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ENGINEERING — SCIENCE, INC.
600 BANCROFT WAY
BERKELEY, CALIFORNIA 94710
(415) 548-7970

Date: 26 December 1990

ES Project No. NC191.01

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To: California Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, California 94612

Attn: Mr. Richard Hiett

Re: Remediation at Minami Nursery Site, Hayward, CA

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☐ SHOP DRAWINGS ☐ TRACINGS
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XX DOCUMENTS ☐ COPY OF LETTER
☐ SPECIFICATIONS ☐ ____

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COPIES	DATE	ITEM
1	12/19/90	Explanatory Letter to Ms. Pamela J. Evans of ACHCSA
1	8/13/90	Underground Fuel Storage Tank Remediation, Minami Nursery Site, Hayward, California

Minami

REMARKS 600 Shirley Ave.

COPY TO

☐ File
☐ Author
☐ Reading File
☐ ____

SIGNED Neal L. Siler

ES
ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

19 December 1990
Ref: NC191.01

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

Attn: Ms. Pamela J. Evans

Subject: Remediation Activities Performed to Date at Minami Nursery Site, Hayward, California

Dear Ms. Evans:

The enclosed report is being transmitted to you at the request of Mr. George Minami, Jr. This report documents remedial activities performed to date at the Minami Nursery site, 600 Shirley Avenue, Hayward, California. Work performed to date includes excavation and removal of two underground fuel storage tanks (UFSTs), legal transport and disposal of the two UFSTs, excavation and on-site stockpiling of the associated contaminated soil and backfilling of the excavations.

We trust this submittal keeps your files up-to-date. Should you require any additional information and/or clarifications, please call.

Very truly yours,

ENGINEERING-SCIENCE, INC.

Neal E Siler

Neal E. Siler
Project Manager

cc: R. Hiett, RWQCB
R. S. Makdisi, ES

NS/dag/168-10.R1

UNDERGROUND FUEL STORAGE TANK REMEDIATION

MINAMI NURSERY SITE HAYWARD, CALIFORNIA

Prepared for:

Mr. George Minami, Jr.
Hayward, California

AUGUST 1990

Prepared by:

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

901-187

ENGINEERING-SCIENCE

ES
ENGINEERING-SCIENCE, INC.

600 BANCROFT WAY
BERKELEY, CA 94710
Tel: (415) 548-7970 Fax: (415) 548-7635

13 August 1990
Ref: NC191.08

Mr. George Minami, Jr.
29640 Vanderbilt
Hayward, California 94544

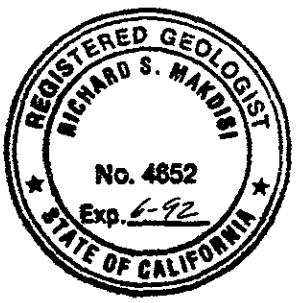
Subject: Report Documenting Remediation Activities Performed To Date at Minami Nursery Site, Hayward, California

Enclosed is the Engineering-Science, Inc. (ES) report documenting remediation activities performed to date at the Minami Nursery Site, Hayward, California. The scope of work described in this report consists of excavation and removal of two underground fuel storage tanks (UFSTs), transport and disposal of the two UFSTs, excavation and stockpiling of associated contaminated soil and backfilling of the excavations.

Engineering-Science, Inc. appreciates the opportunity to provide you with technical assistance. Should you require any additional information and/or clarifications, please call.

Very truly yours,

ENGINEERING-SCIENCE, INC.



Neal E. Siler
Project Manager

Richard S. Makdisi, R. G.
Manager, Hazardous Waste
Management Department

NES/RSM/sls/156-171 R0

cc: T. G. Cole, ES
R. Darling, Kaufman and Broad

UNDERGROUND FUEL STORAGE TANK REMEDIATION

MINAMI NURSERY SITE
HAYWARD, CALIFORNIA

Prepared for:

Mr. George Minami, Jr.
Hayward, California

AUGUST 1990

Prepared by:

ENGINEERING-SCIENCE
DESIGN • RESEARCH • PLANNING
600 BANCROFT WAY, BERKELEY, CALIFORNIA 94710 • 415/548-7970
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LIST OF ABBREVIATIONS

INSTITUTIONAL

ACHCSA	Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Materials Division
ASTM	American Society for Testing and Materials
BAAQMD	Bay Area Air Quality Management District
COSHA	California Occupational Safety and Health Administration
DHS	California Department of Health Services
ECFPD	Eden Consolidated Fire Protection District
EPA	United States Environmental Protection Agency
ES	Engineering-Science, Inc.
NFPA	National Fire Protection Association
OES	California Office of Emergency Services
RWQCB	Regional Water Quality Control Board
SWRCB	State Water Resources Control Board

TECHNICAL

AB	Assembly Bill
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
LEL	Lower Explosive Limit
LUFT	Leaking Underground Fuel Tank
PID	Photoionization Detector
SARA	Superfund Amendments and Reauthorization Act
STLC	Soluble Threshold Limit Concentration
TIV	Total Ionizable Vapors
TTLC	Total Threshold Limit Concentration
UFST	Underground Fuel Storage Tank
UST	Underground Storage Tank
mg/Kg	Milligram/kilogram; equivalent to a part per million (ppm)
ug/Kg	Microgram/kilogram; equivalent to a part per billion (ppb)

CHEMICAL NOMENCLATURE

BEN	Benzene
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
ETB	Ethylbenzene
TOG	Total Oil and Grease
TOL	Toluene
TPH	Total Petroleum Hydrocarbons
XYL	Total Xylenes

EXECUTIVE SUMMARY

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. 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.

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 (ACHASA), 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.

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 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. TPH (3,900 mg/Kg), benzene (13 mg/Kg), toluene (21 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. 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.

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.

SECTION 1

INTRODUCTION

INTRODUCTION

This report describes the implementation of remediation work performed by Engineering-Science, Inc. (ES) to date at the former Minami Nursery site, 600 Shirley Avenue, Hayward, California. The remediation work performed includes excavation and removal of two underground fuel storage tanks (UFSTs), transport and disposal of the UFSTs, excavation and stockpiling of associated contaminated soil, and backfilling of the excavations. The work described was conducted between 6 November 1989 and 22 March 1990.

The original scope of work was presented to Mr George Minami, Jr., in a letter proposal dated 6 February 1989. A revised scope of work, based on changed site conditions, was presented to Mr. George Minami, Jr., in submittals dated 21 February and 9 March 1990. The authorization for this report was transmitted to ES during a telephone conversation between Mr. George Minami, Jr., and Mr. Neal E. Siler of ES on 30 March 1990.

The remediation program implemented to date and described in this report follows general guidelines described in the California Site Mitigation Decision Tree Manual (1986), the State Leaking Underground Fuel Tank (LUFT) Manual (1989), and the Regional Water Quality Control Board (RWQCB) Tri-Regional Recommendations (1989). Prior to 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). 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. Remediation activities (tank removal, soil excavation/stockpiling) were witnessed by representatives of the ACHCSA and/or the ECFPD.

OBJECTIVES AND SCOPE OF WORK

Mr. George Minami, Jr., retained ES to remediate gasoline and fuel oil contamination associated with UFSTs at the project site. The scope of work performed includes excavation and removal of two UFSTs, transport and disposal of the UFSTs, excavation and stockpiling of associated contaminated soil, and backfilling of the excavations.

SITE DESCRIPTION

The Minami Nursery site is located on Penny Lane, Hayward, California (Figure 1-1). The original address of the site was 600 Shirley Avenue, Hayward, California. Figure 1-2 shows the configuration of the nursery prior to redevelopment.

The roughly rectangular shaped site has dimensions of 160 feet by 127 feet, covering an area of approximately 20,300 square feet. It is bounded on the north and east by a residential development, on the south by Penny Lane and the residential development, and on the west by commercial developments (Figure 1-3).

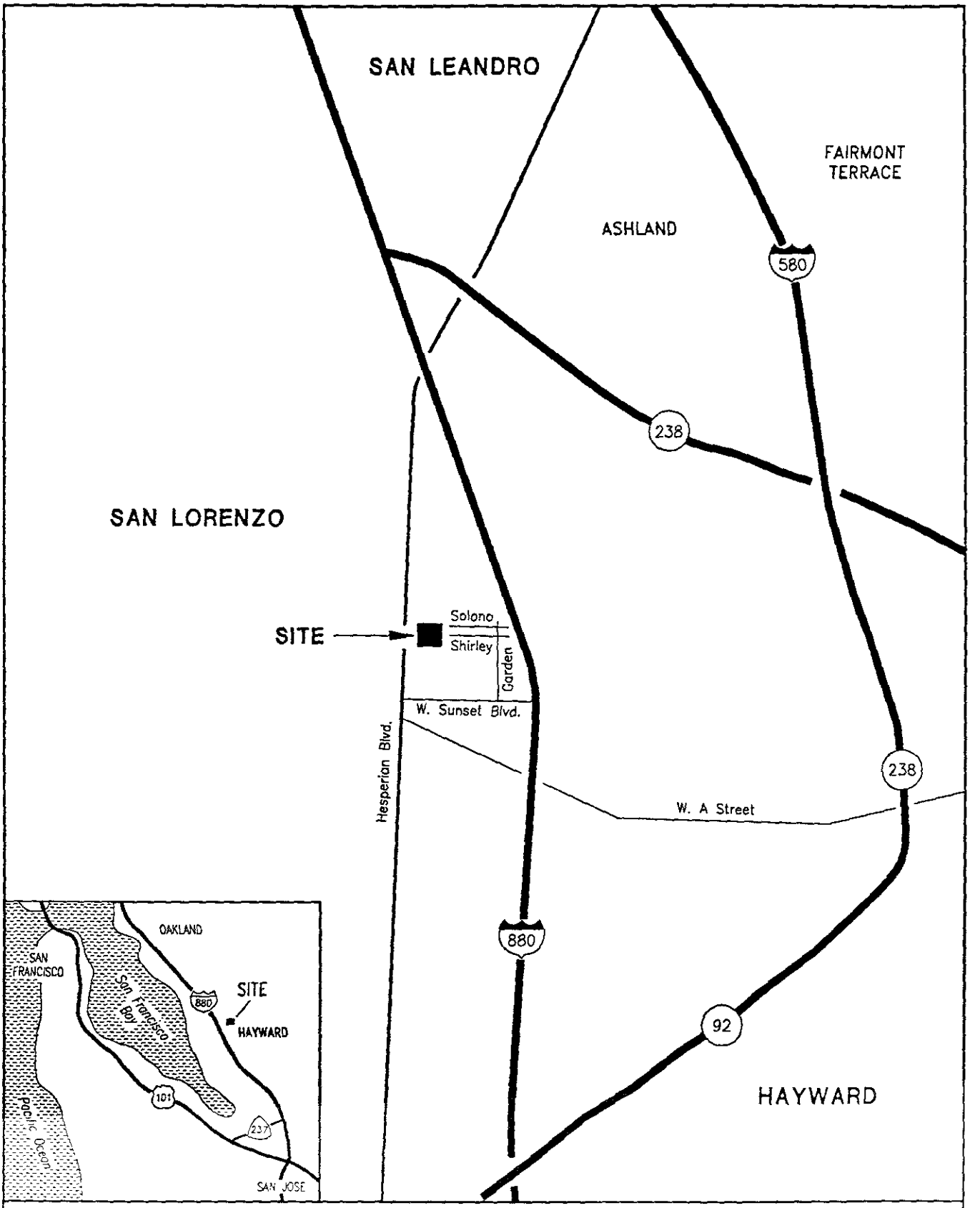
Originally, three underground fuel storage tanks (Tank 1 - gasoline storage, Tanks 2 and 3 - fuel oil storage) were present on the site (Figure 1-2). Reportedly, the gasoline tank was inactive for approximately 10 years prior to original site characterization activities, and the fuel oil tanks were inactive for between 20 to 30 years prior to the original site characterization activities (Emcon Associates, 1988). Prior to this remediation investigation, Tank 3 was removed from the site. Activities performed, analytical results obtained, and the removal and disposal fate of Tank 3 are not known. The investigations described in this report concern Tanks 1 and 2, only.

