*Workplan for Preliminary Site Assessment at*

# FORMER MINAMI NURSERY SITE

## 600 SHIRLEY, HAYWARD, CALIFORNIA

*Prepared For*

**Mr. George Minami, Sr., Ms. Janet Minami Mitobe**
**The Estate of Mr. George Minami, Jr.**
**C/O Mr. Jay Woidtke, Esq.**
**20320 Redwood Road**
**Castro Valley, California 94546**

**October 1993**

*Prepared by*


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*Nc414 02/43-26*

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18 October 1993
Ref: NC433.02

Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

Attention: Ms. Juliet Shin

Subject: Former Minami Nursery Site, 600 Shirley Avenue, Hayward, California

Dear Ms. Shin:

Attached is the workplan for the Preliminary Site Assessment (PSA) Investigation concerning the former Minami Nursery Site, 600 Shirley Avenue, Hayward, California. The Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Materials Division (ACHCSA) requested preparation of this workplan in a letter to Mr. Jay Woidtke, Esq., the executor of the estate of Mr. George Minami, Jr., dated 18 August 1993.

This workplan has been prepared according to guidelines in the California Regional Water Quality Control Board (RWQCB) "Staff Recommendations for the Initial Evaluation and Investigation of Underground Tanks, Appendix A - Workplan for Initial Subsurface Investigation" dated 20 August 1991. Elements of this workplan include sampling of the stockpiled contaminated soil, sampling of shallow subsurface soil to evaluate potential migration from the soil stockpiles, evaluation of groundwater flow direction and quality and report preparations.

We look forward to your favorable review of this workplan. Should you require any additional information and/or clarifications, please call.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Neal Siler
Project Manager

REGISTERED GEOLOGIST
FREDERICK T STANIN
No 5248
Exp 6/94
STATE OF CALIFORNIA

Frederick T Stanin, R. G.
Principal Geologist

NS/ic/47-51L R1

Attachment

cc: Mr. J. Woidtke, Esq.

*Workplan for Preliminary Site Assessment at*

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# WORKPLAN FOR PRELIMINARY SITE ASSESSMENT AT

# FORMER MINAMI NURSERY SITE

## INTRODUCTION

This workplan describes the purpose, objectives, tasks and methods for conducting proposed Preliminary Site Assessment (PSA) activities at the former Minami Nursery Site, 600 Shirley Avenue, Hayward, California. The proposed work addresses total petroleum hydrocarbon (TPH) contamination associated with leaking underground storage tanks (USTs). Preparation of this workplan was requested by the Alameda County Health Care Services, Department of Environmental Health (ACHCSA) in a letter dated 18 August 1993.

This workplan has been prepared in accordance with the suggested reporting format outlined by the California Regional Water Control Board (RWQCB) for investigating leakage from underground fuel storage tanks (UFSTs) (RWQCB 19990a, 1990b). The proposed work included in this workplan follows guidelines set forth in the Leaking Underground Fuel Tank (LUFT) Field Manual - Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure (State of California LUFT Task Force 1989), the Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites (RWQCB 1990a) and the Draft Scientific and Technical Standards for Hazardous Waste Sites, Volume 1: Site Characterization (California Department of Health Services 1990).

## PURPOSE AND SCOPE OF WORK

The purpose of this investigation is to assess disposal options for contaminated soil stockpiled on the site, to evaluate the potential for environmental contamination associated with the stockpiled soil, and to characterize the lateral extent of groundwater contamination associated with the site UFSTs. This will be accomplished by implementing the following scope of work:

- Interaction with regulatory agencies and permit acquisition
- Sampling of stockpiled contaminated soil
- Advancement of soil borings and collection of subsurface soil samples
- Installation of groundwater monitoring wells
- Initiation of a quarterly groundwater monitoring program
- Preparation of a PSA Report and Quarterly Groundwater Monitoring Reports

## SITE DESCRIPTION

### General

The former Minami Nursery Site is currently located on Penny Lane, Hayward, California. The original address of the site was 600 Shirley Avenue, Hayward, California (Figures 1, 2 and 3). The current status of the site is displayed on Figure 4.

The roughly rectangular shaped site has dimensions of 160 by 127 feet and covers an area of approximately 20,300 square feet. It is bounded on the north and east by residential development, on the south by Penny Lane and the residential development and on the west by commercial developments (Figure 3).

Originally, three UFSTs (Tank 1 - gasoline storage, Tanks 2 and 3 - fuel oil storage) were present on the site (Figure 2). Reportedly, the gasoline tank was inactive for approximately 10 years prior to the original site characterization activities and the fuel oil storage tanks were inactive for between 20 and 30 years prior to the original site characterizaton activities (Emcon Associated 1988). Prior to remedial actions performed by Engineering-Science, Inc. (1990), Tank 3 was removed from the site. Activities performed, samples collected and analytical results and the removal and disposal fate of Tank 3 are not known. Tanks 1 and 2 were removed by ES in 1989 (ES 1990).

### Geology and Hydrogeology

The former Minami Nursery Site is located in the East Bay Plain Area (ACFCWCD 1988). Hydrogeologic units in the East Bay Plain area can be classified into two general groups: consolidated and unconsolidated. The consolidated units are referred to as the undivided bedrock units and were deposited as marine sedimentary and volcanic rocks during the Mesozoic and Cenozoic Eras. These units reach thicknesses of up to 10,000 feet. The undivided bedrock units lie east of the Hayward Fault and beneath the unconsolidated deposits and form the boundaries of the East Bay Plain aquifer system (ACFCWCD 1988).

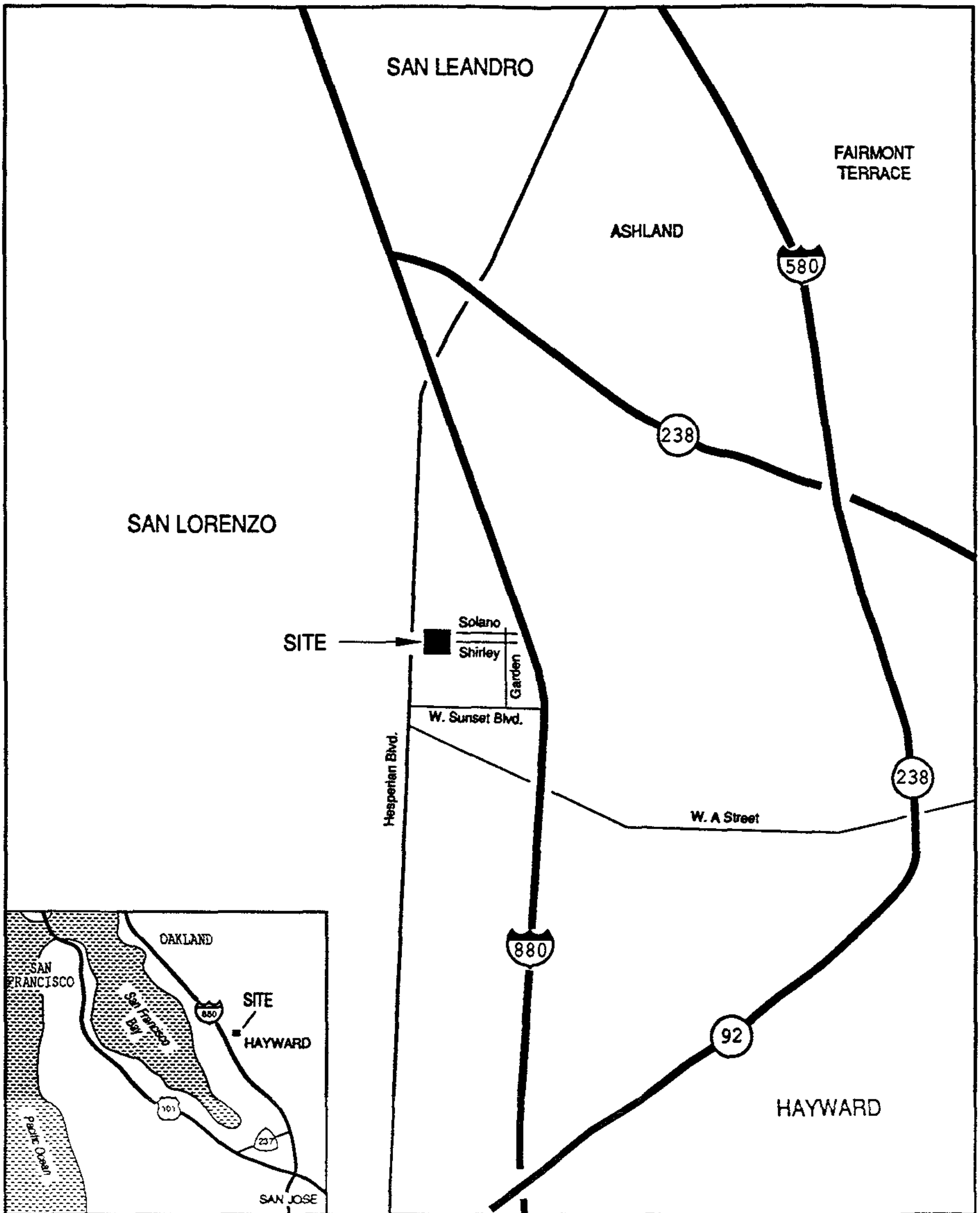
The unconsolidated units make up the groundwater reservoir of the East Bay Plain area and include the older alluvium, bay mud, interfluvial basin deposits, fluvial deposits and younger alluvium. These deposits were laid down in a valley that was formed during the Pliocene/Pliestocene epochs by the depression of a large block of land west of the Hayward Fault. Groundwater conditions in the East Bay Plain area range from unconfined to confined, with confined predominating (ACFCWCD 1988). Under natural conditions, groundwater flows to the west and southwest from recharge along the Hayward Fault toward and under San Francisco Bay.

## PREVIOUS SITE INVESTIGATIONS AND REMEDIAL ACTIONS

### Previous Site Investigations

A limited subsurface investigation was performed at the site in 1988 (Emcon Associates, 1988). A total of 21 soil borings (T1-1 through T1-18, T2-1, T2-2 and T3-1) were advanced for this investigation. Locations of the soil borings are indicated on Figures 5 and 6. The purpose of the soil boring program was to evaluate potential adverse environmental impacts at the site due to historic underground fuel tank practices and to characterize the extent and magnitude of any

