GASOLINE CONTAMINATION REMEDIATION

Minami Nursery property
Hayward, California

HEALTH AND SAFETY PLAN

Prepared for

MR. GEORGE MINAMI
Hayward, California

July 1989

ENGINEERING-SCIENCE

Prepared by

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GASOLINE CONTAMINATION REMEDIATION

MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA

HEALTH AND SAFETY PLAN

Ref: NC191

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Ajay Singh, Project Health and Safety Officer — Date

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Neal E. Siler, Project Manager — Date

Yoko Crume — 8/22/89

Yoko Crume, Ph.D.
Office Health and Safety Representative — Date

Draft reviewed on July 28, 1989

Emergency Contacts

In the event of any situation or unplanned occurrence requiring outside assistance or support services, the appropriate contact(s) from the list below should be made. The nearest public telephone to the site can be found in McDonald's, 18708 Hesperian Boulevard, Hayward, California.

Emergency Fire/Police or Medical	911
Hayward Non-Emergency Fire	(415) 784-8690
Hayward Non-Emergency Police	(415) 881-7501
Poison Control Center	(800) 523-2222
Chem-trec	(800) 424-9300
St. Rose Hospital Emergency Room 27200 Calaroga Avenue Hayward, California	(415) 783-1123

Directions to emergency room nearest site:

Left on Hesperian Boulevard, left on West Tennyson Road, left on Calarogo Street. St. Mary's Hospital is to the right. Figure 4 is a map of the project site relative to St. Mary's Hospital

Engineering-Science Contacts:

Phil Storrs
Corporate Health and Safety Manager
ES Pasadena, California
(818) 440-6000

Neal E. Siler
Project Manager
ES Berkeley, California
(415) 548-7970, Ext. 193

Edward Grunwald
Deputy Corporate Health and Safety Manager
ES Atlanta, Georgia
(404) 325-0770

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Office Health and Safety Representative
ES Berkeley, California
(415) 548-7970

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Hayward, California

(415) 581-1836

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HEALTH AND SAFETY PLAN

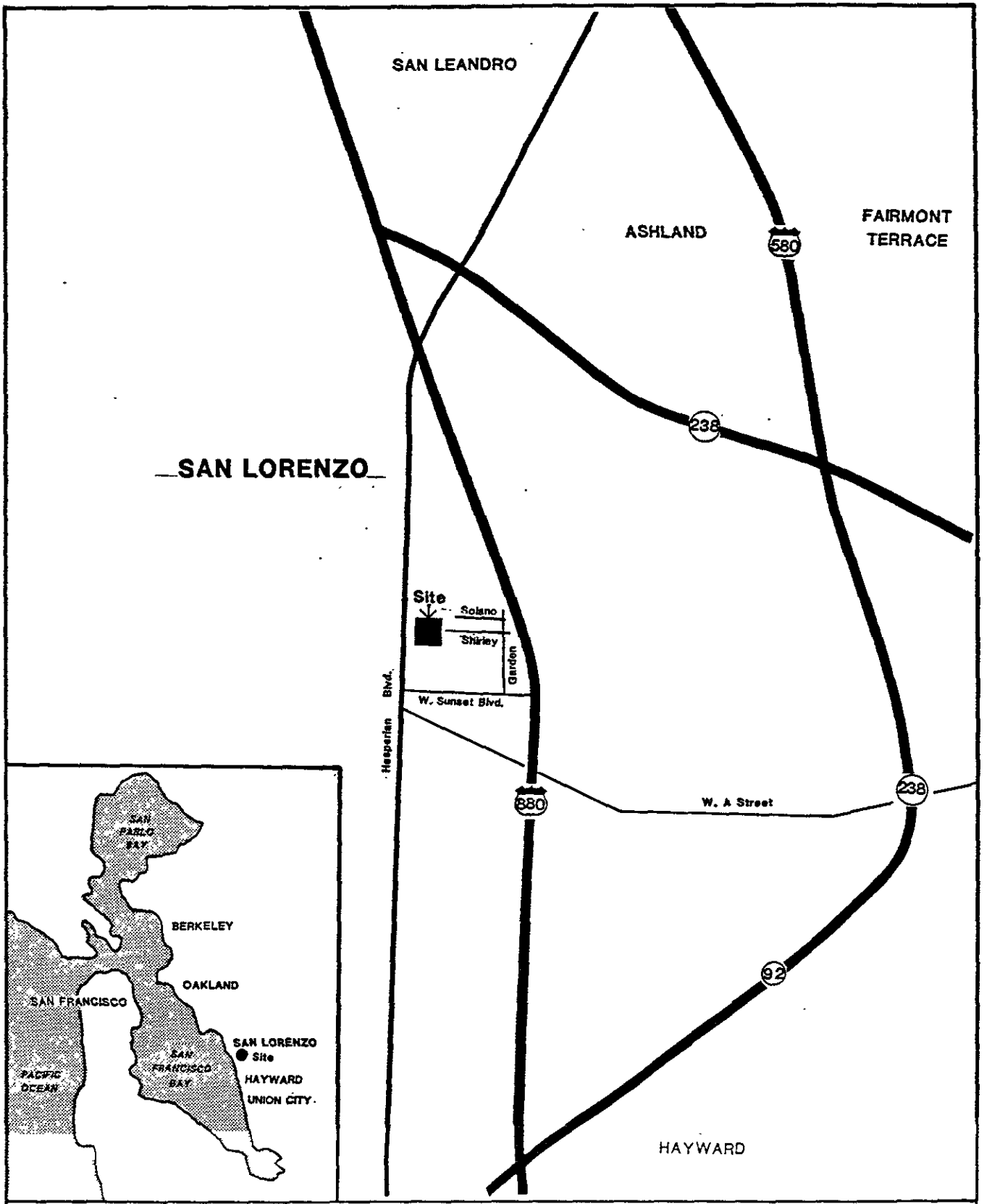
INTRODUCTION

This document describes the health and safety procedures for gasoline contamination remediation at the former Minami Nursery site, 600 Shirley Avenue, Hayward, California. Figure 1 shows the site location. The project will involve excavation and subsequent treatment of contaminated soil using landfarming. Groundwater cleanup at the site will include installation of extraction and monitoring wells at the site and treatment of purged water via activated carbon or air stripping methods. All Engineering-Science (ES) employees, subcontractors, and visitors who wish to enter the study area will read and follow this plan. A plan acceptance form will be signed by all who are admitted to the site.

