APPENDIX D

REVISED SITE SPECIFIC HEALTH AND SAFETY PLAN

REVISED
SITE HEALTH AND SAFETY PLAN

EXPANDED SOIL VAPOR EXTRACTION
PILOT TEST AT OPERABLE UNIT 2
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JET PROPULSION LABORATORY
PASADENA, CALIFORNIA

Contract Number N68711-97-D-8702
Delivery Order No. 0048

Prepared for:

Department of the Navy,
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5187

Prepared by:

GEOFON, INC.
22632 Golden Springs Drive, Suite 270
Diamond Bar, California 91765

GEOFON Project No. 04-4304.480 May 10, 2002

REVISED
SITE HEALTH AND SAFETY PLAN

EXPANDED SOIL VAPOR EXTRACTION
PILOT TEST AT OPERABLE UNIT 2
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
JET PROPULSION LABORATORY
PASADENA, CALIFORNIA

Contract Number N68711-97-D-8702
Delivery Order No. 0048

Prepared by: Brad Shojaee 5/10/02

Brad Shojaee — Date
GEOFON, Inc.
Project Hydrogeologist

Approved by: [signature] 5/10/02

Asrar Faheem, R.E.A. — Date
GEOFON, Inc.
Project Manager

Approved by: Dr. M. Sassoon CIH #5203 May 10, 2002

Maureen Sassoon, C.I.H. — Date
GEOFON, Inc.
Health and Safety Officer

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

ACGIH:	American Conference of Governmental Industrial Hygienist
AL:	action level
ANSI:	American National Standards Institute
Cal-OSHA	California Occupational Safety and Health Administration
CCR:	California Code of Regulations
CERCLA:	Comprehensive Environmental Response, Compensation, and Liability Act
CFR:	Code of Federal Regulations
CIH:	Certified Industrial Hygienist
CNS:	central nervous system
CO_2:	carbon monoxide
COPC:	chemicals of potential concern
CRZ:	contamination reduction zone
dBA:	decibels
DO:	delivery order
EPA:	Environmental Protection Agency
EZ:	exclusion zone
°F:	(degrees) Fahrenheit
FSP:	Field Sampling Plan
GAC:	granular activated carbon
GEOFON:	GEOFON, Inc.
HEPA:	high-efficiency particulate air
HR:	heart rate
HSO:	Health and Safety Officer
IDLH:	immediately dangerous to life and health
JPL:	Jet Propulsion Laboratory
LEL:	lower explosive limit
MSHA:	Mine Safety and Health Administration
NASA:	National Aeronautics and Space Administration
NIOSH:	National Institute of Occupational Safety and Health
NMO:	NASA Management Office
OSHA:	Occupational Safety and Health Administration
OU-2:	Operable Unit 2
PELs:	permissible exposure limits

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

PID:	photo-ionization detector
PPE:	personal protective equipment
PPM:	parts per million
RPM:	Remedial Project Manager
SH&SP:	Site Health and Safety Plan
SOW:	Statement of Work
SPM:	Senior Project Manager
SSO:	Site Safety Officer
STELs:	short term exposure levels
SVE:	soil vapor extraction
SWDIV:	Southwest Division Naval Facilities Command
SZ:	support zone
TLV:	threshold limit values
TPH:	total petroleum hydrocarbons
TWA:	time-weighted average
USEPA:	United States Environmental Protection Agency
VEW:	vapor extraction well
VOCs:	volatile organic compounds

D.1 INTRODUCTION

GEOFON, Inc. (GEOFON) has prepared this Site Health and Safety Plan (SH&SP) for the expanded soil vapor extraction (SVE) pilot test for Operable Unit 2 (OU-2) at the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratory (JPL) in Pasadena, California. The work is provided under the Department of the Navy, Southwest Division (SWDIV) Contract No. N68711-97-D-8702, Delivery Order No. 0048.

D.1.1 Purpose and Objective

This SH&SP and all site activities will be performed in accordance with the U.S. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHAIUSCG/EPA, October 1985; Title 29, Code of Federal Regulations (CFR), 1910.120, 1910.165, 1910.1030, 1910.1200, 1910.134; California Code of Regulations (CCR), Title 8, Section 5192; the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM-385-1-1, (September 1996); and the Navy/Marine Corps Installation Restoration Manual (August 2000), and in accordance with other applicable documents.

The SH&SP objectives are to insure that all necessary precautions for field work are in place and that appropriate health and safety procedures are followed at all times. The object is to protect personnel, to provide the necessary protection to prevent damage, injury, or loss of property and equipment; and to respond quickly and effectively to GEOFON related activities.

All GEOFON employees involved in field work at the site have completed the required 40 hours initial training, maintain qualification through annual refresher training, are under a program of medical monitoring, and are certified to wear respiratory protection, as specified in 29 CFR part 1910.139. Full details of GEOFON's Training, Respiratory Protection, and Medical Monitoring Program are given in the Standard Operating Procedures attached to the GEOFON Corporate Health and Safety Manual.

Although this Health and Safety Plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Activities required during this project may result in slight exposure of site workers and visitors to contaminants at very low concentrations. It is recognized that conditions on a site may change or that more information may become available during field activities. If during the field activities, it is determined that the conditions are not as described, or the protection specified in the SH&SP requires modifications, work will cease, and the Site Safety Officer will contact the Senior Project Manager (SPM) and the Health and Safety Officer (HSO) for guidance or clarification. Work will not resume until authorized by the SPM.

D.1.2 Site Location

JPL is located between the city of La Canada-Flintridge and the unincorporated city of Altadena, California, northeast of the 210 Foothill Freeway. The JPL facilities are located at 4800 Oak Grove Drive in Pasadena, California (Figure D-1). The site is situated on a south-facing slope along the base of the southern edge of the east-west trending San Gabriel Mountains at the northern edge of the metropolitan Los Angeles area.

D.1.3 Scope of Work

According to the Statement of Work (SOW) for Contract No. N68711-D-97-8702, Delivery Order No. 0048, the field work can be summarized into the following major components:

- Drilling and installation of soil vapor extraction wells;
- SVE system installation, operation, and maintenance;
- Soil vapor sampling;
- Coordination of investigation derived waste removal.

These tasks are detailed in the Task Hazard Analysis included in Attachment D-1.

Three new soil vapor extraction wells (VE-02, VE-03, and VE-04) will be installed as part of this delivery order. Also, the existing SVE unit and granular activated carbon treatment units (GAC) will be relocated from Location 1 (extraction well VE-01) to Location 2 (VE-02). The SVE unit will be operated at Location 2 for a period of up to six (6) months. For a detailed description of the Scope of Work, please refer to the Workplan Addendum for the expanded soil vapor extraction pilot test at Operable Unit 2.

The expanded SVE pilot test will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidelines. Under this delivery order, the scope of work will include quarterly, semiannual and annual soil vapor monitoring and SVE system maintenance/monitoring.

D.2 KEY PERSONNEL AND RESPONSIBILITIES

Key personnel for this project include Asrar Faheem (GEOFON), Senior Project Manager (SPM); Maureen Sassoon, Certified Industrial Hygienist (CIH), Anthony Ford (GEOFON), Health and Safety Officer (HSO); Tony Mohammad (GEOFON), Field Supervisor and Site Safety Officer and subcontractor personnel. An alternate SSO with the required training will be assigned when the SSO is not present. All project field staff, including subcontractor personnel, have completed comprehensive health and safety training, which meets the requirements of Title 29 Code of Federal Regulations Part 1910.120 (20 CFR 1910.120). The SSO and the alternate SSO have:

- Completed the required additional training for this project assignment.
- The authority to monitor and correct health and safety problems as they arise on-site.
- The responsibility of completing the Field Health & Safety Meeting Records.

Specific project safety responsibilities for these key personnel are detailed below. This SH&SP has been developed for GEOFON field personnel. Subcontractor personnel will follow this SH&SP or a Plan approved by GEOFON.

D.2.1 SPM Responsibilities

As the Senior Project Manager (SPM), Asrar Faheem is responsible for generating, organizing, and compiling the SH&SP, which describes planned field activities and potential hazards that may be encountered at the site. The SPM is also responsible for ensuring that adequate training and site safety briefing(s), including the provision of safety equipment, are provided to the project field staff. The SPM will provide a copy of this SH&SP to each member of the project field staff and one copy to each subcontractor prior to field activities. Associated health and safety responsibilities will include:

- Coordinating the activities of all field personnel, including their signed acknowledgment of the SH&SP.
- Selecting a SSO and field personnel for the work to be undertaken on site.
- Ensuring that the tasks assigned are being completed as planned and are kept on schedule.
- Providing authority and resources to ensure that the SSO is able to implement and manage safety procedures.

- Preparing reports and recommendations about the project to the client and the concerned personnel.
- Ensuring that the SSO is aware of all of the provisions of this SH&SP and in instructing all personnel on site about safety practices and emergency procedures defined in this plan.
- Ensuring that the SSO is monitoring site safety.

D.2.2 HSO/CIH Responsibilities

The Health and Safety Officer (HSO – Anthony Ford) and/or the Certified Industrial Hygienist (CIH - Maureen Sassoon), will be responsible for developing and coordinating the NASA JPL health and safety program and reviewing and approving the SH&SP for accuracy and incorporating new information or guidelines. This will aid the SPM and SSO in further definition and control of the potential health and safety hazards associated with this project. The HSO/CIH also has the authority to suspend or modify work practices for safety reasons, and to dismiss individuals whose site conduct endangers the health and safety of others.

D.2.3 SSO Responsibilities

The Site Safety Officer (SSO), Tony Mohammad, has a direct line of authority from the HSO to implement specific, health and safety requirements for specific site activities, and for ensuring that all team members including subcontractor(s) comply with the SH&SP. It is the SSO's responsibility to inform the subcontractor(s) and other field personnel of chemical and physical hazards, as he/she becomes aware of them. Additional SSO responsibilities include:

- Ensuring that all project-related personnel have signed the personnel agreement and acknowledgments contained in this SH&SP (Attachment D-2).
- Providing site safety briefing for team members.
- Evaluating weather conditions and chemical hazard information and making recommendations to the SPM about any modification to this SH&SP or personal protective equipment (PPE) requirements to maintain personnel safety.
- Monitoring the compliance activities and the documentation processes.
- Approving all field personnel working on site, taking into consideration their level of training, physical capacity and their eligibility to wear protective equipment necessary for the assigned tasks.
- Inspecting all PPE prior to on-site use.

- Assisting the SPM in documenting compliance with the SH&SP by completing the standard forms.
- Monitoring the compliance of field personnel for the routine and proper use of protective equipment that has been required for each task.
- Assisting in and evaluating the effectiveness of decontamination procedures for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.
- Enforcing the "buddy system" as appropriate for site activities.
- Posting location and route to the nearest medical facility and arranging for emergency transportation to the nearest medical facility.
- Posting the telephone numbers of local public emergency services; (i.e., police and fire);
- Stopping operations that threaten the health and safety of the field team or surrounding populous.
- Entering the exclusion area in emergencies after he/she has notified emergency services and taken appropriate precautions.
- Observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions or site work activities.