FIGURE 1




SITE LOCATION MAP
MINAMI NURSERY PROPERTY
Hayward, California

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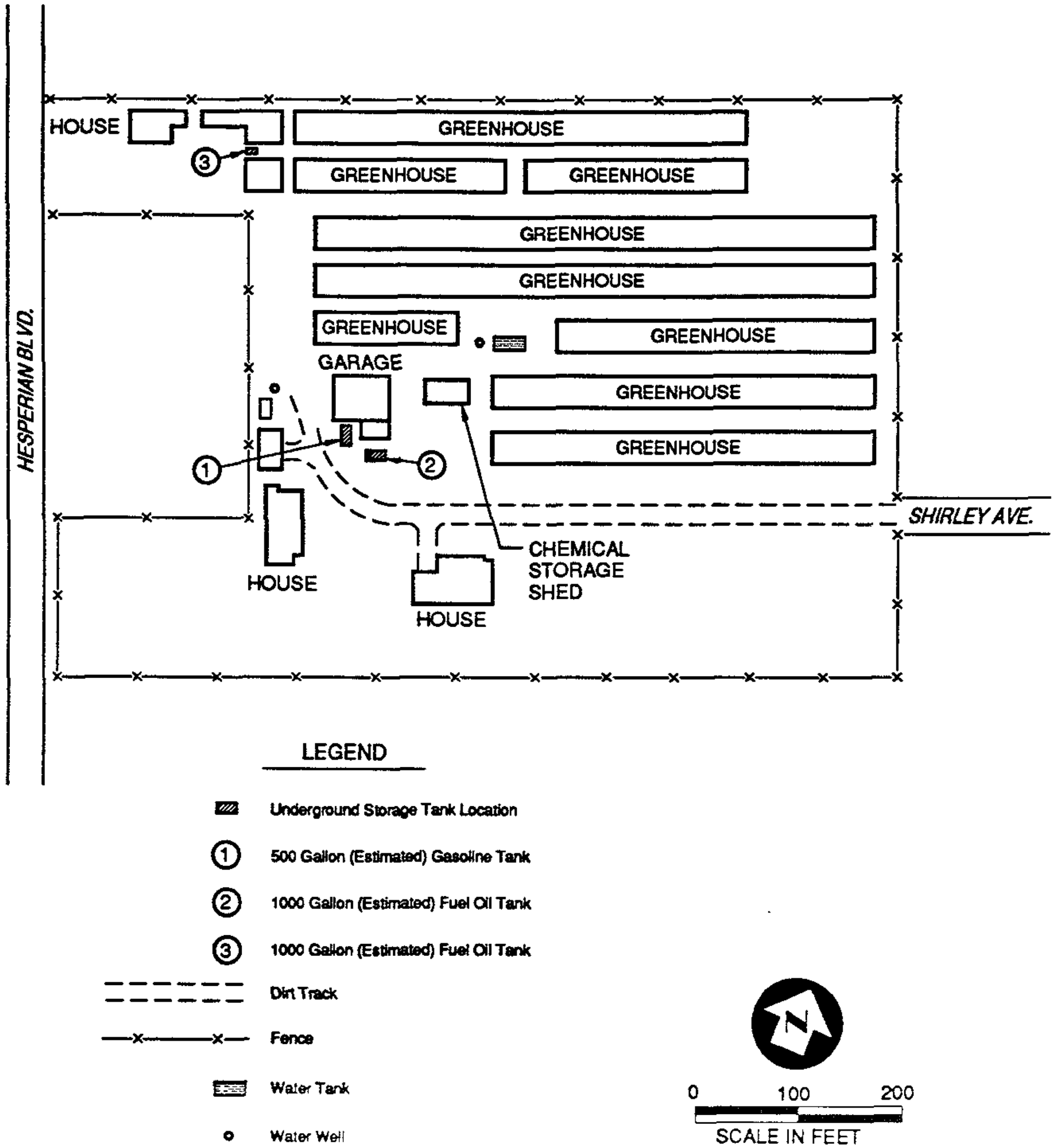


PRE-DEVELOPMENT SITE PLAN
MINAMI NURSERY PROPERTY

Hayward, California

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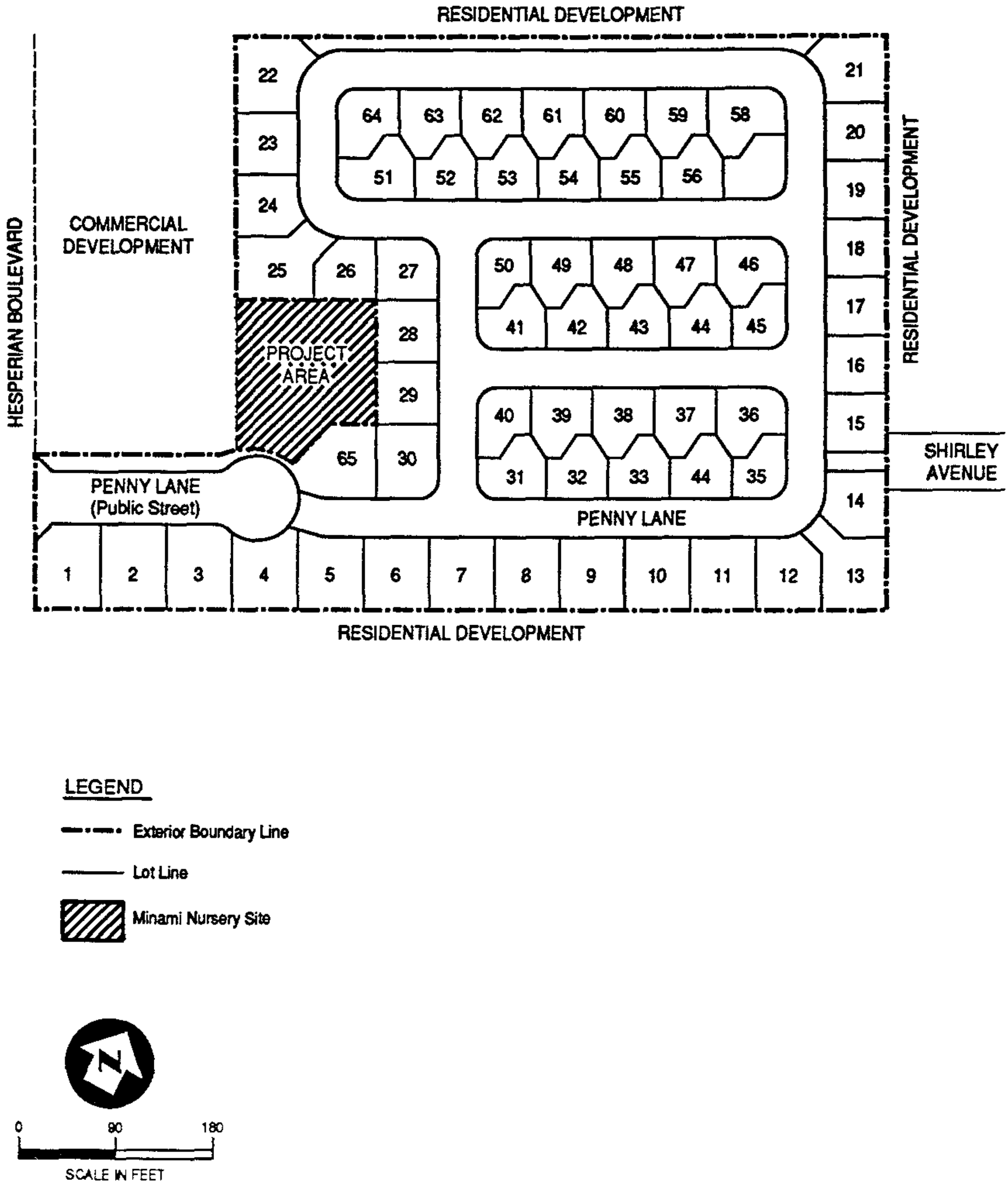
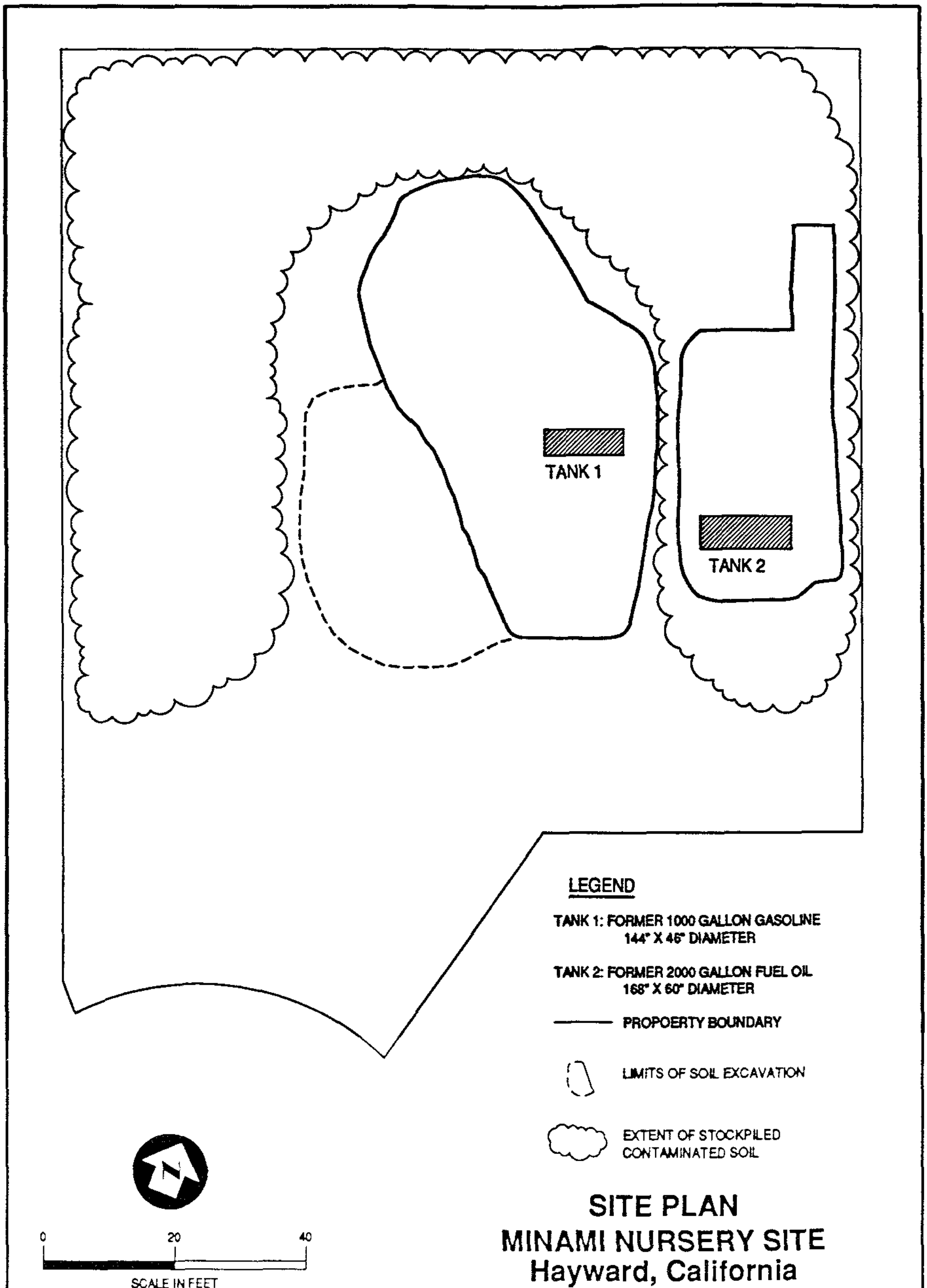
FIGURE 3