The purpose of this plan is to establish personnel protection standards and mandatory safety practices and procedures. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at hazardous waste sites. This safety plan includes procedures and discussions of soil excavation operations, well installation, groundwater sampling, and associated health and safety concerns.

The prime responsibility for employee safety lies with each company for its own employees. It is expressly intended that all project work will comply with applicable sections of the California Code of Regulations Title 8 and the requirements of the Federal Occupational Safety and Health Administration (29 CFR Part (1910 and 1926)). Each

FIGURE 1



SITE LOCATION MAP
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA

field team member and the separate companies working on this project will maintain a general responsibility to identify and control all health or safety hazards and cooperate toward working as safely as possible.

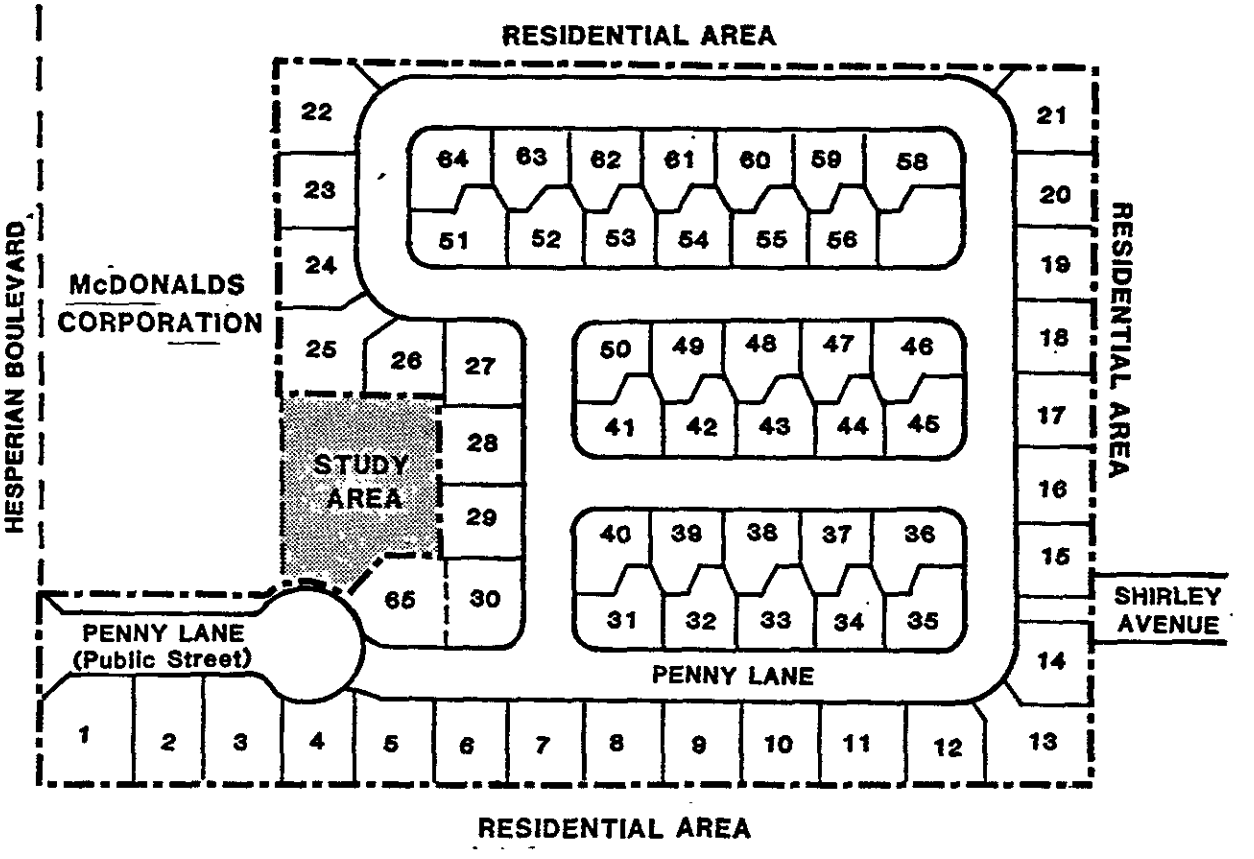
The following sections of the site safety plan provide general guidelines for decision points in site safety planning. Sections cover field personnel responsibilities and work procedures, emergency procedures, air monitoring, levels of personal protection, and heat and cold protective measures. Decontamination, contractor site safety briefing, and exposure incidence reporting are also covered. The plan also covers site-specific information including a site description, contingency plan and list of emergency contacts, requirements for levels of protection and necessary health and safety equipment and decontamination as well as a description of hazardous substances known or suspected to be present on the site. Appendix A contains a Plan Acceptance Form and an Accident Report Form. Appendix B includes a description of the Engineering-Science (ES) annual medical monitoring program.

SITE DESCRIPTION

The project site is an approximately square piece of property with a total area of approximately 15,000 square feet (sq. ft.). The site is bordered by a newly built housing complex on three sides, and by the rear wall of the shopping complex along Hesperian Boulevard on the fourth side. The only access to the project site is from the south, where Penny Lane connects the site to Hesperian Boulevard. Figure 2 shows the project site relative to surrounding parcels. Two underground fuel storage tanks (UFSTs) are known to exist at the site. Tank 1 and tank 2 are 500- and 1,000-gallon steel tanks used for storing gasoline and fuel oil, respectively. Figure 3 shows the locations of both the tanks.

