SITE SAFETY AND HEALTH PLAN

GILL TRACT TANK REMOVAL

UNIVERSITY CALIFORNIA BERKELEY
BERKELEY, CALIFORNIA

(ECI PROJECT NO. 1217)

ENVIRONMENTAL
PROTECTION
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Submitted to:

University California Berkeley
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Submitted by:

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JUNE 1997

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UNIVERSITY CALIFORNIA BERKELEY
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June 1997

Approved by:_____ Date: 6/30/97

Stephen W. Schwartz
Project Manager

UC BERKELEY UNDERGROUND STORAGE TANK REMOVAL
SSHP ACKNOWLEDGEMENT FORM

The contract for the above project requires the following: that you be provided with and complete formal and site-specific training; that you be supplied with proper personal protective equipment including respirators; that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you.

I HAVE REVIEWED, UNDERSTAND AND AGREE TO FOLLOW THE SITE SAFETY AND HEALTH PLAN FOR THE UC BERKELEY PROJECT SITE.

PRINTED NAME	SIGNATURE	REPRESENTING	DATE

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List of Acronyms

Acronym	Title
°F	degrees Fahrenheit
ABC	airway, breathing, and circulation
ABIH	American Board of Industrial Hygiene
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	activity hazard analysis
ANSI	American National Standards Institute
APR	air-purifying respirator
BZ	breathing zone
CBC	complete blood count
CFR	Code of Federal Regulations
CGI	combustible gas indicator
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
dBA	A-weighted decibel
DOSH	Division of Occupational Safety and Health
EKG	electrocardiogram
EPA	Environmental Protection Agency
EZ	exclusion zone
FA/CPR	first aid and cardiopulmonary resuscitation
FM	Factory Mutual
GFCI	ground fault circuit interrupter
IDLH	immediately dangerous to life and health
IT	IT Corporation
kV	kilovolt
LEL	lower explosive limit
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter
MSA	Mine Safety Appliances
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PID	Photo ionization detector
PM	Project Manager
PPE	personnel protective equipment
ppm	parts per million
SHM	Safety and Health Manager
SM	Site Manager

List of Acronyms *(continued)*

Acronym	Title
SMAC 24	Sequential Multiple Analyzer Computer
SPF	Sun Protection Factor
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
SZ	support zone
TLV	Threshold Limit Value
TWA	time-weighted average
$\mu g/m^3$	micrograms per cubic meter
UST	underground storage tank
VOC	volatile organic compound
WBGT	Wet-Bulb Globe Temperature

1.0 Introduction

1.1 Objective

This Site Safety and Health Plan (SSHP) describes the safety and health guidelines developed to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials and incidents at the University of California Berkeley Gill Tract (UC Berkeley) site located in Albany, California. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements may be revised if new information is received or site conditions change. Any revisions or changes to this plan will be made with the knowledge and concurrence of both Ecology Control Industries (ECI) and UC Berkeley. All SSHP revisions or changes will be included as attachments to this SSHP.

1.2 Site/Facility Description

This work will consist of the location, excavation, removal, and disposal of one (1) 500 gallon diesel underground storage tank (UST) and one (1) 500 gallon gasoline UST from the Gill Tract Agricultural Research Facility adjacent to the Maintenace Building. The project also includes confirmatory sampling, backfill and compaction activities, site restoration (asphalt), and final report preparation.

1.3 Policy Statement

It is the policy of ECI to provide a safe and healthful work place for all employees, subcontractors, and clients in compliance with governmental requirements. Additionally, the requirements of our clients shall take precedence provided that their requirements exceed those of ECI and governmental regulations.

We believe in two fundamental principles of safety: all accidents, injuries, and occupational illnesses are preventable; and if an operation cannot be done safely, we will not do it. To put these principles into practice, every associate will receive the appropriate training, equipment, and other resources necessary to complete assigned tasks in a safe and efficient manner.

Safety, industrial hygiene, and loss prevention are the direct responsibility of all members of management, who must create an environment in which everyone shares a concern for their own safety and the safety of their associates. Safety shall take precedence over expediency or short cuts. It is a condition of employment that all employees work safely and follow established safety rules and procedures.

Managers must conduct their business in compliance with governmental safety regulations and company procedures. All ECI health and safety procedures must be implemented for all ECI employees on all projects. ECI health and safety procedures shall also be applied to all subcontractor personnel.

The implementation of effective health and safety practices is a key measure of managerial performance. Management, with the assistance of the internal health and safety professional staff, will conduct audits to assess the effectiveness of the safety program(s) in place, and to identify areas for improvement. All deficiencies shall be corrected promptly.

All injuries, occupational illnesses, vehicle accidents, and incidents with the potential for injury or loss will be investigated. Appropriate corrective measures will be taken to prevent recurrence, and to continually improve the safety of our work place.

1.4 References

This SSHP has been written in accordance with the following references:

National Institute for Occupational Safety and Health (NIOSH)/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, October 1985.

American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices for 1993-1994.

Material Safety Data Sheet Collection, Genium Publishing Corp., Schenectady, NY, March 1992.

Title 40 CFR 260-270 - USEPA Hazardous Waste Requirements.

ACGIH, *Guide to Occupational Exposure Values,* 1994.

Title 29 of the Code of Federal Regulations (CFR), Parts 1910 and 1926 including Part 1926.65.

2.0 Organization, Qualifications, and Responsibilities

2.1 All Personnel

All site personnel will be responsible for continuous adherence to safety and health procedures during the performance of assigned work. In no case may work be performed in a manner that conflicts with the intent of this plan or the inherent safety and environmental cautions outlined in this plan. After due warnings, personnel violating safety procedures will be dismissed from the site and possibly terminated from further work.

Any person who observes unsafe acts or conditions or other safety problems should immediately report observations/concerns to appropriate supervisory personnel. If there is any dispute with regard to health and safety, on-site staff will attempt to resolve the issue on site and if the issue cannot be resolved, they will consult off-site technical staff and supervisors for assistance. The specific task or operation in question shall be discontinued until the issue is resolved.

2.2 Safety and Health Manager

The Safety and Health Manager (SHM) is responsible for the development, implementation, and oversight of the Safety and Health Program and the SSHP.

The SHM will have a minimum of five years of working experience in developing and implementing health and safety programs at hazardous waste sites. The SHM will have expertise in air monitoring techniques, development of personal protective equipment (PPE) programs for working in potentially toxic atmospheres, and must have working knowledge of applicable federal, state, and local occupational health and safety regulations. The SHM will oversee and review the site operations and review and approve this SSHP and all of its amendments. The SHM will have a formal education and training in occupational health and safety or a related field and certification in Industrial Hygiene by the American Board of Industrial Hygiene (ABIH).

2.3 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) will conduct daily inspections to determine if operations are being conducted in accordance with the SSHP and OSHA regulations. On this project, the SSHO is the Project Manager (PM) for the duration of the project, but reports directly to the SHM with operational issues. An open dialogue is kept between the SSHO and supervisory personnel assigned to the project to ensure that safety issues are quickly addressed and corrective action taken. The SSHO has the authority to take immediate steps to correct unsafe or unhealthful conditions including the stoppage of all field work when he deems it necessary.

The SSHO will have specialized training in PPE and respiratory protective equipment, confined space program oversight, proper use of air monitoring instruments, air sampling methods, and interpretation of results. The SSHO must be certified as having completed First Aid and Cardiopulmonary Resuscitation (FA/CPR) by a recognized organization such as the American

Red Cross and must also have working knowledge of applicable federal, state, and local occupational health and safety regulations.

2.4 Project Manager

The PM is responsible for ensuring that the necessary personnel are available for this project and that the reporting, scheduling, and budgetary obligations for this project are met.

The PM will have in-field project management experience with experience in the management of hazardous waste operations and/or emergency response.

2.5 Site Manager

The Site Manager (SM), as the on-site representative of ECI, is responsible for maintaining contact with the UC Berkeley site representative, the SHM, and the PM. The SM is also responsible for implementation of this SSHP. The SM will report to the PM and work directly with the UC Berkeley site representative.

The SM will have a minimum of three years of field and supervisory experience and meet the requirements of a competent person as defined in 29 CFR 1926.32(f). The SM will be competent, experienced, and knowledgeable in the field of hazardous and toxic waste cleanup and the specific activities anticipated during this project. The SM will also be responsible for coordinating site activities with other contractors working in any immediate or adjacent areas.

2.6 Subcontractors, Visitors, and Other On-Site Personnel

Subcontractors are responsible for the health and safety of their employees and for complying with the standards established in this SSHP and the guidelines established in ECI's Safety Rules for Contractors. Subcontractors will report to the SM. All subcontractors, visitors, and other on-site personnel must check in with the SM prior to gaining access to the site, in order to verify that all appropriate entry requirements are met.

3.0 Activity Hazard Analysis (Accident Prevention Plan)

3.1 Scope of Work

ECI will be performing various removal actions at the project site. This project will include the following major tasks:

- Mobilization/demobilization
- Site preparation
- Removal of liquids/sediments
- Excavation and trenching to access USTs and appurtenances •Capping and sealing inlets to piping associated with USTs
- Removal of USTs and appurtenances
- Soil sampling
- Disposal or recycling of USTs and appurtenances
- Backfilling and site restoration

3.2 Activity Hazard Analysis by Task

The Activity Hazard Analyses (AHA) identify potential safety, health, and environmental hazards and provide for the protection of personnel, the community, and the environment. Because of the complexity and constant change of remediation projects, supervisors must continually inspect the work site to identify hazards which may harm site personnel, the community, or the environment. The analysis is an ongoing process from initiation of the SSHP to implementation and completion of field work.

All ECI personnel, subcontractors, and visitors will be familiar with site hazards, and strictly adhere to the appropriate safety procedures.

3.3 Hazardous and Toxic Materials

This section discusses the hazards associated with materials that are anticipated to be encountered during site excavation, sampling and removal activities. The SHM will update this section as information developed during this project warrants. Available information indicates that all of the USTs targeted by this project contained home heating fuel. The hazardous components of hydrocarbons such as diesel and gasoline include benzene, ethylbenzene, toluene, and xylenes, as well as other volatile organic compounds (VOCs). Gasolines did contain lead or lead-containing compounds. Because there is no evidence of extensive tank leakage or damage at this time and because the type of activities to be conducted should result in only minimal exposure of employees to wet or free product, the levels of airborne contaminants and the potential for skin contact are expected to be very low.