POST-REDEVELOPMENT SITE PLAN
MINAMI NURSERY PROPERTY
Hayward, California

FIGURE 4




**SITE PLAN**
**MINAMI NURSERY SITE**
**Hayward, California**

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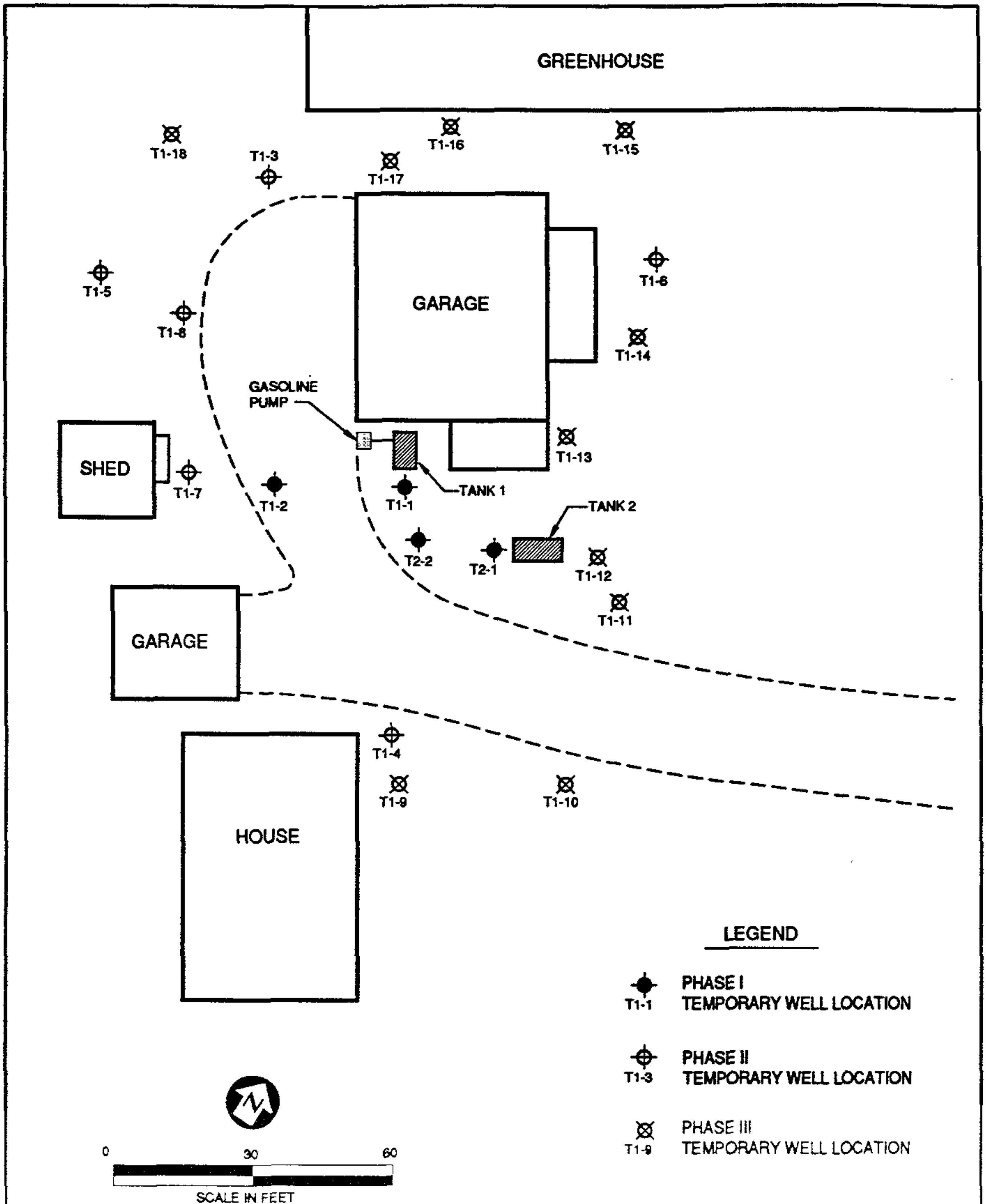
contamination detected. This field investigation was performed in three phases during August and September 1988. The location of the Phase I, II and III field activities are displayed on Figures 5 and 6. The field activities performed during the three field investigation phases are described below:

- Phase I: Five soil borings (T1-1, T1-2, T2-1, T2-2 and T3-1) were advanced during this phase. The purpose of this portion of the investigation was to collect subsurface soil and water samples to evaluate the potential for on-site soil and/or groundwater contamination as a result of leakage from the three underground fuel tanks. Analytical results indicated that both soil and groundwater were contaminated in the vicinity of Tanks 1 and 2 (Figure 5). No evidence of contamination was detected in soil and/or groundwater samples collected in the vicinity of Tank 3 (Figure 6). Table 1 contains analytical results for the soil samples collected, whereas Table 2 presents analytical results for groundwater samples collected.
- Phase II: Phase II was implemented because Phase I analytical results indicated that both soil and groundwater had been contaminated. Six additional soil borings (T1-3 through T1-8) were advanced to evaluate the lateral extent of groundwater contamination in the vicinity of Tank 1 (Figure 5). Analytical results for the Phase II investigation are summarized in Table 3.
- Phase III: Ten additional soil borings (T1-9 through T1-18) were advanced to further characterize the lateral extent of groundwater contamination. Analytical results (Table 4) suggested that groundwater contamination was limited to the confines of the site (Figure 5).

**Remedial Activities**

Between 6 November 1989 and 22 March 1990, remediation of two underground fuel storage tanks (UFSTs), a 1,000-gallon gasoline tank and a 2,000-gallon fuel oil tank, was implemented at the Minami Nursery Site, 600 Shirley Avenue, Hayward, California (Figures 4 and 7). Remediation work performed included: excavation and removal of the UFSTs, transport and disposal of the UFSTs, excavation and stockpiling of associated contaminated soil, and backfilling of the excavations (ES 1990).

Remediation activities followed regulatory agency guidelines and protocols. Before the implementation of remediation activities, an underground tank closure/modification plan was presented to and approved by the Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Materials Division (ACHCSA), the lead regulatory agency. In addition, the Eden Consolidated Fire Protection District (ECFPD) and the Bay Area Air Quality Management District (BAAQMD) were notified of the work via permit applications. Representatives of the ACHCSA and the ECFPD witnessed remediation activities (tank removal, soil excavation/stockpiling) performed at the site.




**LOCATION OF TANK 1 AND 2 FIELD INVESTIGATIONS**
**MINAMI NURSERY SITE**
**Hayward, California**

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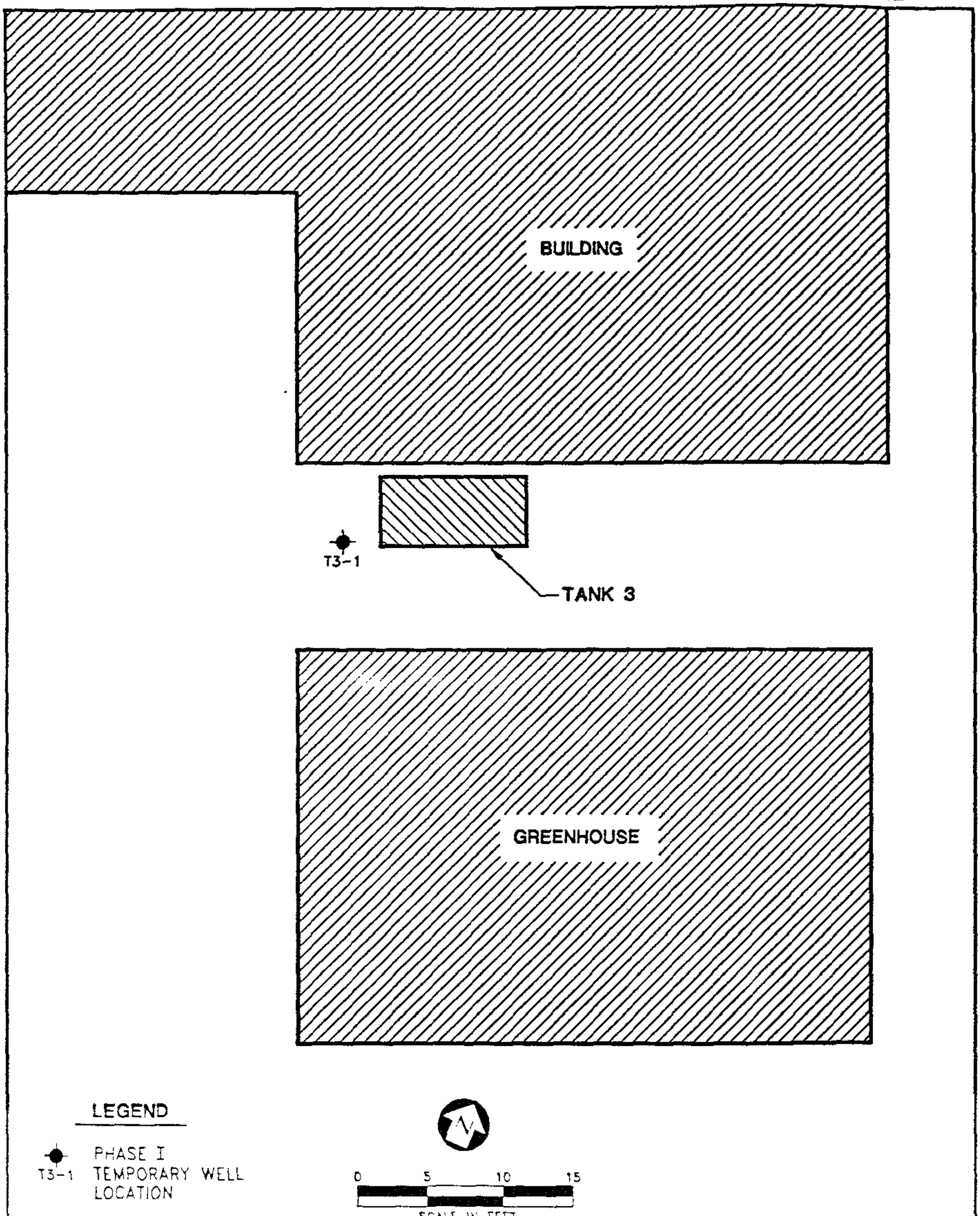
FIGURE 6




LOCATION OF TANK 3 FIELD INVESTIGATIONS
MINAMI NURSERY SITE
Hayward, California

## TABLE 1

## PHASE I ANALYTICAL RESULTS
## SOIL SAMPLES
## MINAMI NURSERY SITE, HAYWARD, CALIFORNIA

| Sample ID | Sample Depth[2] | Analytical Parameter[1] TPH | TOG |
|---|---|---|---|
| T1-1 | 6.0 | ND | NA |
| | 9.5 | 10,000 | NA |
| | 14.5 | 4,400 | NA |
| T1-2 | 13.0 | ND | NA |
| T2-1 | 9.5 | NA | 47 |
| | 13.5 | NA | 33 |
| T2-2 | 9.5 | NA | ND |
| | 14.0 | NA | ND |
| T3-1 | 6.5 | NA | ND |
| | 9.5 | NA | ND |
| | 14.5 | NA | ND |

1 = Reported in mg/Kg (ppm)
2 = Reported in feet below ground surface
NA = Not Analyzed
ND = Not Detected
TPH = Total Petroleum Hydrocarbons as Gasoline
TOG = Total Oil and Grease

## TABLE 2

## PHASE I ANALYTICAL RESULTS
## GROUNDWATER SAMPLES
## MINAMI NURSERY SITE, HAYWARD

| Sample ID | Analytical Parameter[1] | | | | |
|---|---|---|---|---|---|
| | TPH | BEN | TOL | XYL | ETB |
| T1-1 | 250,000 | 2,200 | 16,000 | 28,000 | 5,300 |
| T1-2 | 4,800 | 32 | 14 | 550 | 200 |
| T2-1 | 250 | 1 | 13 | 32 | 5 |
| T2-2 | 270 | 0.9 | 8 | 27 | 4 |
| T3-1 | ND | ND | ND | ND | ND |

1 = Reported in ug/L (ppb)
ND = Not Detected
Chemical Contaminant Key:
BEN = Benzene; ETB = Ethylbenzene; TOL = Toluene; TPH = Total Petroleum Hydrocarbons;
XYL = Total Xylenes

## TABLE 3

## PHASE II ANALYTICAL RESULTS
## GROUNDWATER SAMPLES
## MINAMI NURSERY SITE, HAYWARD

| Sample ID | Analytical Parameter[1] | | | | |
|---|---|---|---|---|---|
| | TPH | BEN | TOL | XYL | ETB |
| T1-3 | ND | ND | ND | ND | ND |
| T1-4 | ND | ND | ND | ND | ND |
| T1-5 | ND | ND | ND | ND | ND |
| T1-6 | ND | ND | ND | ND | ND |
| T1-7 | ND | ND | ND | ND | ND |
| T1-8 | ND | 1.4 | ND | ND | ND |