SITE HISTORY

EMCON Associates performed the site characterization work in August and September, 1988. Soil and ground water quality was assessed through a program of borehole sampling in the general location of

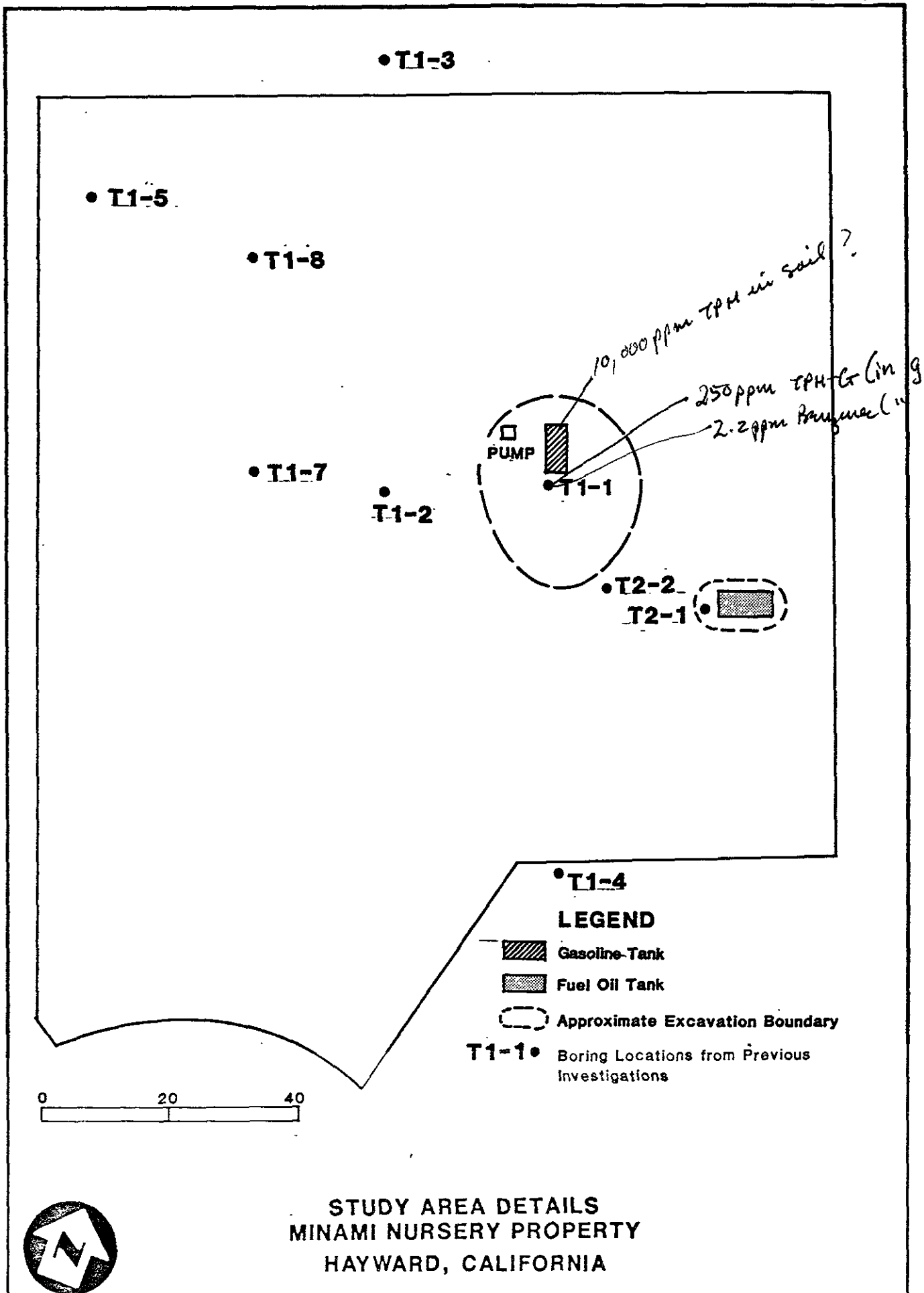


LEGEND

- Exterior Boundary Line
- Lot Line
- Study Area

0 90 180
scale feet

SITE PLAN
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA



STUDY AREA DETAILS
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA

the underground storage tanks. Total petroleum hydrocarbon (TPH) and benzene, toluene, xylene, and ethylbenzene (BTXE) concentrations exceeding regulatory agency's "action levels" were detected in the soil and groundwater samples collected from the vicinity of Tank 1 and Tank 2.

Gasoline soil contamination from Tank 1 extends vertically from a depth of 9 feet to groundwater table at 16 feet. Soil contamination from Tank 2 was concluded to be above groundwater table, between 7 and 13 feet below ground surface. Soil contamination in the vicinity of Tank 1 ranged from approximately 4,400 to 10,000 mg/kg TPH in the 9.5- to 14.5-foot depth interval. The maximum groundwater contamination at the site was reported to be 250 mg/l TPH as gasoline at location T1-1. Benzene, toluene, xylenes and ethylbenzene were reported at the maximum concentrations of 2.2 mg/l, 16.0 mg/l, 28.0 mg/l, and 5.30 mg/l.

SCOPE OF WORK

The scope of work for the project consists of the following tasks:

1) Tank removal
2) Contaminated soil excavation
3) Landfarming
4) Well installation and groundwater monitoring
5) Groundwater extraction and remediation

Engineering-Science will act as the general contractor for the project. Individual tasks will be subcontracted to various firms wherever deemed appropriate. Engineering-Science's responsibilities will include writing plans and specifications for various tasks; overseeing subcontractor's work; monitoring subcontractor's compliance to the Health and Safety (H & S) Plan during all phases of the project; and collection of air, groundwater, and soil samples for analysis.

PROJECT TEAM RESPONSIBILITIES

Project Manager

The project manager shall direct the on-site operation efforts. Neal E. Siler of the ES Berkeley office will act as project manager for this project. The project manager has the primary responsibility for:

- Assuring that appropriate personnel protective equipment is available and is properly utilized by all on-site ES personnel. The project manager shall also advise subcontractors as to the necessity and appropriateness of personal protective equipment and may, if the situation requires, remove subcontractors from the job for practicing unsafe procedures.

- Assuring that personnel are aware of the provisions of this plan and are instructed in the work practices necessary to ensure safety and in procedures for dealing with emergencies.

- Consulting with the health and safety coordinator.

- Assuring that personnel are aware of potential hazards associated with site operations.

- Monitoring the safety performance of all personnel to ensure that the required work practices are employed.

  Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.

- Preparing any accident/incident reports (see Appendix A).

- Assuring the completion of the Plan Acceptance Form (see Appendix A) by all personnel prior to their going on-site and ensuring that they understand the provisions of the form.