D.2.4 Project Field Staff Responsibilities

The project field staff is responsible for ensuring that activities are performed in accordance with the SH&SP and that deviations from the plan are based upon field conditions encountered and are well documented in field notes. The project field staffs' health and safety responsibilities include:

- Following the SH&SP and direction of the SSO.
- Reporting to the SPM any unsafe conditions or practices.
- Reporting to the SPM all facts pertaining to incidents that result in injury or exposure to toxic materials.
- Reporting to the SPM equipment malfunctions or deficiencies, and.
- Reviewing the SH&SP as necessary.

It is the responsibility of individual organizations involved in field activities to ensure understanding of and compliance to the SH&SP by its on-site employees or representatives working in controlled areas. Failure by any person to adhere to this plan may result in removal from site activities.

D.2.5 Subcontractor Responsibilities

All subcontractors are responsible for their own health and safety program and the health and safety of their own employees. This requirement is based on OSHA regulations, which recognize the employer-to-employee responsibility for health and safety. A copy of their written program must be submitted for review to the project manager, if requested. If the subcontractor chooses to follow this SH&SP, GEOFON will provide copies to the subcontractor's employees and they will be required to sign the SH&SP as part of the GEOFON safety protocol.

D.3 HAZARD/RISK ASSESSMENT

This section discusses chemical, physical and environmental hazards to workers on the site. Section 3.1 discusses each historical chemicals of potential concern (COPC) and includes information such as exposure limits and signs and symptoms of exposure. Section 3.2 discusses physical hazards identified with this site including those associated with the operation of remediation equipment and fire and electrical hazards. Environmental hazards discussed in Section 3.3 are associated with the physical location of the site and weather conditions such as heat stress, noise, and flora and fauna contact.

Daily "Tailgate" safety meetings are held at the start of each workday at which potential chemical, physical, and environmental hazards and preventative safety measures are discussed. Attendance is mandatory for all employees and is documented.

A Task Hazard Analysis has been developed for field activities occurring in each phase of work and is presented in Attachment D-1. This analysis identifies the sequence of work, specific hazards anticipated, and the control measures to be implemented to minimize or eliminate each hazard. The analysis will be used to augment daily safety meetings intended to heighten safety and hazard awareness on the job.

Soil vapor sampling procedures are discussed in Section 4.0 of the Field Sampling Plan (FSP) (Appendix A of the Workplan Addendum). Exposure to the (historical) chemicals of concern during vapor extraction well sampling or SVE system sampling is presented in the Task Hazard Analysis. Air samples, due to the inherent necessity of preventing both pressure loss and cross-contamination, will be collected either through a pressure fitting or a Tygon™ septum. Therefore, due to the nature of the sampling methodology, sample collection presents an extremely low possibility of airborne exposure to any COPCs.

D.3.1 Chemical Hazards

COPC at the JPL site include Carbon tetrachloride, freon 113, chloroform, trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), and 1,2-dichloroethane (1,2-DCA). The following sections provide a description of each COPC, OSHA permissible exposure limits (PELs), Cal-OSHA PELs, and OSHA Short Term Exposure Levels (STELs), if available.

PELs are OSHA/Cal-OSHA permissible exposure limits for airborne concentrations of toxic substances measured as an 8-hour time weighted-average (TWA). The OSHA/Cal-OSHA PELs are the recognized levels to which the monitoring at the site will adhere (the most stringent PEL will apply to this project). STELs are OSHA short-term exposure limits measured as a 15-minute TWA. OSHA requires that controls be implemented when employee exposure exceeds

these limits. GEOFON's Site Safety Officer will implement proper control measures, at the specified action levels, before the PELs and/or STELs exceed the OSHA/Cal-OSHA established levels.

D.3.1.1 Carbon Tetrachloride

Carbon tetrachloride is a manufactured compound that does not occur naturally. It is a clear liquid with a sweet smell that can be detected at low levels. It is also called carbon chloride, methane tetrachloride, perchloromethane, tetrachloroethane, or benziform. Trade names include benzinoform, freon 10, halon 104, tetraform, or tetrasol. Carbon tetrachloride is most often found as a colorless gas. It is not flammable and has a low solubility in water. It was used in the production of refrigeration fluid and propellants for aerosol cans, as a pesticide, as a cleaning fluid and degreasing agent, in fire extinguishers, and in spot removers. Because of its harmful effects, these uses are now banned and it is only used in some industrial applications.

High exposure to carbon tetrachloride can cause liver, kidney, and central nervous system damage. These effects result from either eating, drinking, or breathing of the compound, and possibly from exposure to the skin. The liver is especially sensitive to carbon tetrachloride because it swells and cells are damaged or destroyed. Kidneys are also damaged, causing a buildup of wastes in the blood. If exposure is low and then stops, the liver and kidneys can repair the damaged cells and function normally again.

If exposure is very high, the nervous system, including the brain, is affected. People may feel intoxicated and experience headaches, dizziness, sleepiness, and nausea and vomiting. These effects may subside if exposure is stopped, but in severe cases, coma and even death can occur.

OSHA has set a STEL for carbon tetrachloride at 10 ppm (15 minutes) in an 8-hour workday. The Cal-OSHA PEL for carbon tetrachloride is 2 ppm.

D.3.1.2 Freon 113

Freon 113 is the trade name for any of a special class of chemical compounds used as refrigerants, air conditioner coolants, and solvents. Freon compounds are hydrocarbon derivatives that contain fluorine, and often chlorine and bromine as well. They are generally colorless, odorless, non-toxic, non-corrosive, and non-flammable. Though usually non-reactive, freon compounds can undergo reactions in the upper atmosphere that damage the earth's ozone layer. The most commonly used is Freon-12, or dichlorodifluoromethane (CCl_2F_2).

D.3.1.3 Chloroform

Chloroform is a colorless liquid with a pleasant, nonirritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures. In the past, chloroform was used as an inhaled anesthetic during surgery, but it is not used that way today. Today, chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water. Other names for chloroform are trichloromethane and methyl trichloride

Breathing about 900 parts of chloroform per million parts air (900 ppm) for a short time can cause dizziness, fatigue, and headache. Breathing air, eating food, or drinking water containing high levels of chloroform for long periods of time can damage the liver and kidneys. Skin contact to large amounts of chloroform can cause sores.

The Cal-OSHA PEL for chloroform is 2 ppm.

D.3.1.4 Trichloroethene (TCE)

Trichloroethene is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers. Trichloroethene is not thought to occur naturally in the environment. However, it is present in most underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

Breathing large amounts of trichloroethene may cause impaired heart function, coma, and death. Breathing it for long periods may cause nerve, lung, kidney, and liver damage. Breathing small amounts for short periods of time may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating. Drinking large amounts of trichloroethene may cause nausea, liver and kidney damage, convulsions, impaired heart function, coma, or death. Drinking small amounts of trichloroethene for long periods may cause liver and kidney damage, nervous system effects, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

OSHA has set an exposure limit of 100 parts of trichloroethene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek. The Cal-OSHA PEL for trichloroethene is set at 25 ppm and the STEL is set at 100 ppm.

D.3.1.5 1,1-Dichloroethene (1,1-DCE)

1,1-dichloroethene is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It is also called vinylidene chloride.

1,1-dichloroethene is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications.

The main effect from breathing high levels of 1,1-dichloroethene is on the central nervous system. Some people lost their breath and fainted after breathing high levels of the chemical. Breathing lower levels of 1,1-dichloroethene in air for a long time may damage the nervous system, liver, and lungs. Workers exposed to 1,1-dichloroethene have reported a loss in liver function, but other chemicals were present. Spilling 1,1-dichloroethene on the skin or eyes can cause irritation. The Environmental Protection Agency (EPA) has determined that 1,1-dichloroethene is a possible human carcinogen.

OSHA has set an occupational exposure limit of 1 ppm of 1,1-dichloroethene in workplace air for an 8-hour workday, 40-hour workweek.

D.3.1.6 1,2-Dichloroethane (1,2-DCA)

1,2-dichloroethane is a manufactured chemical that is not found naturally in the environment. It is clear and has a pleasant smell and a sweet taste. It is also called 1,2-ethylene dichloride, dichloroethylene, or ethylene dichloride. It's most common use today is to make vinyl chloride and other chemicals and to dissolve grease, glue, and dirt. It is also added to leaded gasoline to remove lead. In the past, 1,2-dichloroethane was used in home products such as cleaning solutions and paint removers. It is rarely used in these products today.

Breathing high levels of 1,2-dichloroethane results in many harmful effects to people. It causes damage to the heart, central nervous system, liver, kidneys, and lungs. These same effects have been seen in people who accidentally ingested high levels of the chemical. We do not know the effects in people of breathing or ingesting lower levels of 1,2-dichloroethane over a longer period of time. The Department of Health and Human Services has determined that 1,2-dichloroethane may reasonably be anticipated to be a carcinogen.

Cal-OSHA has set an occupational exposure limit of 1 parts of 1,2-dichloroethane per million parts of air (1 ppm) for an 8-hour workday, 40-hour workweek, and a STEL of 2 ppm.

The National Institute for Occupational Safety and Health (NIOSH) has recommended an occupational exposure limit of 1 ppm for 1,2-dichloroethane for a 10-hour workday, 40-hour workweek.

D.3.2 Physical Hazards

There are numerous physical hazards associated with this project which, if not identified and addressed, could present accidents and personal injury to field personnel, as well as operational problems. Field personnel should maintain awareness of potential safety hazards and should immediately inform the SSO of any new hazards so that corrective measures can be taken.

D.3.2.1 Slips, Trips, and Falls

During field activities, work will occur in areas where job supplies and other equipment at ground level present possible slip, trip and fall hazards. In addition, wet weather conditions may also pose such hazards. Work locations will be kept as tidy as possible and free of debris on the ground. Personnel will wear appropriate footwear for site conditions and walk carefully.

D.3.2.2 Head and Back Injuries

As minimum requirements, hard hats and safety glasses will be donned prior to performing any site activities. This will prevent minor injuries caused by bumping one's head while working around and under piping and other process related structures. Personnel are instructed in proper lifting techniques and shall be reminded not to lift heavy items without assistance at the daily safety meeting.

D.3.2.3 Heavy Equipment

The use of heavy equipment presents the greatest potential for injury to personnel. The moving parts of heavy equipment create pinch points that can cause serious injury. In all cases, rotating shafts or gears should be covered to prevent accidental contact. In some cases, where rotating parts cannot be adequately guarded, only experienced operators will be allowed to work around these rotating parts. All mobile equipment operators will have had the required training and will have demonstrated the necessary skills to operate the heavy equipment.