Site workers may also be exposed to diesel and gasoline engine exhaust from heavy equipment required during project activities. Exposure to high concentrations of both types of exhaust may result in symptoms including headache, lassitude, nausea, and irritation of the upper respiratory tract and eyes. Long-term exposure has been linked to cancer. Because the work areas are

outside and therefore well-ventilated, exhaust concentrations are not expected to reach high levels and should not present a health risk to employees or area residents.

The atmosphere inside each of the USTs to be removed will be chemically inerted by means of displacement by carbon dioxide in the form of dry ice. Dry ice can cause frostbite injuries to the skin, eyes and mouth on contact. Furthermore, when dry ice sublimes the gaseous carbon dioxide presents a potential asphyxiation hazard. There are no chemical warning signs associated with exposure to concentrated gaseous carbon dioxide.

Samples collected from the UST contents and surrounding soil may be preserved with hydrochloric or other concentrated acids to preserve their integrity until they can be analyzed. Addition of the samples to the preservative can result in the release of corrosive mists, or may result in splashing. Inhalation of corrosive mists or contact with acid preservatives can result in tissue damage similar to a burn.

Health effects along with routes of exposure for health significant site contaminants are detailed in the following paragraphs.

Benzene

Exposure to Benzene can cause local irritation to the skin, eyes, and respiratory tract and may cause redness, dryness and scaling of the skin due to defatting. Acute systemic effects include headache, dizziness, convulsions, and coma. Chronic exposure to benzene may eventually lead to death due to effects on the heart. Chronic exposures effect the blood-forming tissues primarily, resulting initially in increases in blood cell counts followed by aplastic anemia with an overactive or underactive bone marrow. Epidemiological studies have linked benzene with leukemia and it is classified as a suspected human carcinogen.

Ethylbenzene

Ethylbenzene may cause local irritation to the skin, eyes, and respiratory tract and may cause defatting, drying and scaling of the skin. Acute systemic effects include headache, dizziness, nausea, loss of appetite, lassitude and eventual coma if exposure is prolonged. Ethylbenzene does not display the effects on the blood-forming tissues seen with benzene and is not classified as a carcinogen in humans or animals. Chronic exposures can result in deleterious effects on the liver, kidneys, and central nervous system.

Toluene

Toluene can cause local irritation of the skin, eyes, and respiratory tract and may cause defatting, drying and scaling of the skin. Acute systemic effects include headache, dizziness, nausea, loss of appetite, lassitude and eventual coma if exposure is prolonged. Toluene does not display the effects on the blood-forming tissues seen with benzene and is not classified as a carcinogen in humans or animals. Chronic exposures can result in deleterious effects on the liver, kidneys, and central nervous system.

Xylenes

Acute effects of xylene exposure include skin and mucous membrane irritation, central nervous system effects, and respiratory irritation leading to pulmonary congestion, edema, and hemorrhage. Inhalation exposure can also lead to liver and cardiac damage. Chronic exposure can result in effects on the liver, kidneys, and central nervous system and may have an effect on the blood-forming tissues. No carcinogenic effects have been documented; possible teratogenic effects have been observed.

Lead
Suspected carinogen. Poison by ingestion. Lead can cause loss of appetite, insomnia, irritability, muscle and joint pains, tremors and distorted perceptions. Reversible kidney damage can occur from acute exposure. The major organs affected by lead exposure are the nervous system, blood system, and kidneys.

3.4 Exposure Standards

Threshold Limit Values (TLVs) refer to airborne concentrations of substances which represent conditions that nearly all employees may be repeatedly exposed to day after day without adverse effect. These TLVs are prescribed by the American Conference of Governmental Industrial Hygienists (ACGIH) and are based upon the best available information obtained through industrial experience and animal or human studies. Because of the wide variation in individual susceptibility, a small percentage of workers may experience discomfort from some substances at concentrations below the recommended values. It has been policy to use these guidelines for good hygienic practices; however, whenever applicable, stricter guidelines may be utilized.

Currently, exposure guidelines for many chemical substances are regulated by OSHA. These exposures are based upon the time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour work week. Several chemical substances have short-term exposure limits (STEL) or ceiling values which allow a maximum concentration to which workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, narcosis of a sufficient degree to result in accidental injury, impaired self-rescue abilities, or substantially reduced work efficiency.

The STEL is defined by the ACGIH as a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV or TWA. Exposure above the TLV or TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects. OSHA requires that a 15-minute "Ceiling" concentration never be exceeded for that chemical constituent. This notation appears as the letter "C" after the chemical name. Table 3-3 contains the exposure guidelines for identified health significant contaminants.

4.0 Standard Operating Safety Procedures, Engineering Controls, and Work Practices

4.1 General Practices

- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel or set equipment on potentially contaminated ground.

- All contamination reduction zones (CRZ) and exclusion zones (EZ), as established on the site, shall be observed. Entry into a CRZ and EZ shall require prior notification and authorization of the SM. All required PPE shall be worn prior to entering these zones.

- Contaminated equipment and PPE, such as respirators, gloves, boots, etc. (if not discarded), shall not be removed from the CRZ until they have been properly decontaminated.

- Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.

- No food, beverages or items intended for human consumption shall be present or consumed in a CRZ or EZ. These are only allowed in designated areas of the support zone (SZ).

- No tobacco products shall be present or used, and cosmetics shall not be applied in a CRZ or EZ. These are only allowed in designated areas of the SZ, if areas have been designated.

- Field personnel must observe each other for signs of toxic exposure. Indications of adverse effects include, but are not limited to:

  - Changes in complexion and skin discoloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and pupillary response
  - Changes in speech pattern.

- Field personnel shall be cautioned to inform each other of the nonvisual effects of toxic exposure such as:

  - Headaches
  - Dizziness

- Nausea
- Blurred vision
- Cramps
- Irritation of the eyes, skin, or respiratory tract.

- Any detected effects of toxic exposure shall be reported to the SSHO immediately.

- An emergency eyewash unit shall be located immediately adjacent to employees who handle hazardous or corrosive materials, including decontamination fluids. All operations involving the potential for eye injury, splash, etc., must have approved eye wash units locally available capable of delivering at least 0.4 gallons per minute for at least 15 minutes.

- Hazardous work such as handling hazardous materials and heavy loads, equipment operation, etc., should not be conducted during severe storms.

- Operations involving the potential for fire hazards shall be conducted in a manner that minimizes the risk of fire. Nonsparking tools and fire extinguishers shall be used or available as appropriate. Sources of ignition shall be eliminated wherever possible, and shall be kept well away from combustible items at all times. When necessary, explosion-proof instruments and/or bonding and grounding techniques will be used to prevent fire or explosion.

4.2 Buddy System

The "buddy system" will be used at all times by all field personnel in the EZ. No one is to perform field work alone. Maintain visual, voice, or radio communication at all times.

4.3 Vacuum Pumping USTs

Prior to performing any work on the USTs scheduled for removal, the UST must first be emptied of as much liquid as possible and triple-rinsed. A vacuum truck may be used to accomplish the removal of materials from each UST. Safe work practices for materials transfer and disposal include:

- Pump motors and hoses must be bonded to the UST.

- The area where the vacuum truck will be set up must be vapor-free.

- The vacuum truck should be located upwind of the UST and outside the path of probable vapor travel.

- Vacuum pump exhaust shall be discharged through a hose having an adequate diameter downwind of the truck and UST.

4.4 Tank Inerting

Following the removal of the contents of the UST and prior to excavation or disconnection activities, the UST shall be inerted by introducing carbon dioxide in the form of dry ice to remove flammable vapors. Only the vent tube and the opening to be used to introduce the dry ice or nitrogen shall be open. All other openings in the UST shall be plugged. The following precautions shall be taken during UST inerting:

- Personnel shall not allow unprotected skin or body parts to come in contact with dry ice or nitrogen.
- The use of fire extinguishers to inert tanks is prohibited.
- Any liquid or compressed gas supply used to inert a UST shall be bonded to the UST, and both the supply vessel and the UST shall be grounded.
- The inerting media shall be introduced through an opening at the end of the UST opposite the vent.
- Monitoring shall be conducted to verify that the atmosphere inside the UST does not exceed 8% oxygen immediately prior to performing any other activities on the UST. Monitoring shall be conducted at least hourly during any additional activities on the UST, and must be conducted at the top, bottom and mid-level of the UST.
- All vapors shall be vented from the UST with continuous monitoring for both combustible gas and oxygen conducted at the vent area.

4.5 Excavation Procedures

All excavations shall be performed from a stable ground position. Daily inspections of the excavation shall be made by a competent person who has received training in excavation safety. The inspector shall determine the likelihood of a cave-in, and remedial action such as sloping or shoring shall be taken if the walls appear to be unstable. The inspector shall verify that adequate means of egress are in place.

All spoil shall be located at least two feet from the edge of the excavation to prevent it from falling back into the excavation or weakening the walls. Perimeter protection will be used for all excavation activities at the site, consisting of warning barricades or fencing placed at a distance not closer than 6 feet from the edge of the excavation, and displaying adequate warning at an elevation of 3 feet to 4 feet above ground.

All project personnel shall participate in the site-specific training session and be instructed on the following requirements.

- Before excavating, the existence and location of USTs, underground pipe, electrical equipment, and gas lines will be determined and documented. If the locations of

any lines are in question, a cable locating tool will be used to positively locate them.

- No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10 percent of the lower explosive limit (LEL) during the excavation. A combustible gas indicator (CGI) will be used to make this determination.

- Operations must be suspended and the area vented if the airborne flammable concentration reaches 10 percent of the LEL in the area of an ignition source (e.g., sparks from the bucket of an excavator).

- Combustible gas readings in the general work area will be made regularly and whenever conditions change.

- Excavations occurring within 3 feet of communication cables will be performed by hand digging until the cable is exposed.

The excavations will NOT be entered by any personnel.

4.6 Disconnecting USTs

After the UST has been emptied and exposed, all fittings and lines leading to the tank shall be disconnected using nonsparking and non-heat producing tools. Any electrical equipment used during disconnection activities shall be explosion-proof. Precautions, such as providing polyethylene sheets or drip pans, shall be taken to ensure that the contents of the lines do not leak into the surrounding soil during disconnecting activities. UST appurtenances shall be drained into DOT-approved containers for storage and transportation. Following the complete disconnection of each UST, all openings into the tank shall be plugged. If insulation is observed on any UST or ancillary lines, the SHM shall be notified prior to disturbing the insulation and shall determine whether or not it contains asbestos. If asbestos is determined to be present, the material will be left undisturbed until the SHM has addressed the proper handling procedures.