PREVIOUS INVESTIGATIONS

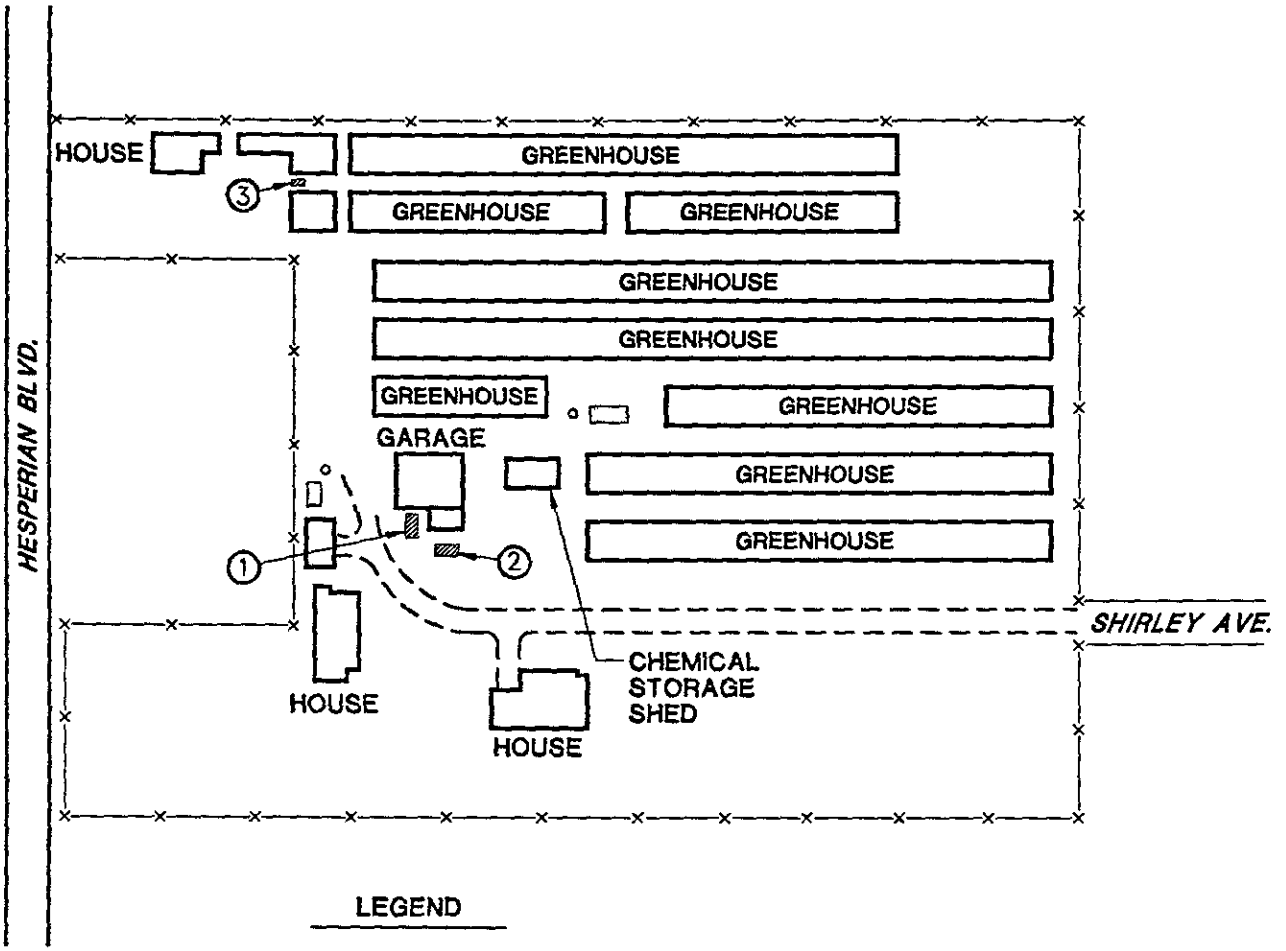
A limited subsurface investigation was performed at the site in 1988 (Emcon Associates, 1988). A total of 21 soil borings (T1-1 through T1-18, T2-1, T2-2 and T3-1) were advanced for this investigation. Locations of the soil borings are indicated on Figures 1-4 and 1-5. The purpose of the soil boring 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 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 1-4 and 1-5. 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 1-4). No evidence of contamination was detected in soil and/or groundwater samples collected in the vicinity of Tank 3 (Figure 1-5). Table 1.1 contains analytical results for the soil samples collected, whereas Table 1.2 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

FIGURE 1-1



SITE LOCATION MAP
MINAMI NURSERY PROPERTY
Hayward, California



LEGEND

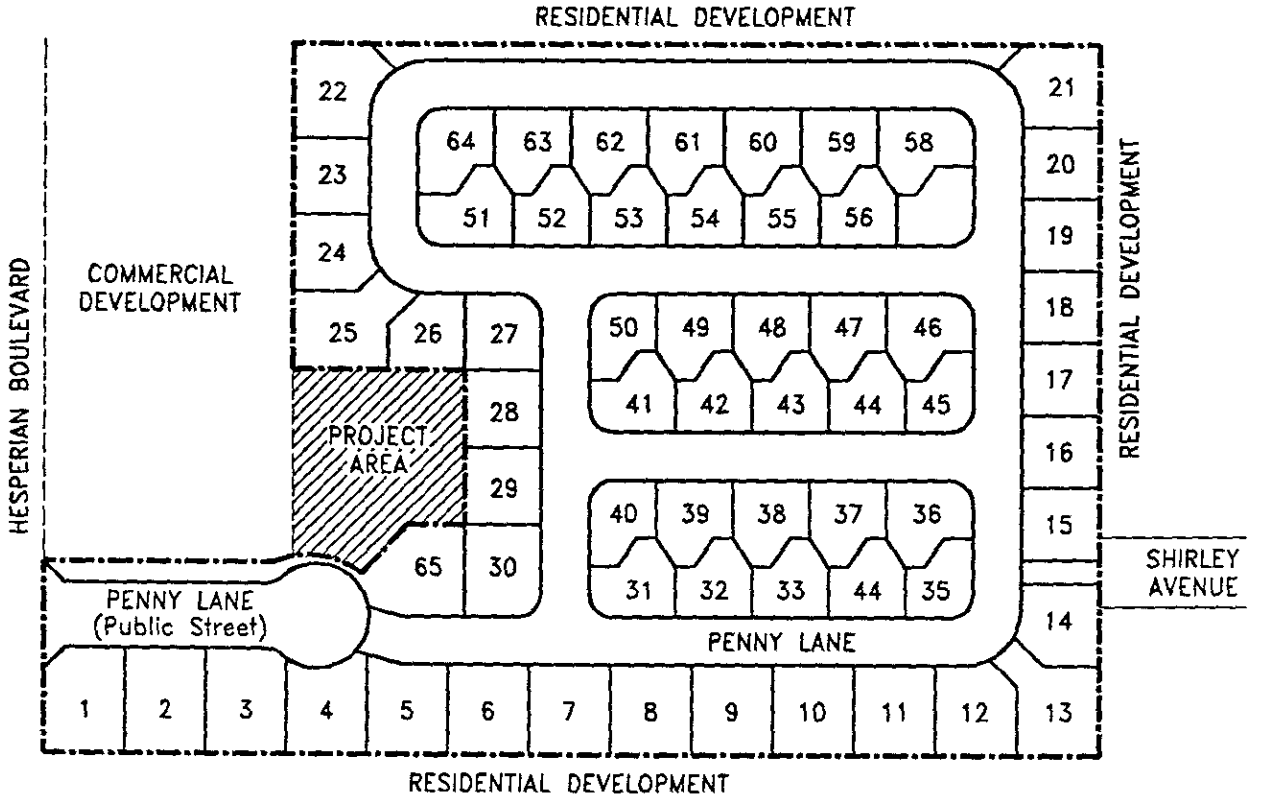
- Underground Storage Tank Location
- (1) 500 Gallon (Estimated) Gasoline Tank
- (2) 1000 Gallon (Estimated) Fuel Oil Tank
- (3) 1000 Gallon (Estimated) Fuel Oil Tank
- Dirt Track
- Fence
- Water Tank
- Water Well