The primary hazard around heavy equipment is the lack of visual contact with equipment operators. Personnel needing to approach heavy equipment while operating will observe the following protocols:

- Make eye contact with the operator (and spotter).
- Signal the operator to cease heavy equipment activity.
- Approach the equipment and inform the operator of intentions.

All personnel working around heavy equipment will wear hard hats, steel-toed boots and brightly-colored vests. Mobile equipment should be equipped with occupant restraints and/or

rollover protection according to 29 CFR 1926, Subpart O. All heavy equipment and trucks (except for pick-up trucks) will have back-up alarms.

D.3.2.4 Electrical Hazards

In order to prevent accidents caused by electric shock, the HSO will inspect all electrical connections on a daily basis. He will shut down and lockout any equipment which is found to have frayed or loose connections in accordance with GEOFON Standard Operating Procedures for Mechanical & Electrical Lockout/Tagout, Section L. The equipment will be de-energized and tested before any electrical work is done. All equipment will be properly grounded prior to and during all work.

D.3.2.5 Fire and Explosion Hazards

Occurrence of elevated concentrations of volatile organic compounds increases the potential fire and explosion hazard. Explosive concentrations of these constituents could develop in small and confined spaces. Explosive potential will be monitored with a LEL/O_2 meter in accordance with the requirements found in Section 6.0. Monitored areas will include the SVE system influent and effluent and each vapor extraction well prior to sampling. If readings of the volatile organic compounds (VOCs) vapor content are greater than 10% of the Lower Explosive Limit (LEL), work will immediately cease. Natural ventilation will be allowed to reduce the vapor concentrations, or engineering control measures such as ventilation or dry ice (CO_2) will be implemented. The trailer-mounted SVE system is equipped with explosion-proof components to handle the potentially explosive mixtures of extracted gas that may be encountered. In the event of fire or explosion, all personnel will evacuate the site, and the Fire Department will be summoned immediately. Upon arrival of the fire department, the Project Superintendent, Project Manager, or the Site Safety Officer will advise the fire commander of the location, nature, and identification of the fire and any hazardous materials on site.

D.3.2.6 Hazards Associated with the SVE System Operation

The SVE system utilizes high temperature and high voltages when in operation. All personnel operating the SVE system have to be trained in the operation and maintenance of the system, as well as the safety devices provided with the system, prior to the initiation of the field activities. The following precautions should be taken:

- Do not attempt to bypass any of the safety interlocks provided with the unit in an attempt to operate the unit unless authorized by the manufacturer.
- Do not modify or bypass the transformer fuse blocks, in order to make the system operational unless authorized by the manufacturer.

- Do not remove any equipment from the unit in order to make the unit operational.
- Keep all body parts clear of the exhaust stack, air intake valves and moving parts due to burns and possible serious bodily injury situations that may occur as a result of body contact with these parts.
- Do not restrict, block or close the exhaust stack during operation.
- Disconnect incoming voltage to the unit control panel before attempting to work on the panel or other electrical components on the unit. Use a voltage meter to determine that the power is off. Have only qualified personnel work on the electrical components, preferably a qualified electrician.
- When working with the electrical components, rubber-soled safety boots, hard hat, and rubber gloves should be worn at all time in order to minimize the potential hazard of electrical shock.

The following additional safety precautions must be taken while working in close proximity to the blower and the associated piping:

- Before operating the blower under power for the first time, check the unit and the installation thoroughly to reduce the likelihood of avoidable troubles. Check for the following conditions:
  - Make sure that the no bolts, tools, rags, or dirt have been left in the blower, and that inlet piping is free of debris.
  - Use a temporary protective screen at the blower.
  - Recheck blower leveling, drive alignment and tightness of all mounting bolts and adjust the belt tightness.
  - Check the oil level in the gearbox and check for the lubrication of the driver. Make sure that electrical overload devices are installed.
  - If a valve is in the inlet piping, make sure that it is open by opening the manual unloading valve in the discharge air line.
  - Bump the blower a few revolutions with driver to check that direction of rotation is correct, and that both units coast freely to stop.
- Avoid bodily contact with the blower casing and associated piping or accessories, which may become hot enough to cause skin burns.

- Do not reach into any opening in the blower while in operation. Cover the external parts with adequate guards.
- Disconnect power before performing any work, and avoid by-passing or rendering inoperative any safety or protective devices.
- Place a strong coarse screen over the inlet and avoid standing in the discharge air stream if the blower is operated while the piping is disconnected.
- Stay clear of open inlet piping (suction area) of pressure blowers, and the open discharge blast from vacuum blowers.
- Stay clear of the blast from pressure relief valves and the suction area of vacuum relief valves.
- Avoid extended exposure in close proximity to machinery which exceeds safe noise levels (85 dBA or above).
- Casing pressure must not exceed 25 PSI (172 kPa) gauge. Do not pressurize vented cavities from an external source, nor restrict the vents.
- Place warning signs and train the personnel to exercise adequate general safety precautions in proximity to the SVE system unit and blower area.

D.3.2.7 Earthquake Contingency Plan

If an earthquake should occur during the course of site activities, the following steps should be taken:

- Stop working; remain calm and do not panic.
- If indoors, stay away from windows and take cover under heavy furniture or near inside walls, if possible.
- Do not do anything that involves a possible source of ignition, such as smoking, cutting, or welding.
- If outdoors, stay away from power lines, power poles, and windows.
- If in a vehicle, stay in the vehicle until the earthquake is over.

After the earthquake is over, the following procedures should be used:

- Prepare for the aftershocks.
- Stay out of severely damaged buildings.
- Meet for a head count at a location designated by the SSO.

- Check for injuries; do not move seriously injured personnel unless they are in danger of further injury.
- Check vehicles, equipment, and buildings for any obvious damage.
- Check utility lines for damage; switch off power, water, and gas until a utility official has inspected the building and determined it is safe.
- If driving, carefully watch for hazards created by the earthquake, such as undermined roads, weak bridges or overpasses, etc.

D.3.3 Environmental Hazards

Environmental hazards associated with this site will be discussed at the orientation meeting prior to the start up of field activities. Personnel will be apprised of symptoms of exposure to certain biological hazards and heat stress.

D.3.3.1 Heat Stress

The potential for heat stress is a concern when field activities are performed on warm, sunny days and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if ambient temperatures are above 80 degrees Fahrenheit (°F).

Precautions to prevent heat stress will include work/rest cycles so that rest periods are taken before excessive fatigue occurs and regular intake of water to replace that lost from sweating. Work/rest cycles will be based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method:

(i) Workers will initially determine their resting HR prior to starting work activities.

(ii) At the start of the rest period, workers will determine their initial HR. This initial HR should not exceed the individual's age-adjusted maximum HR, which equals [(0.7)(220 age in years)]. At 1 minute into the rest period, the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

(iii) If the initial HR exceeds the age-adjusted maximum HR or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by 10 minutes.

An initial work/rest cycle of 1-hour of work and 15 minutes of rest is recommended for protection of staff when the heat stress hazard is high. The recommended cycle will be adjusted

up or down based upon worker monitoring, environmental conditions, and the judgment of the SSO. At any time, field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SSO immediately in order that a rest period can be called.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate sweat loss. Water intake guidelines are as follows:

(i) The sense of thirst is not an adequate indicator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals, as follows:

(a) Before work begins, drink two 8-ounce glasses of water;

(b) During each rest period, drink at least two 8-ounce glasses of water.

(ii) Plain water, served cool, is excellent. An adequate supply of drinking water (at least one gallon per person per day) and clean cups will be readily available (i.e., at the support vehicle) to provide water during rest periods.

(iii) Adding salt to water is not recommended. However, other fluids, in addition to water, could include fruit juices and diluted electrolyte replacement drinks (diluted 3:1 with water). Do not use salt tablets!

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life threatening: heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. If ignoring the signs and symptoms of heat exhaustion and measures described above are not implemented, heat exhaustion will lead to the development of heat stroke. Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death.

The signs and symptoms of heat exhaustion are headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; possible vomiting; difficulty walking; and skin that is cool and sweaty to the touch with pale to ashen-gray coloring.

<u>First aid for heat exhaustion:</u>

- Immediately remove victim to the support area; if you are the victim, go to the support area.

- Decontaminate, if practical, before entering support area.
- Start cooling, but be careful not to cause a chill (i.e., rest in shade and apply wet towel to forehead; open up and/or remove clothing as much as practical, especially chemical-resistant clothing).
- Drink cool water slowly, but only if conscious and not in shock.
- If vomiting, and/or the signs and symptoms are not lessening within an hour, call for emergency help and/or transport the victim to emergency room.

It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

The signs and symptoms of heat stroke are hot, dry skin to the touch with reddish coloring; body temperature >105 degrees °F; no sweating; mental confusion; deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing; headache; dizziness; nausea; vomiting; weakness; dry mouth; convulsions; muscular twitching; sudden collapse; possible unconsciousness.

First aid for heat stroke:

- Immediately remove the victim to the support area; prior to entering the support area, remove and dispose the victim's chemical-resistant clothing.
- Cool the victim rapidly using whatever means are available, such as shade, opening up and/or removing clothing, soaking clothing/skin with water and fanning, placing victim in vehicle using air conditioning on maximum.
- Do not give drinking water to victim.
- Treat for shock, if needed.
- Transport the victim to the emergency room or call for emergency help-no exceptions for heat stroke victim.

D.3.3.2 Noise

Noise is a potential hazard in the areas near the SVE equipment, pumps or generators. Equipment operation may produce noise levels that reach or exceed 85 decibels (dBA), the action level established by the Occupational Safety and Health Administration (OSHA). Exposure to elevated noise levels can lead to temporary or permanent hearing loss and can cause muscle tension and extreme irritability. The SSO will ensure hearing protection is utilized when noise levels are elevated. Elevated noise levels will be evaluated by the SSO when equipment is operated. Excess noise levels can be estimated using the following rule of thumb. When normal

voice communication is not possible between field personnel who are no more than three feet apart, hearing protection will be utilized. Hearing protection typically involves the use of disposable earplugs for the duration of the excessive noise level and will be used during operations that present a noise hazard. Hearing protection will be optional for employees exposed to sound pressure levels of 85 dBA or less.

D.3.4 Biological Hazards

There are varieties of biological hazards to which personnel may be exposed while performing work. These hazards may include animal bites, insect stings, contact with poisonous plants, and exposure to pathogenic (disease producing microorganisms). Serious and/or threatening chemical and physical hazards frequently overshadow any potential exposure to biological hazards. However, specific biological hazards can cause injury and even death. Therefore, when appropriate, such hazards will be identified and evaluated in conjunction with all other actual or potential hazards associated with an operation and steps taken to control exposure. Procedures as prescribed in the First Aid Book will be properly implemented. Paramedics will be summoned for serious injuries.

