not be pushed into on-coming traffic causing a head-on traffic accident.

35.33.7. When traffic is clear, make your turn.

35.34. **Following Distance**

35.34.1. Following too closely is one of the highest causes of accidents, both on surface streets and freeways. It is generally caused by a combination of congested traffic and too high a speed for existing conditions. Some reasons why following too close is such a hazard are:

35.34.2. Driving too close or tailgating. This limits your reaction and braking distance to just a few feet and causes you to depend on the other driver's reactions.

35.34.3. Stopping distance. This is a very touchy subject with most people. With very few exceptions, drivers have the idea that they can stop faster than is physically possible. Remember that trucks cannot stop on a dime. Therefore, you must provide sufficient reaction time and distance.

35.34.4. When following another vehicle, allow a minimum interval of one car length for every ten miles per hour of speed (60 mph - 6 car lengths). Remember that trucks typically need more distance to stop as compared to cars, thus, the two-second rule generally does not apply for trucks.

35.34.5. When driving, project your vision several vehicles ahead so that possible conflicts can be anticipated and the proper defensive driving tactics employed.

35.35. **Safety Belts**

- 35.35.1. Why should you wear a safety belt? In head-on crashes, many drivers involved in collisions have escaped death and serious injury because seat belts were being used:
- 35.35.2. A severe type of accident because of the increased impact caused by the sudden stop.
- 35.35.3. Because vehicles usually collide somewhat off center which causes one or both vehicles to spin.
- 35.35.4. The centrifugal force of the spin hurls the occupants from the vehicle.
- 35.35.5. Here is where safety belts are most valuable and where the most lives are saved.
- 35.35.6. One of the most important pre-operational inspections that can be made is a safety belt check. The areas of attention that should be given to the safety belt.
- 35.35.7. The buckle and tip of the belt.
- 35.35.8. Is the belt properly secured to the vehicle?
- 35.35.9. Are all the belts clean and easily available?

35.36. **Backing**

- 35.36.1. Unsafe starting and backing accidents account for many accidents. In most instances, these collisions could have been averted with the use of proper backing techniques.
- 35.36.2. The most effective means of preventing backing accidents is:
- 35.36.3. Don't back unless absolutely necessary.
- 35.36.4. When possible, plan your stops and parking so that backing is unnecessary. Park so that you drive forward when pulling out.
- 35.36.5. Before backing, make sure there are no obstacles in the direction of travel.
- 35.36.6. To prevent backing accidents, consider the following steps:
- 35.36.7. Check for hazards around the truck.
- 35.36.8. If necessary, get out of the cab and take good look.
- 35.36.9. Back slowly and in stages. If in doubt while backing, stop, get out and look.

35.37. **Fog**

- 35.37.1. Visibility is seriously restricted under foggy conditions and objects may appear distorted.
- 35.37.2. Reduce your speed so the stopping distance does not exceed the one-half the distance you can see. Your speed should never be so great that you do not have stopping or swerving distance. Leave yourself a way out.
- 35.37.3. Lights should be turned on low beam. Keeping your lights on the low beam in foggy conditions will:
- 35.37.4. Assists you to see, and
- 35.37.5. Assists other drivers in seeing you.
- 35.37.6. Never use your parking lights in lieu of headlights.
- 35.37.7. Test your ability to recognize roadside markers and signs; know where you are.

35.38. **Rain**

- 35.38.1. Most hazardous driving conditions are experienced when driving in the first rain after a dry spell. The pavement is most slippery because dust, leaves, and oil drippings have not been washed from the road's surface. In addition to restricted visibility, be alert for:
 - 35.38.2. Wet and slippery pavement.
 - 35.38.3. Washed out and soft shoulders.
 - 35.38.4. Possibility of tire hydroplaning.
 - 35.38.5. Slow down. Do not drive beyond the limits of your visibility. A tightly closed vehicle results in steaming up of the windows inside the vehicle. A slightly open window tends to overcome this situation.
 - 35.38.6. Stop and wipe off the accumulated condensation inside the windows in order to improve your visibility.
 - 35.38.7. Remember, the other driver's visibility and car control are similarly reduced.
 - 35.38.8. Turn on your lights in bad weather in daytime as well as night. This assists other drivers in seeing you.
 - 35.38.9. Check your brakes periodically when driving in wet weather. Apply the brake for a short distance. This will cause friction of the shoes on the drum or rotor, thus drying the brakes.
 - 35.38.10. Avoid large puddles of water. If you can't, slightly apply your brakes while going through the standing water.
 - 35.38.11. Avoid skidding.
 - 35.38.12. Don't lock the brakes. Wheels steer by rolling friction only.
 - 35.38.13. If your vehicle has anti-lock brakes, check the owners manual on their proper use. Anti-lock brakes do not react the same as traditional brakes. Be familiar with their proper application.
 - 35.38.14. Locked brakes may cause a skid.
 - 35.38.15. Apply steady pressure for maximum braking.
 - 35.38.16. When using windshield wipers the driver must:
 - 35.38.17. Ensure that the vehicles lights are on
 - 35.38.18. Intermittent wipers are appropriately adjusted