0 100 200

SCALE IN FEET

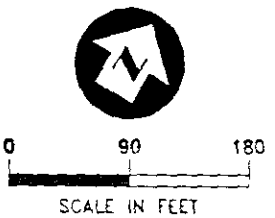
PRE-DEVELOPMENT SITE PLAN
MINAMI NURSERY PROPERTY

Hayward, California

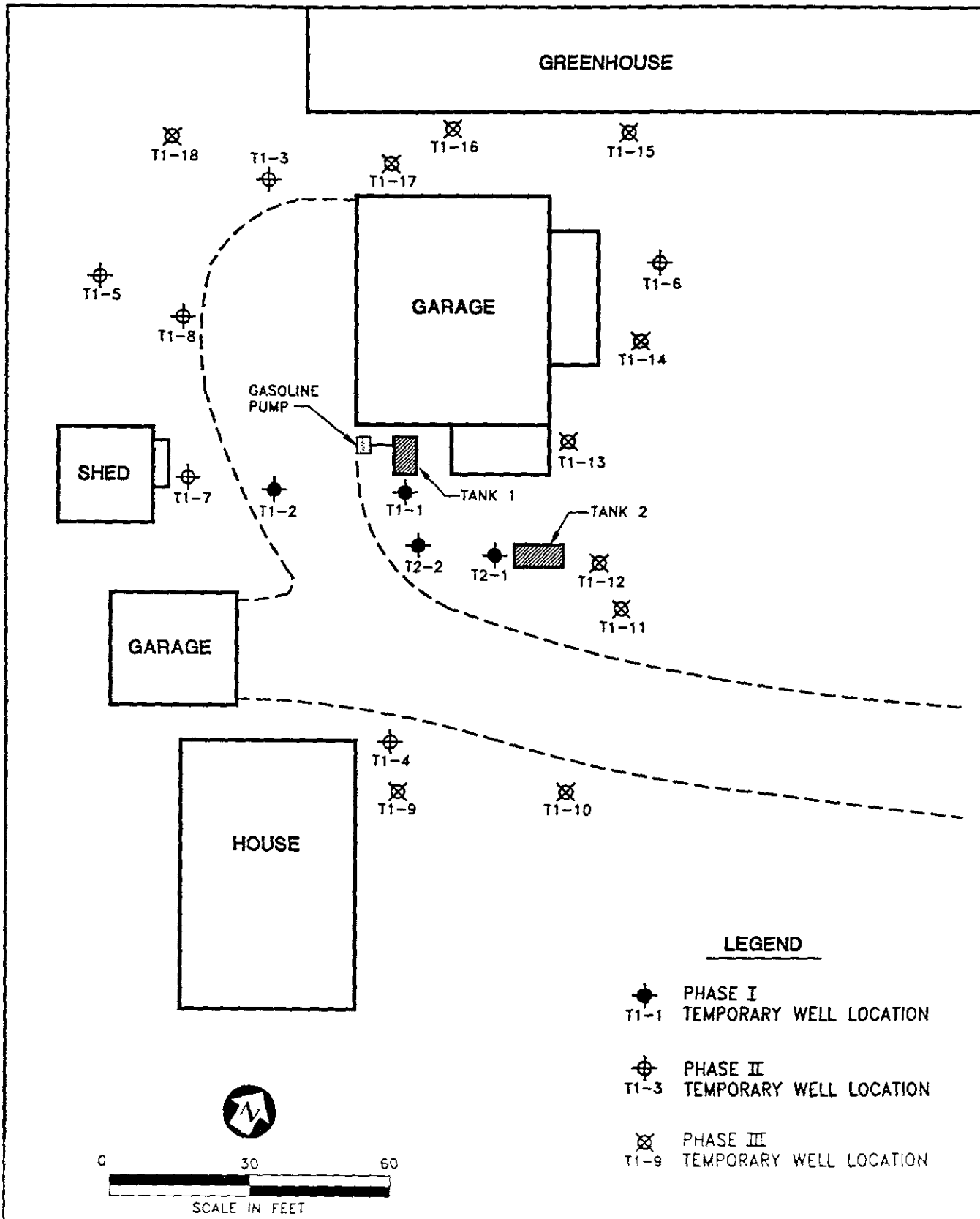


LEGEND

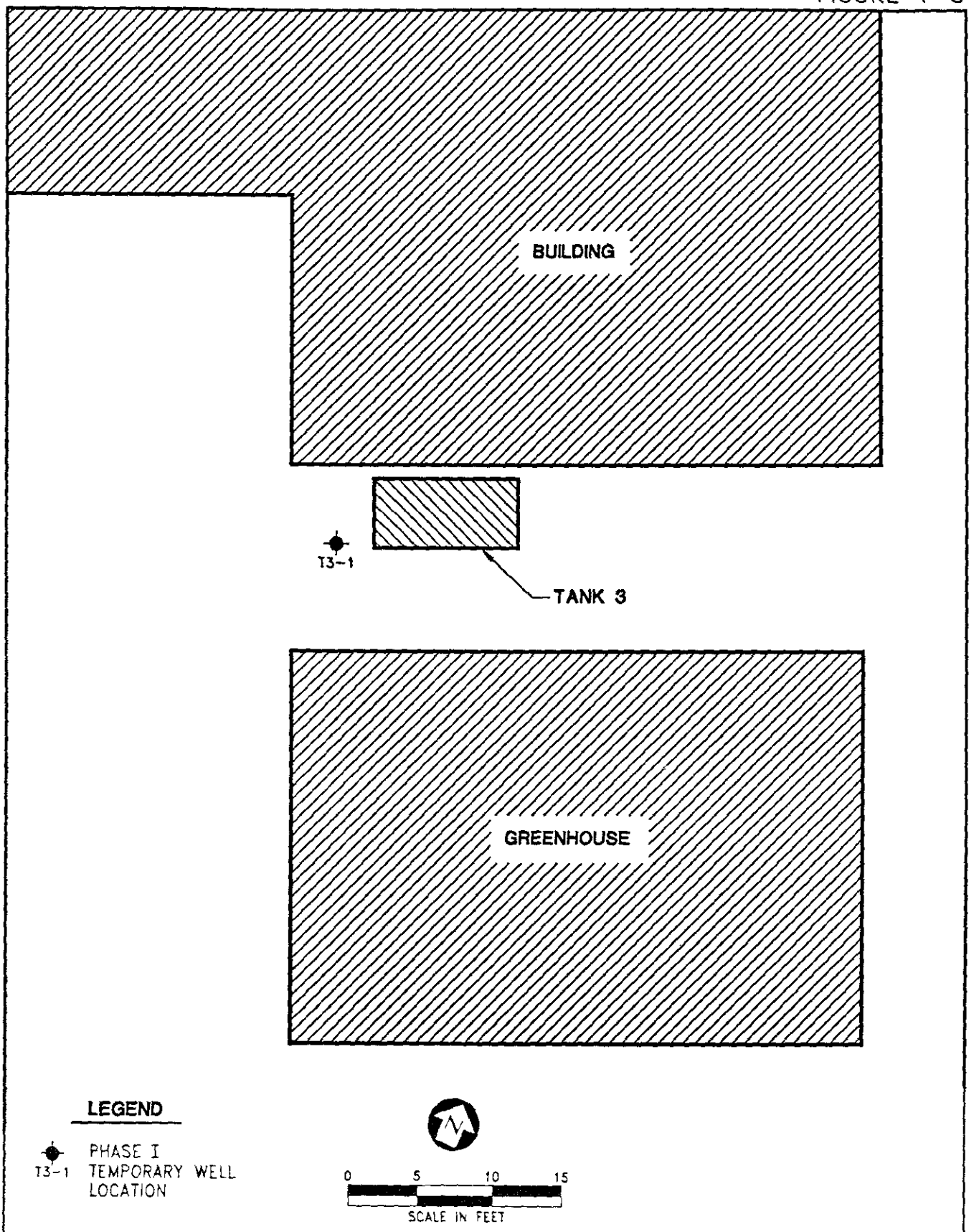
- Exterior Boundary Line
- Lot Line
- Minami Nursery Site



POST-REDEVELOPMENT SITE PLAN
MINAMI NURSERY PROPERTY
Hayward, California



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



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

TABLE 1.1

PHASE I ANALYTICAL RESULTS
SOIL SAMPLES
MINAMI NURSERY SITE, HAYWARD

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 1.2

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
1-2	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 1.3

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

groundwater contamination in the vicinity of Tank 1 (Figure 1-4). Analytical results for the Phase II investigation are summarized in Table 1.3.

- 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 1.4) suggested that groundwater contamination was limited to the confines of the site (Figure 1-4).

TABLE 1.4

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

REGULATORY CONSIDERATIONS

The remediation program at the Minami Nursery site was implemented following regulations and guidelines addressing underground fuel storage tanks. These guidelines are discussed under: 1) underground storage tank regulations; and 2) hazardous waste classification.

Underground Storage Tank Regulations

In 1983, California became one of the first states in the nation to regulate the construction, permitting, and monitoring of underground storage tanks (USTs) with the enactment of the Underground Storage Tank Act. The state UST law is

commonly called the "Sher Bill" (AB 1362). In addition, the "Cortese Bill" (AB 2013), creating an ongoing registration program for all USTs in California, was enacted in 1983. Since 1983, California UST regulation has evolved through more than a dozen bills amending the basic legislation (Elliot and Morell, 1989).

These laws consider USTs as any UST or combination of USTs, including related piping, that store regulated substances "substantially or totally beneath the surface of the ground." Tanks with at least 10% of their volume (including piping) below the ground surface are considered USTs. Regulated substances covered by the legislation include:

- All substances listed as hazardous by the California Department of Health Services (DHS) and/or by California Occupational Safety and Health Administration (COSHA);
- Flammable and combustible liquids as defined by the National Fire Protection Association (NFPA); and
- Hazardous substances for which the United States Environmental Protection Agency (EPA) has established "reportable quantities" under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 and the Superfund Amendments and Reauthorization Act (SARA) of 1986.

The Sher Bill assigns the State Water Resources Control Board (SWRCB) the responsibility of creating and adopting standards for UST construction and operation. The nine Regional Water Quality Control Boards (RWQCBs), which are subsidiary to the SWRCB, are responsible for determining cleanup procedures and standards for leaking USTs. County governments have primary authority for implementation of UST programs. Cities may operate UST programs in lieu of county authority, if proper notification is presented before 1 July 1990. County programs are excluded from jurisdictions where city programs operate. All county and/or city programs in operation before 31 December 1989 are required to implement the state provisions on or before 1 January 1991 (Baker and Hostetler, 1990).

The Cortese Bill (AB 2103) created an ongoing registration program for all USTs in California. All owners of USTs were required to register their tanks with the SWRCB by 1 July 1984 and new USTs are to be registered as they are installed. Between 1984 and 1987, over 161,000 USTs were registered with the SWRCB (Elliot and Morell, 1989). In 1987, the state law changed (AB 1413), removing the SWRCB from the registration process. As of 1 January 1988, owners of USTs must apply for registration permits through locally-administered programs (Elliot and Morell, 1989).

The state UST legislation requires owners and operators to report releases and provides procedures for the characterization and cleanup of contamination resulting from releases. Owners and operators are liable for all corrective action costs whether incurred directly by them or the RWQCB or local UST agency. Unauthorized releases from containment must be reported within 24 hours to the local agency, RWQCB and the State Office of Emergency Services (OES). Within 5

days of the release incident, the permittee must provide a written report detailing containment and cleanup activities. Following the release, the local agency will determine whether the facility's permit should be modified or revoked (Reference 8).

In general, responsibility for the cleanup of contaminated sites rests with the DHS and/or the SWRCB and the RWQCB if water quality is threatened (under the Porter-Cologne Water Quality Act of 1969). However, local UST programs, such as the ACHCSA UST program, are encouraged to provide on-site supervision of cleanup efforts at hazardous material spill sites. State (Carpenter-Presley-Tanner Hazardous Substance Account Act) and federal (SARA) Superfund programs make funds available to local UST programs willing to undertake supervision of remediation activities. Since 1988, a SWRCB administered pilot program has provided training and funding for local abatement activities. In addition, SARA authorizes funding for local UST abatement programs.

A task force of state and local officials, presided over by the SWRCB, has prepared a LUFT Field Manual which presents a "cookbook" approach to site investigation and preliminary mitigation measures for USTs (State of California Leaking Underground Fuel Tank Task Force, 1989). Three investigation/mitigation categories are defined in the LUFT Manual: no evidence of soil contamination; soil contamination; and known or suspected groundwater pollution. The LUFT Manual is revised and updated periodically, and is recommended to guide local agencies participating in pilot cleanup programs. In addition, several regions of the RWQCB, such as the San Francisco Bay Region, have prepared similar guidelines (RWQCB, 1989).

Hazardous Waste Classification

Under California law, a "hazardous material or waste" is defined as "...a substance or combination of substances, which, because of its quantity, concentration, or physical chemical, or infectious characteristics may either:

- Cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or
- Pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed or otherwise managed" (Title 26, California Code of Regulations, Section 66084).

Materials or wastes are classified as hazardous, depending on a property or combination of properties they potentially manifest. These properties include toxicity, corrosivity, ignitability, and/or reactivity. Under California law, approximately 800 substances are listed as hazardous.

Total threshold limit concentrations (TTLCs) and soluble threshold limit concentrations (STLCs) are compound-specific concentration levels that have been established for many compounds in soil by the State of California to evaluate toxicity. TTLC is defined as "...the concentration of a solubilized, extractable, and nonextractable bioaccumulative, or persistent toxic substance, which, if equalled or exceeded in a waste, renders the waste hazardous" (Title 26, California Code of Regulations, Division 22, Section 66206). STLC is defined as "...the concentration of

a solubilized and extractable bioaccumulative or persistent toxic substance which, if equalled or exceeded in a waste, renders the waste hazardous" (Title 26, California Code of Regulations, Division 22, Section 66194).

Presently there is a total of 38 inorganic and organic substances for which there are published TTLC and STLC values (Title 26, California Code of Regulations, Division 22, Section 66700). Materials or wastes containing the remaining 762 substances which are considered hazardous, but for which there are no published TTLC or STLC values (e.g., total petroleum hydrocarbons [TPH]), are evaluated on a case-by-case risk assessment basis by regulatory agencies. This risk assessment considers such site-specific criteria as unsaturated soil zone confinement, depth to groundwater, direct water infiltration, and beneficial uses of groundwater in the area. Thus, acceptable standards may vary between state and local agencies and may be evaluated by multiple agencies.

At present, there are no enforceable standards for TPH, and evaluations of TPH impacts to the environment are assessed on a case-by-case basis. However, the RWQCB uses 100 mg/Kg as a minimum criterion for additional characterization in underground storage tank investigations. The DHS uses 1,000 mg/Kg as a minimum criterion for remediation. A concentration of 1,000 mg/Kg TPH is considered hazardous by virtue of its potential flammability.

SECTION 2

FIELD IMPLEMENTATION

INTRODUCTION

The remedial tasks described in this section were performed between 6 November 1989 and 22 March 1990. These tasks include: excavation and removal of the UFSTs; transport and disposal of the UFSTs; excavation and stockpiling of associated contaminated soil; and backfilling, including compaction, of the excavations. The location of the tanks and the lateral extent of the excavations are shown on Figures 2-1 and 2-2.