1 = Reported in ug/L (ppb)
ND = Not Detected

Chemical Contaminant Key
BEN = Benzene, ETB = Ethylbenzene, TOL = Toluene, TPH = Total Petroleum Hydrocarbons,
XYL = Total Xylenes

## TABLE 4

### PHASE III ANALYTICAL RESULTS
### GROUNDWATER SAMPLES
### MINAMI NURSERY SITE, HAYWARD

| Sample ID | Analytical Parameter[1] | | | | |
|---|---|---|---|---|---|
| | TPH | BEN | TOL | XYL | ETB |
| T1-9 | ND | ND | ND | ND | ND |
| T1-10 | ND | ND | ND | ND | ND |
| T1-11 | ND | ND | 5 | ND | ND |
| T1-12 | ND | ND | ND | ND | ND |
| T1-13 | ND | ND | ND | ND | ND |
| T1-14 | ND | ND | ND | ND | ND |
| T1-15 | ND | ND | ND | ND | ND |
| T1-16 | ND | ND | ND | ND | ND |
| T1-17 | ND | ND | ND | ND | ND |
| T1-18 | ND | ND | ND | ND | ND |

1 = Reported in ug/L (ppb)
ND = Not Detected

Chemical Contaminant Key:
BEN = Benzene; ETB = Ethylbenzene; TOL = Toluene; TPH = Total Petroleum Hydrocarbons;
XYL = Total Xylenes

The two tanks were uncovered on 6 November 1989. The integrity of the gasoline tank (Tank 1) was observed to be sound. It displayed no obvious signs of leakage, but contained a layer of sludge along the tank bottom. Two holes were discovered in the side and bottom of the fuel oil tank (Tank 2) and a black, oily liquid was observed leaking from the side hole. The hole was plugged and the liquid was pumped into a vacuum truck for proper disposal. Following removal of the residual tank materials, the tanks were "inerted," excavated, transported as hazardous material, and properly disposed.

Two soil samples were collected from native materials directly beneath each end of each tank. These samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline, diesel and kerosene, aromatic hydrocarbons (benzene, toluene, ethylbenzene and total xylenes - BTEX), and organic lead. All analytes of concern were quantified using methods approved by the United States Environmental Protection Agency (EPA) and/or described in the Leaking Underground Fuel Tank (LUFT) Manual.

Analytical results for samples collected from beneath the gasoline tank (T1-W and T1-E) suggested that leakage occurred from the west end of the tank (Table 5, Figure 7). TPH (3,900 mg/Kg), benzene (13 mg/Kg), toluene (210 mg/Kg), ethylbenzene (85 mg/Kg), and xylenes (210 mg/Kg) were detected in Sample T1-W. Sample T1-E did not contain detectable quantities of TPH, but toluene (0.023 mg/Kg) was detected. Organic lead was not detected in either sample.

TPH was not detected in the samples collected from beneath the fuel oil tank (T2-W, T2-E). Sample T2-W contained toluene at a concentration of 0.052 mg/Kg. Organic lead was not detected in either sample.

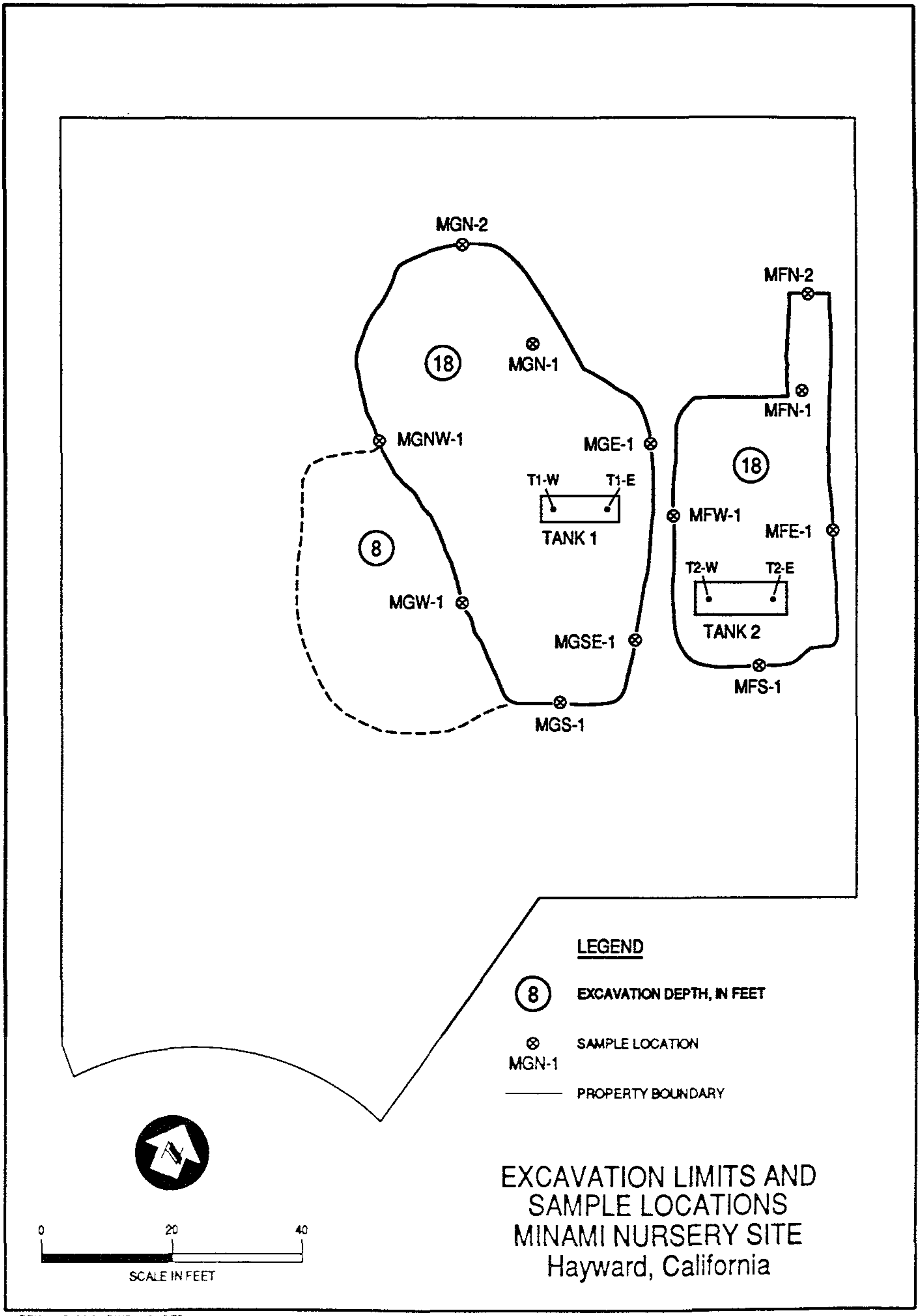
Excavation and stockpiling of contaminated soil took place between 9 November and 5 December 1989. The lateral and vertical extent of contaminated soil was evaluated using a photoionization detector (PID). The highest PID readings (up to 2,400 ppm) could be correlated with a blue-green clay layer initially encountered at a depth of 12.5 feet and extending down to groundwater. This layer was encountered throughout the site.

Confirmatory soil samples were collected once PID readings were relatively low (<2 ppm). Seven confirmatory soil samples were collected from the Tank 1 excavation, whereas 5 samples were collected from the Tank 2 excavation. These confirmatory soil samples were analyzed for TPH and BTEX. Organic lead was not quantified because it was not detected in the original samples collected from beneath each tank.

The confirmatory soil samples collected from the Tank 1 excavation did not contain detectable quantities of TPH and/or BTEX.

Three confirmatory samples collected from the Tank 2 excavation displayed detectable quantities of either TPH or BTEX (Table 6, Figure 7). TPH was detected in Samples MFN-1 (1,200 mg/Kg) and MFE-1 (67 mg/Kg). The excavation was expanded 15 feet to the north to remove the contamination associated with Sample MFN-1, and a confirmatory sample collected at the subsequent location did not contain detectable quantities of TPH. No further excavation occurred to the east of Sample MFN-2 because of its proximity to the eastern property boundary. Benzene (0.032 mg/Kg), toluene (0.024 mg/Kg) and xylenes (0.200 mg/Kg) were detected in Sample MFW-1.

FIGURE 7




EXCAVATION LIMITS AND SAMPLE LOCATIONS
MINAMI NURSERY SITE
Hayward, California

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## TABLE 5

## ANALYTICAL RESULTS FOR SOIL SAMPLES
## GASOLINE TANK EXCAVATION
## MINAMI NURSERY, HAYWARD, CALIFORNIA

| | | | Analytical Results | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Location of Sample | Depth (feet) | TPH as Gasoline (mg/Kg) | TPH as Kerosene (mg/Kg) | TPH as Diesel (mg/Kg) | Benzene (µg/Kg) | Toluene (µg/Kg) | Ethyl Benzene (µg/Kg) | Total Xylenes (µg/Kg) | Organic Lead (mg/Kg) |
| T1-E | Underneath East End of Tank | 8.0 | ND | ND | ND | ND | 23 | ND | ND | ND |
| T1-W | Underneath West End of Tank | 8.0 | 3,900 | ND | ND | 13,000 | 210,000 | 85,000 | 210,000 | ND |
| MGE-1 | East Wall | 17.8 | ND | ND | ND | ND | ND | ND | 15 | NA |
| MGN-1 | North Wall | 18.0 | ND | NA | ND | ND | ND | ND | ND | NA |
| MGS-1 | South Wall | 18.0 | ND | NA | ND | ND | ND | ND | ND | NA |
| MGSE-1 | Southeast Wall | 18.0 | ND | NA | ND | ND | ND | ND | ND | NA |
| MGNW-1 | Northwest Wall | 18.5 | ND | NA | ND | ND | ND | ND | ND | NA |
| MGN-2 | North Wall | 17.0 | ND | NA | ND | ND | ND | ND | ND | NA |
| MGW-1 | West Wall | 17.0-18.0 | ND | NA | ND | ND | ND | ND | ND | NA |

ND = Not Detected
NA = Not Analyzed

## TABLE 6

## ANALYTICAL RESULTS FOR SOIL SAMPLES
## FUEL OIL TANK EXCAVATION
## MINAMI NURSERY, HAYWARD, CALIFORNIA

| Sample ID | Location of Sample | Depth (feet) | Analytical Results: TPH as Gasoline (mg/Kg) | TPH as Kerosene (mg/Kg) | TPH as Diesel (mg/Kg) | Benzene (µg/Kg) | Toluene (µg/Kg) | Ethyl Benzene (µg/Kg) | Total Xylenes (µg/Kg) | Organic Lead (mg/Kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| T2-W | Underneath West End of Tank | 10.0 | ND | ND | ND | ND | 52 | ND | ND | ND |
| T2-E | Underneath East End of Tank | 12.0 | ND | ND | ND | ND | ND | ND | ND | ND |
| MFS-1 | South Wall | 14.0 | ND | ND | ND | ND | ND | ND | ND | NA |
| MFE-1 | East Wall | 17.5 | ND | ND | 67a | ND | ND | ND | ND | NA |
| MFN-1 | North Wall | 15.0 | ND | ND | 1,200a | 30 | 150 | 10 | 56 | NA |
| MFW-1 | West Wall | 16.0 | ND | ND | ND | 32 | 24 | ND | 200 | NA |
| MFN-2 | North Wall | 18.0 | ND | ND | ND | ND | ND | ND | ND | NA |

ND = Not Detected
NA = Not Analyzed
a Quantification based on largest peaks within C12-C26 boiling range.