Specific biological hazards at the NASA JPL site will include scorpion hazards, especially in shaded areas and under rocky crevices. Care will be taken when picking up equipment or other objects off of the ground and when opening the wellheads.

D.4 SITE CONTROL AND WORK ZONES

Control will be established around the SVE unit to protect untrained or unprotected workers from exposure to contaminants or other hazards. The SSO or his designated work location safety representative will be responsible for delineating these areas based upon results of monitoring obtained during work operations and site specific conditions (e.g. proximity of roads or buildings and terrain peculiarities).

D.4.1 Exclusion Zone

An Exclusion Zone (EZ) will be established at the SVE system location to prevent unauthorized access by personnel when there is the potential for exposure to contaminants (i.e., system operation and soil vapor sampling). Once the systems have been started, no one will be allowed within the EZ without wearing the designated level of protective equipment and meeting the training and medical monitoring requirements specified in this Plan. The existing fence that surrounds the SVE system will be used to delineate the EZ at the site.

D.4.2 Contamination Reduction Zone

An area 10 feet around the decontamination/entry area, but outside the boundary of the EZ itself, should be considered as having the potential for exposure to contaminants brought out of the EZ by work personnel, and therefore should also be access-controlled. This area will be designated as the Contamination Reduction Zone (CRZ), and should be located upwind from the work location, if possible, or else crosswind.

The CRZ must be large enough to encompass decontamination activities and prevent unauthorized personnel from approaching closer than is safe, typically 10 feet away from all activities (decontamination, etc.) in all directions except toward the exclusion zone (where full PPE use is in effect). The use of "CAUTION" tape (or other visible marker) to delineate the CRZ is not required so long as access to the area is limited to work personnel only.

D.4.3 Support Zone

Areas outside the controlled-access portions of the work location (EZs and CRZs) are considered to be the Support Zone (SZ). In this area the potential to encounter contamination is highly unlikely.

The SZ can be used for set up and storage of all equipment, vehicles and supplies which are not required for immediate use in the EZ and can serve as a work area for all non-hazardous tasks which might be undertaken (e.g., paperwork). In most instances, the boundaries of the SZ will

not be delineated in any special way, and can be regarded as the general area of work location that is outside the controlled-access areas.

D.4.4 Visitor Requirements

Visitors will not be permitted within any EZ or within five feet of the CRZ, while the system is operating. No visitors, regardless of affiliations or approvals, will be permitted within any EZ unless they provide documentation of the training and medical surveillance requirements specified in this plan, and have read and signed this SHSP. Under no circumstances shall anyone enter the area without authorization from the SSO. This shall include client, utility, and regulatory representatives.

D.5 PERSONAL PROTECTIVE EQUIPMENT

The harmful effects that chemical substances have on the human body often necessitate the use of respiratory protection and personal protective clothing. Proper selection of personal protective equipment (PPE) depends upon a number of factors. Protection against different types of chemicals and differing concentrations of those substances can be quite varied. The tasks to be performed and the probability of exposure to the substances must also be considered when specifying protective clothing.

Once the specific hazard has been identified, appropriate PPE can be selected. The protection level assigned must match the hazard confronted. The specific equipment comprising each level of protection will vary slightly, but are defined primarily by the type of respiratory protective equipment used, and secondly by skin protection. The ensuing list briefly describes the EPA Level categories:

Level A: Used when the greatest level of skin, eye, and respiratory protection is needed and consists of a totally encapsulated suit with supplied breathing air.

Level B: Used when the highest level of respiratory protection is needed but a lesser level (than Level A encapsulating suit) of skin protection is required.

Level C: Used when criteria for using air-purifying respirators are met and a lesser level of skin protection is required.

Level D: Used only as a work uniform and in area without respiratory hazard.

D.5.1 Anticipated Levels of Protection

Based on the hazard analysis for this project, EPA defined Level D protective clothing will be the primary level of protection worn during site activities. The level of protection can and will be upgraded to EPA Level C if necessary, based on air monitoring (Section 6.0).

D.5.1.1 Level D

Level D protection is the lowest level of personal protection allowed on hazardous waste sites. Respiratory protection is not required, as the atmosphere is assumed to be breathable and uncontaminated.

Level D protection will consist of the "basic work clothing" plus:

- Hard hat;
- Coveralls/Standard Work Clothing;

- Safety glasses with protective side shields;
- Safety-toed work boots;
- Chemical-resistant (e.g., butyl or nitrile) inner gloves;
- Immediately available half-face, air purifying respirator with NIOSH approved combination organic vapor/acid gases/high efficiency particulate filter (HEPA) cartridges (yellow/magenta).

Earplugs will be worn if, at any time, verbal communication becomes difficult to comprehend within a radius of three feet. Hard hats, safety glasses (goggles), and safety shoes must meet American National Standards Institute (ANSI) approval.

D.5.1.2 Level C

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

Level C will consist of Level D above, plus:

- Half-face, air-purifying respirator with NIOSH approved combination organic vapor/acid gases/high efficiency dust filter (HEPA) cartridges (yellow/magenta).
- Chemical-resistant disposable outer coveralls (e.g., Tyvek^{TM} or polyethylene-coated Tyvek$^{TM)}$.
- Chemical-resistant (e.g., nitrile) outer gloves (taped to outer coveralls).
- Chemical-resistant (e.g., nitrile) inner gloves.
- Chemical-resistant safety boots (taped to coveralls).

D.5.1.3 Levels A & B

Levels A and B protection are not anticipated during field activities. If it appears that these levels may be required, the SSO will immediately shut down and secure the operation and contact the HSO/CIH and RPM for further guidance.

D.5.2 Changes in Personal Protective Equipment

The level of protection listed in this section shall be upgraded or downgraded based on action levels from direct reading instruments, a change in site conditions, or findings from investigation. The Safety Completion Report, provided in Attachment D-3, and the Action levels for respiratory Protection (Table D-1), will be used to make changes to PPE levels. The SSO will be

responsible for determining the appropriate level of personal protection to be used based on the action levels established in this document. The SSO with the consent of the CIH and SPM shall notify the RPM prior to implementing any PPE modifications or levels of protection. If the action level is to be downgraded, then personnel will continue to work in the original level of protection until the SSO and the CIH have discussed air monitoring results and rationale for the downgrade. After an agreement has been reached and the change has been recorded on the Safety Completion Report, PPE may be modified. The level of protection for any task may be upgraded at any time and documented.

D.6 AIR MONITORING

D.6.1 Purpose

This section outlines monitoring strategies, which can be used to assess employee exposure to chemical hazards. To assess the concentrations or airborne organic vapors, monitoring will be accomplished both in worker breathing zones and at the boundaries of the EZ using direct-reading instruments that can provide immediate contaminant concentrations. These techniques are useful screening methods for evaluating the proper level of personal protection and assistance in the determination of response action in emergency situations. The direct-reading instruments that will be used include a flame-ionization Detector (FID), and a lower explosive level / oxygen (LEL/O_2) meter.

Air monitoring for background levels of air contamination upwind of each work location will be performed prior to the start of work. Air monitoring will be conducted in the worker breathing zones and at the boundaries of the EZ using a FID. At a minimum, air monitoring will be conducted at the start of each work shift, once during operation and maintenance activities, and at the end of each work shift, prior to leaving the site. If the FID reading shows a sustained concentration greater than 10 PPM above background, all personnel at the work location will wear air-purifying respirators. All direct-reading instruments will be calibrated daily or before each use and records detailing date, time, span gas, or other standard and the name of the person performing the calibration will be kept. Protection levels and air monitoring requirements will be based initially on the data provided or obtained prior to remediation work. These requirements may change as site conditions are more fully evaluated once work is underway.

D.6.2 Flame-Ionization Detector

A FID will be used to screen for the concentration of VOCs. The calibration gas for the FID is hydrogen gas. The direct-reading instruments will be calibrated in accordance with the standard operating procedures accompanying each instrument. The SSO will charge the batteries and verify that instruments are fully charged before each use. The SSO will clean the exterior of the instrument, clean the filters, and insure the sample train is clear before each use.

D.6.3 Lower Explosive Limit / Oxygen Meter

An LEL/O_2 meter will be used to screen for the presence of flammable vapors, oxygen deficient and oxygen enriched atmospheres. The calibration gas for the LEL/O_2 meter is usually a methane/air or a hexane/air mixture. The percentage of oxygen is calibrated against ambient air. A low oxygen calibration gas can be used for calibrating the response of the oxygen sensor.

Often 100% nitrogen is used to "zero" the oxygen sensor. If flammable vapors are in excess of greater than 10% LEL, work will cease and the area allowed to vent. If the percentage of oxygen is below 19.5% or above 22%, personnel will leave the area and the area will be ventilated.

D.6.4 Personal Air Monitoring

During the first quarter that GEOFON will perform soil vapor monitoring, personal air monitoring samples will be collected. This monitoring will be performed on two sampling personnel for two days and will be performed during the initial soil vapor sampling activities and during the initial start-up of the SVE system. Personal air monitoring will be performed using 3M® Organic Vapor Badges. Personnel will be monitored for the four most prevalent chemicals of concern (carbon tetrachloride, freon 113, trichloroethene and chloroform) historically identified at the site. This monitoring will be performed to determine the "background" concentrations of chemicals of potential concern for employee protection/information purposes.

D.7 DECONTAMINATION

Decontamination involves the physical removal and/or neutralization of harmful contaminants. The extent of decontamination depends on the hazard and the quantities of the contaminant.

Contamination can occur from:

- Contacting vapors, gases, mists, or air particulates.
- Splashes while sampling or opening containers.
- Walking or driving through puddles or on contaminated soil.
- Handling contaminated instruments or equipment.
- Assisting contaminated personnel during operations, decontamination procedures, and emergencies.
- Chemicals used for the decontamination of equipment.
- Nitrile Gloves.

All decontamination will be performed by personnel wearing protective gear appropriate for the level of decontamination as determined by the SSO.

D.7.1 Decontamination Procedures

Contamination reduction procedures appropriate for the existing work area will be developed and specified by the SSO. Such procedures must be in place before site operations begin, and they must remain in place (modified as necessary) throughout the period of activity. Whenever possible, the need for decontamination should be reduced through work practices that minimize contact with contaminants. Personnel should avoid walking through heavily contaminated areas, should not kneel or directly touch contaminated materials and should use remote handling and sampling techniques when feasible. Decontamination will be performed only in designated areas. Separate areas may be set up for equipment and personnel.

D.7.2 Decontamination Hazards

Contamination on the upper areas of protective clothing poses a greater risk to the worker because volatile compounds could make breathing hazardous both for the worker and for the decontamination personnel. There is also an increased probability of contaminant contact with the skin when the worker is doffing the upper part of the clothing.