35.39. **Night Driving**

- 35.39.1. Turn on your lights when light first begins to fade, especially under all adverse conditions.
- 35.39.2. Adjust your speed to lighting conditions.
- 35.39.3. Night driving should automatically increase your alertness.
- 35.39.4. Follow the rules governing the use of high and low beams:
- 35.39.5. When meeting another vehicle you must dim your high beams within 500 feet of an oncoming vehicle.
- 35.39.6. When overtaking and passing another vehicle, you must dim your high beams at 300 feet

36. Accident Investigation and Reporting

- 36.1. Accident investigations are a valuable tool in preventing future accidents, and eliminating hazards. Accidents should be investigated as soon as possible after the incident. Photographs, video and any other material evidence can be useful. All witnesses should be interviewed. A written report should be completed; it should answer the following questions:
- 36.2. What happened? The investigation report should begin by describing the accident, the injury sustained, the eyewitnesses, the date, time and location of the incident and the date and time of the report. Remember: who, what, when, where and how are the questions that the report must answer.
- 36.3. Why did the accident occur? The ultimate cause of the accident may not be known for several days after all the data is analyzed. However, if there is an obvious cause, include your conclusions at the time you give your information to the person in charge of the investigation.
- 36.4. What should be done? Once a report determines the cause of the accident, it should suggest a method for avoiding future accidents of a similar character. Once a solution has been adopted, it is everyone's responsibility to implement it.
- 36.5. What has been done? A follow up report will be issued after a reasonable amount of time to determine if the suggested solution was implemented, and if so, whether the likelihood of accident has been reduced. If it has not been implemented, why not.

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**ATTACHMENT 1
EMPLOYEE TRAINING/QUALIFICATIONS**

- 40-Hour HAZWOPER Certificates
- 8-Hour HAZWOPER Refresher Certificates
- First Aid/CPR Certificates
- Employee Resumes
- Bloodborne Pathogens Certificate

AdvanceOnline Online Institute

Certificate of Completion

Hannah Lydia Thompson

has met the online course completion requirements for

Hazardous Waste Operations and Emergency Response 8-Hour Refresher

This student has spent the amount of time listed below towards the annual refresher requirements in OSHA 29 CFR 1910.120 (a)-(q), Hazardous Waste Operation and Emergency Response. If the Course Time shown is less than 8:00 hours, there should be a supervisor's signature on this certificate. This signature indicates that the student has had supplemental training that, together with this course, meets the 8-hour training requirement.

Certificate ID: 189038 **Date:** 15 March 2007

Continuing Education Units: 0.8 **Time Online:** 8:10

On-site Supervisor's Signature:

x *Jacquelyn Forrest* Date: 03-20-2007

AdvanceOnline
5858 Westheimer Rd. Ste. 405
Houston, TX 77057
<http://www.advanceonline.com>
Toll Free: 1.866.4BRAINS

This education program meets the
Criteria for Certification established by
the Authorized Provider Commission of
the International Association for
Continuing Education and Training,
1200 19th St., NW, Suite 300,
Washington, DC 20036-2401.





American
Red Cross

Together, we can save a life

This recognizes that
HANNAH THOMPSON
has completed the requirements for
Standard First Aid

conducted by

ARC BAY AREA

Date completed **06/22/06**

The American Red Cross recognizes this certificate
as valid for **3** year(s) from completion date.



American
Red Cross

Together, we can save a life

This recognizes that
HANNAH THOMPSON
has completed the requirements for
INFANT & CHILD CPR

conducted by

American Red Cross Bay Area

Date completed **06/20/07**

The American Red Cross recognizes this certificate
as valid for **1** year(s) from completion date.



American
Red Cross

Together, we can save a life

This recognizes that
HANNAH THOMPSON
has completed the requirements for
Adult CPR / AED

conducted by

AMERICAN RED CROSS BAY AREA

Date completed **06/20/07**

The American Red Cross recognizes this certificate
as valid for **1** year(s) from completion date.

HANNAH THOMPSON
Environmental Scientist

SKILL SUMMARY:

Entry level professional: 1 year of experience with biological field work, 2 years working in university labs, 2-month geology internship.