Project Health and Safety Officer

Unless the project is designated by the ES Project Manager to be hazardous enough to require a professional safety person, the Project

Health and Safety Officer will be a member of the assigned project team who is responsible for site safety. The Project Health and Safety Officer will be Ajay Singh of the ES Berkeley office. The responsibilities of the health and safety officer will be:

- Establishing and directing the safety program.
- Advising and consulting with the project manager on all matters related to the health and safety of those involved in site operations.
- Directly supervising, in the field, the health and safety aspects of response activities when necessary.
- Carrying a list of emergency contacts on person.

Project Personnel

Project personnel involved in field investigations and operations are responsible for:

- Taking all responsible precautions to prevent injury to themselves and to other employees.
- Implementing the Site Safety Plan and reporting to the project manager, site manager, or safety officer any deviations from the anticipated conditions described in the plan.
- Performing only those tasks that they believe they can do safely, and immediately reporting any accidents or unsafe conditions to the project manager, on-site supervisor, or safety officer.

Project Team Organization

The following personnel are designated to carry out the job functions described above.

Project Manager:	Neal E. Siler
Project Health and Safety Officer:	Ajay Singh

Project Personnel:	Marcus Pierce
Project Personnel:	Ajay Singh
	Wayne Hauck
	Eric Storrs
	Bruce Rucker

TRAINING AND MEDICAL MONITORING

The ES employees that will be involved in site activities are enrolled in a medical surveillance program. This program requires the employees to receive a baseline physical and yearly check-up exams. The tests performed during the annual exam are listed in Appendix B. Additional medical monitoring will be included whenever necessary. In the event that an employee is exposed to adverse levels of contaminants during site work, the employee will be examined to evaluate and treat potential health problems resulting from the exposure.

ES employees involved in field work have received 40 hours of health and safety training meeting the requirements of 29 CFR 1910.120 paragraph e. ES employees who may need to wear respirators during site activities will receive instructions, demonstration and practice on how the respirator should be worn, how to adjust it, and how to determine if the respirator fits properly (29 CFR 1910.134). Health and safety personnel working at the site will be familiar with the operation, calibration, and limitations of all field monitoring equipment.

The on-site field team will have the following health and safety equipment readily available:

Copy of the Health and Safety Plan
First aid kit
Eye wash bottle
Duct tape
Paper towels
Fire blanket
Plastic garbage bags
A list of emergency contacts
Photovac Tip 1 or OVM Model 580A
Sensidyne gas pump with Benzene and Gasoline colorimetric tubes

HEALTH AND SAFETY RISK ANALYSIS

Chemical Hazards

Gasoline and fuel oil compounds have been detected at the site. These compounds can potentially cause some health and safety hazards. Gasoline is a mixture of approximately 150 different hydrocarbon species, several elements (in small concentrations), and fuel additives such as: ethylene dibromide, ethylene dichloride, tetraethyl lead, and tetramethyl lead. The constituent of most concern in these fuels is benzene.

Benzene is an OSHA-regulated, known human carcinogen, and it has a definite cumulative action. Benzene has a moderate explosion hazard and is highly flammable. OSHA permissible exposure limit (PEL) and ACGIH threshold limit value (TLV) for benzene are 1.0 ppm and 10.0 ppm, respectively. Table 1 describes the OSHA exposure limits (PELs) and ACGIH (TLVs) for some petroleum hydrocarbon constituents.

The possible routes of exposure to gasoline are through inhalation, ingestion, and dermal contact. Repeated or prolonged exposure can cause dermatitis and blistering of skin. Pulmonary aspiration can cause severe pneumonitis. Some addiction has been reported to inhalation of fumes. Even brief inhalation of high concentrations can cause fatal pulmonary edema. It can cause hyperemia of the conjunctiva and other disturbances of the eyes. Potential health and safety hazards associated with gasoline are listed in Appendix C. A narrative description of the health effects associates with gasoline is also included in Appendix C.

Site activities will include excavation of contaminated soil, borehole drilling and well installation, soil remediation by landfarming, and possibly groundwater remediation. All the above mentioned activities may result in exposure to gasoline. In order to prevent the potential exposure to chemical hazards at the site, personal hygiene principles should be followed as a rule. Care should be taken to prevent skin contact with contaminated soil. Where direct contact of contaminated soil with exposed skin is possible, dermal protection such as boots, gloves, Tyvek/Saranex suits should be implemented, as appropriate. Should contaminated soil contact the skin, the affected areas should be

TABLE 1

OSHA EXPOSURE LIMITS

Compound	Abbreviation	PEL/TLV	Carc./Rep. Hazard
Gasoline		/300	yes/no
Benzene	C_6C_6	1.0/10.0	yes/no
Toluene	$C_6H_5CH_3$	200/100	no/no
Xylene	$C_6H_5(CH_3)_2$	100/100	no/no
Tetraethyl lead	TEL	0.075/0.1	no/no
Tetramethyl lead	TML	0.075/0.15	no/no
Ethylene dibromide	EDB	20/0.045	yes/no
Kerosene*		/14	no/no

PEL/TLV expressed as parts per million (ppm) except for TEL and TML which are expressed as mg/cubic meter.

*Recommended TWA/action level by NTIS.

washed with soap to prevent absorption. Hand to mouth contact should be avoided during site activities. Since benzene is the compound with lowest PEL (1 ppm), as a precautionary measure benzene concentration should be monitored in the breathing zone as specified in the section on air monitoring.

Construction-Related Hazards

Construction-related hazards consist of accidents that can occur during operation of the heavy equipment (trucks, loaders, tractors, discs, etc.) and other accidents resulting from falls. Potential for these types of accidents can be reduced by the use of proper safety equipment (hard hats, steel-toed boots) and being alert to potential hazards.

A Gastech Model GX-82 combustible gas detector will be available on-site at all times. At least two minimum rated 2A20BC fire extinguishers shall also be available. No smoking or other ignition sources, other than excavation equipment, shall be permitted on-site during conduct of the work.