Disposable items (Tyvek™ coveralls, inner-gloves, and safety-boots) must be replaced as they become heavily soiled, torn at any portion, or when personnel break for extended periods of time.

Dual respirator canisters will be changed as deemed appropriate by site air monitoring data and personnel determination of contaminant breakthrough.

The assigned level of protection for a site also impacts the complexity of the decontamination effort. The higher the level of protection, the more equipment must be managed with every site entry or exit.

D.7.3 Personnel Decontamination

Decontamination procedures are carried out on all personnel leaving hazardous waste sites. Under no circumstances (except emergency evacuations) will personnel be allowed to leave the site without decontamination.

Decontamination of personnel should be performed in the CRZ when exiting the EZ and should consist primarily of soap and water washing and water rinse of exterior protective gear to remove contaminants, followed by doffing of the gear. Coveralls should be removed by turning the clothing inside out. A procedure appropriate to the degree of contamination should be established. The extent of washing required, or modifications to the sequence, may be specified as appropriate.

D.7.3.1 Level D

Personnel exiting the EZ while site activities require the use of Level D PPE (as outlined in Section 5.1) will perform decontamination in accordance with the following guidelines:

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

D.7.3.2 Level C

Personnel involved in site activities that require the use of Level C PPE (as outlined in Section 5.1) will observe the decontamination procedures outlined below. These guidelines consist of the following:

- Place tools, instruments, samples and trash at an appropriate location. These areas should be clean and dry, and at a minimum contain plastic bags for trash. Waste PPE will not be placed in the same containers as general trash.
- Inspect equipment, samples and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off equipment, samples and tools prior to removal from the EZ areas.
- Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
- Wash and Rinse outer work gloves and boots (boot covers) with soap and water.
- Wash/brush off outer protective coverall (Tyvek).
- Untape wrists and ankles.
- Remove outer work gloves and place them in an appropriate container specified for waste PPD.
- Remove outer Tyvek coveralls and place them in an appropriate container specified for waste PPD.
- Remove respirator mask (also goggles if worn).
- Wash hands using soap and cleaners/solutions).

D.7.4 Equipment Decontamination

Equipment to be decontaminated may include small tools, sampling equipment, and the decontamination equipment itself when the decontamination is closed down.

Before entering the site, all equipment will be cleaned to remove grease, oil, encrusted dirt, or other potential contaminants. Wherever possible, gross contamination of equipment will be removed in the EZ prior to bringing equipment back to the CRZ or decontamination area. When needed, a decontamination area will be established immediately outside of the gates to the SVE

system compounds at each site. The locations of the decontamination areas will be coordinated with the NASA JPL Point of Contact to minimize disruptions to site operations.

General equipment decontamination consists of soap and water wash, and a water rinse. If soap and water alone cannot remove contamination, additional procedures may be used such as a solvent rinse/wipe or steam cleaning. The following procedures shall be implemented if and when necessary.

Tools

Tools will be dropped into a plastic pail, tub or other container in the EZ. They will be brushed off, rinsed, and transferred into a second pail to be carried to the decontamination station. Generally, tools will be washed with a detergent solution, rinsed with tap water, and finally rinsed with de-ionized water.

Avoid using wooden tools; they cannot be adequately decontaminated due to their absorptive properties. If used, wooden tools cannot be removed from the EZ until the end of the project, and then only to be disposed of as hazardous waste.

Sampling Equipment

Sampling equipment will be decontaminated before and between sampling to prevent cross contamination, and when the equipment leaves the EZ. Sampling equipment may include trowels, shovels, and bailers.

All sampling equipment will be decontaminated using an Alconox™ wash or equivalent, followed by two clean water rinses. The sampling tool will then be rinsed with de-ionized or distilled water and air-dried.

Respirator Decontamination

Respirators when worn will be decontaminated daily. Taken from the drop area, the masks will be disassembled, the cartridges will be disposed of and the rest placed in a cleansing solution. Personnel will inspect their own masks to be sure of proper strap readjustment for correct fit.

Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded and replaced.

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

D.7.5 Disposal of Decontamination Waste

Solid and liquid decontamination waste should be containerized. Solids may be double bagged, or placed in a sealed drum or similar container. Liquids will be collected during decontamination and placed in 55-gallon drums for future testing and disposal. The drums will be clearly labeled for content, the operation from which they were filled, and the dates. Waste shall not be stored on-site greater than 90 days.

D.7.6 Decontamination During Emergencies

Often during emergencies the need to quickly respond to an accident or injury must be weighed against the risk to the injured party from chemical exposure. It may be that the time lost or the additional handling of an injured person during the decontamination process may cause greater harm to the individual than the exposure that would be received by undressing that person without proper decontamination.

This decision must be made by the SSO. The SSO, as the on-site focus for safety matters, must be familiar with the safety criteria and the logic behind them. Each operation is different, and the risks to personnel from exposure vs. injury are different.

An additional consideration to include when bypassing decontamination of injured personnel is the acceptance of contaminated personnel at emergency medical facilities. Many facilities will not accept contaminated personnel. Site response personnel should accompany contaminated victims to the medical facility to advise on matters involving decontamination. A copy of SH&SP will accompany the injured worker to the medical facility.

D.7.6.1 Physical Injury

Physical injuries can range from minor to life threatening. Life-saving care should be instituted immediately without considering decontamination. The outside garments can be removed (depending on the weather) if this does not cause delays, interfere with treatment, or aggravate the problem. Respiratory masks and backpack assemblies must always be removed. Fully encapsulating suits or chemical-resistant clothing can be cut away.

If the outer contaminated garments cannot be safely removed, the individual should be wrapped in plastic, rubber, or blankets to help prevent contaminating medical personnel and/or the inside of ambulances. Outside garments are then removed at the medical facility. No attempt should be made to wash or rinse the victim unless it is known that he has been contaminated with an extremely toxic or corrosive material that could also cause severe injury or loss of life. For minor medical problems or injuries, the normal decontamination procedure should be followed.

D.7.6.2 Heat Stress

Heat-related illness ranges from heat fatigue to heat stroke, the latter being the most serious. Heat stroke requires prompt treatment to prevent irreversible damage to health or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately.

D.7.6.3 Chemical Exposure

Chemical exposure can be divided into two categories:

1. Direct contact through either touch (e.g. acid burns) or inhalation
2. Indirect contact through gross contamination of clothing or equipment

Qualified physicians can only treat injuries from contaminant inhalation. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract its effect. First-aid treatment usually involves flooding the affected area with water.

When protective clothing is grossly contaminated, contaminants may be transferred to the wearer or to treatment personnel and cause injuries. Unless severe medical problems could be created by splashing, the protective clothing should be washed off as rapidly as possible and carefully removed.

Personnel must be aware of the chemical properties of the site hazards as well as the decontamination rinse solutions used to prevent cross contamination during the sampling process. Personnel shall discuss with the SSO the compatibilities of the rinse solutions (e.g., water, methanol, hexane) with the contaminants being removed prior to decontamination activities.

D.8 EMERGENCY PROCEDURES

D.8.1 Communications

A communication program including the use of signals, and cellular phones among workers shall be implemented during the project. Workers are to use the "buddy system" at all times and be cognizant of the reduction of communication abilities in high noise areas. The specific hand signals to be used during the project shall be discussed in the tailgate safety meeting.

In case of emergencies, an air horn shall be used to alert site personnel. Any sounding of this device shall be cause to stop work and retreat to a predetermined safe area for further direction or information. In the event of an emergency, all personnel will meet in the parking lot of the pass and ID building located at the main gate. Figure D-2 presents the emergency evacuation route map.

D.8.2 First Aid

A first aid kit and fire extinguisher will be located in the SZ. The first aid kit will contain the American Red Cross first aid manual. In the event of an accident requiring first aid, the SSO will be responsible for coordinating the first aid. If an injured individual requires further attention, the individual will be immediately transported to the nearest hospital. A map illustrating the route to the nearest emergency medical facility will be present on site (Figure D-3). If necessary, the victim will be decontaminated prior to transport to the facility; if the injury is serious, decontamination is of secondary importance. A copy of SHSP will accompany the injured workers to the medical facility.

All accidents, without regard to severity, shall be reported in writing to the HSO by the SPM within 24 hours. General first aid procedures are outlined below.

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyewash and emergency shower or drench system will be provided on-site at the contamination reduction zone and/or support zone as appropriate. Eyes should be rinsed for 15 minutes upon chemical contact.
- Inhalation: Move to fresh air and, if necessary, decontaminate and transport to hospital. Any loss of consciousness or exposure to airborne toxic substances, even if the individual appears to have fully recovered, will require immediate treatment or surveillance by a qualified physician.

- Ingestion: Notify Poison Control Center and emergency medical facility and transport to nearest emergency medical facility immediately.
- Puncture Wound or Laceration: Decontaminate and transport to emergency medical facility. Apply direct compression to stop or slow the flow of blood. Universal precautions, in order to prevent contacting the blood of another, shall be implemented.

D.8.3 Emergency Assistance

The name, telephone number, and location of police, fire, and other emergency response agencies will be posted in the support zone (Table D-2). If emergency personnel are called to the site, efforts should be made to accommodate their operations in the support zone.

EMERGENCY TELEPHONE NUMBERS
NASA's JET PROPULSION LABORATORY

Emergency Services	
Fire Department	911
Police Department	911
Ambulance Service	911
Huntington Memorial Hospital	(626) 397-5000 General
100 West California Boulevard	
Pasadena, CA 91109	
Poison Control Center	(800) 544-4404
Department of Environmental Services	(800) 258-6942
National Response Center	.
Toxic Chemicals and Oil Spills	(800) 424-8802

GEOFON, Inc.		
Asrar Faheem*	Senior Project Manager	Office (909) 396-7662
		Cellular (619) 843-5975
Aqeel Mohammad*	FOM	Office (909) 396-7662
		Cellular (714) 920-8727
Dr. Maureen Sassoon	CIH	Office (310) 544-2912
Anthony Ford*	HSO	Office (909) 396-7662
		Cellular: (619) 843-5973
Tony Mohammad*	SSO	Cellular (714) 920-8438

Onsite Contacts

Richard Zuromski, P.E.	Activity Point of Contact	Office (818) 354-5379 Fax (818) 393-2607

Navy Contacts

Marvin Hillstrom	RPM, SWDIV	Office (619) 532-1153 Fax (619) 532-3546
Jennifer Scofield	CS, SWDIV	Office: (619) 532-1226 Fax: (619) 532-2469

Note: * = GEOFON personnel trained in First Aid.

D.9 SPILL AND DISCHARGE CONTROL PLAN

The Spill and Discharge Control Plan has been developed to prevent the contamination of soils, water, atmosphere, uncontaminated areas/surfaces, equipment or material by the uncontrolled release of hazardous waste and materials to the removal and disposal operations involved in this project.