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS:

Building Inspection and Management Planning for Asbestos, #3348, CAL/OSHA, Expiration date: December 10, 2005.

WORK HISTORY:

Sullivan International Group, Inc., San Francisco, CA **February 2005 – Present**

Environmental Scientist. Support project managers on a variety of tasks, including report writing, community relation meetings, creating soil boring logs, etc. Lead field projects and act as the safety coordinator at various field locations.

Marin Parks and Open Space **May 2004 – October 2004**

Seasonal Park Ranger. General oversight and maintenance of the open space in Marin County, including re-vegetation activities, installation of ecologically friendly irrigation systems, fire fuel reduction activities, and invasive plant removal.

Marin Conservation Corps/Americorps **January 2003– April 2004**

Environmental Educator. Taught elementary and high school classes about various environmental topics. Conducted business waste audits and guided the businesses to be more sustainable. Facilitated watershed restoration projects with students throughout Marin County.

EDUCATION:

2003, B.Sc., Environmental Science, University of California Santa Barbara, Santa Barbara, CA

ADDITIONAL RELEVANT TRAINING:

40-Hour Hazardous Waste Operations and Emergency Response, Fetzone, #020405-17-1, 2/05.



CERTIFICATE OF COURSE COMPLETION

Hannah L Thompson

Bloodborne Pathogens

11/27/2007 15:57 CST

Student's Name

Course Title

Course Completion Date
MM / DD / YYYY

803913

Certificate Number

Student's Signature

1

Approved # of Hours

I hereby attest and certify that I personally took the above named safety lesson in accordance to Osha Campus guidelines. I further state that I have paid for the course and that I did not use another's work (Plagiarism). Students should retain certificates and refer to course instructions to receive official certification where necessary.

360training
Corporate Headquarters
13801 N. Mo-Pac, Suite 100
Austin, Texas 78727
tel: 888-360-8764
fax: 512-727-7683
email: support@360training.com

**ATTACHMENT 2
MATERIAL SAFETY DATA SHEETS**

- Aervoe Marker Paint
- Alconox
- Hydrochloric acid (sample container preservative)
- Sulfuric acid (sample container preservative)



Material Safety Data Sheet

TO: MSDS USERS

Please find below the material safety data sheet as per your request.

The information presented in these forms is believed to be correct and sufficient to meet the requirements of OSHA Hazard Communication standard (29 CFR 1910.1200) concerning worker's right to know. In order for the information contained in the MSDS to be most helpful we recommend that these forms be made available to all those who handle or may otherwise be exposed to the product.

The following material safety data sheet covers the hazardous ingredients associated with more than one color aerosol product. As per 29 CFR 1900.1200 paragraph (g); whenever the hazards associated with similar mixtures are the same, then one MSDS may be prepared to cover several products.

This MSDS covers the following AerVOE-Pacific aerosol products

WATER-BASED MARKING PAINT

FLUORESCENT

246 RED
247 ORANGE
248 GREEN
249 PINK
250 BLUE

REGULAR

251 BLACK
252 YELLOW
254 BLUE
255 WHITE

256 RED
257 ORANGE
258 HI VIS YELLOW
259 GREEN

PRODUCT NAME: WATER-BASED M/P - ALL COLORS PRODUCT CODE: 40A1

HMS CODES: H F R P
2 2 0 X

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: AerVOE-Pacific Company, Inc.
INFORMATION PHONE: 775-782-0100
DATE REVISED: 01-07-02

ADDRESS: 1198 Mark Circle, Gardnerville, NV 89410
EMERGENCY PHONE: 1-800-424-9300
REASON REVISED: Updated

SECTION II - HAZARDOUS INGREDIENTS / SARA III INFORMATION OCCUPATIONAL EXPOSURE LIMITS

HAZARDOUS COMPONENTS	WEIGHT PERCENT	OSHA PEL	ACGIH TLV	OTHER	LD50 SPECIES & ROUTE	LC50 SPECIES & ROUTE
*XYLENE (CAS 1330 20 7)	22	100 PPM	100 PPM		4300 mg / kg RAT (ORAL)	6700 PPM; 4 hr RAT (INHA)
MINERAL SPIRITS (CAS 8052 41 3)	<5.0%	100 PPM	100 PPM		N/A	N/A
*HEXANE (CAS 110 54 3)	10	50 PPM	50 PPM		28,710 mg / kg RAT (ORAL)	N/A
PROPANE (CAS 74 98 6)	10	1000 PPM	1000 PPM		N/A	N/A
ISOBUTANE (CAS 75 28 6)	<5.0%	800 PPM	800 PPM	ESTIMATED	N/A	57 PPM / 15 min RAT (INHA)
NORMAL BUTANE (CAS 106 97 8)	<5.0%	600 PPM	600 PPM		N/A	656 mg / L; 4 hr RAT (INHA)

*Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.