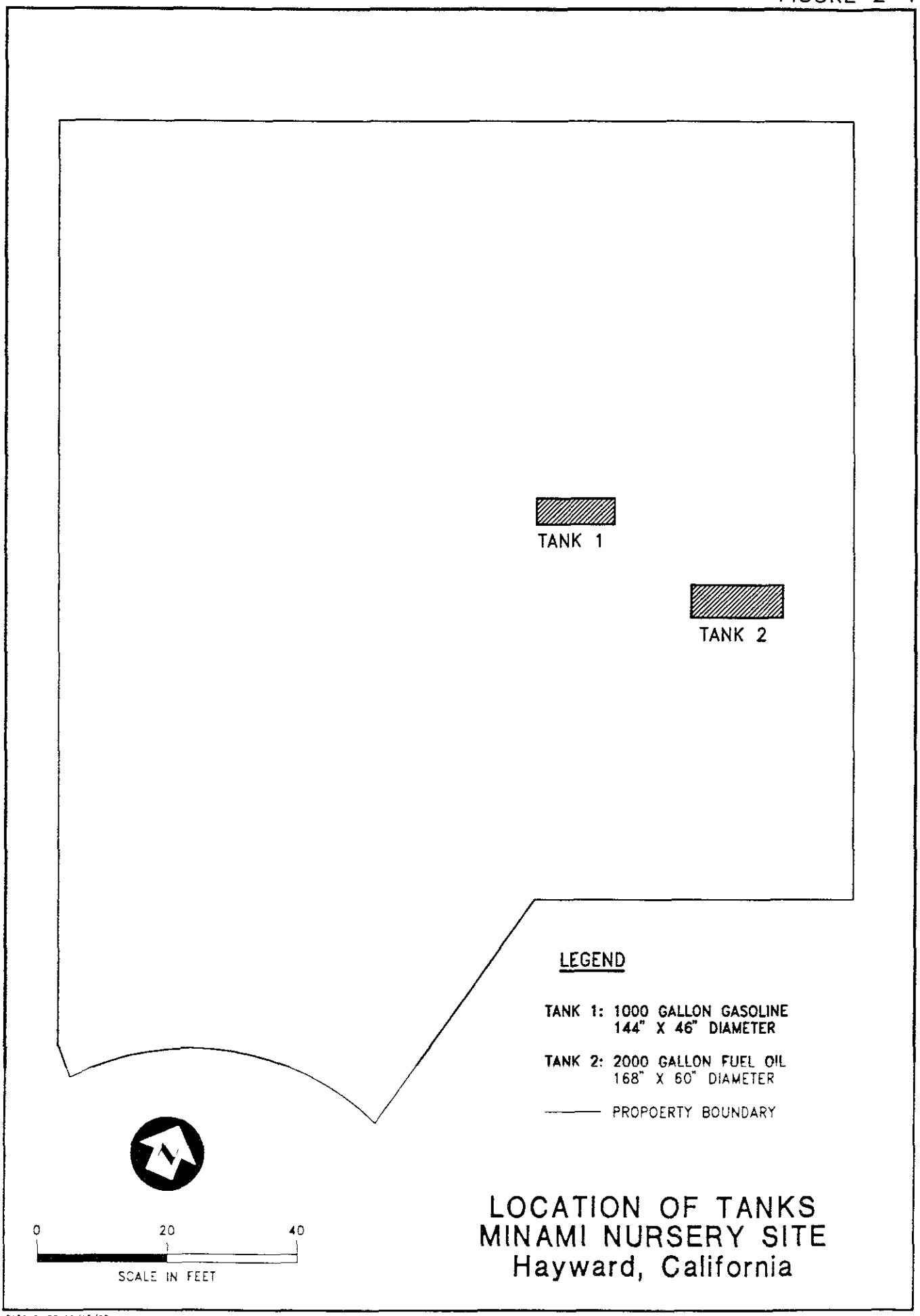
Removal of the gasoline tank (Tank 1) and the fuel oil tank (Tank 2) was performed between 6 and 8 November 1989. Excavation/stockpiling of associated contaminated soil took place from 6 November to 5 December 1989. Backfilling and compaction of the excavations was implemented during 19 through 22 March 1990.

Photodocumentation of the remedial work is contained in Appendix A. The ACHCSA-approved work plan is presented as Appendix B. Appendix C contains applicable permits and manifests. Chain-of-custody records are contained in Appendix D. Appendix E contains complete laboratory analytical results.

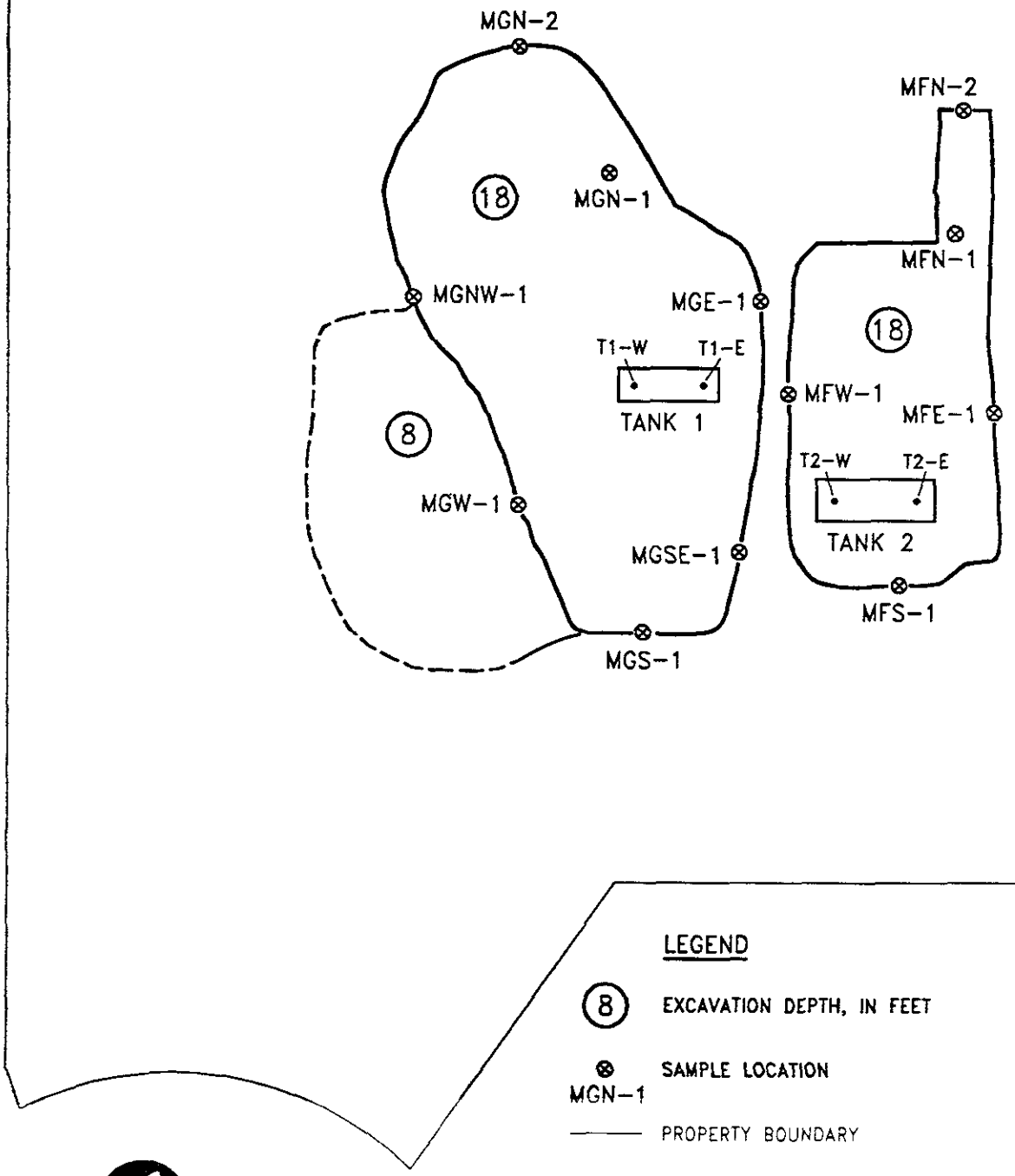
TANK EXCAVATION, REMOVAL, TRANSPORT AND DISPOSAL

Tank removal work began on 6 November 1989 with the location and uncovering of the two USTs. The location, true configuration, and size of these tanks (as uncovered) is displayed on Figure 2-1. Tank excavation/removal was performed with the aid of a hydraulic excavator (John Deere Model 790D-LC), a backhoe with a loader (John Deere Model 710D), and a front-end loader (John Deere Model 544E).

The fuel oil tank, Tank 2, was the first to be uncovered (Photo 3; Appendix A). During uncovering operations, a hole was observed in the side of the tank. A black, oily liquid was discovered to be leaking from this hole (Photo 5; Appendix A). A piece of wood was used to plug the hole, thus preventing the liquid from spilling into the excavation surrounding the tank. On 8 November 1989, approximately 750 gallons of liquid was pumped from Tank 2 into a vacuum truck (Photo 4; Appendix A). Measurement of the tank indicated that the tank's volume was 2,000 gallons instead of 1,000 gallons as originally reported (Emcon Associates, 1988).



LOCATION OF TANKS
MINAMI NURSERY SITE
Hayward, California



EXCAVATION LIMITS AND SAMPLE LOCATIONS MINAMI NURSERY SITE Hayward, California

Upon uncovering, the gasoline tank, Tank 1, was discovered to be larger than originally reported (1,000 gallons as opposed to 500 gallons) (by Emcon Associates, 1988). The tank was free of liquid, but contained a 1/2-inch thick layer of sludge along the tank bottom.

Following uncovering and removal of residual tank products, dry ice (solid carbon dioxide) was placed in both tanks (approximately 20 pounds placed in Tank 1 and approximately 35 pounds placed in Tank 2) and the tanks were allowed to inert for a minimum period of approximately 1.5 hours prior to tank removal. When the lower explosive limit (LEL) was measured at less than 20% for each tank, the tanks were removed from their excavation pits. Mr. Scott Seery of ACHCSA and Chief Jim Ferdinand of ECFPD witnessed the removal of both tanks.

Upon removal, it was observed that Tank 2 had a hole in its underside (Photos 11 and 12; Appendix A) in addition to the one it its side. No holes were observed in Tank 1.

Once removed, the tanks were loaded on trucks and transported, by H & H Ship Services Company, as hazardous material, to the disposal site. The manifests for the transport of the tanks and the residual materials in the tanks are contained in Appendix C.

Two soil samples were collected from beneath each tank, one near each end of each tank. Soil sampling protocol consisted of driving 6-inch long, 2.0- or 2.5-inch diameter brass tubes into undisturbed soil materials, extracting the tubes and samples from the soil, capping the brass sampling tubes with Teflon-tape and nonreactive plastic caps, and refrigeration and transportation, under chain-of-custody records, to a DHS-certified hazardous waste laboratory for analysis using EPA- and LUFT-Manual-approved methods. The locations of these samples are displayed on Figure 2-2.

EXCAVATION/STOCKPILING OF CONTAMINATED SOIL

Excavation/stockpiling of both uncontaminated and contaminated soil from the excavations began on 9 November 1989. A hydraulic excavator and a front-end loader were utilized to facilitate this portion of the work.

Prior to stockpiling any soil, bermed, plastic-lined (10-millimeter thick Visqueen) stockpile areas were constructed (Photo 15; Appendix A). Contaminated soil was stockpiled separately from uncontaminated overburden. After each day's work, the soil stockpiles were covered with plastic sheeting (10-mm thick Visqueen) to prevent release of vapors to the environment and to prevent erosion and leaching due to moisture infiltration and/or runoff.