The Tank 1 excavation measured approximately 75 feet (northwest-southeast) by 36 feet (northeast-southwest). The Tank 2 excavation measured 58 feet (north-south) by 24 feet (east-west). Both excavations were excavated to a depth of approximately 18 feet below grade.

At the completion of excavation/stockpiling activities, a total of approximately 1,700 cubic yards (in-bank) of material (uncontaminated and contaminated) had been removed from the excavations. An estimated 670 cubic yards (in-bank) of contaminated soil (gasoline tank excavation - 540 cubic yards; fuel oil tank excavation - 130 cubic yards) were excavated.

Approximately 1,255 cubic yards of contaminated material was stockpiled on bermed, plastic-lined pads encircling the excavations. Volumetric expansion due to pressure release, mechanical breakup, and mixing with uncontaminated material accounts for the increased stockpiled volume of contaminated soil, as opposed to the in-bank estimated volume of contaminated soil.

Backfilling of the excavations was completed by 22 March 1990. During excavation of the Tank 1 pit, uncontaminated overburden previously excavated from both excavations was replaced in the Tank 2 pit. This was done to allow for continued characterization of the lateral and vertical extent of soil contamination associated with Tank 1. Before placing the "clean" overburden into the Tank 2 excavation, a composite soil sample was collected and analyzed for TPH and BTEX. Analytical results indicated that TPH concentrations (14 mg/Kg) and BTEX (not detected) were within permissible limits. Representatives of ACHCSA approved the placement of the overburden in the Tank 2 pit.

During backfilling operations, 101 truck loads (approximately 1,820 cubic yards of material) of imported fill was transported to the site and placed in the excavations. Backfill material was placed in uniform lifts not exceeding 12-inches in thickness. Each layer was compacted individually using self-propelled compaction equipment. Compaction was checked in the field using nuclear density tests. The relative compaction at each test location was assessed to be greater than or equal to 90 percent.

## SCOPE OF WORK

The scope of work described here is designed to evaluate the level of contamination residing in the stockpiled soil and the materials underlying the stockpiled soil and to characterize the type, level and lateral extent of groundwater contamination. The following sections describe specific scope tasks. Specific field protocols and analysis methods are described in Appendix A.

### Regulatory Agency Interaction Acquisitions

The ACHCSA is the lead implementing agency (LIA) for this investigation. All plans and documents describing the environmental investigations described herein will be transmitted to ACHCSA. In addition, the RWQCB - San Francisco Bay Region will receive copies of all pertinent environmental documentation.

ACHCSA personnel will be consulted during the conduct of the investigations. The ACHCSA will be notified approximately 48-hours prior to implementation of any site activities. In addition, the ACHCSA and the RWQCB will be notified as soon as possible should significant modifications to the proposed work be mandated by unforeseen field/site conditions.

Prior to the implementation of any field activities, a utility location service (USA locator) will be contacted. USA Locator will notify concerned utilities (power, telephone, water, sewer, etc.) of the proposed work and arrange for delineation of underground/aboveground utilities that may be impacted by the proposed work. In addition, a line-locator company will be used to scan the site prior to the initiation of intrusive procedures.

After ACHCSA approval of this workplan, soil boring and well construction permits will be obtained from ACHCSA and the Alameda County Flood Control and Water Conservation (ACFCWCD) District - Zone 7.

**Evaluation of Stockpiled Soil Contamination**

The contaminated soil stockpiled on the site has not been disturbed since March 1990. In order to evaluate the current level of contaminants residing in the stockpiled soil and to profile the soil for potential disposal options, a soil sampling program will be implemented. A four point composite sample will be collected for every 100 cubic yards of stockpiled soil. Thus, a total of 13 composite samples (52 discrete samples) will be collected from the estimated 1,255 cubic yards stockpiled on the site.

To assess any contamination that may have migrated into the environment, shallow subsurface soil samples will be collected from native materials surrounding the soil stockpiles. Samples collected from the shallow subsurface will be analyzed for TPHG, TPHD, and BTEX. Samples will be collected at 20 foot intervals around the perimeter of the soil stockpile.

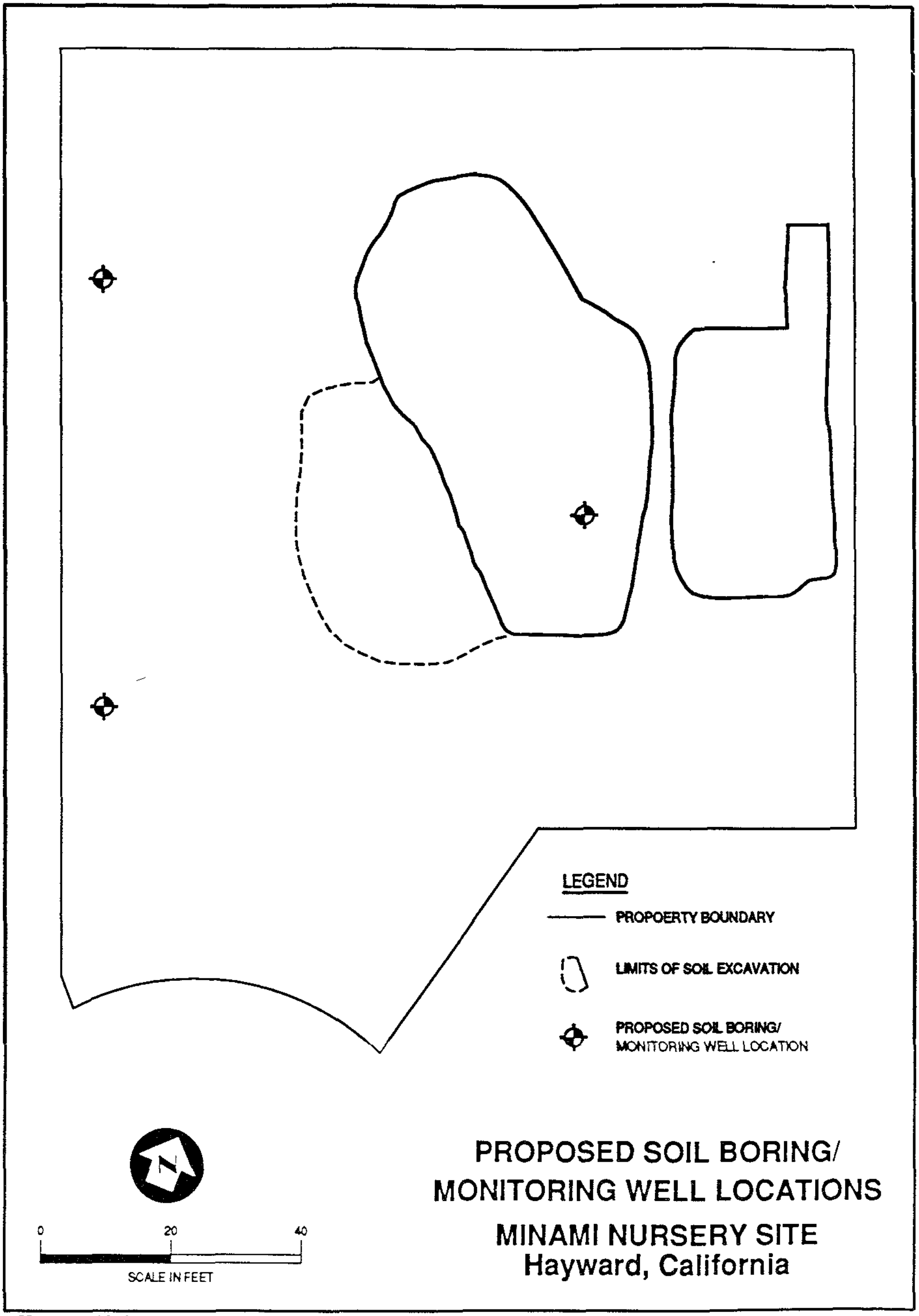
**Evaluation of Groundwater Flow Direction and Quality**

In order to evaluate the groundwater flow direction and quality at the site, a total of three soil borings will be advanced. These soil borings will be used as soil sampling locations and for the installation of permanent groundwater monitoring wells. The proposed locations of these soil borings/groundwater monitoring wells are displayed on Figure 8. Following the installation of the monitoring wells, a quarterly groundwater monitoring program will be implemented. Groundwater samples will be analyzed for TPHG, TPHD, and BTEX. Soil boring/sampling, groundwater well installation and groundwater monitoring will be performed in accordance with the procedures and protocols described in Appendix A.

**Preparation of Preliminary Site Assessment Report and Quarterly Groundwater Monitoring Reports**

Two types of reports will be prepared: a Preliminary Site Assessment Report and Quarterly Groundwater Monitoring Reports. The format and content of these reports will follow RWQCB reporting guidelines wherever applicable (RWQCB 1990a, 1990b).

FIGURE 8




PROPOSED SOIL BORING/
MONITORING WELL LOCATIONS

MINAMI NURSERY SITE
Hayward, California

REV 4 C263-13 DWG 10/18/93

ENGINEERING-SCIENCE, INC.

These reports will be submitted to both the ACHCSA and RWQCB and each report will be signed and stamped with the seal of a California Registered Geologist (R.G.), Certified Engineering Geologist (C.E.G.) or Professional Engineer (P.E.).

**Preliminary Site Assessment Report**

Following the receipt of analytical laboratory data, a PSA Report will be prepared. The PSA Report will include the following:

- A description of the site with maps showing buildings, utilities and/or local wells impacted and/or potentially threatened
- A brief history of the environmental investigations conducted to date
- A discussion of procedures and protocols used for soil stockpiling sampling, shallow subsurface soil sampling, soil boring/sampling, groundwater monitoring well installation and groundwater monitoring
- A discussion of the treatment/disposal of the stockpiled soil
- A discussion of site geology and stratigraphy including cross-sections based on boreholes and monitoring wells with supporting logs
- A discussion of the hydrogeologic environment including the regional and contaminated aquifer groundwater flow pattern and gradient as based upon recent water depth data
- Measurements of free-product thickness and extent
- A description of the lateral and vertical extent of soil and groundwater contamination
- Presentation of soil and groundwater analytical results (tables, figures) in the context of regulatory agency "action levels" and guidelines
- Certified laboratory analytical reports including chain-of-custody records
- Photodocumentation of site activities
- An evaluation of applicable remedial actions
- Conclusions, and, if warranted, recommendations for further studies and remedial actions

**Quarterly Groundwater Monitoring Reports**

Following receipt of laboratory results, a brief report will be prepared for each subsequent groundwater monitoring event. These reports will include:

- A description of sampling methods and protocols;
- Characterization of the local hydrogeologic environment;
- A discussion of analytical results including certified results and chain-of-custody records; and
- Conclusion.

## QUALITY ASSURANCE

### Field Quality Assurance

The quality of the data collected during this study will be assured by following the soil and groundwater sampling procedures detailed in Appendix A of this workplan. In addition, the following Quality Control (QC) samples will be collected to assess reproducibility and representativeness of results:

#### Field Duplicate Samples

Approximately one duplicate sample will be collected per ten field samples for each media type. At least one duplicate will be collected per sampling event if less than twenty samples are collected. The need to collect undisturbed soil samples does not allow use of sample splitting methods so soil "duplicates" will be collected from adjacent sampling tubes. Therefore, "duplicate" results may in part reflect heterogeneity of contaminant distribution and soil type.

#### Equipment Blanks (Groundwater Only)

One equipment blank will be collected per sample shipment whenever groundwater samples are submitted for analysis. The blank will be held by the laboratory until groundwater samples are analyzed, and will be analyzed for any analytes that are detected in groundwater samples.