4.7 UST Removal

Immediately prior to removing each UST from an excavation, the SSHO shall inspect the tank and verify that it is completely disconnected and isolated, and that the internal oxygen content is still less than or equal to 8%. The inspection shall also include an inspection for potential underground and overhead utilities and other hazards. The following requirements apply to UST removal:

- Only equipment designed and equipped to lift a load equivalent in size and weight to the UST shall be used. Cranes, if utilized, must bear the appropriate current permit, inspection tag, and weight rating.

- Lifting USTs by the manhole flange or open bungs is prohibited. Lifting eyes or straps under each end of the UST shall be used during any crane lifts.

- Where possible, the ends of the UST shall be positioned so that they point towards the **least** inhabited, travelled, or occupied areas. Personnel shall remain well away from the ends of the UST during movement of the tank.

- Each UST shall be placed on a level surface and stabilized with wooden blocks after removal.

- All tanks shall be secured during transportation to prevent movement.

4.8 Heat Stress

Heat stress is not expected to be of a concern during the execution of tasks associated with this project. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Extreme hot weather can cause physical discomfort, loss of efficiency, or personal injury. It is anticipated that most of the work on this project will be conducted during mild, dry weather.

4.9 Cold Stress

Cold stress is not anticipated to be encountered during the execution of this delivery order.

4.10 Hearing Conservation

Caution should be taken at or around loud locations. Hearing protection, such as E-A-R™ plugs (Noise Reduction Rating [NRR] of 29), is required to be worn by personnel working with or around heavy equipment. All sound levels above 85 dBA will require the use of hearing protection. ECI Procedure HS402 will be adhered to.

4.11 Sanitation

A break area will be designated and provided in an area in the SZ (outside of contaminated zones). Outdoor and indoor areas may be designated. The designated areas will be clean and will facilitate the number of workers using it. Eating, drinking, and tobacco use may be permitted in break areas. Smoking will only be permitted in an area that is approved by the SHM. Smoking is prohibited within any work area during UST inerting, disconnection or movement.

4.11.1 Water

ECI will provide an adequate supply of drinking water or electrolyte replacement beverage to be dispensed from an approved potable water system and in a manner which prevents contamination between the consumer and dispenser.

4.11.2 Toilets

Permanent toilet facilities are available (within 500 feet).

4.11.3 Trash Collection

A trash receptacle will be placed at the job site for trash collection. Contaminated trash must be segregated from sanitary trash. Sanitary trash receptacles should be labeled "Sanitary Trash" and hazardous waste should be labeled according to applicable regulations.

High housekeeping standards must be maintained. The trash receptacle shall be emptied on an as-needed basis.

4.12 Fire Prevention and Protection

Clothes, cotton waste, and other combustible materials that might constitute a fire hazard will be placed in closed metal containers and placed outside or destroyed at the end of each day.

ECI will provide and maintain portable fire extinguishers in the following manner:

- Portable fire extinguishers will be provided, where needed, and inspected on a monthly basis. A visual inspection will be made to ensure that extinguishers are fully charged and in an operable condition. Hoses, nozzles, brackets, and supports will be inspected for deficiencies and corrected. Gauge pressure will be checked on pressurized units on a monthly basis to ensure units are fully charged and non-pressurized units will have their cartridges weighed on an annual basis. The chemical within dry chemical extinguishers will be inspected on an annual basis to ensure that it is powdery and in a free-running condition. An inspection tag will be attached to all extinguishers to designate that they have received an annual inspection.

- Fire extinguishers will be suitably placed, distinctly marked, and readily accessible.

- A fire extinguisher with a rating of not less than 10-B will be located within 50 feet or wherever more than 5 gallons of flammable gas are being used on the work site (this does not apply to integral fuel tanks of motor vehicles).

- A fire extinguisher with a rating of not less than 20-B will be located outside of and within 10 feet of the door opening into any room, building, or trailer used for storage of more than 60 gallons of flammable or combustible liquids.

- At the UST location and where flammable liquids are being stored, at least one portable fire extinguisher with a rating of not less than 20-B will be located at least 25 feet from the UST or storage area, but not more than 75 feet away.

- All tank trucks or vehicles used for transporting and/or dispensing flammable or combustible liquids will have a portable fire extinguisher with not less than a 20-BC rating.

- A portable fire extinguisher with a rating of not less than 20-BC will be placed within 50 feet of each service or fueling area.

- Fire extinguishers capable of extinguishing materials being stored will be placed in storage areas.

- All fire extinguishers will be approved by a nationally recognized testing laboratory.

- A fire extinguisher with a rating of not less than 2-A will be provided where torches or open flames are in use.

Fuel handling is another hazard which may be present during this task. Refueling of the mechanical equipment poses burn hazards. All refueling and fuel handling equipment must be Underwriters Laboratories (UL) listed and Factory Mutual (FM) approved. The refueling must be done in a designated area to prevent contamination from minor spills and to reduce the risk of fires. The following guidelines must be followed whenever personnel are dispensing flammable and combustible liquids:

- Flammable liquid dispensing systems will be electrically bonded and grounded. All tanks, hoses, and containers of 5 gallons or less will be kept in metallic contact while flammable liquids are being transferred; transfer of flammable liquids in containers in excess of 5 gallons will be done only when the containers are electrically bonded.

- Flammable or combustible liquids will be drawn from, or transferred into, vessels, containers, or tanks within a building or outside only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited.

- Areas in which flammable or combustible liquids are transferred in quantities greater than 5 gallons from one tank or container to another will be separated from other operations by at least 25 feet or a barrier having a fire resistance of at least 1 hour. Drainage or other means will be provided to control spills.

- Fuel-dispensing activities shall never be left unattended.

- Natural or mechanical ventilation will be provided to maintain the concentration of flammable vapor at or below 10% of the lower explosive level.

- Dispensing units will be protected against collision damage.

- Dispensing nozzles and devices for flammable liquids will be of an approved type.

- Lamps, lanterns, heating devices, and similar equipment will not be filled while hot: these devices will be filled only in well-ventilated rooms free of open flames or in open air and shall not be filled in storage buildings.

4.13 Electrical Power

All electrical equipment must have a GFCI as part of the circuit. All equipment must be suitable and approved for the class of hazard. Temporary wiring conductors installed for operation of construction tools and equipment will be either Type TW or THW contained in metal raceways, or will be hard usage or extra hard usage multiconductor cord. Temporary wiring will be secured above the ground or floor in a workmanlike manner and will not present an obstacle to persons or equipment. Applicable OSHA standards for electrical power, 29 CFR 1926 Subpart K, shall apply.

4.14 High or Elevated Work

Elevated work, where a fall potential exists, will be performed using appropriate ladders and/or fall protection (i.e., body harness and lifeline). No employee may be exposed to a fall of over 6 feet without being adequately protected. Prior to commencement of work in elevated work areas, the SSHO will submit drawings depicting all provisions of the positive fall protection system in use to the UC Berkeley site representative.

4.15 Manual Material Lifting

Many different types of objects may be handled manually during site operations. Care should be taken when lifting and handling heavy or bulky items as they are the cause of many back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered.
- No individual employee is permitted to lift any object that weights over 60 pounds. Multiple employees or the use of mechanical lifting devices are required for objects over the 60-pound limit.
- The anticipated path to be taken by the lifter should be inspected for the presence of slip, trip, and fall hazards.
- The feet shall be placed far enough apart for good balance and stability (typically shoulder width). THE FOOTING SHALL BE SOLID.
- The worker shall get as close to the load as possible. The legs shall be bent at the knees.
- The back shall be kept as straight as possible and abdominal muscles should be tightened.

- To lift the object, the legs are straightened from their bending position.
- A worker shall never carry a load that cannot be seen over or around.
- When putting an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

When two or more workers are required to handle the same object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, shall face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines shall be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves shall be used if necessary.
- The hands and object shall be free of oil, grease, and water which might prevent a firm grip, and the fingers shall be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.
- Wearing jewelry during field activities is prohibited.

4.16 Clearing - General Practices

If personnel are clearing brush using machetes, the following rules apply:

- When employees are using a machete to clear the area, no one is permitted within 30 feet of the person swinging the machete.
- Personnel will be instructed to not stand with their backs toward the active machete work area.
- All personnel must wear the appropriate PPE outlined in Section 5.0 and be familiar with the use of a machete.

When trees are being felled, the following rules must be adhered to:

- Before beginning the operation, alert all personnel in the area that the operation is about to commence. Then check that the area around the landing point of the tree is clear.
- Use a spotter to make sure that area remains clear.

- Check that there are no overhead power lines or obstructions that may catch or deflect the tree as it falls.

- Never turn your back on the tree while it is being felled.

- Watch for kickback from the saw and do not force the saw if it becomes stuck in the tree.

- Make use of wedges to ensure fall direction and prevent saw binding on larger diameter trees.

4.17 Crane Safety

Cranes will not be used for removing the USTs.

4.18 Dust Control

The most effective way to control dust is to minimize its initial generation. Preventative measures will be implemented by project personnel to maintain fugitive dust emissions at levels below action levels established in Table 8-1. The following list details methods and measures to be applied.

Methods and Measures

- Use of dust suppressants during loading and hauling operations. Suppressants may include water spraying of stockpile(s) and loading equipment

- Use of manufactured dust suppressants which are environmentally acceptable

- Installation of enclosures and dust collectors on fixed equipment

- Scheduling and staging operations to take advantage of prevailing winds

- Covering of stockpiles for long term storage

5.0 Personnel Protective Equipment

5.1 Respiratory Protection

Respiratory protective equipment shall be NIOSH-approved and respirator use shall conform to American National Standards Institute (ANSI) Z88.2, OSHA 29 CFR 1926.103, and 29 CFR 1910.134 requirements. ECI Procedure HS601 further defines the respiratory protection program which details the selection, use, inspection, cleaning, maintenance, storage, and fit testing of respiratory protective equipment. This procedure complies with the requirements contained within 29 CFR 1926.103 and will be maintained in the SSHO's site office along with the rest of ECI's Health and Safety Policies and Procedures.

Respirators are not expected to be utilized during this project.

5.2 Levels of Protection

The following is a brief description of the PPE which may be required during various phases of the project. The EPA terminology for protective equipment will be used: Levels A, B, C, and D. At a minimum, four sets of appropriate PPE will be maintained at the site for visitor usage.

5.2.1 Level A Protection

Level A protection use is not anticipated during this project.