NOTE: N/A applies to not available or not applicable

ALCONOX

MATERIAL SAFETY DATA SHEET		
PRODUCT NAME: ALCONOX October 8, 2003		Page 2 of 4
SECTION 4 – FIRST AID MEASURES		
INHALATION: Remove affected person to fresh air; if symptoms persist seek medical attention		
SKIN: Remove contaminated clothing; wash affected area with soap and water; launder contaminated clothing before reuse; if irritation persists seek medical attention		
EYES: Remove contact lenses. Flush eyes with clear running water for 15 minutes while holding eyelids open; if irritation persists, seek medical attention		
INGESTION: Give two glasses of water for dilution; DO NOT induce vomiting		
SECTION 5 – FIRE FIGHTING MEASURES		
FLASH POINT (METHOD USED) Non-flammable	FLAMMABLE LIMITS AUTOIGNITION TEMPERATURE: Not Determined	LEL: NOT APPLICABLE UEL: NOT APPLICABLE NFPA CLASS: none
GENERAL HAZARDS: Product is not considered flammable or combustible. Products of combustion include compounds of carbon, hydrogen and oxygen, including carbon monoxide.		
EXTINGUISHING MEDIA: Carbon dioxide, water, water fog, dry chemical, chemical foam		
FIRE FIGHTING PROCEDURES: NONE		
UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE		
HAZARDOUS COMBUSTION PRODUCTS: Smoke, fumes, oxides of carbon		
SECTION 6 – ENVIRONMENTAL RELEASE MEASURES		
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Confine and segregate product for reuse; place material into approved containers for disposal; for spills in excess of allowable limits (RQ) notify the National Response Center @ (800) 424-8802; refer to CERCLA 40 CFT 302 for detailed instructions		
SECTION 7 – HANDLING AND STORAGE		
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep container closed when not in use; protect containers from abuse; store containers in cool, dry area. Keep this and other chemicals out of reach of children.		
SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION		
ENGINEERING CONTROLS		
The use of local exhaust ventilation and airborne particle collection is recommended. No other special controls are indicated.		
PERSONAL PROTECTION		
RESPIRATORY PROTECTION (SPECIFY TYPE): NIOSH approved respirator designed to remove airborne particulate present in excess of maximum allowable concentrations due to operations such as mixing, spraying, sanding, buffing, etc. Refer to 29 CFR 1910 134 or European Standard EN 149 for regulations.		
PROTECTIVE GLOVES: Neoprene or rubber gloves		
EYE PROTECTION: Safety goggles with side shields		
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Safety eyebath nearby		
WORK/HYGENIC PRACTICES: Practice safe workplace habits. Minimize body contact with this, as well as all chemicals in general		
Document Name	MSDSAX.doc	Effective date: 10/15/2003
Issued By	Malcolm McLaughlin	Issue Date: 10/08/03
Author	Malcolm McLaughlin	Supercedes: AXeumsds112502

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MATERIAL SAFETY DATA SHEET

PRODUCT NAME: ALCONOX
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SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

VAPOR PRESSURE (MM Hg) Not Applicable	VAPOR DENSITY (AIR = 1) Not Applicable
SPECIFIC GRAVITY (WATER = 1) 0.85-1.10	EVAPORATION RATE (WATER = 1) Not Applicable
SOLUBILITY IN WATER Complete to > 10% w/w pH: 9.5 (1% aqueous solution)	FREEZING POINT Not Applicable PHYSICAL STATE: Granular Powder
BOILING POINT Not Applicable	APPEARANCE AND ODOR White granular powder, practically odorless
VISCOSITY Not Applicable	VOLATILE ORGANIC COMPOUNDS (VOC) None

SECTION 10 – STABILITY AND REACTIVITY

STABILITY UNSTABLE STABLE XXX	CONDITIONS TO AVOID Store in a cool dry area
INCOMPATIBILITY (Materials to Avoid) Strong oxidizers, strong acids	
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Decomposition will no occur if handled and stored properly. In case of fire, oxides of carbon, hydrocarbons, fumes, and smoke may be produced.	
HAZARDOUS POLYMERIZATION MAY OCCUR WILL NOT OCCUR XXX	CONDITIONS TO AVOID None