### Laboratory Quality Assurance

All samples delivered to the laboratory will be maintained under strict chain-of-custody procedures. All laboratory analyses will be conducted by a laboratory certified by the California-Environmental Protection Agency (Cal-EPA) Environmental Laboratory Accreditation Program (ELAP) for each required analytical method. Method detection limits for groundwater samples will be lower than drinking water standards for each analyte. Laboratory QC samples will be analyzed according to the requirements of the specific EPA methods utilized.

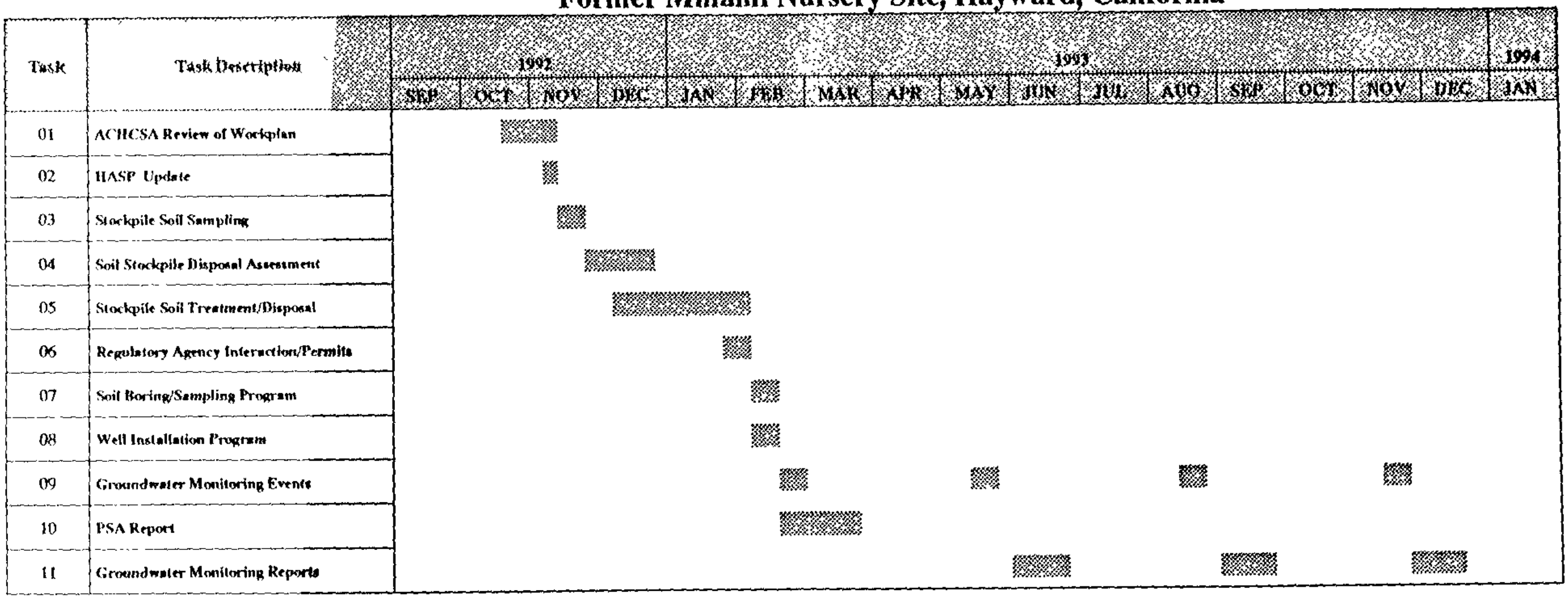
## SCHEDULE

Upon receipt of written approval of this workplan from ACHCSA, a total of a minimum of one year will be required to implement the work described herein. Figure 9 is a summary of the proposed schedule for this PSA.

The first task that will be undertaken will be updating of the site specific HASP. This will take approximately one week. Following completion of the HASP, field activities can be implemented. Sampling of the stockpiled soil and the shallow subsurface soil around the perimeter of the stockpile will take approximately two weeks. Following receipt of analytical results from the laboratory (ten working days), options for treatment/disposal of the stockpiled contaminated soil can be evaluated. This will take approximately four weeks. Arrangements for treatment/disposal will take four weeks and implementation of soil treatment/disposal will require approximately two to sixteen weeks, based on data collected to date.

# FIGURE 9

## PROJECT SCHEDULE
### Preliminary Site Assessment Workplan
### Former Minami Nursery Site, Hayward, California




Notes:

M = Meeting Completed m = Meeting Scheduled C = Comments Received = Work Proposed

S = Submission Completed s = Submission Scheduled ? = Initiation/Completion Date Unknown

D = Draft Document Submitted F = Final Document Submitted

MINWPSCH WK1

Following removal of the stockpiled contaminated soil from the site, the groundwater evaluation phase of the investigation can be initiated. Approximately two weeks will be required to obtain soil boring/well construction permits. Approximately two weeks will be required to advance the soil borings, install the monitoring wells and perform the initial groundwater monitoring event. Following receipt of analytical data, approximately four weeks will be required to prepare the PSA Report.

Brief reports will be submitted following each quarterly groundwater monitoring event. These reports will require approximately four weeks to prepare from receipt of analytical laboratory results. Such quarterly reports will be submitted to the regulatory agencies on the first day of the second month of each subsequent quarter.

## HEALTH AND SAFETY

ES has prepared a site specific Health and Safety Plan (HASP) (Appendix B) for proposed field activities at the project site that complies with Federal Occupational Safety and Health Administration (OSHA) regulations governing hazardous waste site activities (29 CFR 1910.120). Prior to the initiation of this workplan, the HASP will be updated to include data collected during the removal of the USTs and associated contaminated soil. The provisions of the HASP will be mandatory for all site personnel. All ES sub-contractors shall be responsible for the health and safety of their own personnel, and prior to start of work, will be required to develop a HASP that meets or exceeds the requirements of the ES HASP. In addition, all ES and sub-contractor personnel will be enrolled in a medical monitoring surveillance program that meets the requirements of 29 CFR 1910.120.

## QUALIFICATIONS

Engineering-Science (ES) is a California-based international multidisciplinary consulting firm providing a broad range of environmental engineering, planning and design services. ES has conducted environmental engineering and environmental science projects throughout the United States and abroad for over 45 years, including over 15 years of direct hazardous waste management experience. ES maintains all current licenses, certifications, training and insurance required for hazardous waste operations in the State of California, including:

- State of California Contractors State License Board General Engineering Contractor (A), General Buildings Contractor (B) and Hazardous Substances Removal and Remedial Actions (HAZ) Certifications
- Federal Occupational Safety and Health Administration (OSHA) 40-hour health and safety training for hazardous waste operations (29 CFR 1910.120) certifications for all site workers.
- Federal Occupational Safety and Health Administration (OSHA) 8-hour supervisory training for hazardous waste operations (29 CFR 1910.120) certifications for site supervisors
- Workers compensation insurance

This workplan has been prepared, and the proposed scope of work will be conducted, under the supervision of Mr. Frederick T. Stanin. Mr. Stanin is a California Registered Geologist (No. 5248) and has over 10 years experience in the geological consulting field, including 3 years of directly applicable experience serving as a principal investigator and/or technical director on hazardous waste site investigations. Regulatory agencies will be notified in the event of any substitution for the principal scientist responsible for supervising technical issues on the project, and any substituted staff member will possess the required California professional registration (Registered Geologist or Registered Professional Engineer) and have an equivalent experience level.

The soil boring/sampling and well installation contractor selected by ES will have the following certifications and training:

- Class C-57 Contractor's License
- Federal Occupational Safety and Health Administration (OSHA) 40-hour health and safety training for hazardous waste operations (29 CFR 1910.120) certifications for all site workers.
- Federal Occupational Safety and Health Administration (OSHA) 8-hour supervisory training for hazardous waste operations (29 CFR 1910.120) certifications for the site supervisor.

# REFERENCES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RWQCB 1990a, Tri-regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites. Staff Report prepared by the North Coast Regional Water Quality Control Board, the San Francisco Bay Region Water Quality Control Board and the Central Valley Regional Water Quality Control Board. 10 August.

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# APPENDIX A

# FIELD AND LABORATORY PROTOCOLS

# APPENDIX A

# FIELD AND LABORATORY PROTOCOLS

## STOCKPILED SOIL SAMPLING PROCEDURES

Stockpiled soil samples will be collected using a hand-auger equipped with a split-spoon sampling device lined with brass tubes. Four discrete soil samples will be collected for every 100 cubic yards of stockpiled soil. Thus, a total of 52 discrete samples will be collected from the surveyed 1,255 cubic yards of stockpiled soil. Each soil sample quadruplicate will be composited in the laboratory prior to analysis. Thus, a total of 13 composite soil samples will be analyzed.

Soil sampling protocol will consist of boring the hand auger a minimum of five feet into the soil stockpile section. Following removal of the sampling device from the soil stockpile section the brass tube will be sealed with Teflon tape and non-reactive caps, then labelled and transferred to an iced sample cooler for delivery to the laboratory. A chain-of-custody record will accompany each sample from collection in the field to the laboratory. Soil samples will be analyzed for TPHG and TPHD using the DTSC/LUFT Method (modified EPA Method 8015), VOCs using EPA Method 8010, BTEX using EPA Method 8020, metals using the EPA Method 6010/7000 series, soluble threshold limit concentration (STLC) for lead and RCI using methods described in Title 22 of the California Code of Regulations (CCR). All analyses will be performed at a CalEPA ELAP certified laboratory.

## SHALLOW SUBSURFACE SAMPLNG PROCEDURES

Soil samples used to evaluate any migration of contamination from the soil stockpile to the environment will be collected at approximately 20 foot intervals around the perimeter of the soil stockpile. Soil sampling protocol will consist of boring the hand auger a minimum of one-half feet into the ground. Following removal of the sampling device from the ground, the brass tube will be sealed with Teflon tape and non-reactive caps, then labelled and transferred to an iced sample cooler for delivery to the laboratory. A chain-of-custody record will accompany each sample from collection in the field to the laboratory. Soil samples will be analyzed for TPHG and TPHD using the DTSC/LUFT Method (modified EPA Method 8015) and BTEX using EPA Method 8020. All analyses will be performed at a CalEPA ELAP certified laboratory.

## SOIL BORING/SAMPLING PROCEDURES

Soil borings will be advanced to a maximum depth of 45 feet below ground surface using 12-inch outside diameter (OD), continuous flight, hollow stem auger rig equipped with a split-spoon sampler. Split-spoon sampling techniques will be performed in accordance with established American Society for Testing and Materials (ASTM) Standard 1586-D. The borings will be logged by an ES geologist using the Unified Soil Classification System (USCS) and all samples will be inspected for signs of staining and screened for the presence of hydrocarbon odors and the evolution of organic vapors with a photoionization detector (PID). Based on PID readings, the soil sample with the highest PID reading from each boring will be selected for chemical analysis. Thus, one soil sample will be submitted from each soil boring.

Sampling protocol will consist of collecting soil samples in brass tubes and sealing the brass tubes with Teflon tape and non-reactive caps, then labelling the tube and transferring it to an iced sample cooler for delivery to the laboratory. A chain-of-custody record will accompany each sample from collection in the field to the laboratory. Soil samples will be analyzed for TPHG and TPHD using the DTSC/LUFT Method (modified EPA Method 8015) and BTEX using EPA Method 8020. All analyses will be performed at a CalEPA ELAP certified laboratory.

## GROUNDWATER MONITORING WELL INSTALLATION PROCEDURES

The soil borings will be converted to permanent monitoring well locations. The soil borings will be advanced to a maximum depth of 45 feet below ground surface (bgs). Should groundwater be encountered within the maximum depth range, the the soil boring will be converted to a permanent monitoring well. Wells will be constructed using 4-inch diameter polyvinyl chloride (PVC) casing equiped with screw-type, flush joints. No solvent, cement, glue, screws or mechanical adpators will be used at the casing joints.