5.2.2 Level B Protection

Level B protection is required when airborne concentrations of hazardous materials exceed or are expected to exceed twice the OSHA permissible exposure limit (PEL) in confined spaces. The use of Level B protection is not anticipated during this project.

5.2.3 Level C Protection

Level C protection shall be used when:

- The types of air contaminants have been identified, concentrations have been measured, and an air-purifying respirator (APR) is available that can remove contaminants
- The substance has adequate warning properties and all criteria for the use of an APR has been met.

The use of Level C protection is not anticipated during this project; however, if the SHM determines that it is prudent to implement Level C based on air monitoring data, then Level C protective equipment at a minimum shall consist of:

- Full-face APR with NIOSH/Mine Safety and Health Administration (MSHA)-approved cartridges

- Combination filter/cartridge providing protection against:

- Not more than 1,000 parts per million (ppm) organic vapors

- Dusts, fumes, and mists having a TWA less than 0.05 milligrams per cubic meter (mg/m^3)

- Steel-toed neoprene boots

- Tyvek or cloth coveralls with hoods and elastic wrists and ankles (poly-coated when there is a potential for contaminated rinsate or free product contact)

- Latex gloves (inner)

- Nitrile gloves (outer)

- Hearing protection (if necessary)

- Hard hat

- Duct tape openings (ankles, wrists, and respirator).

5.2.4 Level D Protection

It is anticipated that most, if not all, work conducted during this project will require either Level D or modified Level D PPE. Level D PPE shall be used when:

- Work functions preclude significant splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals

- Atmospheric concentrations of contaminants are less than one-half the TLV or PEL.

Level D PPE at a minimum shall consist of:

- Standard work uniform or coveralls
- Steel-toed work boots
- Safety glasses with side shields
- Hearing protection (if necessary)
- Splash shield (if necessary)
- Hard hat
- Leather palm gloves or nitrile gloves (as appropriate).

Modified Level D PPE at a minimum shall consist of:

- Standard work uniform or coveralls
- Steel-toed PVC boots
- Tyvek or cotton coveralls with hoods and elastic wrists and ankles
- Latex gloves (inner)
- Nitrile gloves (outer)
- Hearing protection (if necessary)
- Splash shield (if necessary)
- Hard hat
- Safety glasses
- Duct tape openings (ankles, wrists).

5.3 Activity Specific Levels of Protection

The required level of protection is specific to the activity being conducted. The initial levels of PPE are as follows:

Task	Activity	Initial Level of PPE
1	Mobilization/demobilization	D
2	Site preparation	D
3	Removal of liquids/sediments from USTs and triple-rinsing	Modified D (if contact with wet contaminants is likely), or D
4	Inerting USTs	D
5	Sampling and removal of USTs	D
6	Capping and sealing pipe inlets	Modified D (if contact with wet contaminants is likely), or D
7	Excavation	D
8	Drum and materials handling	D
9	Soil/water sampling	Modified D (if contact with wet contaminants is likely), or D
10	Backfilling and site restoration	D
11	Equipment decontamination	Modified D (if contact with wet contaminants is likely), or D

As site activities progress, levels of PPE are subject to change or to modification. The SSHO may upgrade PPE when action levels are exceeded or whenever the need arises to protect the safety and health of site personnel. Levels of PPE will not be downgraded without prior approval from the SHM.

5.4 Donning/Doffing PPE

All persons entering an EZ shall put on the required PPE in accordance with the requirements of this SSHP. When leaving the EZ, PPE will be removed in accordance with the procedures listed in Section 7.2, in order to minimize the spread of contamination.

6.0 Contamination Control Zones

The primary purpose for contamination control zones is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas, and to prevent access or exposure to hazardous conditions by unauthorized persons. At the end of each workday, the site will be secured to prevent unauthorized entry. Site work zones will include a SZ, CRZ, and EZ.

6.1 Support Zone

The uncontaminated SZ, or clean zone, will be the area outside the EZ and CRZ and within the geographic perimeters of the site. The area is used for staging of materials, parking of vehicles, office facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the EZ.

6.2 Contamination Reduction Zone

Personnel and equipment decontamination will be performed in the CRZ that is adjacent to the EZ. All personnel entering or leaving the EZ will pass through this area in order to prevent any cross-contamination. Personal protective outer garments and respiratory protection will be removed in the CRZ and properly labeled. All water generated from equipment and personal decontamination will be contained on site and disposed of in an appropriate manner.

6.3 Exclusion Zone

The EZ is the area where contamination does or could occur during site activities. This zone has the highest potential for exposure to contamination by contact, ingestion, or inhalation. All employees will use proper PPE when working in these areas. The location of the EZ will be identified by fencing or other appropriate means.

6.4 Emergency Entry and Exit

During an emergency, the evacuation routes should be followed. If conditions such as wind direction or physical hazards do not allow access to the prescribed evacuation routes, evacuate by the safest means available and decontaminate to the greatest extent possible. Additional emergency procedures can be found in Section 11.0.

Emergency routes will be determined at the onset of the project activities.

6.5 Site Entry Requirements

In order to allow an individual into potentially contaminated areas of the site (CRZ and EZ), he/she must meet the following requirements:

- Documentation of completing training requirements as described in Section 9.0 (including review of this SSHP and signing off as such)

- Documentation of completing medical surveillance requirements as described in Section 10.0
- Respiratory fit testing as necessary (Section 5.1)
- A hazard briefing which includes current operations at the site, hazards that exist, and control measures to follow

7.0 Decontamination

In general, everything that enters an EZ at a site must either be decontaminated or properly discarded upon exit from an EZ. All personnel must enter and exit an EZ through a CRZ. Prior to movement from an EZ, contaminated equipment will be decontaminated and inspected by the SSHO before it is moved into the SZ.

7.1 Procedures for Equipment Decontamination

Any item or vehicle taken into an EZ must be assumed to be contaminated and must be carefully inspected and/or decontaminated prior to leaving that particular EZ. A visual inspection of the frame and tires of all vehicles and equipment leaving an EZ will be completed. In order for a vehicle/equipment to pass inspection, it must be in a broom-clean condition, water washed, and free of loose dirt or sludge material on tailngates, axles, wheels, bucket, etcetera.

The equipment decontamination procedures will consist of washing equipment to remove mud and/or dirt. A special "clean area" will be utilized by personnel who must come in contact with equipment during vehicle maintenance and repair. All equipment requiring maintenance or repair will be staged in a CRZ prior to servicing.

Personnel assigned to vehicle decontamination will wear the protective equipment, clothing, and respiratory protection consistent with this SSHP. Seats and flooring in equipment and vehicles that are to be used in the EZ will be covered to the greatest extent possible with disposable polyethylene.

7.2 Personnel Decontamination

A personnel decontamination area will be established immediately outside the EZ in the CRZ to facilitate contamination and PPE removal. All personnel exiting the EZ will pass through the decontamination area to remove gross contamination. Standard ECI decontamination procedures are as follows.

Decontamination Procedures Level D-Modified

- Step into the first wash tub and wash PVC boots with soap solution and scrub brush.
- Step into the second wash tub and rinse boots with clean water and scrub brush.
- Remove outer nitrile gloves and dispose of in the proper receptacle.
- Remove outer coveralls and dispose of in the proper receptacle.

- Remove PVC boots and place in boot rack.
- Remove latex gloves and dispose of in the proper receptacle.
- Wash hands and face before eating, drinking, or smoking (break/end of shift).
- Redress in street clothes/leave site.

8.0 Exposure Monitoring/Air Sampling Program

According to 29 CFR 1926.65, air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on site. The following sections apply unless the SM, SSHO, and SHM deem that monitoring for a specific activity may be discontinued or modified. Air monitoring action levels are provided in Table 1.

8.1 Routine Air Monitoring Requirements

- ***When the possibility of an IDLH condition or flammable/explosive atmosphere has developed***
- ***Contaminants other than those previously identified are being handled***
- ***A different type of operation is initiated***
- ***Employees are handling leaking drums or containers or working in areas with obvious liquid contamination***
- ***When respiratory protection is being used.***

8.2 Site-Specific Air Monitoring Requirements

Measurements of airborne volatile organic compounds (VOC) will be conducted in the work area by using a photo ionization detector (PID) or equivalent. VOCs will be monitored in the breathing zones (BZ) of employees.

Measurements of oxygen and combustible gas will be made using a combination oxygen/combustible gas monitor.

All air monitoring equipment will be maintained and calibrated according to the manufacturer's recommendations which will be available in the SSHO's site office. Calibration will be done by the supplier.

If an instrument is found to be inoperative or is suspected of giving erroneous readings, the SSHO shall be responsible for immediately removing the instrument from service and obtaining a replacement unit. The specific ECI or subcontractor operation for which this equipment is essential shall cease until an appropriate replacement unit is obtained. The SSHO will be responsible for ensuring that a replacement unit is obtained and/or repairs are initiated on the defective equipment.

When applicable, only manufacturer-trained and/or authorized ECI personnel will be allowed to perform instrument repairs or preventive maintenance.

8.3 Other Hazardous Conditions

The SSHO will take affirmative action to limit exposures. If unknown chemicals or contamination is encountered, operations will cease until the situation is evaluated. The SSHO will contact the SHM to evaluate any potentially hazardous situations, or any situation with elevated contamination levels. Operations will only be resumed if they can be accomplished in a safe manner.

9.0 Training Requirements

9.1 General Training

The SSHO will be responsible for informing all personnel performing on-site activities and all visitors of the contents of this SSHP and ensuring that each person signs the SSHP. By signing this form, individuals acknowledge that they recognize the hazards present on site and the policies and procedures required to minimize exposure to hazards or adverse effects caused by hazards.

9.2 Hazardous Waste Operations Training

ECI trains all field personnel according to 29 CFR 1926.65 before their initial assignment to any project.

9.2.1 40-Hour Training

The following is a general list of topics covered in the 40-hour course:

- General site safety
- Physical hazards (fall protection, noise, heat stress, cold stress)
- Key management positions responsible for site health and safety
- Safety, health, and other hazards
- Use of PPE
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements including the recognition of symptoms and signs which might indicate potential overexposure to hazards
- Worker Right-to-Know (Hazard Communication)
- Engineering controls and safe work practices
- Components of the site health and safety program
- Decontamination practices for personnel and equipment
- Confined space entry procedures

- Emergency Response Procedures.

9.2.2 Supervisory Training

Site supervisory personnel shall receive eight additional hours of specialized training on program supervision. The following topics are discussed:

- Overall health and safety program
- PPE program
- Spill containment program
- Air monitoring techniques.