The following spill control equipment will be available in case of a liquid or solid waste spill:

- Sand or other appropriate spill absorbent material.
- 55-gallon drums.
- Shovels.
- Decontamination supplies and protective clothing.
- Hand operated pump.

Regardless of the type of spill (liquid or solid), the following measures will be taken to isolate the spilled material(s):

- Isolate and contain the hazardous spill area.
- Restrict access of unauthorized personnel.
- Prevent contact with the spilled material.
- Relocate upwind and up gradient of the spilled material.
- Take air, soil, or appropriate samples to determine if clean up is complete.

D.9.1 Liquid Material Spills

Liquid spills should be adsorbed with sand or other appropriate absorbent material. The absorbent material will be incorporated into the contaminated stockpiled soil. The final disposition of the absorbent material will be determined in conjunction with the stockpiled soil.

In the event of a discharge of liquid into the soil, GEOFON will immediately identify the location of the discharge and take appropriate remedial actions to eliminate further spillage. The discharged liquid material will be controlled and disposed of as described above. The process shall be coordinated with the SWDIV RPM.

D.10 MEDICAL SURVEILLANCE

D.10.1 Medical Examination Requirements

All GEOFON and Subcontractor project personnel working on-site will have undergone either a baseline or annual medical monitoring examination within 11 months prior to participation in fieldwork. Medical screening is conducted at the start of employment and annually thereafter, and consists of the following:

- Medical and occupational history.
- Physical examination, with particular attention to the cardiopulmonary system, general physical fitness, skin, blood forming, hepatic, renal, and nervous systems.
- Urinalysis.
- Blood analysis.
- Pulmonary function test.
- Chest X-ray.
- Electrocardiogram.

Based on this examination, the physician will certify in writing whether the individual is capable of full participation in the program, or whether that person must work within certain restrictions. Personnel may be excluded from this project for medical reasons.

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical surveillance examination at, or if necessary, before the conclusion of the project to determine the medical implications of the exposure. Any person suffering a lost-time injury or illness must have medical approval prior to returning to work on-site.

D.10.2 Record Keeping

All medical records must be maintained by the employer for a period of at least 30 years after the employee's termination of employment, in accordance with OSHA regulations on confidentially and record keeping.

Prior to the initiation of work, subcontractors will submit to the HSO copies of medical fitness certifications for each employee to be assigned to the site. The certifications will state that the employee has received a medical examination within the previous 12 months and has been determined fit to perform onsite work.

D.11 TRAINING

As required by OSHA regulations (29 CFR 1910.120), all GEOFON and subcontractor personnel involved in hazardous waste site operations are required to receive an initial 40 hours of health and safety training and receive refresher training annually. This general (not site-specific) training must be completed by all site personnel before assignment to the project. The course content of this training will include, but not be limited to the following:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health, and other hazards present on the site.
- Using protective clothing and equipment.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the Site.
- Medical surveillance requirements including recognition of symptoms and signs that might indicate overexposure to hazards.
- Emergency response procedures.
- Refresher training requirements.

In addition, the on-site management and supervisors/HSO will receive an additional eight hours of specialized hazardous waste operations management training with eight-hour refresher training annually. This training will include, but not limited, to the following:

The employer's safety and health program.

- Associated employee-training program.
- PPE program.
- Spill containment program.
- Health hazard monitoring procedures and techniques.
- CPR/First Aid Training.

The HSO will keep copies of the certification for the completion of such training for all site workers on-site in a file. Workers without such certification will not be allowed to work at the site.

Prior to commencement of field operations at the project site, personnel will receive site-specific training (briefed in the tailgate safety meeting). This training will include a review of all information contained in this SH&SP with particular emphasis on the following:

- Types and anticipated levels of hazardous substances known to be present on-site, their permissible exposure limits, health effects, and exposure routes.
- The need for personal protective equipment.
- The importance of maintenance and attention to proper fit of personal protective equipment.
- Prescribed decontamination procedures.
- Safe work practices, such as proper site entry and egress, and proper hygiene during meal and rest breaks.
- Recognition, in oneself and others, of physical conditions requiring immediate medical attention, especially heat stress, and application of simple first aid measures.
- Procedures to be followed in case of emergencies.

In addition to the 40-hour training, GEOFON personnel involved in the field operations will have an additional three (3) days of field experience under the direction of a skilled supervisor on similar kind of projects.

D.12 ADVERSE WEATHER CONDITIONS

In case of adverse weather conditions, the SPM or HSO will determine if work can continue without endangering the health and safety of the field workers. The HSO will monitor the weather news both at AM and PM through the radio and will document it in the contractor production report. He will also coordinate with the local/base observatory to obtain more specific information about the current weather conditions at the base. The coordination with the observatory will be done through the NASA Management Office (NMO), JPL on-site liaison office. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries
- Dangerous weather-related working conditions (e.g., high winds, rain, smog, fog)
- Limited visibility
- Potential for electrical storms. No outdoor activities will be permitted during electrical storms.

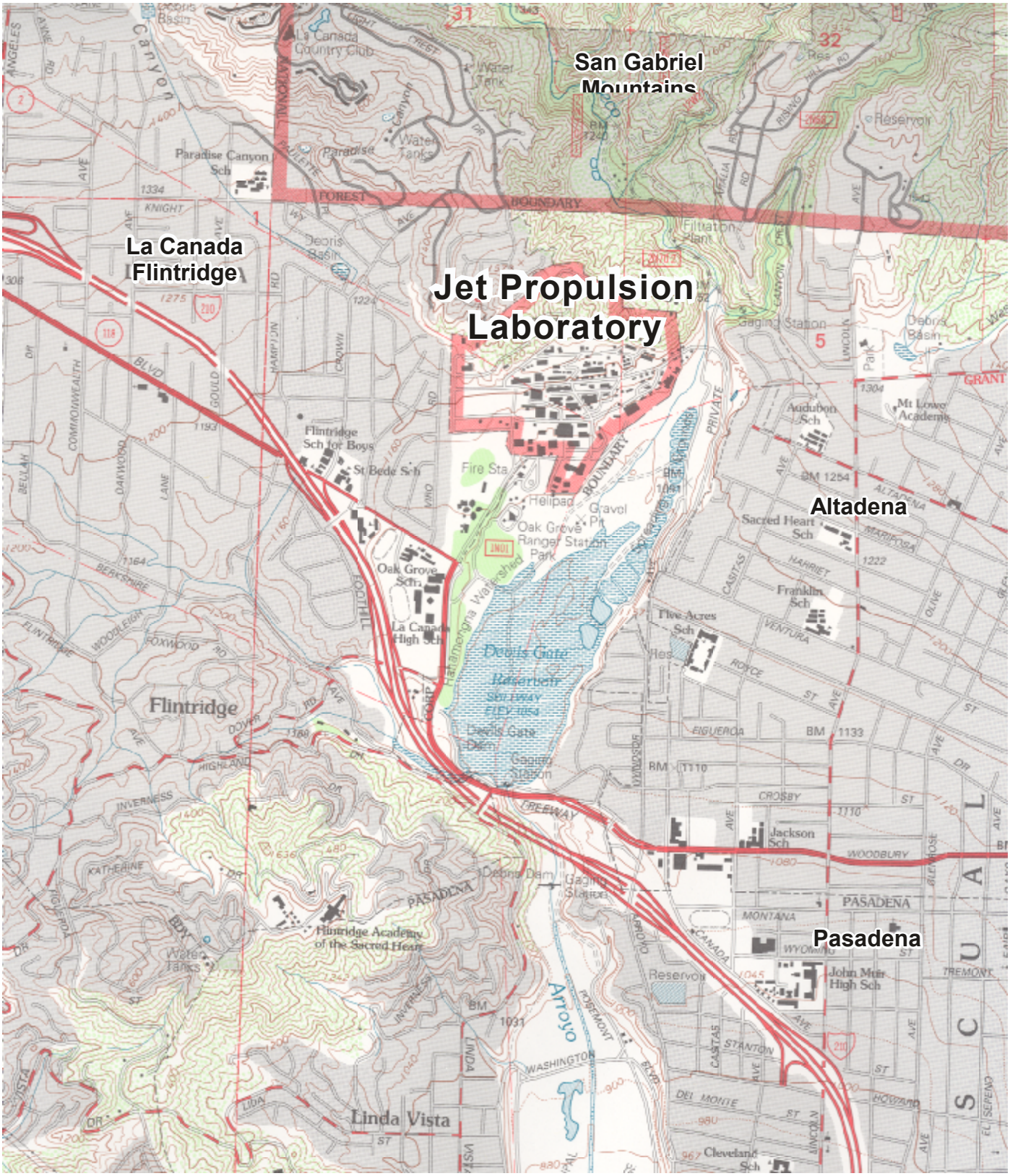
D.13 REFERENCE SOURCES

The format and content of this plan are consistent with the following regulatory requirements and guidelines:

- Occupational Safety and Health Standards, Title 29 CFR Parts 1910 and 1926, U.S. Department of Labor, Occupational Safety and Health Administration (OSHA).
- Occupational Safety and Health Administration (OSHA) Standards: Title 29 Code of Federal Regulations (CFR) Sections 1910.1001 and 1926.58 (as amended), 1910.134, 1910.20 and 1910.1200.
- California Occupational Safety and Health Administration (Cal/OSHA) Standards: Subchapter 7, Group 16, Article 109, §5192: Hazardous Waste Operations and Emergency Response.
- U.S. Environmental Protection Agency (EPA) Standards; Title 40 CFR, Part 61, Subpart M; Title 40 CFR, Part 763, Subpart E; Title 40 CFR Part 763, Subpart G.
- OSHA Standards for Hazardous Waste Operations and Emergency Response, Final Rule. 29 CFR 1910.120.54 FR 9294, March 6, 1989.
- OSHA Air Contaminants: Permissible Exposure Limits (PELs) 29 CFR 1910.1000.54 FR 2332, January 19, 1989.
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/EPA/USCG, DHHS (NIOSH) Publication No. 85-115, 1985.
- Navy/Marine Corps Installation Restoration Manual, February 1997.
- U.S. Army Corps of Engineers Safety & Health Requirements Manual, EM 385-1-1. September 1996.
- Occupational Diseases, A Guide to their Recognition, USDHEW (1977)
- Tyver D.F. and K.A. Anderson, Industrial Medicine Desk Reference, Chapman & Hall (1986)
- Chemical Information File, USDOL-OSHA 1985
- OSHA CD-ROM A95-2 (1995 3Q)
- Hamilton. A. and H. L. Hardy, Industrial Toxicology, 3rd. ed., Publishing Sciences Group, Inc., Acton, Mass, (1974)
- Williams, P.L. & J.L. Burston, Industrial Toxicology, VNR 1985

- NIOSH Pocket Guide to Chemical Hazards. DOHS Pub No. 90-117
- National Library of Medicine, Specialized Information Services (TOXNET)
- Workplan Addendum; Expanded Soil Vapor Extraction Pilot Test at Operable Unit 2; March 2002
- GEOFON, Inc. Health and Safety Policy and Procedures Manual, December 1997.