Sampling Techniques

The lateral and vertical extent of contaminated soil was evaluated by measuring soil vapors with a photoionization detector (PID), Photovac Model MicroTIP. This device measures total ionizable vapors (TIV), which are commonly present in hydrocarbon contaminated soils. Soil vapor measurement protocol consisted of calibrating the PID, placing approximately 50 grams of soil in a plastic bag, sealing

the bag, exposing the soil to sunlight, unsealing the bag and inserting the PID sampling tube in the headspace area, and electronic and manual recording of the TIV concentration. This monitoring is used to access worker exposure during excavation activities, to segregate obviously contaminated soil, and to select locations for sidewall and base of excavation sampling. The TIV concentrations were measured by the PID as the excavation work proceeded until readings of < 2 ppm and/or no detectable soil vapors were recorded. Confirmatory soil samples were then collected to assess the reliability of the PID readings and to characterize the lateral and vertical extent of the contamination.

Soil sampling protocol consisted of driving 6-inch long, 2.0- to 2.5-inch diameter brass tubes into undisturbed soil materials, extraction of the tubes and samples from the soil, capping the brass sampling tubes with Teflon-tape and non-reactive plastic caps, refrigeration and transportation, under chain-of-custody records, to a DHS certified hazardous waste laboratory for analysis using EPA- and LUFT-Manual-approved methods.

Gasoline Tank Excavation

Excavation of contaminated soil surrounding Tank 1 was initiated first. Work began on 9 November and was completed on 5 December 1989. PID measurements indicated contamination beginning between depths of 6 and 8 feet below grade directly beneath the tank. During excavation activities, it was observed that the highest PID measurements (up to 2,400 ppm TIV) could be correlated with a layer of blue-green clay that was initially encountered at a depth of 12.5 feet and extended throughout the excavation. This blue-gray layer extended down to groundwater.

In order to assess the lateral and vertical extent of the contamination, trenches were first excavated to the northwest (Photo 16; Appendix A), southwest (Photo 17; Appendix A), south (Photo 18; Appendix A). and west. No trench was advanced towards the east because the eastern boundary of the gasoline tank contamination was roughly contiguous with the western boundary of the fuel oil tank contamination. As the lateral extent of contamination was characterized, the areas between the trenches were excavated, with contaminated soil removed and stockpiled. Excavation of the trenches to the northeast, southeast, and west resulted in formation of an open pit, with Tank 1 at the approximate pit center.

As mentioned above, uncontaminated overburden materials were stockpiled separately from the contaminated materials. The original stockpile of uncontaminated material was placed on the southwestern portion of the site (Photo 22; Appendix A). As the gasoline tank excavation expanded to the west, this stockpile of uncontaminated soil had to be moved to facilitate characterization of the western lateral edge of the gasoline contamination. Because of site space constraints this material was placed in the remediated fuel oil tank excavation. Prior to placement in the fuel oil tank excavation, seven soil samples were collected from the stockpile. These seven samples were composited into one sample and analyzed for total petroleum hydrocarbons (TPH) as gasoline, kerosene and diesel, benzene, toluene, ethylbenzene and total xylenes (BTEX). Analytical results indicated that the material was acceptable as fill (Section 3; Appendix E); thus, it was used to

backfill the fuel oil tank excavation (Photos 29 and 30; Appendix A). ACHCSA approved the placement of the overburden in the fuel oil tank excavation (Peacock, T., 1989). Removal of the stockpile allowed for continued characterization of the gasoline contamination to the west.

Seven confirmatory soil samples (MGN-1, MGN-2, MGE-1, MGSE-1, MGS-1, MGW-1, MGNW-1) were collected to characterize the lateral extent of the gasoline contamination. Table 2.1 identifies the sample, TIV concentration recorded by the PID, sample collection depth, and sidewall compass direction. Samples locations are shown on Figure 2-2.

At its greatest extent, the roughly rectangular-shaped gasoline tank excavation measured approximately 75 feet (northwest-southeast) by 36 feet (southwest-northwest) (Figures 2-2 and 2-3). The maximum depth was approximately 18 feet below grade. An 8-foot deep shelf was cut into the southwest section of the excavation to facilitate heavy equipment access (Figure 2-2). Approximately 977 cubic yards of soil were removed during the excavation. The in-bank volume of contaminated soil excavated from the pit can be estimated to be between 500 and 545 cubic yards.

An isopach (thickness) map of the TPH contamination uncovered during excavation is presented as Figure 2-3. Figures 2-4 (north-south) and 2-5 (east-west) are cross-sectional views of the extent of the contaminated soil in the excavation.

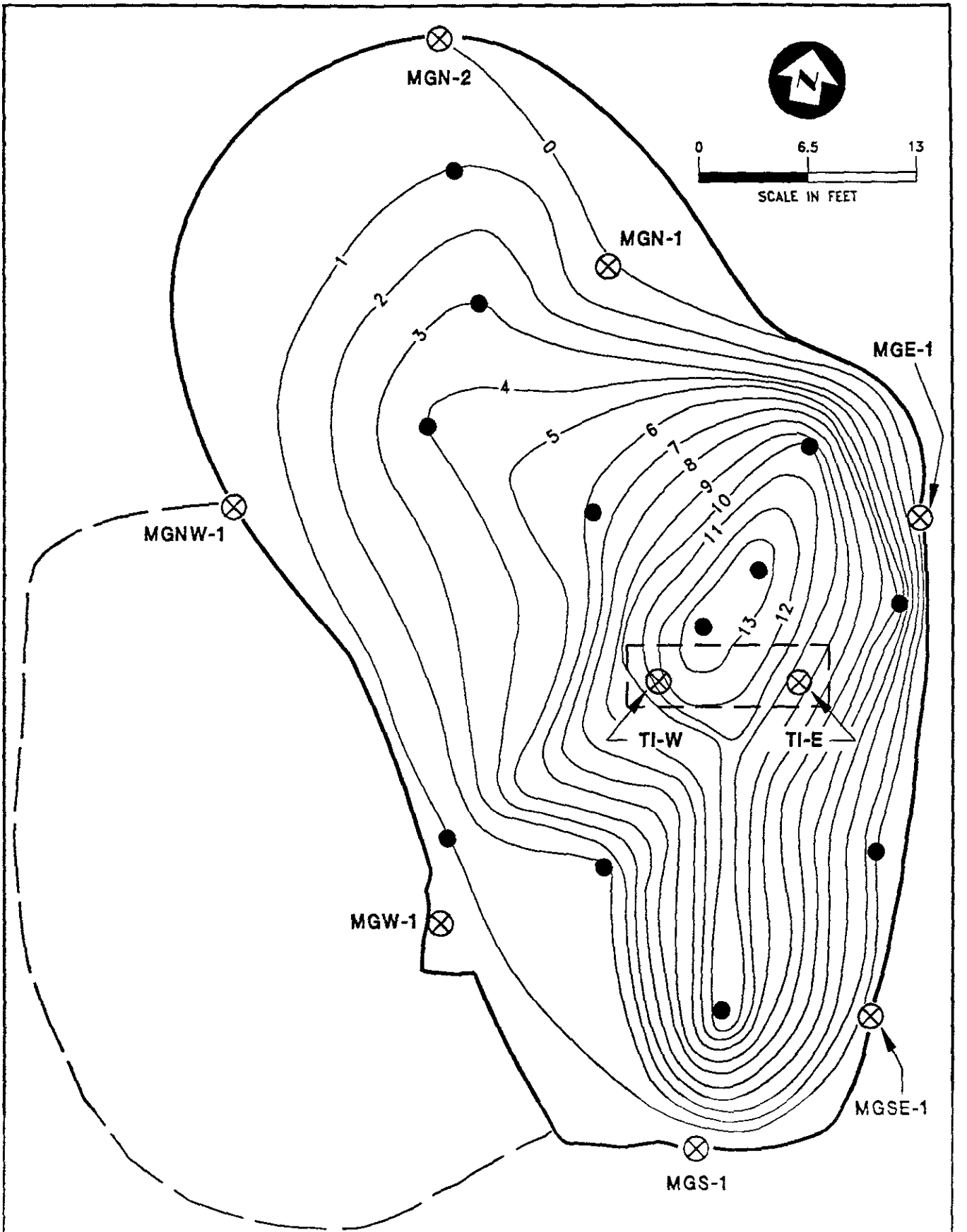
TABLE 2.1

GASOLINE TANK EXCAVATION
CONFIRMATORY SOIL SAMPLES
MINAMI NURSERY SITE, HAYWARD, CALIFORNIA

Sample ID	Matrix Description	TIV Concentration (ppm)	Sample Depth (feet)	Sidewall
MGN-1		0.0	18	Northeast
MGN-2	Brown to blue-green clay	0.8	17	North
MGE-1		0.0	18	East
MGSE-1	Blue-green clay; no odor	0.0	18	Southeast
MGS-1		0.0	18	South
MGW-1	Brown clay	0.0	18	Southwest
MGNW-1		0.0	18.5	Northwest

TIV = Total Ionized Vapors

FIGURE 2-3



GASOLINE TANK EXCAVATION
TPH ISOPACH MAP
MINAMI NURSERY SITE
Hayward, California

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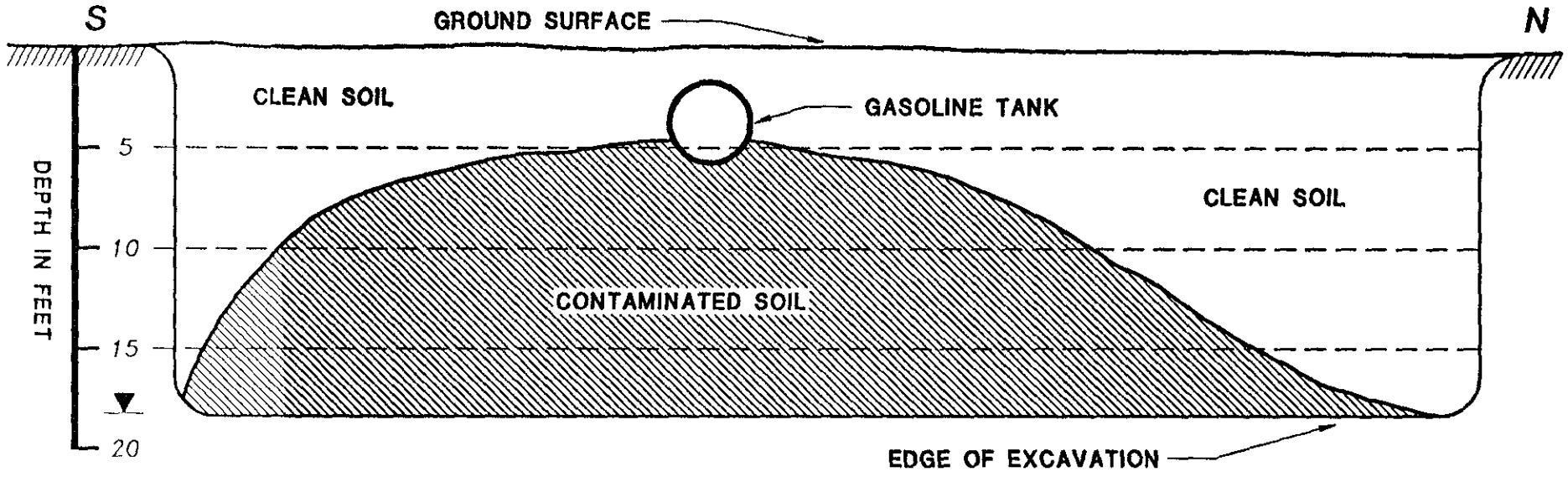
ENGINEERING-SCIENCE