Heat Stress

Major heat stress-related illness include: heatstroke; heat exhaustion; heat cramps; and heat rash. Heat stroke is the most serious clinical condition among them. It is caused by loss of body's cooling mechanism, resulting in uncontrolled acceleration of body core temperature. It is fatal if treatment is delayed. Heat exhaustion is caused by dehydration from deficiency of water and/or salt intake. Heat cramps is painful spasms of muscles used during work. It usually starts after work hours. It is caused by loss of body salt in sweat. The rash occurs when body parts are exposed to humid heat with skin continuously wet with unevaporated sweat.

All field staff assigned to this project are requested to take the following preventative measures:

1. MUST take ample supply of water or other appropriate liquids to all field assignments unless a drinking fountain is conveniently available at the site. In the field, when temperatures are high, employees MUST make a conscious effort to keep drinking liquid to avoid dehydration.

2. MUST take rest whenever one feels tired. He/she MUST NEVER rush to finish the job when he/she is fatigued in hot environment. When tired, find a cool place nearby, have a cool drink and rest for 10 minutes, or more if necessary.

3. Remember that alcohol consumption might affect body's ability to deal with heat stress.

4. Wear a hat and light-colored clothes to minimize heat absorption.

WHAT TO DO WHEN SOMEONE DEVELOPS SYMPTOMS OF THE STRESS:

HEATSTROKE

Symptoms: hot dry skin; mental confusion; loss of consciousness; convulsions

First Aid: Immediate and rapid cooling by immersion in chilled water with massage, or by wrapping in wet sheet with vigorous fanning with cool dry air. Avoid overcooling. Call 911.

HEAT EXHAUSTION

Symptoms: fatigue; nausea; headache; giddiness; clammy and moist skin; faint on standing, with rapid thready pulse and low blood pressure

First Aid: Remove to cooler environment. Administer salted fluids by mouth. Keep at rest. Call to 911 may be necessary.

HEAT CRAMPS

Symptoms: Painful spasms of muscles

First Aid: Salted liquids by mouth. Call to 911 may be necessary.

HEAT RUSH

Symptoms: Profuse tiny raised vesicles on affected areas

Treatment: Mild drying lotions. Skin cleanliness to prevent infection.

CONTINGENCY PLAN AND EMERGENCY CONTACTS

Chemical and physical hazards will exist at the Minami Nursery gasoline contamination remediation site at various times during the project. Chemical hazards will occur in the form of possible exposure to gasoline. Repeated or prolonged dermal exposure can cause dermatitis and

blistering of skin. Inhalation and oral routes cause CNS depression. Pulmonary aspiration can cause severe pneumonitis. Some addiction has been reported to inhalation of fumes. Even brief inhalation of high concentrations can cause a fatal pulmonary edema. It can cause hyperemia of the conjunctiva and other disturbances of the eyes. Gasoline can be dangerous when exposed to heat or flame. Protective devices and clothing may be required for all personnel at the site.

General Health and Safety Procedures

All personnel going on-site must be thoroughly briefed on anticipated hazards and trained on equipment to be worn, safety practices, emergency procedures, and communications.

The safety practices listed below must be followed:

- All respirator users must be medically cleared.
- Any required respiratory protective devices and clothing must be worn by all personnel going into areas designated for wearing protective equipment.
- Personnel must be fit-tested prior to use of respirators.
- No facial hair which interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators.
- No contact lenses shall be worn on site.
- Contact with contaminated or suspected surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces; or lean, sit, or place equipment on drums, containers, or on soil suspected of being contaminated.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer

and ingestion of material is prohibited in any area designated as contaminated.

- Personnel should practice unfamiliar operations prior to doing the actual procedure in the field.

- Field crew members shall be familiar with the physical characteristics of the site, including:

  - wind direction in relation to contamination zones (wind indicators visible to all on-site personnel should be provided to indicate possible routes of upwind escape);

  - accessibility to associates, equipment, and vehicles;

  - communications;

  - exclusion zones;

  - site access; and

  - nearest water sources.

- Personnel on-site must use the buddy system (pairs), when wearing respiratory protective equipment. As a minimum, a third person, suitably equipped as a safety backup, is required during initial entries. Buddies should pre-arrange hand signals or other means of emergency signaling for communication in case of lack of radios or radio breakdown (see the General Emergency Procedures).

- Visual contact must be maintained between pairs on-site and site safety personnel. Entry team members should remain close together to assist each other in case of emergencies.

- All field crew members should make use of their senses to alert themselves to potentially dangerous situations which they should avoid, e.g., presence of strong and irritating or nauseating odors. However, they should never rely upon the sensory information as the basis for safety decision-making.

- Personnel and equipment in the contaminated area should be kept to a minimum, consistent with effective site operations.

- Procedures for leaving a contaminated area must be planned and implemented prior to going on-site in accordance with the site specific health and safety plan.

- Hands and face must be thoroughly washed upon leaving the work area.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescription drugs should not be taken by personnel on response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake should be avoided during response operations.

An on-site orientation session will be required for all on-site personnel and will include the following:

- Health effects and hazards of the chemicals identified or suspected to be on-site.

- Personal protection including:

  - Use, care, and fitting of personal protection equipment; and

  - Necessity for personal protection, its effectiveness, and limitations of equipment.

- Decontamination procedures.

- Any prohibitions in areas and zones, including:

  - Site layout;

- Procedures for entry and exit of areas and zones; and

- Standard safe work practices.

- Emergency procedures, including:

  - Emergency contacts;

  - Instructions for implementing the emergency plan; and

  - Location of emergency equipment.

Additionally, routine health and safety meetings shall be held at the discretion of the project manager or project health and safety officer. As part of the general safety training program, ES employees participate in Red Cross First Aid and CPR courses to more effectively handle physical and medical emergencies that may arise in the field. In addition, all subcontractors hired by ES are required to have the federally mandated 40-hour Hazardous Waste Operations Instruction as well as a medical monitoring program.