9.2.3 Refresher Training

Personnel covered by Sections 9.2.1 are required to complete eight hours of refresher training annually on the following topics:

- Safe work practices
- Chemical hazard awareness
- Hearing conservation
- Hazard communication
- Respiratory protection and fit-testing
- Confined space entry procedures update.

9.2.4 Supervised Field Experience

Personnel covered by Section 9.2.1 will receive a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor. This supervised field experience will be documented on the ECI On-the-Job Training Record.

9.2.5 Visitor Training

Site access by personnel making deliveries or performing repairs to utilities, public or government officials, visitors, or local residents will be limited to support areas only. These persons will not be required to comply with the medical and training requirements as previously defined. SZ access will be limited to designated work, delivery, or observation areas to minimize any potential exposure to site contaminants. Site observation areas will be located upwind from predominant wind directions, and access to observation areas may be restricted by weather conditions or site activities. Authorization for limited site access will be determined on a case-by-case basis by the SSHO in consultation with the SHM and PM. Site access for such personnel will be limited to areas with no potential for exposure during routine operations. These personnel will be escorted on site and will be strictly prohibited from entering the CRZ or EZ.

9.3 Tailgate Safety Meetings

The SSHO conducts a tailgate safety meeting the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting include health and safety considerations for the day's activities, necessary PPE,

problems encountered and new operations. Attendance records and meeting notes are maintained with the project files. At the conclusion of each shift, a debriefing for site employees will be held, if necessary.

9.4 Site-Specific Training

ECI provides site-specific training for all personnel assigned to projects falling within the scope and application of 29 CFR 1926.65. The content of the training will be derived from information contained within this SSHP. All workers must also read and sign the SSHP acknowledging acceptance of site rules and understanding of site hazards before being permitted to enter an EZ. Emergency procedures contained within Section 11.0 will be rehearsed during this training.

9.5 Hazard Communication

All personnel performing field activities shall receive basic hazard communication training which involves a review of the ECI written hazard communication program (ECI Procedure HS060), MSDSs, container labeling, and chemical health hazards. Personnel shall be trained on the hazards of chemicals handled or used on site by reviewing Section 3.2 and the MSDSs in Appendix C. MSDSs will be obtained for all materials purchased for the site that require them.

9.6 First Aid and CPR

At least one person trained in a minimum of both American Red Cross first-aid techniques and CPR will be on site whenever activities occur. Refresher training in CPR is required every two years, and every 3 years for first aid.

10.0 Medical Surveillance

ECI will utilize the services of a Board-Certified Occupational Medicine physician for the medical surveillance requirements of this project.

10.1 Medical Examination

All personnel on site working within a CRZ or EZ will have successfully completed a preplacement or periodic/updated physical examination.

10.1.1 Preplacement Examination

This examination has been designed to meet 29 CFR 1926.65 requirements for hazardous waste site operations.

The ECI medical surveillance program examination at a minimum consists of:

- Medical and occupational history questionnaire which includes information on past gastrointestinal, hematologic, renal cardiovascular, reproductive, immunological, and neurologic problems
- Physical examination
- Blood pressure measurements
- Complete blood count (CBC) and differential to include hemoglobin and hematocrit determinations, red cell indices, and smear of peripheral morphology
- Blood urea nitrogen and serum creatinine
- Sequential Multiple Analyzer Computer (SMAC 24)
- Pulmonary function test
- Audiogram
- Electrocardiogram (EKG) for employees over 35 years old or when other complications indicate the necessity
- Drug and alcohol screening
- Visual acuity.

The following information is, or has been, provided to the examining physician:

- Copy of 29 CFR 1926.65 and their Appendices

- Description of employee's duties
- Contaminants potentially exposed to
- Description of the PPE to be used
- Information from previous medical exams.

The medical surveillance provided to the employee includes a judgment by the medical examiner of the ability of the employee to use either positive- or negative-pressure respiratory equipment. Any employee found to have a medical condition which could directly or indirectly be aggravated by exposure to these chemical substances or by the use of respiratory equipment will not be employed for the project. A copy of the medical examination is provided at the employee's request.

The employee will be informed of any medical conditions that would result in work restriction or that would prevent them from working at hazardous waste sites.

10.1.2 Annual Examination

All ECI employees receive an annual update examination meeting the requirements of 29 CFR 1926.65. The results of these exams are compared to previous results and the baseline physical to determine if any effects due to potential exposure, may have occurred. Appropriate actions are taken as recommended by the physician should the results indicate a potential exposure effect or other concerns; otherwise, employees are cleared for continued work.

10.1.3 Exit Examination

ECI offers exit physical examinations for all employees involved in the medical surveillance program who are leaving the company for any reason to ensure they are in good health.

10.2 Subcontractor Requirements

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician on the Training Acknowledgement Form. The physical examinations will meet the requirements of 29 CFR 1926.65 and 29 CFR 1926.103, Respiratory Protection. Subcontractors will also supply copies of the medical examination certificate for each employee they have on site.

10.3 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1926.65 and will be kept for a minimum of 30 years. Confidentiality of employee medical records will be maintained. The written medical opinion from the occupational physician will be made available upon request to the USACE site representative for any site worker.

10.4 Medical Restrictions

When a medical care provider identifies a need to restrict work activity, the employee's home office will communicate the restriction to the employee, the SM, the SSHO, and the SHM. The

terms of the restriction will be discussed with the employee and the SM. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction.

11.0 Emergency Response Plan and Contingency Procedures

Site personnel must be prepared to respond and act quickly in the event of an emergency or accidental contaminant release. Emergency preparedness and response procedures will aid in protecting site workers and the surrounding environment. Preplanning measures will include employee training, fire and explosion prevention and protection, chemical spill and discharge prevention and protection, and safe work practices to avoid personal injury or exposure.

11.1 Personnel Roles/Lines of Authority

The roles and responsibilities of ECI personnel for response to emergencies at the project site will be clearly defined and coordinated with ECI subcontractors, UC Berkeley project personnel, and the UC Berkeley Fire Department. The Fire Department will evaluate the emergency situation and make the determination whether to involve the local HAZMAT Unit in the response. The responsibilities of specific project individuals and the coordination of local Fire Department are defined as follows.

Site Manager. At all times during scheduled work activities, a designated SM shall be present on site. This individual will be responsible for implementing these procedures and determining appropriate response actions. Depending upon the circumstances and time permitting, the SM will review proposed response actions with the SSHO, and the UC Berkeley site representative. Specific responsibilities for the SM include:

- Evaluating and assessing emergency incidents or situations
- Assigning personnel and coordinating response activities on site
- Assuring that field personnel are aware of the potential hazards associated with the site
- Summoning the local emergency response team
- Notifying the PM or, in his absence, the Program Manager of an emergency situation
- Coordinating response to an incident with the UC Berkeley site representative
- Assuring that all ECI emergency equipment is routinely inspected and functional
- Working with the SSHO regarding the correction of any work practices or conditions that may result in injury to personnel or exposure to hazardous substances

- Assuring that appropriate emergency response agencies are aware of the provisions made herein

- Evaluating the safety of site personnel in the event of an emergency, and providing evacuation coordination if necessary

- Maintaining site facilities and assisting site personnel in accessing those facilities.

The SM will direct all emergency response activities conducted or managed by ECI and is responsible for field implementation and enforcement of health and safety policies and procedures. The SM will be fully trained in health and safety procedures and maintain current certification in standard first aid and CPR. Other responsibilities include overall supervision and management of field activities.

Site Safety and Health Officer. The SSHO is responsible for implementing, communicating, and enforcing health and safety policies and procedures during the course of the project. The SSHO will review the fitness and training records of all field personnel for compliance with the established requirements and will assist in arranging proper training and medical examinations. He will also assist in evaluating health and safety concerns with respect to environmental releases and emergency response actions.

Project Manager. The PM will provide support to emergency responders and dedicate appropriate project resources to the response effort. If required, the PM will mobilize additional personnel and equipment to the site. The PM will notify and provide the UC Berkeley site representative with recommendations concerning any additional action(s) to be taken.

11.2 List of Emergency Contacts and Notification

The SM, PM, and SSHO will be notified immediately in the event of an emergency. The SM will immediately evaluate the incident and, if necessary, notify the local Fire Department emergency support services. If not previously notified, the PM, UC Berkeley site representative, and designated environmental contact will be advised of the situation. Telephone numbers for emergency contact personnel are as follows:

1) ECI Corp
Stephen Schwartz
(510) 372-9100 ext 3240
Pager: 988-5687

2) UC Berkeley
Anna Moore/Hari Krashna
(510) 643-9518/(510) 642-6416

3) 911 - They will contact all other relevant local and UC Berkeley Personnel.

The list will be maintained with current contacts, and telephone numbers will be posted along with other emergency phone numbers at all telephone locations at the site.

The information provided to the notified person should include the nature of the incident and the exact location and suspected contaminants or material involved. Information regarding the incident that should be reported to the emergency operator includes the following:

- Name and telephone number of the individual reporting the incident
- Location and type of incident
- Nature of the incident (fire, explosion, spill, or release) and substances involved
- Number and nature of medical injuries
- Movement or direction of spill/vapor/smoke
- Response actions currently in progress
- Estimate of quantity of any released materials
- Status of incident
- Other pertinent information.

A complete incident report shall be completed by the SSHO and provided to the UC Berkeley representative, once the urgency of the emergency incident has been resolved.

11.3 Medical Emergency Response

In the event of severe physical or chemical injury, the Richmond Kaiser Permanente Medical Center emergency response personnel shall be summoned for emergency medical treatment and ambulance service. Their response time is estimated to be between 4 and 8 minutes upon initial notification. The emergency medical responders will be utilized to provide care to severely injured personnel. Once an initial assessment is made by the emergency medical technicians, the decision on using ground or air transportation for the victims will be made. Minor injuries will be treated on site by qualified first-aid/CPR providers and if additional treatment beyond first aid is required, the injured personnel will be transported to the Kaiser Medical Center. The hospital can provide 24-hour emergency medical care along with the services of a critical care center.

Transportation routes and maps will be posted in the project office and in each site vehicle prior to the initiation of on-site activities. A copy of this map has been provided as Figure 2.