LEGEND

STATIC GROUNDWATER LEVEL

CONTAMINATED SOIL

0 6.5 13

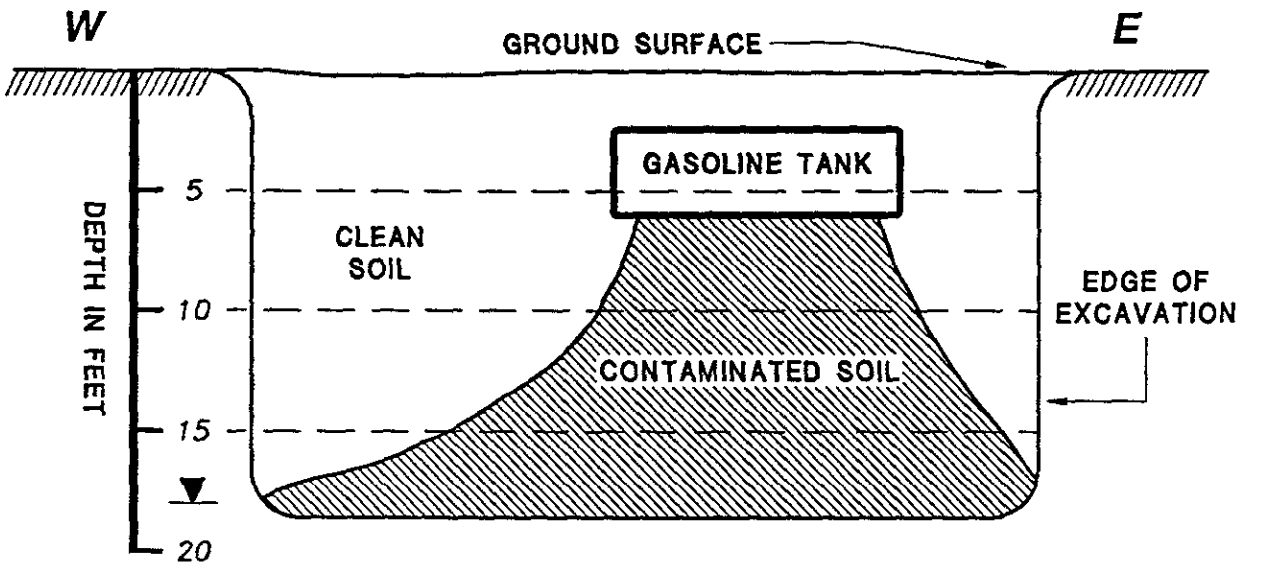
SCALE IN FEET

CROSS-SECTIONAL VIEW
GASOLINE TANK EXCAVATION
MINAMI NURSERY SITE
Hayward, California

FIGURE 2-4

ENGINEERING-SCIENCE

C150-11 R3 08/15/90



LEGEND

STATIC GROUNDWATER LEVEL

CONTAMINATED SOIL

0 6.5 13

SCALE IN FEET

CROSS-SECTIONAL VIEW
GASOLINE TANK EXCAVATION
MINAMI NURSERY SITE
Hayward, California

Fuel Oil Tank Excavation

Excavation of contaminated soil associated with the fuel oil tank (Tank 2) was initiated on 14 November 1989 (Photos 19 and 20; Appendix A). The characterization of the lateral/vertical extent of the soil contamination was completed by 27 November 1989.

Initially, the excavation was extended to the south. The TIV measurements collected were generally low, ranging from 0 to 13 ppm. Characterization of the western extent of soil contamination occurred next. Following characterization of the western edge of contamination, the northern (Photo 21, Photos 23 to 26; Appendix A) and eastern sections of the excavation were expanded. The eastern extent of the excavation was limited by the property boundary.

Five soil samples (MFS-1, MFW-1, MFE-1, MFN-1 and MFN-2) confirming the lateral boundaries of the excavation were collected. One sample, MFN-1, contained 1,200 ppm TPH (Section 3), thus facilitating further characterization of the northern boundary of contamination. Excavation continued approximately 15 feet north of Sample MFN-1, until PID measurements of between 2.5 and 3.4 ppm were recorded at a depth of 21 feet. Sample MFN-2 was then collected at this location (Figures 2-2 and 2-6). Table 2.2 correlates sample identification with soil matrix, TIV concentration, depth of sample, and sidewall.

TABLE 2.2

FUEL OIL TANK EXCAVATION
CONFIRMATORY SOIL SAMPLES
MINAMI NURSERY SITE, HAYWARD, CALIFORNIA

Sample ID	Matrix Description	TIV Concentration (ppm)	Sample Depth (feet)	Sidewall
MFE-1		0.0	17.5	East
MFS-1		0.0	14	South
MFW-1	Green to brown silty clay	0.0	16	West
MFN-1	Gray-green clay	0.0	15	North
MFN-2		3.4	18	North

The extent of the fuel oil tank excavation is shown on Figures 2-2 and 2-6. The excavation measures 58 feet (north-south) at its greatest extent, the key area located on the northeast portion, by 24 feet (east-west). The maximum depth is 18 feet. Approximately 723 cubic yards of material were removed during excavation activities. The in-bank yardage of contaminated soil was estimated to be approximately 130 cubic yards (Figure 2-6).

Figure 2-6 is an isopach (thickness) map of the contaminated soil associated with the Tank 2 excavation. Cross-sectional views of the extent of soil contamination are presented as Figures 2-7 (north-south) and 2-8 (east-west).

Contaminated Soil Stockpiles

As excavation progressed, contaminated soil was stockpiled around the perimeter of the excavations (Photos 33, 34 and 40); Appendix A). The total volume of contaminated soil stockpiled was surveyed at approximately 1,255 cubic yards. The difference between the estimated in-bank yardage of contaminated soil and the surveyed stockpiled contaminated soil is due to pressure release, mechanical breakup, and mixing of contaminated and uncontaminated soil. At the completion of excavation activities, the soil stockpiles were covered with plastic sheeting (10-mm thick Visqueen).

BACKFILL AND COMPACTION OF EXCAVATIONS

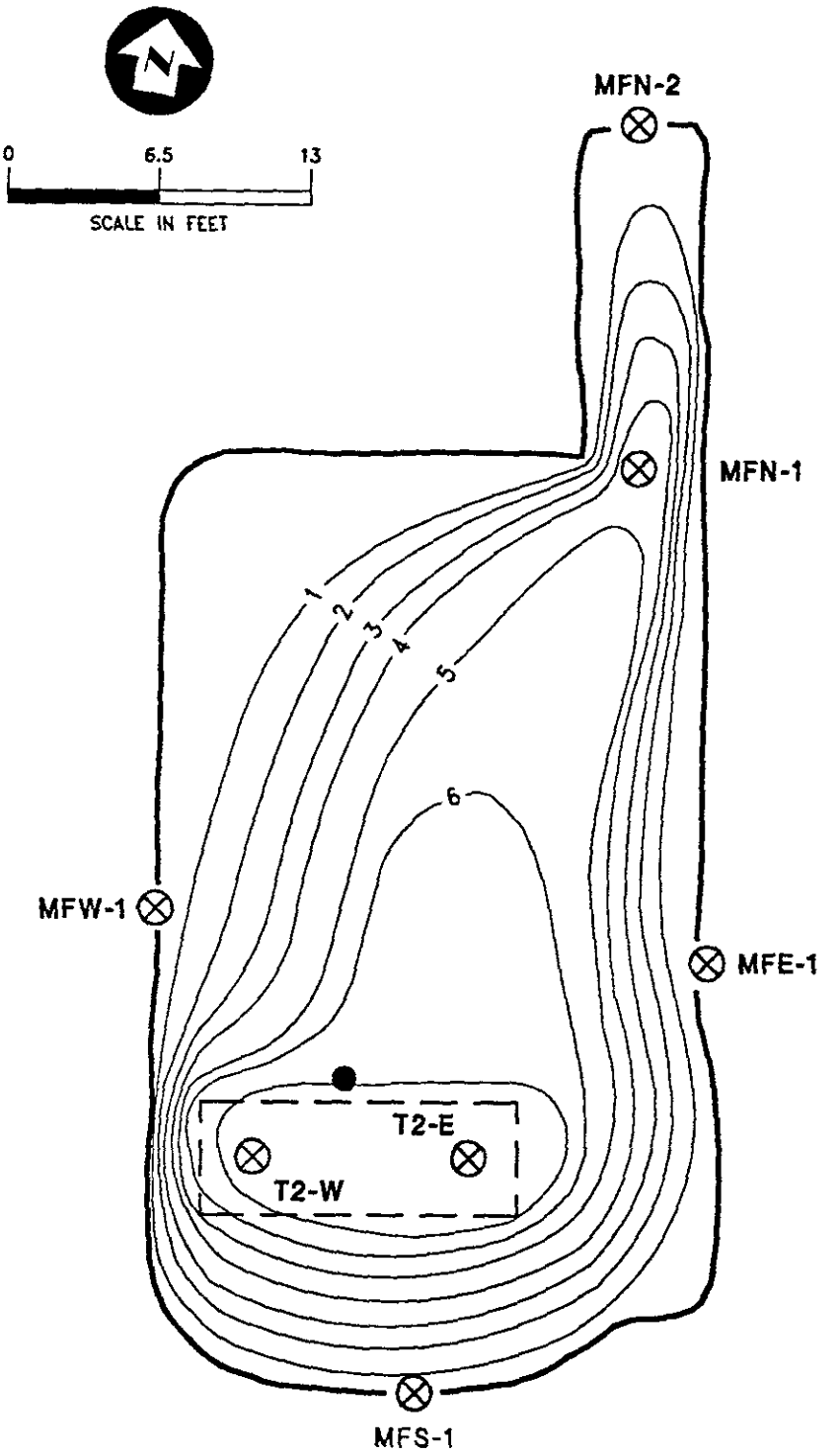
Backfilling of the UFST excavations occurred by 22 March 1990. The fuel oil tank excavation was initially backfilled on 28 November 1989, when it was filled with materials from an on-site, soil stockpile of overburden. Backfilling of the gasoline tank excavation took place between 19 and 22 March 1990.

Transportation of imported fill to the site began on 19 March 1990 (Photo 36; Appendix A). Between 19 and 22 March 1990, a total of 101 truckloads (approximately 1,820 cubic yards) of imported fill materials was delivered to the site.

The backfill material consisted of high-quality imported soil and rock, free of organic material and debris (Photo 35; Appendix A). Prior to placing the material in the excavation, a particle-size analysis (ASTM Test D422-63) and a compaction curve test (ASTM Test D-1557) were performed. Results of these tests are presented in Appendix E.

The imported fill material was placed in the excavation in uniform lifts not exceeding 12 inches in thickness (Photos 37, 38 and 39; Appendix A). Each layer of fill was compacted individually using a self-propelled tamping foot-roller (BOMAG Model 142) (Photos 38 and 39; Appendix A). In-site compaction was randomly checked using a nuclear density gauge (ASTM Test D2922-71). The locations and depths of the in-situ compaction tests are presented on Figure 2-9.