FIGURES



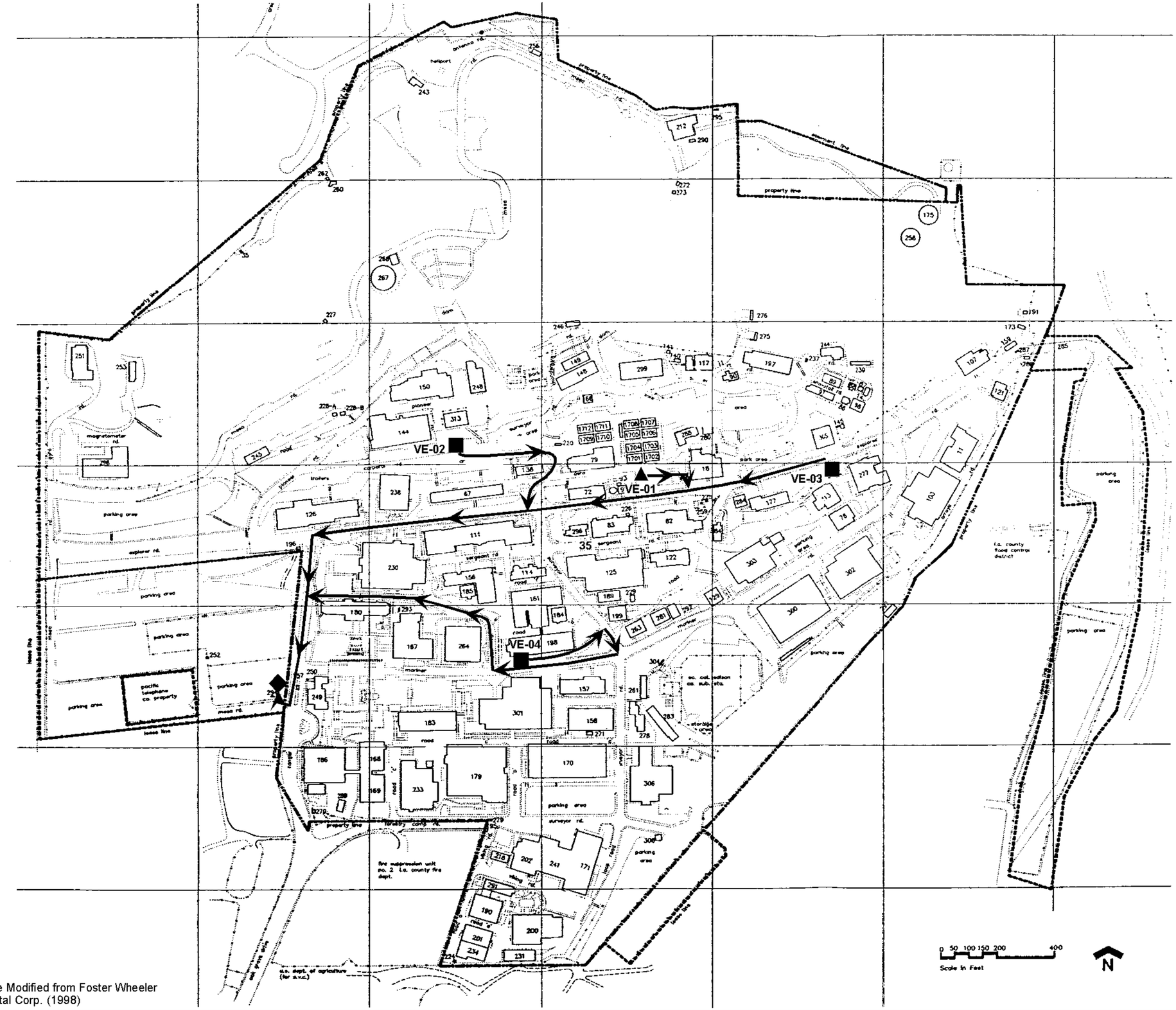
SOURCE: USGS Pasadena 7 1/2-Minute Quad, 1995

SITE LOCATION MAP
FIGURE D-1

Jet Propulsion Laboratory
Pasadena, California

GEOFON

Date: May 2002
Contract No.: N68711-97-D-8702
DO No.: 0048



EXPLANATION

▲ VE-01 APPROXIMATE LOCATION OF EXISTING SOIL VAPOR EXTRACTION WELL

■ VE-02 PROPOSED LOCATION OF ADDITIONAL SOIL VAPOR EXTRACTION WELLS

◆ EMERGENCY MEETING LOCATION

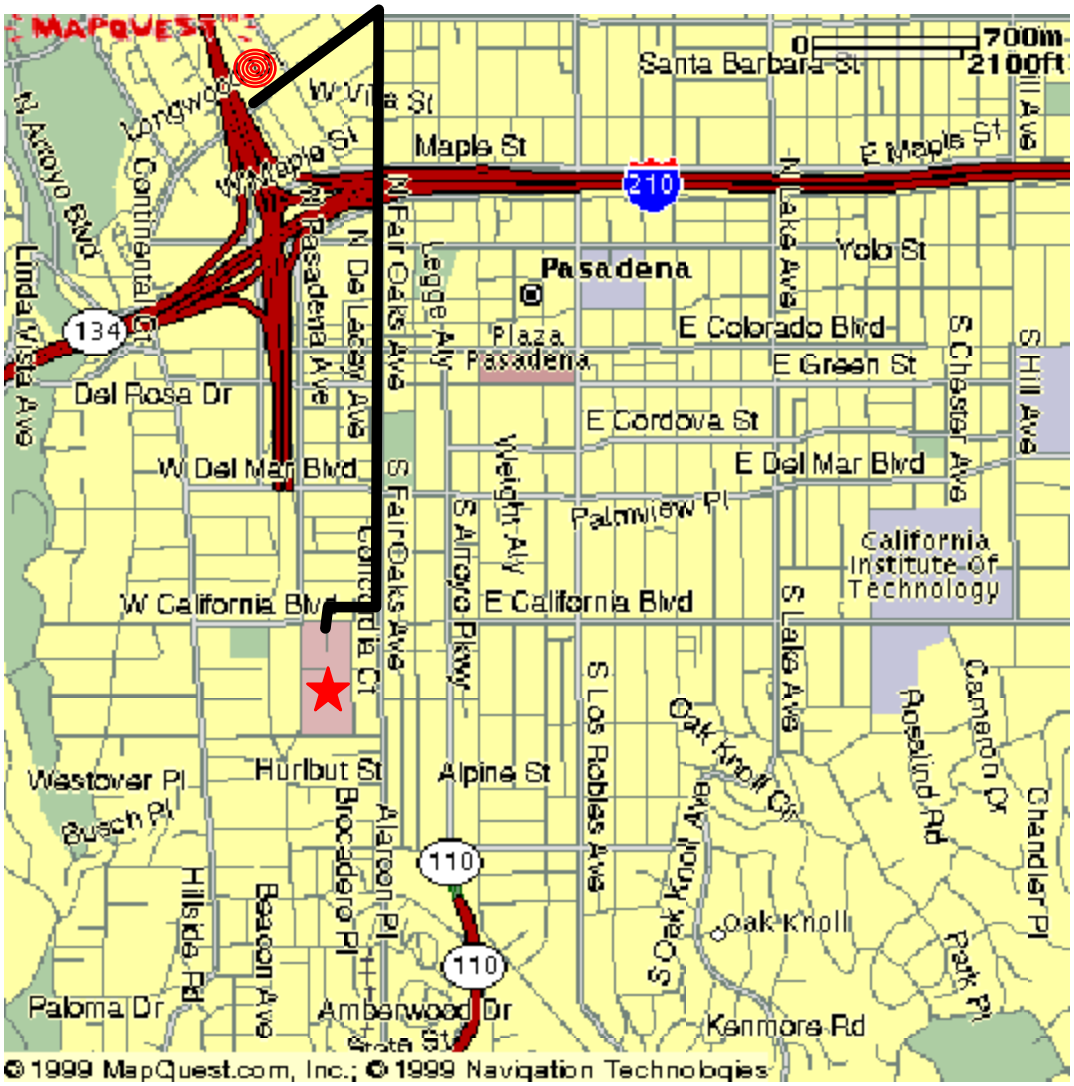
Note: Figure Modified from Foster Wheeler Environmental Corp. (1998)

EMERGENCY EVACUATION ROUTE MAP
FIGURE D-2

Jet Propulsion Laboratory
Pasadena, California

GEOFON ENGINEERS

Date: May 2002
Contract No.: N68711-97-D-8702
DO No.: 0048



Starting From:

JPL, 4800 Oak Grove Dr, Pasadena, CA 91109-8001

Arriving At:

Huntington Memorial Hospital, 100 W. California Blvd
Pasadena, CA 91105-3010

Distance: Approximate Travel Time:

1.7 miles 4 mins

Directions Miles:

1. Start out going Northeast on W PEORIA ST towards N FAIR OAKS AVE by turning left. 0.2
2. Turn RIGHT onto N FAIR OAKS AVE. 1.4
3. Turn RIGHT onto W CALIFORNIA BLVD. 0.1

N

Jet Propulsion Laboratory

Huntington Memorial Hospital

ROUTE TO THE HOSPITAL
FIGURE D-3

Jet Propulsion Laboratory
Pasadena, California

GEOFON

Date: May, 2002
Contract No.: N68711-97-D-8702
DO No.: 0048

TABLES

TABLE D-1
ACTION LEVELS
NASA JET PROPULSION LABORATORY, PASADENA, CA

Monitoring Device	Action Level	Action
PID or Equivalent	0 to 10 ppm in Breathing Zone	Wear Level D PPE
PID or Equivalent	> 10 to 100 ppm in Breathing Zone	Don Air-Purifying respirator
PID or equivalent	> 50 ppm 3” from soil	Initiate control measures
PID or equivalent	> 100 ppm	Work will be discontinued, personnel will evacuate to the predetermined safe area, and control measures initiated

Notes:

PID: Photo-ionization Detector.
PPM: Parts per Million
PPE: Personal Protective Equipment

TABLE D-2
EMERGENCY TELEPHONE NUMBERS
NASA's JET PROPULSION LABORATORY

Emergency Services		
Fire Department		911
Police Department		911
Ambulance Service		911
Huntington Memorial Hospital		(626) 397-5000 General
100 West California Boulevard		
Pasadena, CA 91109		
Poison Control Center		(800) 544-4404
Department of Environmental Services		(800) 258-6942
National Response Center		
Toxic Chemicals and Oil Spills		(800) 424-8802

GEOFON, Inc.		
Asrar Faheem*	Senior Project Manager	Office (909) 396-7662
		Cellular (619) 843-5975
Aqeel Mohammad*	FOM	Office (909) 396-7662
		Cellular (714) 920-8727
Dr. Maureen Sassoon	CIH	Office (310) 544-2912
Anthony Ford*	HSO	Office (909) 396-7662
		Cellular: (619) 843-5973
Tony Mohammad*	SSO	Cellular (714) 920-8438

Onsite Contacts		
Richard Zuromski, P.E.	Activity Point of Contact	Office (818) 354-5379
		Fax (818) 393-2607

Navy Contacts		
Marvin Hillstrom	RPM, SWDIV	Office (619) 532-1153
		Fax (619) 532-3546
Jennifer Scofield	CS, SWDIV	Office: (619) 532-1226
		Fax: (619) 532-2469

Note: * = GEOFON personnel trained in First Aid.