11.4 Personal Exposure or Injury

Every precaution will be taken to aid in the prevention of injuries and/or exposure to contaminants. These precautions are detailed in this SSHP and generally consist of the following measures:

- Personnel will be properly trained for their work duties
- Site personnel will wear appropriate PPE for each specific task or work assignment
- Site personnel will follow the proper field safety protocols as defined

- Site controls will be enforced so that only authorized personnel are able to access the work zones

- Site personnel will be made aware of potential environmental and chemical hazards

- Real-time air monitoring will be performed to evaluate the effectiveness of engineering controls and levels of personal protection

- Proper decontamination procedures will be followed for personnel and equipment.

In the event of personal exposure to contaminants, the following general guidelines will be adhered to:

- Contact/Absorption - Copious amounts of potable water will be used to flush, for at least 20 minutes, contaminants from the skin. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. The condition of the individual will be assessed and transport to a medical center arranged if necessary. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.

- Inhalation - The victim will be moved immediately to an area providing fresh air. Decontamination of the victim and artificial respiration will be provided if necessary. The condition of the individual will be assessed and transport to a medical center arranged if necessary.

- Ingestion - Immediately contact local poison control center. The victim will be decontaminated, if necessary, and transported to a medical facility.

11.5 Fire Control

In the event of a fire or explosion, or imminent danger of fire or explosion, all activities shall halt, and the UC Berkeley Fire Department (911) shall be notified immediately. If it is safe to do so, site personnel may use fire-fighting equipment available on site to remove and isolate flammable or other hazardous materials which may contribute to the fire.

Upon arrival of the Fire Department emergency responders, the SM will advise the fire chief or lead representative of the location, nature, and identification of the hazardous materials on site. Specific hazards inherent with the site will be conveyed at that time.

The following measures will be implemented during site field activities to minimize the risk of fire and/or explosion:

- Smoking is permitted on site only in the designated smoking area

- Good housekeeping procedures will be required on site

- Material storage methods will be in accordance with manufacturers' recommendations

- Flammable liquids will be stored in approved containers and cabinets only

- All storage, handling, or use of flammable and combustible materials shall be conducted by trained personnel

- Entry and exit pathways shall be kept clear of debris or obstacles

- Work areas will be cleared of excess vegetation and obstructions.

11.6 Spills or Control

ECI will maintain the following equipment and materials in the CRZ for use during spill response activities:

- Absorbent pads
- Granular absorbent material (noncombustible)
- Polyethylene sheeting
- 55-gallon drums
- Shovels and assorted hand tools (nonsparking).

If a hazardous waste spill or material release to the air, soil, or water at the site is observed, ECI will immediately notify the UC Berkeley site representative. An assessment will be made of the magnitude and potential impact of the release. If it is safe to do so, site personnel will attempt to locate the source of the release, prevent further release, and contain the spilled and/or affected materials as follows:

- The spill or release area will be approached cautiously.
- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, logs). The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.

- If necessary, the release area will be evacuated, isolated, and secured.

- If possible, spill containment will initially be made without entering the immediate hazard area.

- Entry to the release area will be made with the PPE, personnel, methods, and equipment necessary to perform the work. Hazardous spill containment and collection will be performed in four steps as follows:

- Contain the spill with absorbent socks, booms, granules, or construction of temporary dikes.

- Control the spill at the source by plugging leaks, uprighting containers, overpacking containers, or transferring the contents of a leaking container.

- Collect the spilled material with shovels or heavy equipment as necessary.

- Store and label the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

If site personnel cannot safely and sufficiently respond to an environmental release, evacuation of the area may be warranted. The decision to evacuate will depend upon the risk of exposure to SZ personnel and the severity of the release. The UC Berkeley Fire Department will be notified in the event of a significant spill along with the local HAZMAT Unit, if applicable. Upon their arrival at the site, the SM will brief them on the current situation at hand and any potential hazards the team may be faced with.

11.7 Site Evacuation Procedures

The authority to order personnel to evacuate the area rests with the SM and SSHO. In the event that site evacuation is required, a continuous, uninterrupted car/truck horn will be sounded for approximately ten seconds. Radio communication may also be used to alert site workers and provide special instructions.

Personnel working in the EZ or CRZ will immediately make their way to the pre-determined area for a "head count." Depending on the severity of the event and allowable time, personnel exiting the EZ and CRZ may be instructed to forgo or modify decontamination procedures.

Personnel in the SZ will immediately report to the designated area for a "head count" and further instructions. The SM and the SSHO will remain in contact to ensure that evacuation procedures are properly executed. Personnel shall evacuate to an upwind location and perform a "head count."

Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills or releases. In the event of project evacuation, the UC Berkeley site representative, local Fire Department, and the local Police Department will be notified immediately. A site emergency map that delineates evacuation routes, emergency horn locations, first-aid kit locations, rally point, and site contamination control zone perimeters will be developed once an on-site evaluation of conditions and topography is complete.

11.9 Adverse Weather Conditions/Natural Disasters

Adverse weather can take many forms. Thunder and lightning storms, earthquakes, hail, high winds, and tornados are a few examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Generally, poor working conditions arise, and slip, trip and fall hazards exist. Natural disasters can create many secondary hazards such as release of hazardous materials to the environment, structure failure and fires.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. The SSHO must decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

The best protection against most severe weather episodes and natural disasters is to avoid them. This means seeking shelter before the storm hits. Stay away from pipes and electrical equipment should lightning be a threat and watch for damage caused by lightning strikes nearby. Operating cranes or performing work on USTs is prohibited during electrical storms.

Earthquakes. The following general guidelines will be adhered to in the event of an earthquake:

- If you are indoors, duck or drop down to the floor. Take cover under a sturdy desk, table or other furniture. Hold on to it and be prepared to move with it. Hold the position until the ground stops shaking and it is safe to move. Stay clear of windows, fireplaces, and heavy furniture or appliances. Do not rush outside. You may be injured by falling glass or building parts. Do not try using the stairs or elevators while the building is shaking or while there is danger of being hit by falling glass or debris.

- If you are outside, get into the open, away from buildings and power lines.

- If you are driving - stop if it is safe. Remain inside the vehicle. Do not stop on or under a bridge, overpass or tunnel. Move your car as far out of the normal traffic pattern as possible. Do not stop under trees, light posts, electrical power lines or signs.

11.10 Critique and Follow-Up of Emergency Procedures

The UC Berkeley site representative shall be verbally notified immediately and receive a written notification within 24 hours of all accidents or incidents including releases of toxic chemicals, fires, or explosions. The report shall include the following items:

- Name, organization, telephone number, and location of the Contractor

- Name and title of the person(s) reporting

- Date and time of accident/incident

- Location of accident/incident (i.e., site location, facility name)
- Brief summary of accident/incident including pertinent details such as type of operation ongoing at time of accident
- Cause of accident/incident, if known
- Casualties (fatalities, disabling injuries)
- Details of any existing chemical hazard or contamination
- Estimated property damage, if applicable
- Nature of damage, effect on contract schedule
- Action taken by Contractor to ensure safety and security
- Other damage or injuries sustained (public or private).

The SM and the SSHO will investigate the cause of the incident to prevent its reoccurrence. The investigation should begin as soon as practical after the incident is under control, but not later than the first work day after the incident. Investigations will follow the procedures described below:

- Interview witnesses and participants as soon as possible or practical.
- Determine the chronological sequence of events (opinions as to cause should not be solicited at this time).
- Note the location, movement, displacement, liquid levels, sounds, noises, or other sensory perceptions experienced by the participants or witnesses.
- Obtain weather data.
- Ascertain the location and position of all switches, controls, etc.
- Verify the condition of all safeguards.

After the facts have been collected, causal factors should be identified. Two causal factors typically exist, apparent and contributing; and there may be several of each. Apparent factors are those which are self-evident or readily deduced. Contributing factors usually become apparent by questioning why the apparent causal factor was allowed to exist.

12.0 Record Keeping and Data Management

Proper record keeping and data management are essential in the implementation of this SSHP. The forms associated with the record keeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the SM to ensure that the forms are properly completed. Completed forms will be kept and maintained by ECI. These records shall be maintained for a five-year period. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel.

12.1 Safety Inspections

ECI's accident prevention program is centered around the following key procedures:

- Project reporting, investigation, and review of all near misses, incidents, and accidents
- Management reviews of all incident/accident reports, corrective action, and project safety concerns
- Review of project, operations, and construction activities by health and safety professionals.

Safety reviews and inspections are conducted by all tiers of the management structure and are documented. A list of all corrective action items is required to be maintained showing the corrective action, responsible person, and the date action is to be completed. Follow-up inspections are conducted by health and safety personnel to ensure that corrective actions or measures have been implemented.

The SM or PM will inspect the site weekly and interview one or two site workers regarding areas of safety concerns or ideas for safety improvement. Site supervisory personnel will inspect site conditions and activities daily to identify changing conditions or potential hazards. Identified safety and occupational health deficiencies and suggested corrective measures will be brought to the attention of the SM and SSHO. Safety review inspections will be recorded and filed for reference by project management and UC Berkeley personnel.

12.3 Accident Reporting and Investigation

All project personnel are required to report all near misses, injuries, illnesses, and accidents to their immediate supervisor. The SSHO shall immediately arrange appropriate medical care as required. Once immediate medical care for the injured personnel has been accomplished, the SSHO shall complete and submit the appropriate report forms within 24 hours. The appropriate form(s) to be completed may include:

- ECI Superintendents Employee Injury Report
- ECI Vehicle Accident Report
- ECI General Liability, Property Damage, and Loss Report

Identified safety and occupational health deficiencies and corrective measures shall be documented and filed on site for reference by the UC Berkeley or designated representative.

All near misses, injuries, illnesses, and accidents shall be investigated by on-site management personnel. The SM, PM, and SSHO will investigate the conditions which led to the accident. They will document how the accident occurred and identify unsafe acts or conditions that occurred or existed at the time of the accident. Corrective actions will be determined and implemented to prevent recurrence of the accident, and responsibility for implementation of corrective actions will be assigned. The investigation shall be started immediately, and all information shall be collected as soon as possible after the occurrence. The final report and required forms will be submitted to the UC Berkeley and other appropriate personnel.