Emergency Conditions

All hazardous waste site activities present a degree of risk to on-site personnel. During routine operations, risk is minimized by establishing good work practices, staying alert, and using proper personnel protective equipment. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site; or

- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

General Emergency Procedures

The following emergency procedures should be followed:

- **In the event of emergency, the contacts identified in the following section shall be notified. This list should be posted conspicuously at the site.**

- **In emergencies, the following hand signals by field workers are suggested:**

  - **Hand gripping throat: out of air, can't breath.**

  - **Grip partner's wrist or place both hands around waist: leave area immediately, no debate!**

  - **Hands on top of head: need assistance.**

  - **Thumbs up: OK, I'm all right, I understand.**

  - **Thumbs down: No, negative.**

- **In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew should immediately halt work and act according to the instructions provided by the project manager.**

- **The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.**

- **In the event that an accident occurs, the project manager is to complete an Accident Report Form. Follow-up action should be taken to correct the situation that caused the accident.**

Chemical Exposure

If any field crew demonstrates symptoms of chemical exposure the following procedures apply. At sites where two or more field crew are involved another team member (buddy) should remove the individual from

the immediate area of contamination. At all sites not matter how many personnel are involved these procedures must be followed:

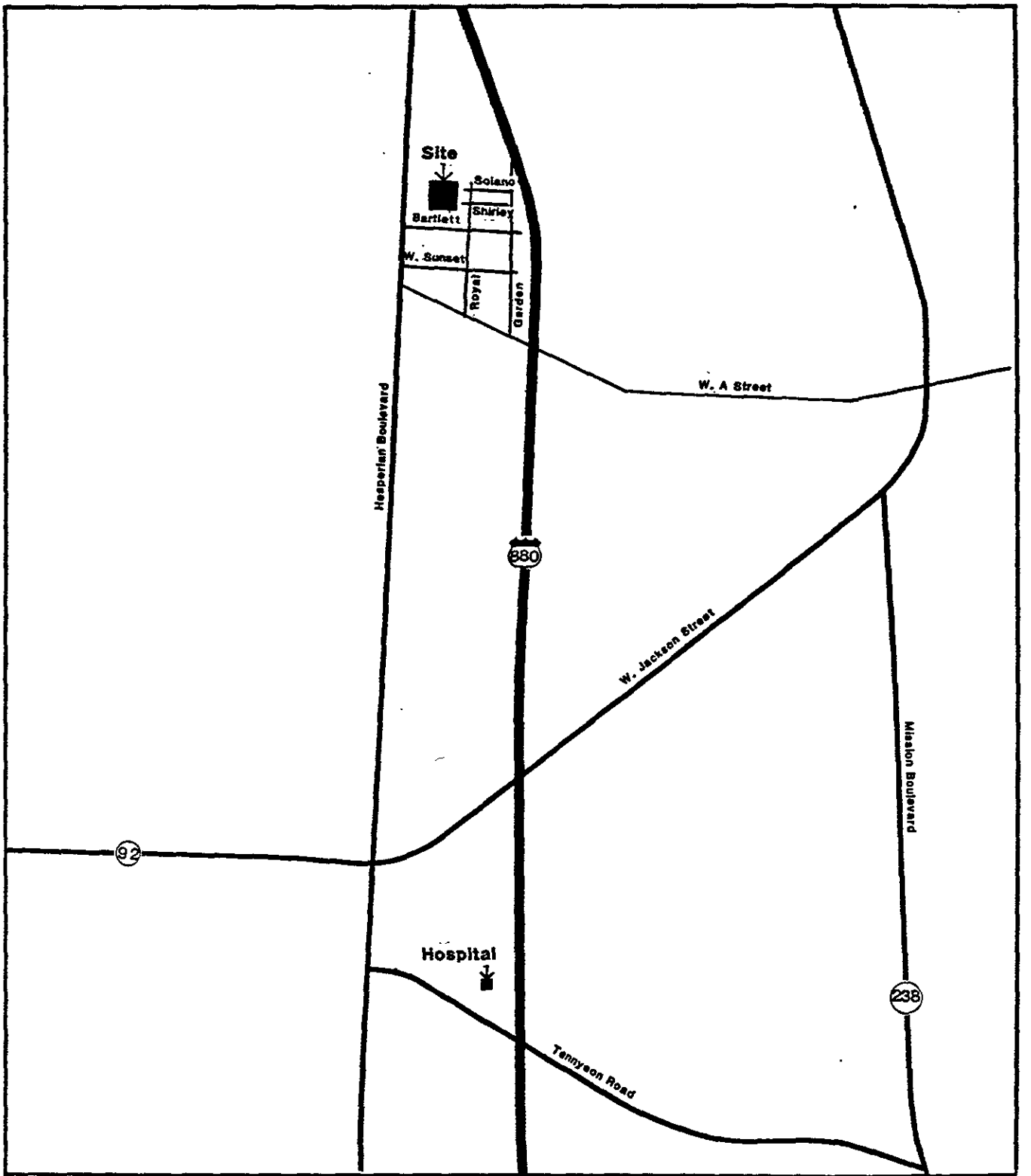
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the clothing should be removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water, preferably under a shower.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.
- If necessary, the victim should be transported to the nearest hospital or medical center. An ambulance should be called to transport the victim, if necessary.
- All chemical exposure incidents must be reported in writing.

Personal Injury

In case of personal injury at the site, the following procedures are to be followed:

- Field team members trained in first aid should administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center. If necessary, an ambulance should be called to transport the victim.
- The project manager is responsible for making certain that an accident report form is completed. This form is to be submitted to the office health and safety representative. Follow-up

FIGURE 4



HOSPITAL LOCATION
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA

action should be taken to correct the situation that caused the accident.

LEVELS OF PERSONNEL PROTECTION REQUIRED FOR SITE ACTIVITIES

Personnel protective equipment, divided into respiratory and dermal protection categories, is described below. All site activities will initially require use of respiratory and dermal protection level D. However, the actual protection levels appropriate for the activity will depend on air monitoring measurements and field conditions. Contingencies for use of dermal protection level C and respiratory protection levels B and C will be provided for soil sampling activities.

Respiratory Protection

The appropriate levels of respiratory protection for site activities depend upon air monitoring measurements. Selection of respiratory protection will be based on the following tables. In the event that the two monitoring systems indicate the need for different levels of respiratory protection, the most conservative protection level will be used.

Air Monitoring Procedures

Air monitoring during site work will include: monitoring for general organic vapors using a Thermo Environmental Organic Vapor Monitor (OVM) - Photoionization Detector (PID), and for benzene using Sensidyne colorimetric indictor tubes.