ATTACHMENTS

ATTACHMENT D-1

TASK HAZARD ANALYSIS

TASK HAZARD ANALYSIS # _1_

ACTIVITY: SVE System Operation and Maintenance **ANALYZED BY:** Sree Akkenapally **REVIEWED BY**: Maureen Sassoon, CIH
DATE: _____ **DATE:** _____

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
SVE System Operation and Maintenance	Fire/Explosion Hazards	• Ambient air monitoring shall be performed using direct reading instruments (FID and/or LEL/O_2) • Ignition sources will be eliminated in transfer area. • All pumping equipment will be bonded and grounded
	Chemical Hazards	• Exclusion zone shall be delineated and Level D PPE shall be worn. • Air monitoring shall be performed using direct reading instruments (FID and/or LEL/O_2) • Use ambient air monitoring and visual monitoring to verify selection of PPE • Contaminants that may possibly be encountered: • Volatile Organic Compounds: (CCl_4, chloroform, Freon 113, TCE, 1,1-DCA, 1,1-DCE) • Stay clear of the blast from pressure relief valves and the suction area of vacuum relief valves
	Slip, Trip, and Fall Hazards	• Work areas shall be visually inspected. Slip, trip, and fall hazards shall be marked, barricaded, or eliminated as feasible • Proper illumination shall be maintained in all work areas
	Hand/Power Tools	• Inspect hand/power tools before each use • Use tools designed for the activity
	Noise Exposure	• Hearing protection will be required when sound levels exceed 85 dBA continuously. Areas where hearing protection is required shall display warning signs requiring hearing protection
	Faulty/Damaged Equipment	• Continual inspection of work areas • Equipment will be inspected by competent mechanic and certified to be in safe operating condition • Make sure that the no bolts, tools, rags, or dirt have been left in the blower, and that inlet piping is free of debris

TASK HAZARD ANALYSIS # _1 (Continued)_

ACTIVITY: SVE System Operation and Maintenance **ANALYZED BY:** Sree Akkenapally **REVIEWED BY**: Maureen Sassoon, CIH
DATE: **DATE:**

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
SVE System Operation and Maintenance	Faulty/Damaged Equipment	• Use a temporary protective screen at the blower • Recheck blower leveling, drive alignment and tightness of all mounting bolts and adjust the belt tightness • Check the oil level in the gearbox and check for the lubrication of the driver. Make sure that electrical overload devices are installed • If a valve is in the inlet piping, make sure that it is open by opening the manual unloading valve in the discharge air line • Bump the blower a few revolutions with driver to check that direction of rotation is correct, and that both units coast freely to stop • Avoid bodily contact with the blower casing and associated piping or accessories, which may become hot enough to cause skin burns • Do not remove equipment from the unit in order to make the unit operational • Do not restrict, block, or close the exhaust stack during the operation • Do not modify or bypass the transformer fuse blocks
	Burn Hazard	• Keep all body parts clear of the exhaust stack, air intake valves and moving parts due to burns and possible serious bodily injury situations that may occur as a result of body contact with these parts • Avoid bodily contact with the blower casing and associated piping or accessories, which may become hot enough to cause skin burns
	Electrical Hazard	• Disconnect incoming voltage to the unit control panel before attempting to work on the panel or other electrical components on the unit. Use a voltage meter to determine that the power is off. Have only qualified personnel work on the electrical components, preferably a qualified electrician • When working with the electrical components, rubber-soled safety boots, hard hat, and rubber gloves should be worn at all time in order to minimize the potential hazard of electrical shock.

TASK HAZARD ANALYSIS # _2_

ACTIVITY: Soil Vapor Sampling **ANALYZED BY:** Sree Akkenapally **REVIEWED BY**: Maureen Sassoon, CIH
DATE: **DATE:**

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Soil Vapor Sampling	Chemical Hazards	• Level D PPE shall be worn. • Air monitoring shall be performed using direct reading instruments (FID and/or LEL/O_2) • Use ambient air monitoring and visual monitoring to verify selection of PPE • Contaminants that may possibly be encountered: • Volatile Organic Compounds: (CCl_4, chloroform, Freon 113, TCE, 1,1-DCA, 1,1-DCE)
	Hand/Power Tools	• Inspect hand/power tools before each use. • Use tools designed for the activity.
	Slip, Trip, and Fall Hazards	• Work areas shall be visually inspected. Slip, trip, and fall hazards shall be marked, barricaded, or eliminated as feasible. • Proper illumination shall be maintained in all work areas.

TASK HAZARD ANALYSIS # _3_

ACTIVITY: IDW Disposal **ANALYZED BY:** Sree Akkenapally **REVIEWED BY**: Maureen Sassoon, CIH
DATE: **DATE:**

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
IDW Disposal	Heavy Lifting	• Use proper lifting techniques, size up the load, use teamwork, never twist or turn while lifting. • Wear Level D personnel protective equipment including steel-toed work boots • Objects greater than 60 lbs. Require assistance or use of a mechanical lifting device.
	Slip, Trip, and Fall Hazards	• Work areas shall be visually inspected. Slip, trip, and fall hazards shall be marked, barricaded, or eliminated as feasible. • Proper illumination shall be maintained in all work areas.
	Heavy Equipment Hazards	• There shall be one spotter/signal person per piece of machinery. • Communication such as hand signals, two-way radios, etc. shall be utilized by the operation and surrounding personnel. • Equipment will be operated by trained/experience personnel only • Equipment shall not be used on unstable or unsafe inclines • Hard hats and colored vests will be required when working around moving equipment, cranes, and construction vehicles. • Do not stand beneath suspended equipment or in the path of moving vehicles.
	Chemical Hazards	• Level D PPE shall be worn. • Air monitoring shall be performed using direct reading instruments (FID and/or LEL/O_2) • Use ambient air monitoring and visual monitoring to verify selection of PPE • Contaminants that may possibly be encountered: • Volatile Organic Compounds: (CCl_4, chloroform, Freon 113, TCE, 1,1-DCA, 1,1-DCE)

TASK HAZARD ANALYSIS # _4_

ACTIVITY: Drilling and SVE Well Installation **ANALYZED BY:** Sree Akkenapally **REVIEWED BY:** Maureen Sassoon, CIH
DATE: _____ **DATE:** _____

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Drilling	Heavy Equipment Hazards	• Inspect drilling equipment at beginning and during each shift. • Equipment will be operated by trained/experienced personnel only. • All self-propelled equipment shall be equipped with Roll-Over Protection Systems (ROPS), seat belt, and back-up alarms. • Restrain loose clothing with duct tape to prevent entanglement in moving parts. • Keep feet and hands clear of moving/suspended materials or equipment. • Keep machine guards in place. • Hard hats and orange colored vests will be required when working around moving equipment, cranes, and construction vehicles. • Do not stand beneath suspended equipment or in the path of moving vehicles.
	Overhead and Underground Utilities	• Notify underground utilities prior to drilling. • Keep boom at least 20 feet away from overhead utilities.
	Chemical Hazards	• Exclusion zone shall be delineated and Level D PPE shall be worn. • Air monitoring shall be performed using direct reading instruments (PID and/or LEL/O2) • Use ambient air monitoring and visual monitoring to verify selection of PPE
	Slip, Trip, and Fall Hazards	• Work areas shall be visually inspected. Slip, trip, and fall hazards shall be marked, barricaded, or eliminated as feasible. • Proper illumination shall be maintained in all work areas.

TASK HAZARD ANALYSIS # _4_(Continued)

ACTIVITY: Drilling & SVE Well Installation **ANALYZED BY:** Sree Akkenapally **REVIEWED BY**: Maureen Sassoon, CIH
DATE: **DATE:**

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Drilling (Continued)	Noise Exposure	• Hearing protection will be required when sound levels exceed 85 dBA continuously. Areas where hearing protection is required shall display warning signs requiring hearing protection.
Soil Cuttings handling	Chemical Hazards	• Level D PPE shall be worn. • Air monitoring shall be performed using direct reading instruments (PID and/or LEL/O2) • Use ambient air monitoring and visual monitoring to verify selection of PPE
	Hand/Power Tools	• Inspect hand/power tools before each use. • Use tools designed for the activity.
	Slip, Trip, and Fall Hazards	• Work areas shall be visually inspected. Slip, trip, and fall hazards shall be marked, barricaded, or eliminated as feasible. • Proper illumination shall be maintained in all work areas.

ATTACHMENT D-2

SAFETY COMPLIANCE AGREEMENT FORM

SAFETY COMPLIANCE AGREEMENT FORM

Site: NASA's Jet Propulsion Laboratory **Project No.: 04-4304.480**

I the undersigned, acknowledge that I have attended the safety meeting, and. I have read and understood this safety plan, and do agree to assertively adhere to the specifications within. I understand that I may be prohibited from continuing work on the project for failing to comply with this safety plan.

SIGNATURE & NAME (PRINTED)	**COMPANY**	**DATE**
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		
_____	_____	_____
( )		

Meeting Conducted by: _____

ATTACHMENT D-3

SAFETY COMPLETION REPORT

SAFETY COMPLETION REPORT

A completed copy of this report is to be placed into the project files within seven days of the completion of site work.

Site Name: _____ Project: _____
Project Manager: _____ SSO: _____

Safety Plan
Was the plan complete? _____
Was the plan appropriate to conditions found onsite? _____
Was more information on the site available but not included? _____
Was the plan clear and understandable? _____

Plan implementation
What levels of protection were used? A____ B____ C____ D____

Field Air Monitoring Results:

High	Low	Typical
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Air Monitoring Results: _____
_____

Any Equipment Problems? (Include ID #) _____
_____

Level of General Site Control (Good, Moderate, Poor): _____
Evaluate General GEOFON and Subcontractor Compliance/Performance:
_____
_____
_____

Comments: _____
_____
_____
_____