FIGURES

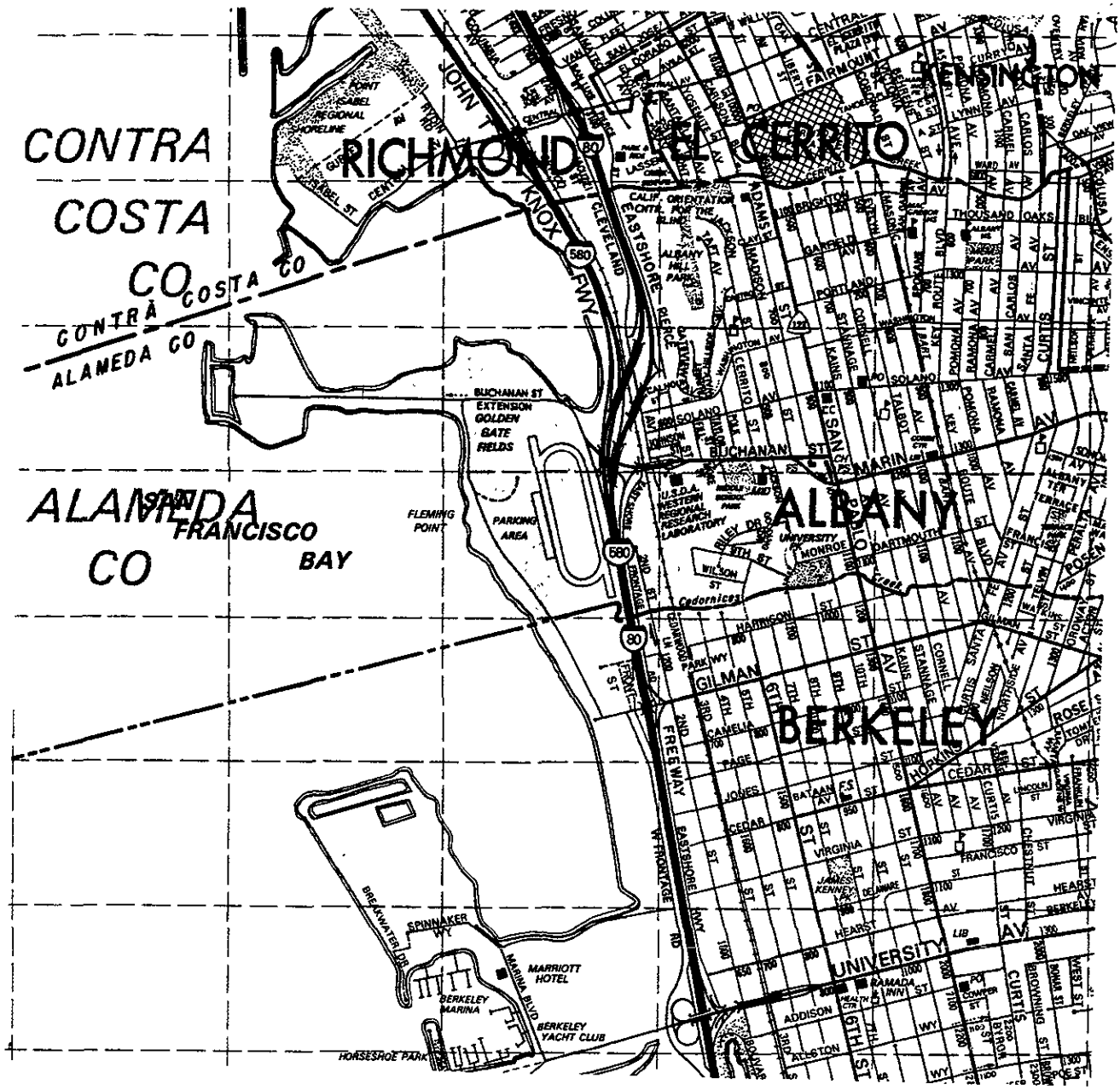

Figure 1
SITE LOCATION MAP
UC BERKELEY GILL TRACT

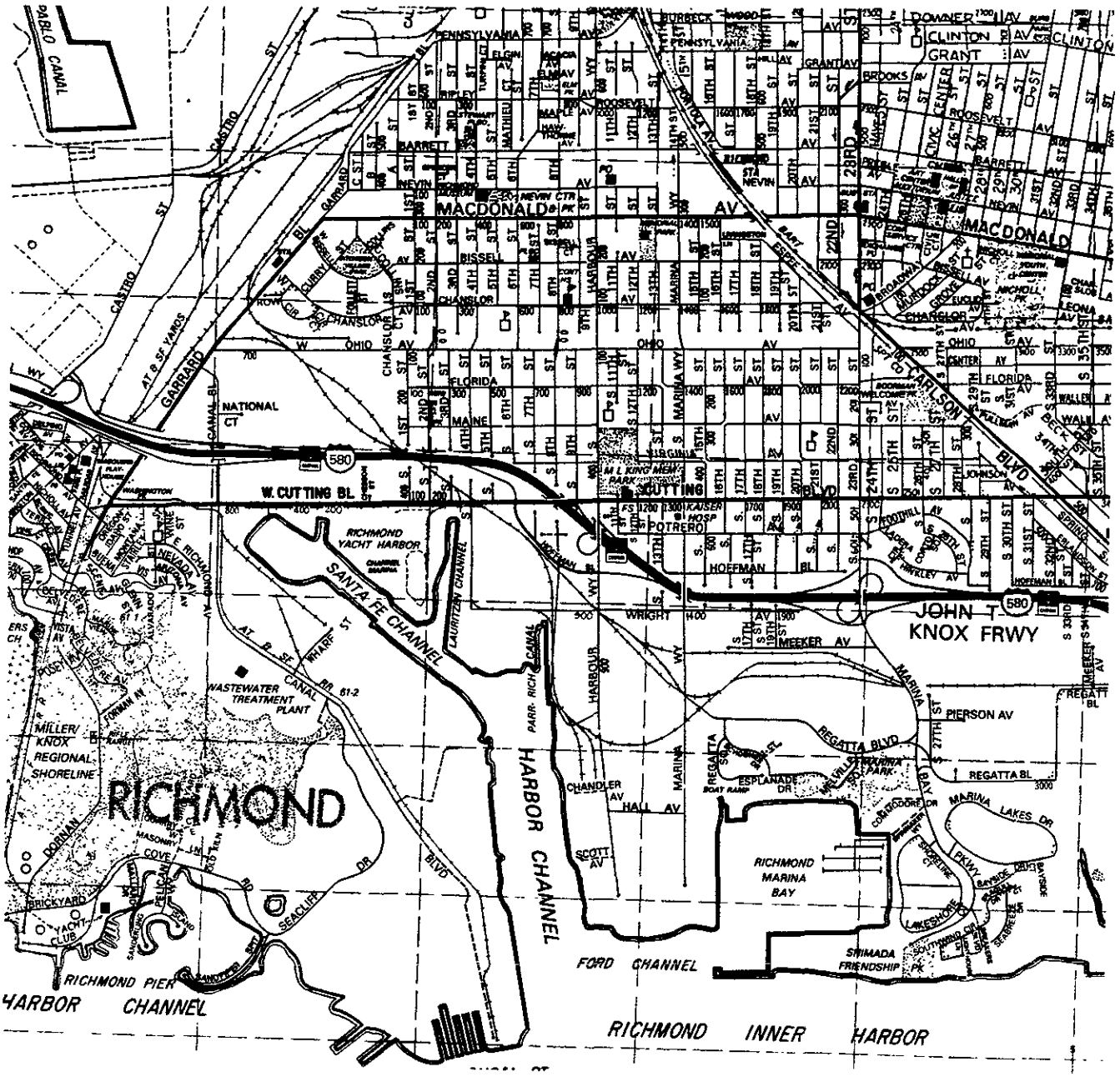

Figure 2
ROUTE TO HOSPITAL MAP
UC BERKELEY GILL TRACT

TABLES

TABLE 1

HAZARDOUS AND TOXIC MATERIALS

Underground Storage Tank Removal and Sampling
University of California, Berkeley, CA 94720

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Benzene	Colorless to light yellow liquid with an aromatic odor.	MW: 78 BP: 176°F MP: 42°F VP: 75 mm Hg Sol: 0.07% FP: 12°F LEL: 1.3% UEL: 7.9% IP: 9.24 eV	Strong oxidizers, fluorides, perchlorates, nitric acid.	Contaminated soil and UST residue, trace amounts.	Skin, eyes, blood, CNS, bone marrow, respiratory system.	Irritation of eyes, nose, respiratory tract; dermatitis; giddiness, headache, nausea, fatigue, anorexia; leukemia.
Ethylbenzene	Colorless liquid with aromatic odor.	MW: 106 BP: 277°F MP: -139°F VP: 10 mm Hg Sol: 0.01% FP: 55°F LEL: 1.0% UEL: 6.7% IP: 8.76 eV	Strong oxidizers.	Contaminated soil and UST residue, trace amounts.	Eyes, skin, upper respiratory system, CNS.	Irritation of eyes, mucous membranes; dermatitis; headache, narcosis, coma.

TABLE 1

HAZARDOUS AND TOXIC MATERIALS
(CONTINUED)
Underground Storage Tank Removal and Sampling
University of California, Berkeley, CA 94720
Gill Tract

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Hexane	Colorless liquid with odor like gasoline.	MW: 86.2 BP: 156°F MP: -219°F VP: 150 mm Hg Sol: 0.002% FP: -7°F LEL: 1.1% UEL: 7.5% IP: 10.18 eV	Strong oxidizers.	Decontamination agent for sampling equipment.	Eyes, skin, respiratory system.	Irritation of the eyes, nose, skin; nausea, dizziness, headache; muscle weakness, numbness.
Methanol	Colorless liquid with a characteristic pungent odor.	MW: 32.1 BP: 147°F MP: -144°F VP: 92 mm Hg Sol: Miscible FP: 52°F LEL: 6.0% UEL: 36% IP: 10.84 eV	Strong oxidizers.	Cleansing agent for decontamination.	Eyes, skin CNS, gastro-intestinal tract.	Irritation of eyes; headache, nausea, dizziness; nausea, vomiting, blindness.

TABLE 1

HAZARDOUS AND TOXIC MATERIALS
(CONTINUED)
Underground Storage Tank Removal and Sampling
University of California, Berkeley, CA 94720
Gill Tract

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Toluene	Colorless liquid with sweet, pungent odor like benzene.	MW: 92 BP: 232°F MP: -139°F VP: 20 mm Hg Sol: 0.05% FP: 40°F LEL: 1.2% UEL: 7.1% IP: 8.82 eV	Strong oxidizers.	Contaminated soil and UST residue, trace amounts.	Skin, liver, kidneys, CNS.	Dermatitis; dilated pupils; weakness, dizziness, fatigue; insomnia, nervousness.
Xylene	Colorless liquid with aromatic odor.	MW: 106 BP: 269-292°F MP: -13-56°F VP: 7-9 mm Hg Sol: Insoluble FP: 63-84°F LEL: 1-1.1% UEL: 7.0% IP: 8.44-8.56 eV	Strong oxidizers.	Contaminated soil and UST residue, trace amounts.	Skin, eyes, liver, kidneys, gastro-intestinal tract, CNS, blood.	Irritation of eyes, nose, throat; corneal damage; dermatitis; staggering, incoherence, dizziness; anorexia, nausea, vomiting, abdominal pain.