Each monitoring well will be screened with 20-feet of factory milled slot, with five (5) feet above and 15 feet below the top of the zone of saturation. The screen slot size will be 0.020-inch. A PVC cap will be affixed to the bottom of the screened interval.

A filter pack will be placed to enclose the entire length of the screened section with an additional 2-feet of filter pack above the top of the screen. Filter pack material and size is anticipated to be Monterey Sand Number 3.

Directly on top of the filter pace will be a 2-foot bentonite plug designed to prevent vertical migration of possible contaminants through the annulus. The bentonite pellets shall be emplaced into the annulus by tremie pipe and hydrated.

The remaining annular space (above the bentonite plug to the surface) will be sealed using a mixture of 95 percent Portland cement/5 percent bentonite powder. This annular seal will be installed by tremie pipe. The seal will be allowed to set for a least 24 hours before any subsequent activities such as well development or sampling.

The top of each monitoring well will be protected by a water-tight locking cap with lock and will be inside a flush mounted, water-tight traffic box mounted in concrete and sloped to about one-inch above grade to drain away surface water.

Each monitoring well location will be surveyed for horizontal and vertical location to the nearest 0.01 foot. The elevation will be surveyed to a measuring point marked on the top of the well casing, which is the point from which all water level measurements shall be recorded

Well development will occur after the annular seal has had at least 24-hours to set. Development will be performed by mechanical surging and bailing with a bailer and/or surge block. The purging of three to five well casing volumes is planned. Temperature (T), hydrogen ion index (pH) and electric conductivity (EC) and turbidity will be measured in the field during development to document stabilization of formation water.

## GROUNDWATER MONITORING PROCEDURES

The newly installed groundwater wells will be monitored following their development. Monitoring will not be conducted until water levels have been allowed to equilibrate.

Groundwater monitoring involves the measurement of depth to water and free-product thickness, and the collection of water quality samples. Prior to collection of any samples the depth to water and free-product thickness will be measured in each well using an electronic interface probe and water level meter. Data recorded at each well will include:

- Identification of the well by number
- Location and elevation of the reference point
- Date of measurement
- Measurement of free-product thickness
- Measurement of water-level

After each measurement, the water level probe and the oil-water interface probe will be washed in an Alconox solution followed by two rinsings in deionized water.

Groundwater sampling protocol will follow recommended guidelines of the RWQCB for sampling "free-phase" floating product (RWQCB 1985). A quartz/teflon bailer will be used to collect a sample at the free-product/groundwater interface. This sample will be field inspected for free-product thickness and the presence of any odor and sheen. Water quality samples will be collected using a quartz-Teflon bailer after purging a minimum of three submerged volumes from each well. Wells will be purged using a 2-inch diameter, stainless steel, submersible, electric pump (Grundfos Model Redi-Flow 2) then sampled with a quartz-Teflon bailer. During the purging of the wells, physical parameters [temperature (T), hydrogen ion index (pH) and electric conductivity (EC)] will be measured. Should the physical parameters not stabilize prior purging a total of three well volumes, then purging will continue until a maximum of five well volumes are purged from the well.

In the event that recharge rates do not permit at least three well volumes to be purged, and the well is purged dry, the sample will be collected after the well sufficiently recovers. The water will be retested for T, pH, and EC after sampling to measure representativeness of the water sampled.

Samples will be collected in two 1-liter amber glass bottles (TPHD) and three 40-ml glass volatile organic analysis (VOA) vials (BTEX). All samples will be labeled, refrigerated and transported to a Cal EPA ELAP certified laboratory for analysis of TPHG and TPHD (DTSC/LUFT Method) and BTEX (EPA Method 8020).

## DECONTAMINATION PROCEDURES

Prior to advancing each borehole, all downhole equipment will be thoroughly decontaminated by steam cleaning or washing with Alconox solution and then rinsing with deionized water. All sampling equipment will be decontaminated prior to collecting each sample by scrubbing with Alconox solution, then rinsing three times with deionized water.

## FIELD QUALITY CONTROL PROCEDURES

### Field Documentation

All field activities and any information pertinent to sampling (e.g. sample numbers, locations, etc.) will be documented on a daily basis in a bound field notebook. All entries will be filled out in ink. Erroneous entries will be crossed-out and initialled.

Standard field forms will be utilized for tabulation and documentation of relevant data (e.g. soil boring logs, air monitoring data forms).

### Sample Labels

Sample labels will be filled out in waterproof ink at the time of sample collection and before the sample is placed in the cooler. Label entries will include: sample ID; date and time; sample location; analysis; preservative, if any; samplers' initials; and, project number.

### Sample Custody

Immediately after collection, soil and groundwater samples will be labeled and placed in an iced cooler for delivery or shipment to the laboratory. A chain-of-custody record will be filled out as soil and/or groundwater samples are collected. The record will be checked for completeness at the end of the day and signed by the sampler. It will then be hand-delivered with the samples to the laboratory, or placed in a sealable plastic bag and taped to the inside lid of the cooler, if shipped. All samples will be analyzed as soon as possible, without exceeding the prescribed holding time.

### Waste Storage and Disposal

All soil cuttings, well development purge water and decontamination rinsate fluids generated during this investigation will be containerized in labeled, DOT-approved, 55-gallon drums pending analysis. The property owner will dispose of any contaminated materials at an appropriate licensed waste disposal facility based on analytical results. Uncontaminated materials may be disposed of either at a licensed waste disposal facility, or on-site.

# APPENDIX B

# HEALTH AND SAFETY PLAN

***GASOLINE CONTAMINATION REMEDIATION***

**Minami Nursery property**
**Hayward, California**

# HEALTH AND SAFETY PLAN

***Prepared for***

**MR. GEORGE MINAMI**
**Hayward, California**

**July 1989**

***Prepared by***


ENGINEERING-SCIENCE
DESIGN • RESEARCH • PLANNING
*600 BANCROFT WAY, BERKELEY, CALIFORNIA 94710 • 415/548-7970*
*OFFICES IN PRINCIPAL CITIES*

## 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<br>27200 Calaroga Avenue<br>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

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

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

Yoko Crume, Ph.D.
Office Health and Safety Representative
ES Berkeley, California
(415) 548-7970

## Client Contact:

Mr. George Minami
c/o Minami Nursery
29640 Vanderbilt
Hayward, California
(415) 581-1836

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SOIL/GROUNDWATER REMEDIATION
MINAMI PROPERTY
HAYWARD, CALIFORNIA

# HEALTH AND SAFETY PLAN

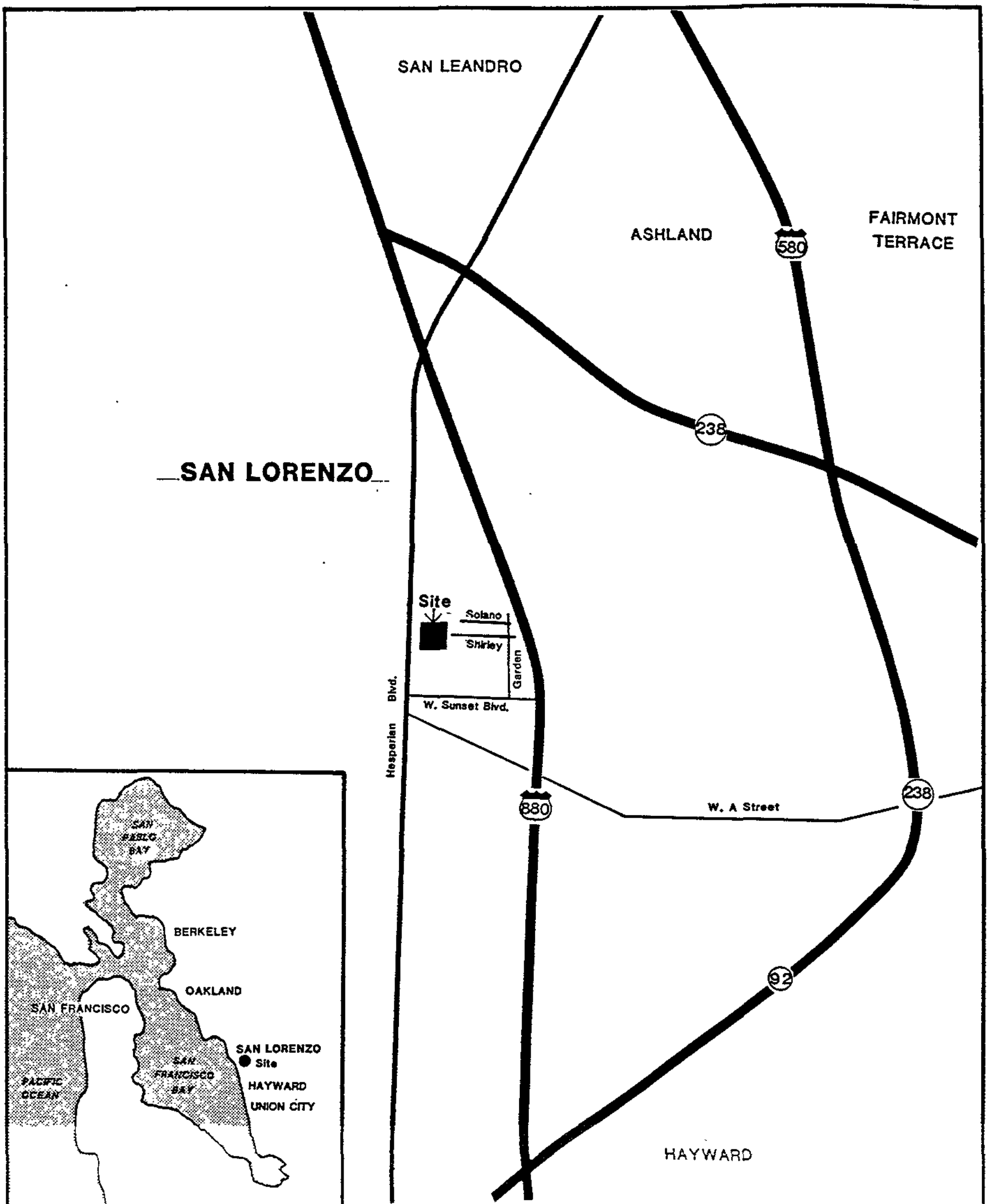
## INTRODUCTION

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.