Air monitoring will be conducted for organic vapors and benzene dependent on the level of activity and likelihood of vapor generation during the soil remediation activity. As a minimum, PID and benzene readings will be taken according to the following schedule:

1. At the remediation site prior to moving any soil to obtain baseline OVM and benzene reading.

2. During soil moving procedures.

3. During daily disking.

4. If fugitive vapors can be detected by smell.

5. If other site specific conditions exist that warrant additional monitoring.

Refer to the following tables of Respiratory Protection Levels for Benzene and Total Organic Vapors to obtain information concerning necessary respiratory protection that will be required for various levels of these contaminants if found in air.

Respiratory Protection Levels

Level D Operations

- No respiratory protection

Level C Operations

- Full-face air purifying respirator equipped with organic vapor canister or cartridges (NIOSH approved) with HEPA filter.

Dermal Protection

The level of dermal protection required depends upon the nature of the site activities. Selection of dermal protection shall be made according to need, based on the information shown in Tables 3 and 4.

TABLE 2

AIRBORNE CONCENTRATION OF BENZENE AND SUBSEQUENT RESPIRATORY PROTECTION

Airborne Concentration of Benzene	Respiratory Protection
<1 ppm	No protection needed
>1 ppm to <50 ppm	Full facepiece respirator with organic vapor cartridges

TABLE 3

AIRBORNE CONCENTRATION OF TOTAL ORGANIC VAPORS AND SUBSEQUENT RESPIRATORY PROTECTION

Airborne Concentration of Total Organic Vapors	Respiratory Protection
Background levels	Level D
0 ppm to 14 ppm (The NTIS recommended TWA/action level for kerosene)	Level D
>14 ppm but less than 70 ppm	Level C

Dermal Protection Levels

Level D Operations

This level of protective clothing will be worn where work functions preclude potential for splashes or immersion.

Excavation and Drilling Activities; Soil Sampling

- Hard Hat
- Safety glasses or goggles
- Neoprene Rubber Boots, steel toe and shank
- Coveralls
- Neoprene work gloves

Groundwater Sampling

- Safety glasses or goggles
- Neoprene Rubber Boots
- Coveralls
- Neoprene work gloves

Level C Operations

This level of protective clothing will be worn where liquid splashes or other direct contact will not adversely affect or be absorbed through any exposed skin.

Excavation and Drilling Activities; Soil Sampling

- **Hard Hat**
- **Safety glasses or goggles if a full face respirator is not required.**
- **Neoprene Rubber Boots, steel toe and shank**
- **Coveralls**
- **Saranex or tyvex coated with saranex suit (over coveralls)**
- **Neoprene gloves**
- **Inner gloves**

Groundwater Sampling

- **Safety glasses or goggles if a full face respirator is not required**
- **Neoprene Rubber Boots**
- **Coveralls**
- **Saranex or tyvex coated with saranex suit (over coveralls)**
- **Neoprene Gloves**
- **Inner Gloves**

All hard hats, safety eye wear, and foot wear must meet applicable OSHA standards. These requirements can be found in OSHA General Industry Standards, 24 CFR 1910. The manufacturer should specify if their product meets this criteria.

Note: Latex gloves are relatively permeable to leaded and unleaded gasolines. These gloves can only be used as inner gloves and not the sole source of hand protection.

AIR MONITORING PROCEDURES

Air monitoring will be used to identify and quantify airborne levels of hazardous substances.

Organic Vapors

General monitoring for organic vapors will be conducted using an OVM. The OVM will be calibrated for prior to use according to the manufacturers specifications. Specific air monitoring will be done for benzene because of its high health hazard and low PEL compared to other chemicals likely to be present on site. Benzene monitoring will be performed using a sensidyne colorimetric gas detector pump with benzene tubes. All respiratory protection air monitoring will be done in the breathing zone during sampling activities. See Tables 3 and 4 for airborne concentrations of potential air contaminants that warrant different levels of respiratory protection.

SITE CONTROL MEASURES

During site activities, control boundaries delineating the exclusion zone (contaminated area) contamination reduction zone and the support zone (clean area) will be established if needed. Control boundaries will be identified by boundary tape. The location of the boundaries will be determined daily at the site dependent upon actual wind direction.

DECONTAMINATION PROCEDURES

Activities at these sites will be of short to moderate duration and exposure to these petro-chemicals should be minimal if proper precautions are followed. Simple and expedient decontamination procedures, appropriate to the site and work conditions will be followed.

The only anticipated decontamination of personal protective gear will be the cleaning of rubber gloves and boots with an alconox solution and D.I. water rinse. Equipment decontamination will consist of washing any hammers, shovels, etc. with Tri Sodium Phosphate and D.I. water rinse between each sample point.

APPENDIX A

FORMS

PROJECT HEALTH AND SAFETY PLAN ACCEPTANCE FORM

I have read and agree to abide by the contents of the
Health and Safety Plan
for
Gasoline Contamination Remediation
at

Former Minami Nursery Site
600 Shirley Avenue
Hayward, California

_____ _____

Signature Company

_____

Name (please print)

_____

Date

Return to: Yoko Crume, Ph.D.
Office Health and Safety Representative
Engineering-Science, Inc., Berkeley

I28-31.R9 10/5/89

ES ENGINEERING-SCIENCE COMPANIES

ACCIDENT REPORT FORM

Project: _____

EMPLOYER

1. Name: _____

2. Mail Address: _____
(No. and Street) (City or Town) (State)

3. Location, if different from mail address: _____

_____

INJURED OR ILL EMPLOYEE

4. Name: _____ Social Security Number: _____
(First) (Middle) (Last)

5. Home Address: _____
(No. and Street) (City or Town) (State)

6. Age: _____ 7. Sex: Male ( ) Female ( )

8. Occupation: _____
(Specific job title, not the specific activity employee was performing at time of injury)

9. Department: _____
(Enter name of department in which injured persons is employed, even though they may have been temporarily working in another department at the time of injury)

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

10. Place of accident of exposure: _____
(No. and Street) (City or Town) (State)

11. Was place of accident or exposure on employer's premises? Yes ( ) No ( )

12. What was the employee doing when injured? _____
(Be specific - Was employee

_____
using tools or equipment or handling material?)

_____

13. How did the accident occur? _____
(Describe fully the events that resulted in the injury or occupational illness. Tell what happened and how. Name objects and substances involved. Give details on all factors that led to accident. Use separate sheet for additional space.)