SECTION 11 – TOXICOLOGICAL INFORMATION

Hazardous Ingredients	%	CAS #	LD50 of Ingredient (Species and Route)	LC50 of Ingredient (Species and Route)
Sodium phosphate, tribasic (a)	10-30	7758-29-4	3100 mg/kg oral -rat	Not established
Sodium carbonate (Nuisance Dust)	7-13	497-19-8	4020 mg/kg	1200 mg/m3/2H
Sodium dodecylbenzene sulfonate (a)	10-30	25155-30-0	Not Established	Not Established
Tetrasodium phosphate	10-30	7722-88-5	Not Established	Not established
Mixture as a whole	100%	various	>5.0 g/kg oral-rat	

SECTION 12 – ECOLOGICAL INFORMATION

No data are available on the adverse effects of this material on the environment. Neither COD nor BOD data are available. Based on the chemical composition of their product it is assumed that the mixture can be treated in an acclimatized biological waste treatment plant system in limited quantities. However treatment should be evaluated and approved for each specific biological system. None of the ingredients in this mixture are classified as a Marine Pollutant.

SECTION 13 – DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS: Dispose of in accordance with Local, State, and Federal regulations. Do not flush to waterway. Refer to "40 CFR Protection of Environment Parts 260 – 299" for disposal regulations in the US. Consult your Local, State, and Federal Environmental Protection Agency before disposing of any chemicals.

SECTION 14 – TRANSPORT INFORMATION

PROPER SHIPPING NAME: Not Regulated	IATA HAZARD CLASS / Pack Group: None
HAZARD CLASS / Pack Group: None / None	IMDG HAZARD CLASS: None
REFERENCE: Not Applicable	RID/ADR Dangerous Goods Code: None
IDENTIFICATION NUMBER: None	Canadian TDG Class / Division: None
LABEL: None Required	HAZARD SYMBOLS: None

Note: Transportation information provided is for reference only. Client is urged to consult CFR 49 parts 100 – 177, IMDG, IATA, EC, Canadian TDG, and United Nations TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging and materials and methods of shipping.

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SECTION 15 – REGULATORY INFORMATION

TSCA (Toxic Substances Control Act):

Components of this product are listed on the TSCA inventory

SARA TITLE III (Superfund Amendments and Reauthorization Act)

311/312 Hazard Categories
Acute Health

313 Reportable Ingredients
None

CERCLA (Comprehensive Response Compensation and Liability Act)

(a) The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) has notification requirements for releases or spills to the environment of the Reportable Quantity (RQ for this mixture = 6,000 lbs) or greater amounts, according to 40 CFR 302

CPR (Canadian Controlled Products Regulations)

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled products Regulations

EINECS (European Inventory of Existing Commercial Chemical Substances)

Components of this product are on the European Inventory of Existing Commercial Chemical substances

AICS (Australian Inventory of Chemical Substances)

Components of this product are on the Australian Inventory of Chemical substances

EC Risk Phrases

R20 Harmful by Inhalation
R36 Irritating to eyes
R37 Irritating to respiratory system
R38 Irritating to skin

EC Safety Phrases

S8 Keep container dry
S22 Do not breath dust
S24 Avoid contact with skin
S25 Avoid contact with eyes

SECTION 16 – OTHER INFORMATION

No Specific Notes

HMIS HAZARD RATINGS	HEALTH	1	0= insignificant	3= high
	FLAMMABILITY	0	1= slight	4= extreme
	REACTIVITY	0	2= moderate	
	PERSONAL PROTECTIVE EQUIPMENT	B	Safety Glasses, Gloves	

REVISION SUMMARY This MSDS has been revised in the following sections:
No revisions available

MSDS prepared by manufacturer

The information contained herein is believed to be accurate but is not warranted to be so. Users are advised to confirm in advance of need that information is current, applicable and suited to the circumstances of use. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, vendor assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed.

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Material Safety Data Sheet

Hydrochloric Acid 50% v/v
ACC# 89240 Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrochloric Acid 50% v/v
Catalog Numbers: 93580
Synonyms: Muriatic acid; Chlorohydric acid; Hydrogen chloride; Spirits of salt
Company Identification:

Fisher Diagnostics
Fisher Scientific Company, LLC
8365 Valley Pike
Middletown, VA 22645-0307

For information, call: 800-524-0294
Emergency Number: 800-524-0294
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887
Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7647-01-0	Hydrogen chloride	< 20	231-595-7
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: T C
Risk Phrases: 23 35

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless to slight yellow clear liquid. Danger! Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause fetal effects based upon animal studies. Possible sensitizer. May be harmful if swallowed.

Target Organs: Respiratory system, teeth, eyes, skin, circulatory system.

Potential Health Effects

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.

Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Contact with liquid is corrosive and causes severe burns and ulceration.

Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.

Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated

exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!

Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Give milk of magnesia.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician: Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

Antidote: Do NOT use oils or ointments in eye.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.

Extinguishing Media: For large fires, use water spray, fog, or alcohol-resistant foam. Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Large spills may be neutralized with dilute alkaline solutions of soda ash (sodium carbonate, Na_2CO_3), or lime (calcium oxide, CaO). Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove

all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.

Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits Chemical NameACGIHNIOSHOSHA - Final PELs

Hydrogen chloride2 ppm Ceiling50 ppm IDLH5 ppm Ceiling; 7 mg/m3 Ceiling

Waternone listednone listednone listed

OSHA Vacated PELs: Hydrogen chloride: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear neoprene or polyvinyl chloride gloves to prevent exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid

Appearance: colorless to slight yellow

Odor: strong, pungent

pH: 0.01

Vapor Pressure: 5.7 mm Hg @ 0 deg C

Vapor Density: 1.26

Evaporation Rate:> 1.00 (N-butyl acetate)

Viscosity: Not available.

Boiling Point: 81.5-110 deg C @ 760 mmHg

Freezing/Melting Point:-74 deg C

Decomposition Temperature:Not available.

Solubility: Miscible.

Specific Gravity/Density:1.0-1.2

Molecular Formula:HCl.H2O

Molecular Weight:36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Mechanical shock, incompatible materials, metals, excess heat, exposure to moist air or water, bases.

Incompatibilities with Other Materials: Bases, acetic anhydride, alkali metals, aluminum, amines, copper, copper alloys, fluorine, iron, sodium hydroxide, steel, sulfuric acid, vinyl acetate, zinc, potassium permanganate, cesium acetylene carbide, rubidium acetylene carbide, rubidium carbide, sodium, chlorosulfonic acid, oleum, carbonates, perchloric acid, calcium phosphide, metal oxides, acetates, cesium carbide, beta-propiolactone, ethyleneimine, propylene oxide, lithium silicides, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, 1,1-difluoroethylene, ethylene diamine, magnesium boride, mercuric sulfate, silver perchlorate + carbon tetrachloride, uranium phosphide.

Hazardous Decomposition Products: Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 7647-01-0: MW4025000; MW4031000

CAS# 7732-18-5: ZC0110000

LD50/LC50:

CAS# 7647-01-0:

Inhalation, mouse: LC50 = 1108 ppm/1H;

Inhalation, mouse: LC50 = 8300 mg/m³/30M;

Inhalation, rat: LC50 = 3124 ppm/1H;

Inhalation, rat: LC50 = 45000 mg/m³/5M;

Inhalation, rat: LC50 = 8300 mg/m³/30M;

Oral, rabbit: LD50 = 900 mg/kg;

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:

CAS# 7647-01-0:

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

Epidemiology: Experimental reproductive effects have been reported.

Teratogenicity: Embryo or Fetus: Stunted fetus, Inhalation, rat TCL0=450

mg/m³/1H Specific Developmental Abnormalities: homeostatis, Inhalation, rat TCL0=450 mg/m³/1H (female 1 days pre-mating).

Reproductive Effects: No information available.

Neurotoxicity: No information available.

Mutagenicity: Cytogenetic analysis: Hamster, lung = 30 mmol/L.; Cytogenetic analysis: Hamster, ovary = 8 mmol/L.

Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified)

Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5 No data available.

Environmental: Rapidly hydrolyzes when exposed to water. Will exhibit extensive evaporation from soil surfaces. Upon transport through the soil, hydrochloric acid will dissolve some of the soil materials (especially those with carbonate

bases) and the acid will neutralize to some degree.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

Section 14 - Transport Information

US DOT IATA RID/ADRIMO Canada TDG

Shipping Name: No information available. No information available.

Hazard Class:

UN Number:

Packing Group:

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7647-01-0 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 7647-01-0: 500 lb TPQ

SARA Codes

CAS # 7647-01-0: acute.

Section 313

This material contains Hydrogen chloride (CAS# 7647-01-0, 20%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA. STATE

CAS# 7647-01-0 can be found on the following state right to know lists:

California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T C

Risk Phrases:

R 23 Toxic by inhalation.

R 35 Causes severe burns.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)

CAS# 7647-01-0: 1

CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

CAS# 7647-01-0 is listed on Canada's DSL List.

CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, D2A.