The gasoline tank excavation backfill operation was started on 19 March 1990. Imported fill material was placed in the excavation in one-foot layers from the base of the excavation (18 feet) to approximately 3 to 4 feet below grade. Then, on 21



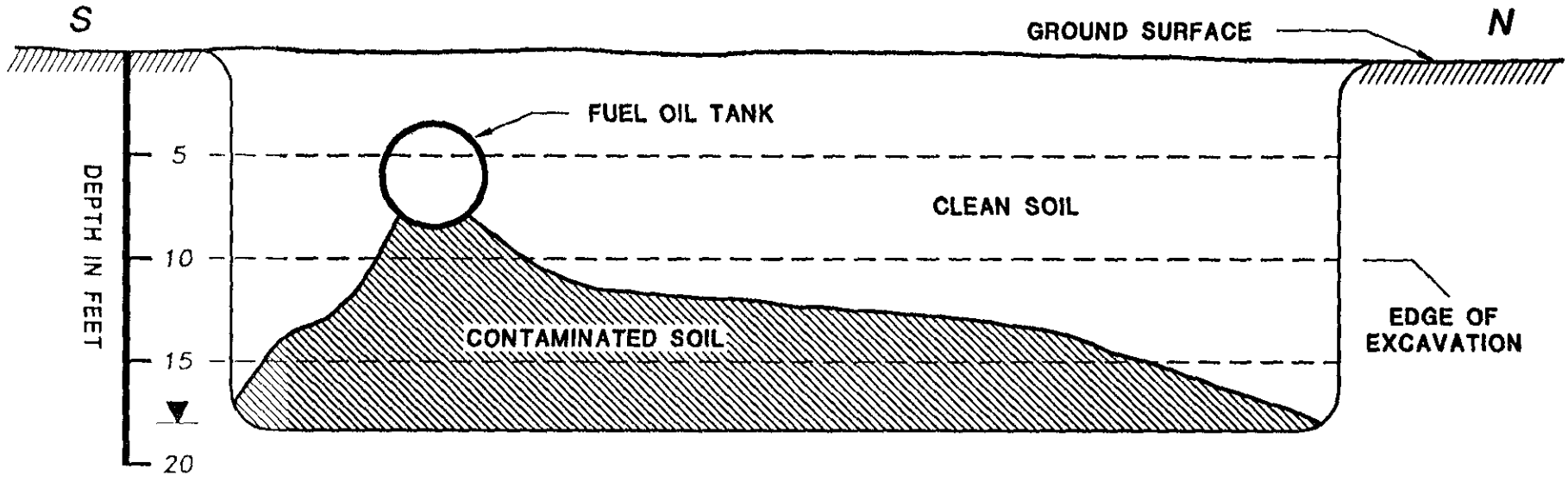
LEGEND

MFS-1 ⊗ SOIL SAMPLE LOCATION

● PID READING LOCATION

—6— CONTAMINATED SOIL THICKNESS, IN FEET

FUEL OIL TANK EXCAVATION
TPH ISOPACH MAP
MINAMI NURSERY SITE
Hayward, California



LEGEND

STATIC GROUNDWATER LEVEL

CONTAMINATED SOIL

0 6.5 13

SCALE IN FEET

CROSS-SECTIONAL VIEW
FUEL OIL TANK EXCAVATION
MINAMI NURSERY SITE
Hayward, California

FIGURE 2-7

ENGINEERING-SCIENCE

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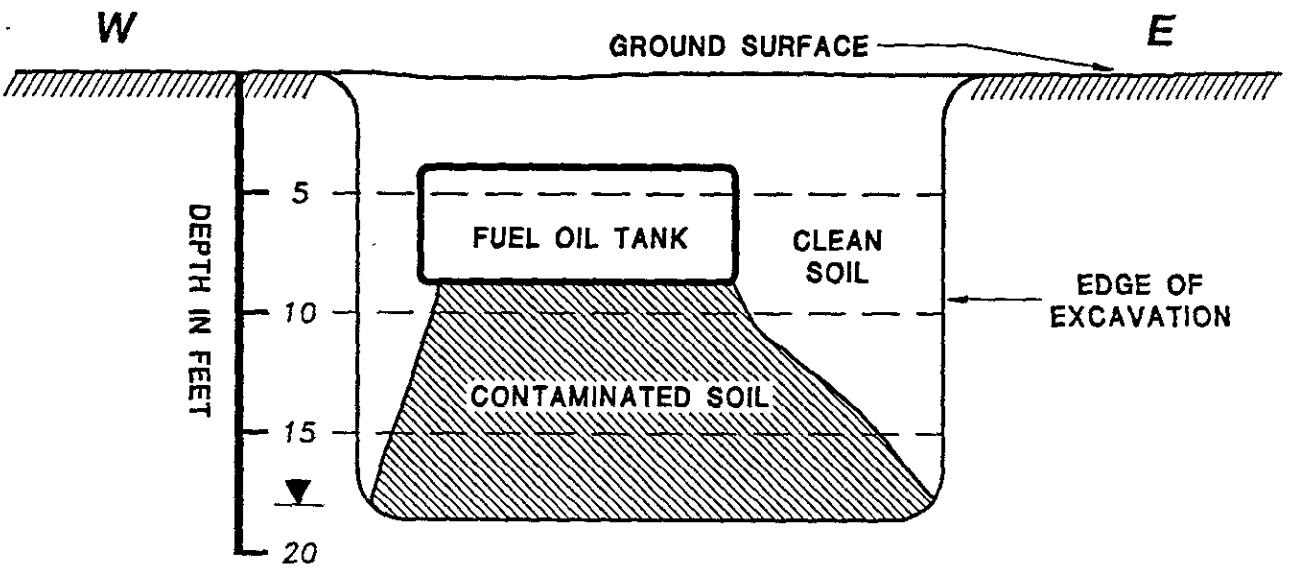


LEGEND

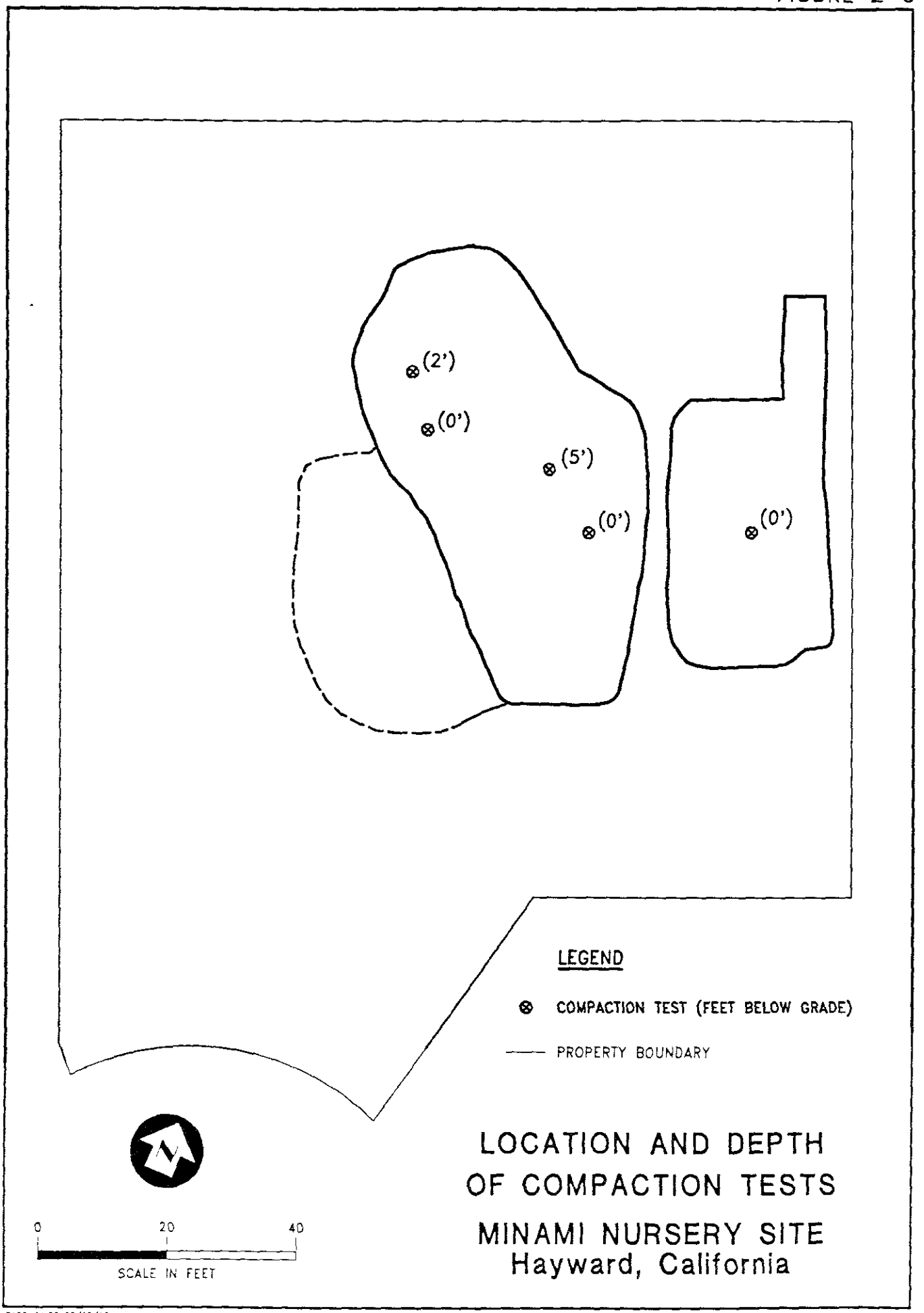
STATIC GROUNDWATER LEVEL

CONTAMINATED SOIL

0 6.5 13

SCALE IN FEET

CROSS-SECTIONAL VIEW
FUEL OIL TANK EXCAVATION
MINAMI NURSERY SITE
Hayward, California



LOCATION AND DEPTH OF COMPACTION TESTS

MINAMI NURSERY SITE
Hayward, California

March 1990, the top 5 feet of the overburden that was used to initially backfill the fuel oil tank excavation was excavated and spread on the imported fill in the gasoline tank excavation (Photos 40 and 41; Appendix A). This material was subsequently capped with imported fill (Photo 42; Appendix A).

Refilling of the fuel oil tank excavation was completed on 21 and 22 March 1990. Imported material was used to backfill the excavation from a depth of 5 feet to ground surface (Photo 42; Appendix A).

SECTION 3

ANALYTICAL RESULTS

INTRODUCTION

Samples collected for this investigation were analyzed for total petroleum hydrocarbons (TPH) as gasoline, diesel, and/or kerosene, for the aromatic hydrocarbons benzene, toluene, ethylbenzene and xylene (BTEX), and for organic lead. Geotechnical tests (particle size analysis, compaction curve, in-situ compaction) were performed during and after backfilling of the excavations.

TPH analyses were performed using modified EPA Method 8015 (gas chromatography). BTEX was quantified using EPA Method 8020. Organic lead was analyzed according to DHS methods described in the LUFT Manual (Reference 5).

The particle size distribution of the backfill material was characterized using ASTM Test D422-63. A compaction curve was established using ASTM Test D-1557. In-situ compaction was assessed using ASTM Test D2922-71.

Tables 3.1 and 3.2 summarize the analytical results for the environmental samples. Geotechnical results are summarized on Tables 3.3, 3.4, and 3.5. Complete chemical and geotechnical results are presented as Appendix E.

GASOLINE TANK EXCAVATION ANALYTICAL RESULTS

Total Petroleum Hydrocarbons

A total of nine soil samples was collected and analyzed for total petroleum hydrocarbons (TPH) as gasoline and diesel from the gasoline tank excavation. Three of these samples were also analyzed for TPH as kerosene. Sample information and corresponding analytical results are presented on Table 3.1.

Two samples were initially collected from below the tank, one under each end from a depth two feet below the tank bottom. These were labeled T1-E and T1-W. Sample locations including analytical results are shown on Figure 3-1. TPH (gasoline) concentrations ranged from not detected (T1-E) to 3,900 mg/Kg (T1-W). TPH as diesel and kerosene was not detected in either sample. These results suggest that the contamination from this tank was primarily gasoline and originated at the western end of the tank.

TABLE 3.1

ANALYTICAL RESULTS FOR SOIL SAMPLES
GASOLINE 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)
T1-E	Underneath East End of Tank	8.0	ND	ND	ND	ND	23	ND	ND	ND
T-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 3.2

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	67[a]	ND	ND	ND	ND	NA
MFN-1	North Wall	15.0	ND	ND	1,200[a]	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.

TABLE 3.3

SIEVE ANALYSIS
FILL MATERIAL SAMPLE
MINAMI NURSERY SITE, CALIFORNIA

ASTM Sieve Size	Particle[a] Diameter	Percent Retained	Cumulative % Retained	Cumulative % Passing
3-inch	75	0	0	100
2.5-inch	62.5	0	0	100
2-inch	50	0	0	100
1.5-inch	37.5	0	0	100
1-inch	25	0	0	100
0.75-inch	19	0	0	100
0.5-inch	12.5	2.1	2.1	97.9
0.375-inch	9.5	2.6	4.7	95.3
No. 4	4.75	6.2	10.9	89.1
No. 10	2.0	9.8	20.7	79.3
No. 40	0.425	11.5	32.2	67.8
No. 200	0.075	29.5	61.7	38.3
Pan		38.3	100.0	

a Reported in millimeters (mm).