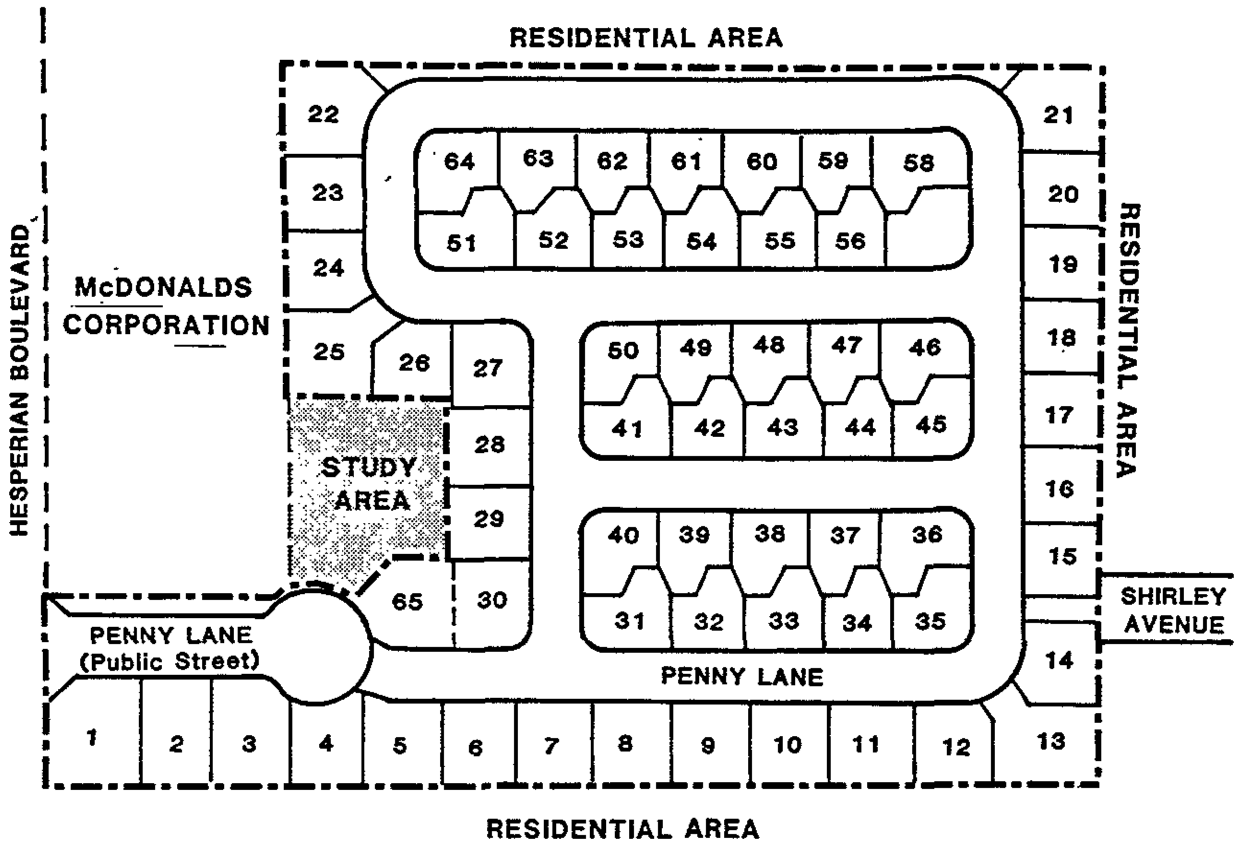
The following sections of the site safety plan provide general guidelines for decision points in site safety planning. Sections cover field personnel responsibilities and work procedures, emergency procedures, air monitoring, levels of personal protection, and heat and cold protective measures. Decontamination, 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

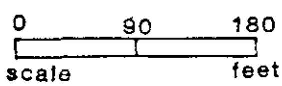



**LEGEND**

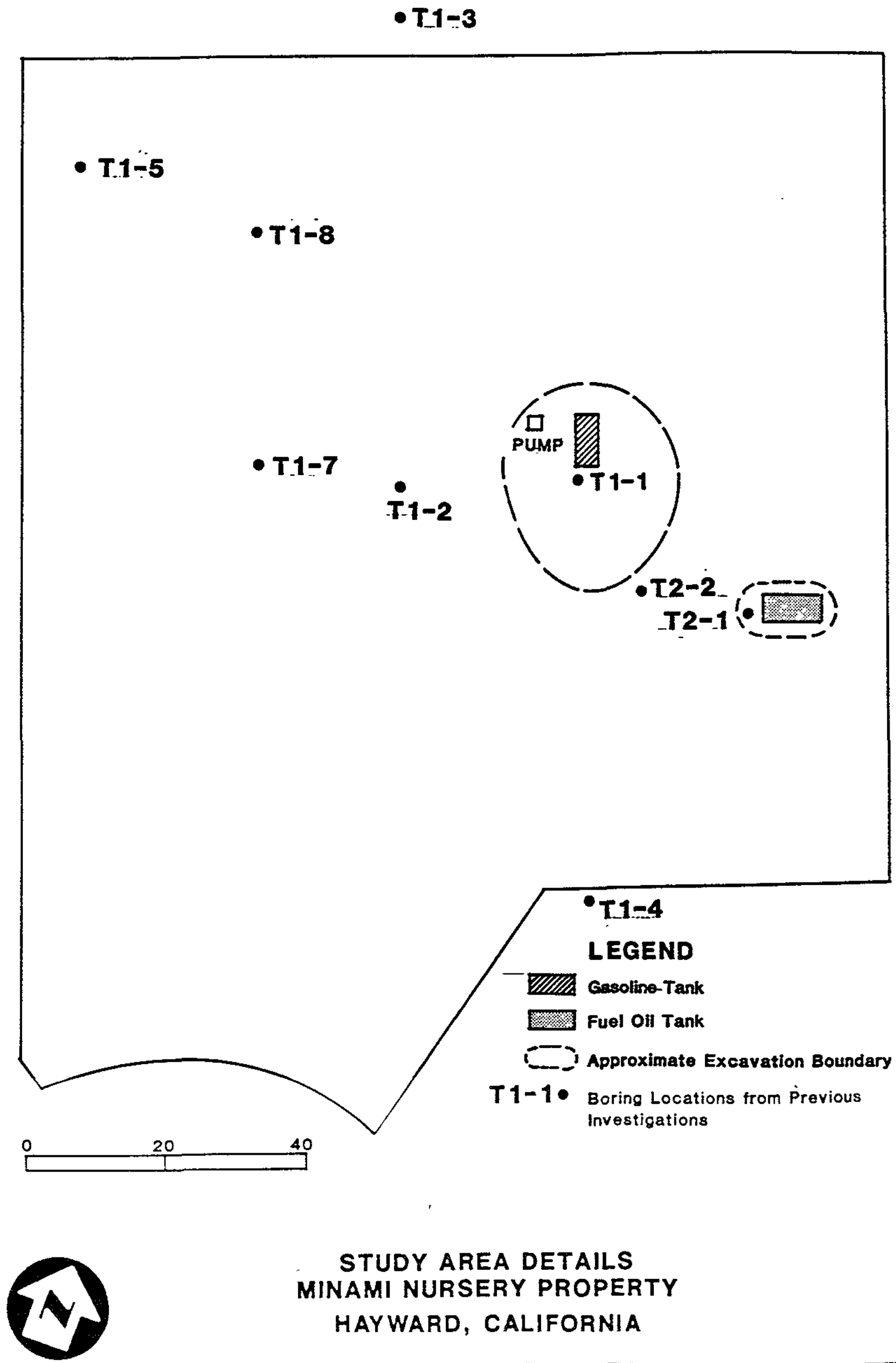
Exterior Boundary Line

Lot Line

Study Area




**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<br>Wayne Hauck<br>Eric Storrs<br>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.

<u>Heat Stress</u>

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 onsite 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*

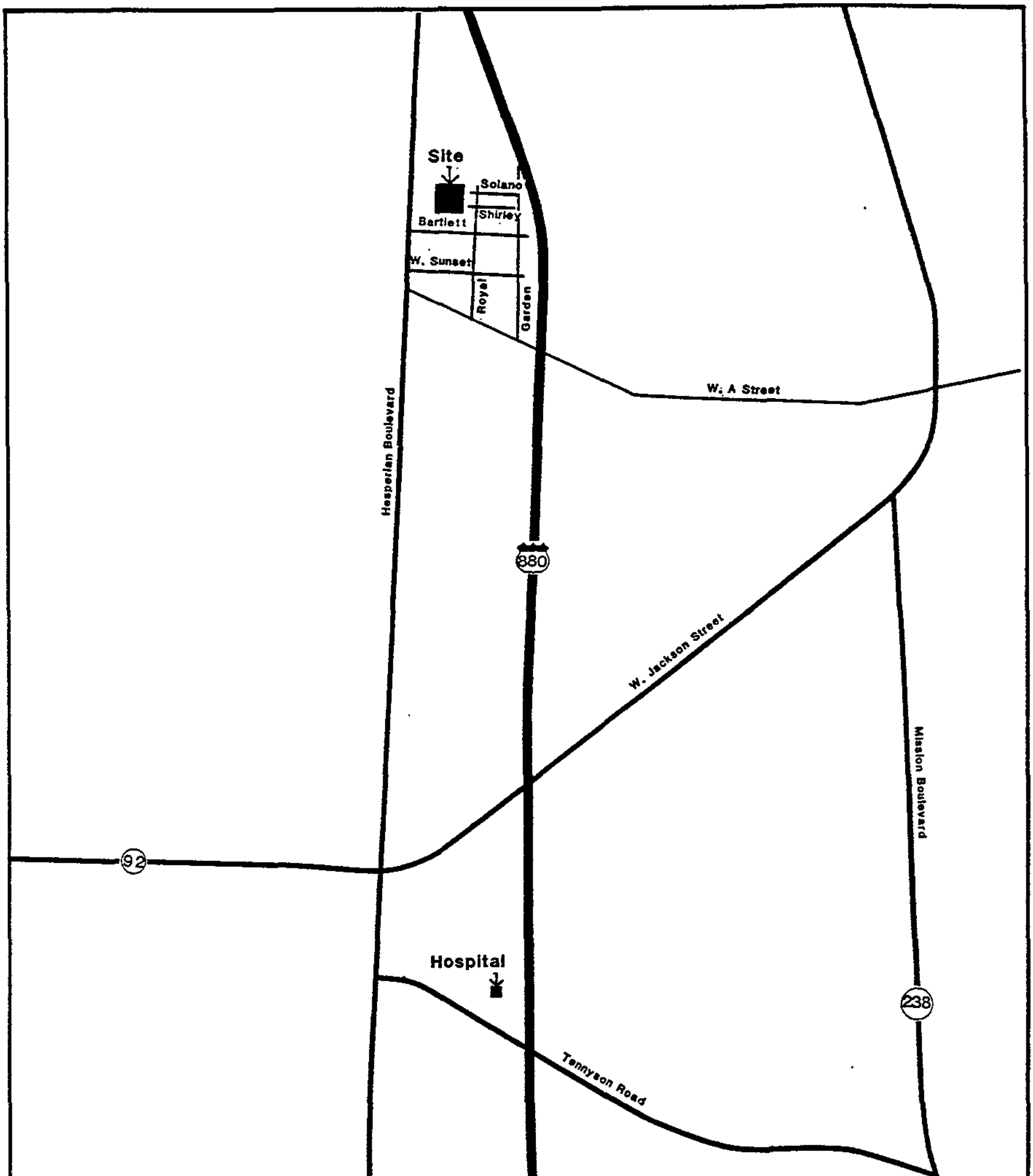
If any field crew demonstrates symptoms of chemical exposure the following procedures apply. At sites where two or more field crew are involved another team member (buddy) should remove the individual from the immediate area of contamination. At all sites not matter how many personnel are involved these 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




**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 recomended 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

# 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 $mg/m_3$.

# LETTER OF TRANSMITTAL

ENGINEERING SCIENCE, INC.
1301 MARINA VILLAGE PARKWAY
SUITE 200
ALAMEDA, CA 94501
Phone: (510) 769-0100
Fax: (510) 769-9244

DATE: 18 October 1993

93 OCT 18 PM 4:0

ES PROJECT#: NC433.02

---

**TO:** Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Material Divison
80 Swan Way, Room 200
Oakland, CA 94621

**ATT:** Ms. Juliet Shin

**RE:** Workplan

---

**WE ARE SENDING YOU:**

ATTACHED__XXX___ UNDER SEPARATE COVER__________

DOCUMENTS_________ OTHER________________

VIA MAIL__________ EXPRESS MAIL______ FED EX_____ OTHER Hand Del.

| QUANITITY | DATE | ITEM |
|---|---|---|
| 1 | 10/18/93 | Workplan for the Perliminary Site Assessment |

---

**REMARKS:**

SIGNED: ____________________
Neal Siler

---

COPY TO: FILE_XX___AUTHOR______READING_XX__OTHER_____________