Canadian Ingredient Disclosure List

CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3) OEL-AUSTRIA:TWA 5 ppm (7 mg/m3) OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3) OEL-DENMARK:STEL 5 ppm (7 mg/m3) OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin OEL-FRANCE:STEL 5 ppm (7.5 mg/m3) OEL-GERMANY:TWA 5 ppm (7 mg/m3) OEL-HUNGARY:STEL 5 mg/m3 OEL-JAPAN:STEL 5 ppm (7.5 mg/m3) OEL-THE NETHERLANDS:TWA 5 ppm (7 mg/m3) OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3) OEL-POLAND:TWA 5 mg/m3 OEL-RUSSIA:STEL 5 ppm (5 mg/m3) OEL-SWEDEN:STEL 5 ppm (8 mg/m3) OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3) OEL-THAILAND:TWA 5 ppm (7 mg/m3) OEL-TURKEY:TWA 5 ppm (7 mg/m3) OEL-UNITED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 7/02/1999

Revision #3 Date: 3/18/2003

The information above is believed to be accurate and represents the best

information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

COULTON CHEMICAL -- SULFURIC ACID, CONCENTRATED
MATERIAL SAFETY DATA SHEET
NSN: 685000N067562
Manufacturer's CAGE: CXULT
Part No. Indicator: A
Part Number/Trade Name: SULFURIC ACID, CONCENTRATED

=====
General Information
=====

Company's Name: COULTON CHEMICAL CO
Company's Street: 6600 SYLVANIA CO
Company's City: SYLVANIA
Company's State: OH
Company's Country: US
Company's Zip Code: 43560
Company's Emerg Ph #: 419-698-8181;800-424-9300 (CHEMTREC)
Company's Info Ph #: 419-885-4661
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01JUN93
Safety Data Review Date: 26DEC95
MSDS Serial Number: CBGCS

=====
Ingredients/Identity Information
=====

Proprietary: NO
Ingredient: SULFURIC ACID (SARA 302/313) (CERCLA)
Ingredient Sequence Number: 01
Percent: 93-99.5
NIOSH (RTECS) Number: WS5600000
CAS Number: 7664-93-9
OSHA PEL: 1 MG/M3
ACGIH TLV: 1 MG/M3/3 STEL

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 02
Percent: 7-0.5
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUP DAT: IF WATER IS ADDED TO STRONG ACID, HAZARDOUS BOILING
AND SPATTERING MAY OCCUR.
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: RESP PROT: RESP SELECTION & USE. IN EMER/NON-ROUTINE
OPERATIONS WHERE EXPOS LEVELS ARE UNKNOWN/HIGH, WEAR (ING 5)
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 4: NIOSH/MSHA APPROVED SCBA WILL FULL FACE PIECE OPERATED
IN THE POSITIVE PRESSURE MODE.
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: EYE PROT: GOGGLES AND FULL LENGTH FACESHIELD (FP N).
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
=====

Physical/Chemical Characteristics

=====

Appearance And Odor: CLEAR, COLORLESS, OILY LIQUID
Boiling Point: >518F,>270C
Specific Gravity: 1.84 (H*20=1)
Solubility In Water: MISCIBLE
=====

Fire and Explosion Hazard Data

=====

Flash Point: NON FLAMMABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: USE MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL
PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: SULFURIC ACID IS NONFLAMM. HOWEVER, DILUTE
SULFURIC ACID WILL REACT W/MOST METALS TO LIBERATE HYDROGEN GAS WHICH CAN
REACH FLAMM/EXPLO LIMS IF ALLOWED (SUP DAT)
=====

Reactivity Data

=====

Stability: YES
Cond To Avoid (Stability): STABLE IF STORED PROPERLY.
Materials To Avoid: SULFURIC ACID WILL REACT STRONGLY W/BASES & MOST ORG
MATLS. IF DILUTED IT WILL RAPIDLY CORRODE MOST METALS.
Hazardous Decomp Products: EVEN NORM CORR BY CONC ACID GENERATES HYDROGEN
GAS WHICH WILL SLOWLY PRESS CLSD CONTRS. IN USE, SULFURIC ACID (SUP DAT)
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.
=====

Health Hazard Data

=====

LD50-LC50 Mixture: LD50 (ORAL MAN): 135 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE/CHRONIC: INHALATION OF SULFURIC ACID
MISTS CAN DAMAGE THE RESPIRATORY TRACT AND LUNGS. CONCENTRATED SULFURIC
ACID IS A STRONG DEHYDRATING AGENT THAT WILL QUICKLY DAMAGE HUMAN TISSUE,
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ESPECIALLY IF HOT. EYE INJURIES CAN BE SEVERE AND PERMANENT.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: SULFURIC ACID: IARC MONO ON EVALUATION OF CARCIN RISK OF CHEM TO MAN, VOL 52, PG 41, 1992: GROUP 1. ANIMAL: PULM IRRIT.

Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES: IMMEDIATE FLUSH W/WATER FOR AT LEAST 15 MIN. FLUSH UNDER LIDS BY LIFTING THEM/ROLLING EYES. SEE MD AS SOON AS POSSIBLE.

SKIN: FLUSH W/WATER IMMEDIATE & CONTINUE FOR AT LEAST 15 MIN. REMOVE CLOTHING QUICKLY IN SAFETY SHOWER & CONTINUE FLUSHING. INHAL: SEEK FRESH AIR & RESTORE NORMAL BREATHING. INGEST: DRINK LARGE VOLUME OF MILK/WATER FOLLOWED BY MILK OF MAGNESIA PENDING MED ATTENTION. AVOID VOMITING IF POSSIBLE.

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Precautions for Safe Handling and Use
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Steps If Matl Released/Spill: MINOR SPILLS CAN BE DILUTED W/LOTS OF WATER & NEUTRAL W/SODA ASH, LIME/CAUSTIC. CONTAINMENT PROVISIONS FOR MAJOR SPILLS & SUBSEQUENT HANDLING SHOULD BE PREDETERMINED TO CONFORM W/APPLICABLE LAWS & REGS & INSURE SAFETY OF PERSONS INVOLVED. CONTACT SUPPLIER FOR ADDITIONAL INFO.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: DISPOSAL SHOULD FOLLOW ALL ENVIRONMENTAL REGULATIONS. DISPOSE OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS (FP N).

Precautions-Handling/Storing: STORE SULFURIC ACID DRUMS IN SHADED, WELL-DRAINED STORAGE AREAS. DO NOT ADD WATER TO LARGE AMOUNTS OF CONCENTRATED SULFURIC ACID.

Other Precautions: DO NOT ALLOW DILUTE ACID (LESS THAN 70%) TO CONTACT METALS. MOST METALS ARE RAPIDLY CORRODED IN WEAK SULFURIC ACID AND EXPLOSIVE HYDROGEN IS GENERATED.

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Control Measures
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Respiratory Protection: SPRAY FROM LEAKS, ADDING WATER TO SPILLS/AGITATION OF ACID MAY GENERATE MIST LEVELS REQUIRING BREATHING PROTECTION. IF RESPIRATION IS NEEDED, FOLLOW OSHA RESPIRATORY REGS (29 CFR 1910.134) & WEAR NIOSH/MSHA APPROVED RESPIRATOR. SEEK PROFESSIONAL ADVICE PRIOR TO (ING 4)

Ventilation: PROVIDE VENTILATION TO CONTROL EXPOSURE LEVELS BELOW AIRBORNE EXPOSURE LIMITS.

Protective Gloves: ACID-RESISTANT GLOVES.

Eye Protection: ANSI APPROVED CHEMICAL WORKERS (ING 6)

Other Protective Equipment: ACID-RESISTANT PROTECTIVE CLOTHING (SUIT, BOOTS, HOOD). ANSI APPROVED EMERGENCY EYEWASH & DELUGE SHOWER (FP N).

Work Hygienic Practices: WEARING OF CONTACT LENSES IS NOT RECOMMENDED.

Suppl. Safety & Health Data: EXPLO HAZ: TO COLLECT. CONC SULFURIC ACID WILL REACT W/MANY ORGANIC MATERIALS & MAY CAUSE FIRE DUE TO REACTION HEAT. IF WATER IS ADDED TO CONC ACID A SEVERE ERUPTION MAY RESULT, ESPECIALLY IF QUANTITIES INVOLVED ARE LARGE. HAZARD DECOMPOSITION PRODUCT: SHOULD ALWAYS BE DILUTED BY ADDING ACID SLOWLY TO WATER IN ORDER TO CONTROL HEAT GENERATED BY DILUTION. (ING 3)

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Transportation Data
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Disposal Data
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Label Data
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Label Required: YES
Technical Review Date: 26DEC95
Label Date: 26DEC95
Label Status: G
Common Name: SULFURIC ACID, CONCENTRATED
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: CORROSIVE. ACUTE: INHALATION OF SULFURIC ACID MISTS CAN DAMAGE THE RESPIRATORY TRACT AND LUNGS. CONCENTRATED SULFURIC ACID IS A STRONG DEHYDRATING AGENT THAT WILL QUICKLY DAMAGE HUMAN TISSUE, CANCER HAZARD. CONTAINS SULFURIC ACID, WHICH IS LISTED AS AN ANIMAL PULMONARY CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: COULTON CHEMICAL CO
Label Street: 6600 SYLVANIA CO
Label City: SYLVANIA
Label State: OH
Label Zip Code: 43560
Label Country: US
Label Emergency Number: 419-698-8181;800-424-9300 (CHEMTREC)