MW: Molecular weight.
BP: Boiling point at 1 atmosphere pressure, in degrees Fahrenheit (°F).
MP: Melting point in °F.
VP: Vapor pressure at 1 atmosphere pressure and 68°F.

TABLE 1

HAZARDOUS AND TOXIC MATERIALS

Underground Storage Tank Removal and Sampling
UC Berkeley, Gill Tract

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Lead	Bluish-gray, soft metal.	AW: 207.19 BP: 1740°C MP: 327.42°C VP: 1 mm Hg@ 973°C Sol: N/A FP: N/A LEL: N/A UEL: N/A IP: N/A	Soluble in dilute nitric acid.	Contaminated soil. 20 - 1,500 parts per million.	Nervous system, blood system, and kidneys.	Loss of appetite, anemia, insomnia, headache, irritability, muscle and joint pains.

AW:	Atomic weight.
BP:	Boiling point at 1 atmosphere pressure, in degrees Celsius (°C).
MP:	Melting point in °C.
VP:	Vapor pressure.
Sol:	Solubility in water at 68°F, as percentage (%) by weight.
FP:	Flash point, closed cup method, in °F.
LEL:	Lower explosive limit in air, as % by volume.
UEL:	Upper explosive limit in air, as % by volume.
IP:	Ionization potential, in electron-volts (eV).
CNS:	Central nervous system.
mm Hg:	Millimeters of mercury.
°F:	Degrees Fahrenheit.
%:	Percent.
>:	Greater than.
<:	Less than.
N/A:	Not applicable.
Not est.:	Not established.

TABLE 1

HAZARDOUS AND TOXIC MATERIALS
(CONTINUED)
Underground Storage Tank Removal and Sampling
University of California, Berkeley, CA 94720
Gill Tract

Sol:	Solubility in water at 68°F, as percentage (%) by weight.
FP:	Flash point, closed cup method, in °F.
LEL:	Lower explosive limit in air, as % by volume.
UEL:	Upper explosive limit in air, as % by volume.
IP:	Ionization potential, in electron-volts (eV).
CNS:	Central nervous system.
mm Hg:	Millimeters of mercury.
°F:	Degrees Fahrenheit.
%:	Percent.
>:	Greater than.
<:	Less than.
N/A:	Not applicable.
Not est.:	Not established.

TABLE 2

EXPOSURE GUIDELINES
GILL TRACT UST REMOVAL

CONTAMINANT (SYNONYMS)	OSHA PEL		ACGIH TLV		IDLH	WARNING PROPERTIES
	8-HR TWA	15-MIN STEL	8-HR TWA	15-MIN STEL		
Benzene	1 ppm	5 ppm	10 ppm	-	500 ppm, Carcinogen	Odor Thresh: 34-119 ppm Eye Irr Lvl: Not established
Ethylbenzene	100 ppm	125 ppm	100 ppm	125 ppm	800 ppm	Odor Thresh: 0.092-0.60 ppm Eye Irr Lvl: 200 ppm
Hexane	50 ppm	-	50 ppm	-	1,100 ppm	Odor Thresh: Not established Eye Irr Lvl: 1500 ppm
Methanol	200 ppm	250 ppm	200 ppm	250 ppm	6,000 ppm	Odor Thresh: >2,000 ppm Eye Irr Lvl: Not established
Toluene	100 ppm	150 ppm	50 ppm	-	2,000 ppm	Odor Thresh: 0.16-69 ppm Eye Irr Lvl: Not established
Xylene	100 ppm	150 ppm	100 ppm	150 ppm	900 ppm	Odor Thresh: 0.081-40 ppm Eye Irr Lvl: Not established
Lead	0.050 mg/m^3	Action Level 0.030 mg/m^3	0.050 mg/m^3	-	100 mg/m^3	Odor Thresh: N/A Eye Irr Lvl: N/A

ACGIH: American Conference of Government Industrial Hygienists.
Eye Irr Lvl: Eye irritant level.
Hr: Hour.
Min: Minute.
Odor Thresh: Odor threshold.
OSHA: Occupational Safety and Health Administration.

mg/m3: milligrams per cubic meter.
PEL: Permissible Exposure Limit.
ppm: Parts per million.
TLV: Threshold Limit Value.
TWA: Time-weighted average.
STEL: Short-term exposure limit.

TABLE 3

PPE SELECTION MATRIX

Underground Storage Tank Removal and Sampling
University of California, Berkeley, CA 94720
Gill Tract UST Removal Project

PPE LEVEL	CONDITIONS
Level D	All identified contaminant airborne concentrations below the PEL for that contaminant. • Oxygen concentration less than 25% and greater than 20%. • < 5 ppm VOC above background as determined by PID or OVA. • No significant splash or skin contact potential.
Level C	Any contaminant airborne concentration above the PEL but below 10 times the PEL for that contaminant. • Oxygen concentration less than 25% and greater than 20%. • < 50 ppm VOC above background as determined by PID or OVA. • All confined space entry with contaminant airborne concentrations below 2 times the PEL. • Low splash or skin contact potential.
Level B	Contact the Health and Safety Department.
Level A	Contact the Health and Safety Department.
Stop Work	• Oxygen content more than 25% or less than 20% • 50 ppm VOC above background as determined by PID or OVA.

Level B protection must be approved by the local Health and Safety Department. Level A protection must be approved by a CIH, the IT Corp. EES Divisional Manager or Health and Safety and the IT Corporate Director of Health and Safety.

PEL = permissible exposure limit.
VOC = volatile organic compounds.
OVA = organic vapor analyzer.
PID = photoionization detector.
ppm = parts per million by volume.
% = percentage by volume.
< = less than.

TABLE 4

ACTION LEVELS

When in Level C PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 6.38 mg/m^3	Stop work[2]/initiate dust suppression
Unknown VOC's	≥ 50 ppm above background in breathing zone (BZ)	Stop work
O_2	≥ 23% or ≤ 20%	Stop work
LEL	≥ 10% of LEL	Stop work

When in Level D/Modified D PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 3.19 mg/m^3	Stop work[2]/initiate dust suppression
Unknown VOC's	≥ 5 ppm above background in breathing zone (BZ)	Stop work
O_2	≥ 23% or ≤ 20%	Stop work
LEL	≥ 10% of LEL	Stop work

When in Support Zone

Analyte	Action Level	Required Action
Dust	≥ 1.6 mg/m^3	Initiate dust suppression
Unknown VOC's	≥ 1 ppm above background in BZ	Evacuate support zone and reestablish perimeter of EZ.

[1] Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

[2] Contact with the SHM must be made prior to continuance of work. The SHM may then initiate integrated air sampling along with additional engineering controls.

No one is permitted to downgrade levels of PPE without authorization from the SHM.

TABLE 4

ACTION LEVELS

When in Level C PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 6.38 mg/m^3	Stop work[2]/initiate dust suppression
Unknown VOC's	≥ 50 ppm above background in breathing zone (BZ)	Stop work
O_2	≥ 23% or ≤ 20%	Stop work
LEL	≥ 10% of LEL	Stop work

When in Level D/Modified D PPE

Analyte	Action Level	Required Action[1]
Dust	≥ 3.19 mg/m^3	Stop work[2]/initiate dust suppression
Unknown VOC's	≥ 5 ppm above background in breathing zone (BZ)	Stop work
O_2	≥ 23% or ≤ 20%	Stop work
LEL	≥ 10% of LEL	Stop work

When in Support Zone

Analyte	Action Level	Required Action
Dust	≥ 1.6 mg/m^3	Initiate dust suppression
Unknown VOC's	≥ 1 ppm above background in BZ	Evacuate support zone and reestablish perimeter of EZ.

[1] Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.

[2] Contact with the SHM must be made prior to continuance of work. The SHM may then initiate integrated air sampling along with additional engineering controls.

No one is permitted to downgrade levels of PPE without authorization from the SHM.

TABLE 5

AIR MONITORING FREQUENCY AND LOCATION

WORK ACTIVE CIY	INSTRUMENT	FREQUENCY[1]	LOCATION
Mobilization/ demobilization	PID or FID O_2/LEL Meter	N/A N/A	N/A N/A
Site preparation	PID or FID O_2/LEL Meter	N/A N/A	N/A N/A
Removal of liquids/sediments	PID O_2/LEL Meter	Initially and periodically Continuously	BZ of employees N/A
Sampling and removal of USTs	PID O_2/LEL Meter	Initially and periodically Continuously	BZ of employees BZ of employees
Decontamination	PID O_2/LEL Meter	Periodically Periodically	BZ of employees N/A Decon work area
Trenching and excavation (potentially contaminated soil)	PID O_2/LEL Meter	Periodically Periodically	BZ of employees Soil surface level
Soil/water sampling	PID O_2/LEL Meter	Periodically Periodically	BZ of employees Soil surface level
Capping and sealing inlets to piping	PID O_2/LEL Meter	Periodically Continuously	BZ of employees Piping level
Equipment decontamination	PID O_2/LEL Meter	Periodically Periodically	BZ of employees Soil surface level
Backfilling and site restoration	PID O_2/LEL Meter	Periodically Periodically	BZ of employees Soil surface level

[1] Frequency of air monitoring may be adjusted by the SHM after sufficient characterization of site conditions has been completed.

TABLE 6

EMERGENCY PHONE NUMBERS

Local Fire Department Emergency Non-Emergency	911
Local Police Department Emergency Non-Emergency	911
Local HAZMAT Unit Emergency Non-Emergency	911
Richmond Kaiser	(510) 231-4690
Poison Control Center	(800) 955-9119
National Response Center	(800) 424-8802

TABLE 7

MINIMUM CLEARANCE FROM ENERGIZED OVERHEAD ELECTRIC LINES

Nominal System Voltage	Minimum Required Clearance
0 - 50 kV	10 feet
51 - 100 kV	12 feet
101 - 200 kV	15 feet
201 - 300 kV	20 feet
301 - 500 kV	25 feet
501 - 750 kV	35 feet
751 - 1000 kV	45 feet