14. Time of accident: _____

15. ES WITNESS TO ACCIDENT _____ (Name) (Affiliation) (Phone No.)

_____ (Name) (Affiliation) (Phone No.)

_____ (Name) (Affiliation) (Phone No.)

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

16. Describe injury or illness in detail; indicate part of body affected:

_____

_____

17. Name the object or substance that directly injured the employee. (For example, object that struck employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.).

_____

_____

18. Date of injury or initial diagnosis of occupational illness _____ (Date)

19. Did the accident result in employee fatality? Yes ( ) No ( )

OTHER

20. Name and address of physician _____

_____

21. If hospitalized, name and address of hospital _____

_____

Date of report _____ Prepared by _____

Official position _____

APPENDIX B

ANNUAL MEDICAL EXAMINATION

APPENDIX B

ANNUAL MEDICAL EXAMINATION

Each ES employee's annual medical examination will involve compiling an interval medical history and undergoing a thorough medical examination as outlined below.

INTERVAL MEDICAL HISTORY

Interval medical history will be performed focusing on changes in health status, illnesses, and possible work-related symptoms. The worker will provide the examining physician with information about the worker's interval exposure history, including exposure monitoring results (if performed).

PHYSICAL EXAMINATION

- Height, weight, temperature, pulse, respiration , and blood pressure.
- Head, nose, throat.
- Vision tests that measure refraction, depth perception, and color vision.
- Chest (heart and lungs).
- Peripheral vascular system.
- Abdomen and rectum (including hernia exam).
- Spine and other components of the musculoskeletal system.
- Genitourinary system.
- Skin.
- Nervous system.
- Blood test.
- Urine test.

ADDITIONAL TESTS

Additional medical testing may be performed, depending on available exposure information, medical history, and examination results. Testing should be specific for the possible medical effects of the worker's exposure. Multiple testing for a large range of potential exposures is not always useful; it may involve invasive procedures (e.g.. tissue biopsy), be expensive, and may produce false-positive results.

Pulmonary Function

Pulmonary function test should be administered if the individual uses a respirator, has been or may be exposed to irritating or toxic substances, or if the individual has breathing difficulties, especially when wearing a respirator.

Audiometric Tests

Annual retest are required for personnel subject to high noise exposers (an 8-hour, time-weighted average of 85 dBA or more), those required to wear hearing protection, or as otherwise indicated.

Electrocardiogram

An electrocardiogram (EKG) will be performed annually for those over 40 and every three years for all others. The EKG will be the standard 12- lead resting type.

Chest X-Rays

Chest X-rays will be performed when clinically indicated or every three years. The x-ray should be at least 14 by 17 -inch P-A (posterior/anterior).

Blood and Urine Test

Blood and urine test frequently performed by occupational physicians include:

Blood Test

- Complete blood count with differential and platelet evaluation
- White cell count
- Red Blood cell count
- Hemoglobin
- Hematocrit
- Reticuloyte count
- Total protein
- Albumin
- Globulin
- Total bilirubin
- Alkaline phosphatase
- Gamma glutamyl transpeptidase (GGTP)

- Lactic dehydrogenase (LDH)
- Serum glutimigoxaloetic transaminase (SGOT)
- Serum glutamic-pyruvic transaminase (SGPT)
- Blood urea nitrogen (BUN)
- Creatinine
- Uric Acid

Urinalysis

- Color
- Specific gravity
- pH
- Qualitative glucose
- Protein
- Bile
- Acetone
- Microscopic examination of centrifuged sediments

APPENDIX C

CHEMICAL HAZARDS

PETROLEUM HYDROCARBONS

Petroleum hydrocarbons are family of petroleum based compounds consisting of carbon and hydrogen. A wide variety of branched, straight-chain and ringed structures is possible given the nature of the way carbon bonds to itself and hydrogen. Petroleum hydrocarbons exist as solids, liquids and gasses. Some common liquid petroleum hydrocarbons include: gasoline, diesel fuel, fuel oil, jet fuel, and kerosene. These liquids are complex mixtures containing numerous species of hydrocarbon. The toxicity and environmental behavior of these fuel mixtures, and any additives, depends on the mixture constituents. Gasoline, for instance, is a mixture containing approximately 150 different hydrocarbon species, several elements (in small concentrations), and fuel additives such as: ethylene dibromide, ethylene dichloride, tetramethyl lead, and tetraethyl lead. The constituent of most concern in these fuels is benzene, a known human carcinogen, which may consist of up to 5% of the total volume in gasoline. The main routes of exposure to petroleum hydrocarbons are inhalation and skin absorption. Another major hazard to consider in dealing with petroleum hydrocarbon fuels is fire and explosion. If gasoline vapors reach 1.4 to 7.6% in air, a violent exlosion may occur in the presence of an ignition source. Acute exposure to petroleum hydrocarbons primarily cause Central Nervous System (CNS) effects such as: headache, dizziness, weakness and loss of coordination, loss of consciousness and death. Chronic exposure to petroleum hydrocarbon may cause: skin drying and irritation upon repeated skin expousre, cancer, peripheral neuropathy, and decreased immunologic response. These health effects are highly dependent upon exposure concentration and duration. Personal protection against exposure to petroleum hydrocarbon fuels would include primarily respiratory and dermal protection. The Occupational Safety and Health Administration (OSHA) has set limits for exposure to many of the constituents of petroleum hydrocarbon fuels. Below is a table which descibes the OSHA exposure limits (PEL's) and ACGIH (TLV's) for some petroleum hydrocarbon constituents.

COMPOUND	ABREVIATION	PEL/TLV	CARC./REP.HAZARD
Gasoline		/300	yes/no
Benzene	C_6H_6	1.0/10.0	yes/no
Toluene	$C_6H_5CH_3$	200/100	no/no
Xylene	$C_6H_5(CH_3)_2$	100/100	no/no
Tetraethyl Lead	TEL	0.075/0.1	no/no
Tetremethyl Lead	TML	0.075/0.15	no/no
Ethylene Dibromide	EDB	20/0.045	yes/no

Note: PEL/TLV expressed as parts per million (ppm) except for TEL and TML which are expressed as mg/m_3.