TABLE 3.4

HYDROMETER ANALYSIS
FILL MATERIAL SAMPLE
MINAMI NURSERY SITE, CALIFORNIA

Elapsed[a] Time	Particle[b] Diameter	Percent Passing	Adjusted[c] % Passing	Cumulative % Passing
2	0.0296	33.6	12.9	12.9
5	0.0194	29.9	11.5	24.4
15	0.0118	24.5	9.4	33.8
30	0.0085	21.7	8.3	42.1
60	0.0062	18.1	6.9	49.0
250	0.0031	12.8	4.9	53.9
1440	0.0013	11.0	4.2	58.1

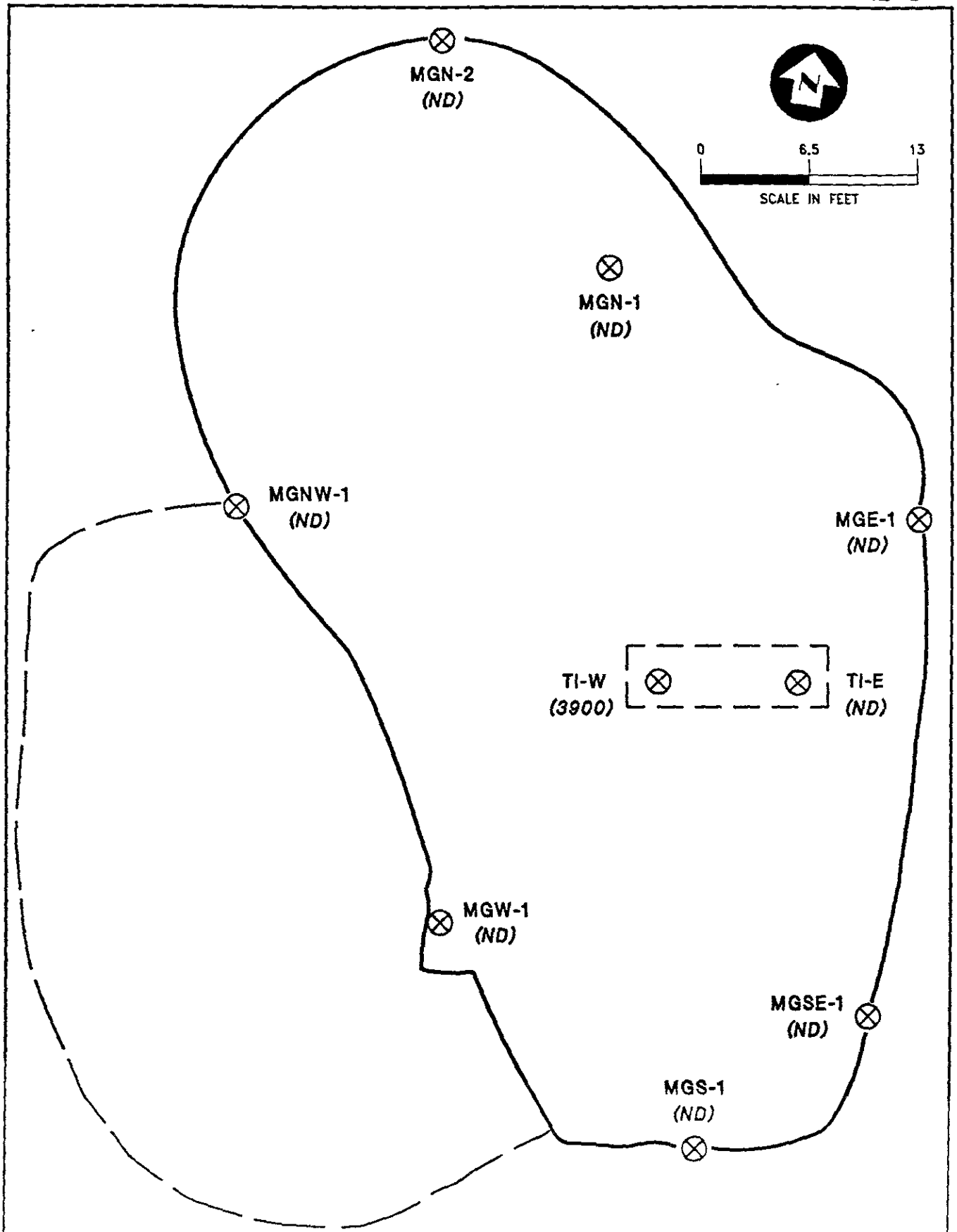
a Reported in minutes.
b Reported in millimeters (mm).
c Equals percent passing times percent finer than No. 200 sieve.

TABLE 3.5

FIELD DENSITY RESULTS
MINAMI NURSERY SITE
HAYWARD, CALIFORNIA

Sample ID	Location	Depth[a] Density	Dry[b]	Moisture[c]	Relative[c]
1	Subexcavated West Side of Gasoline Tank Excavation	2	99.1	18.3	95
2	Subexcavated East Side of Gasoline Tank Excavation	5	100.1	17.8	96
3	Fuel Oil Tank	0	94.1	20.2	90
4	East Side of Gasoline Tank Area	0	98.3	18.2	94
5	Northwest Side of Gasoline Tank Area	0	95.1	16.9	91

a Feet below Ground Surface.
b Pounds per Cubic Foot.
c Percent Dry Weight



LEGEND

MGN-1 ⊗ SAMPLE LOCATION

(3900) TPH CONCENTRATION (mg/Kg)

GASOLINE TANK EXCAVATION
ANALYTICAL RESULTS
MINAMI NURSERY SITE
Hayward, California

During excavation of the gasoline-contaminated soil, concentrations were monitored using a PID which measures TIV concentrations. When it appeared that relatively uncontaminated soil was reached, a sample was collected for laboratory confirmation. In this way, a set of samples and analyses were gathered which characterized the lateral extent of the contamination. These samples were identified as MGE-1 (east wall), MGN-1 (northeast wall), MGS-1 (south wall), MGSE-1 (southeast wall), MGNW-1 (northwest wall), MGN-2 (north wall), and MGW-1 (southwest wall). TPH concentrations for these samples were below the laboratory detection limit (Table 3.1).

Benzene, Toluene, Xylenes, and Ethylbenzene

All of the samples listed above were also analyzed for BTEX. The only samples showing any detectable concentrations of these compounds were MGE-1, with 0.015 mg/Kg xylenes, T1-E, with 0.023 mg/Kg toluene, and T1-W, with 13 mg/Kg benzene, 210 mg/Kg toluene, 210 mg/Kg xylenes, and 85 mg/Kg ethylbenzene. As with the TPH analyses, it appears that the leakage occurred from the western end of the tank. No BTEX was detected in the sidewall confirmatory samples (Table 3.1; Appendix E).

Organic Lead

Only the two initial samples (T1-E and T1-W) were analyzed for organic lead. Organic lead was not detected in either sample (Table 3.1; Appendix E).

FUEL OIL TANK EXCAVATION ANALYTICAL RESULTS

Total Petroleum Hydrocarbons

The initial TPH samples collected directly under the fuel oil tank (T2-W and T2-E) contained no detectable concentrations of TPH as gasoline, diesel or kerosene (Table 3.2). Sample locations and corresponding analytical results are shown on Figure 3-2.

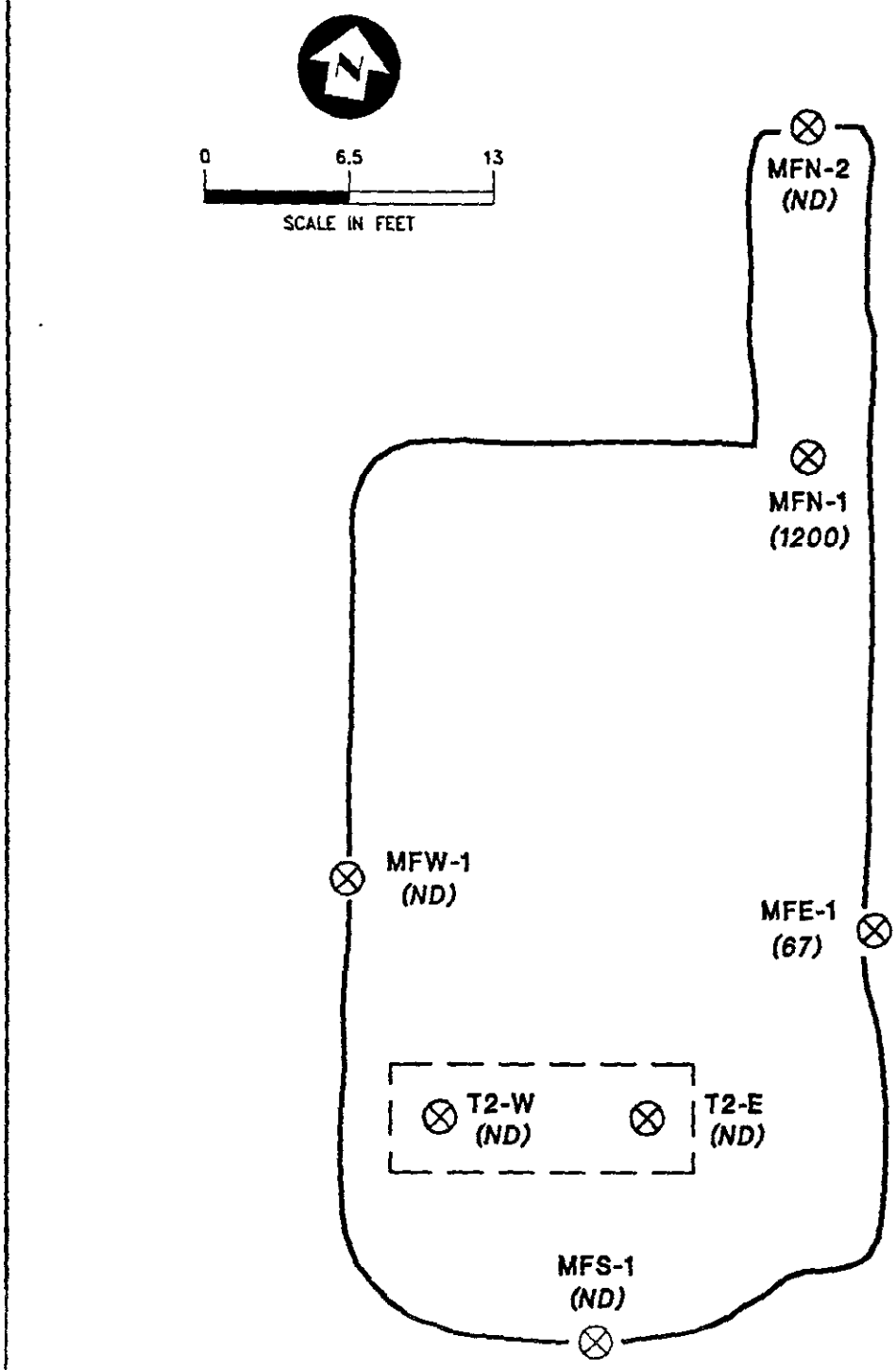
However, further excavation in the area did show evidence of contamination. A sample collected to the north of the tank location (MFN-1) contained 1,200 mg/Kg diesel and one to the east (MFE-1) had 67 mg/Kg TPH as diesel. The other samples collected (MFS-1, MFW-1, and MFN-2) contained no detectable levels of TPH as gasoline, diesel, or kerosene.

Benzene, Toluene, Xylenes and Ethylbenzene

All samples collected were analyzed for BTEX. Three samples contained BTEX above method detection limits. Sample T2-W contained toluene at a concentration of 0.052 mg/Kg. Benzene (0.032 mg/Kg), toluene (0.024 mg/Kg), and total xylenes (0.200 mg/Kg) were detected in Sample MFW-1. Sample MFN-1 contained 0.030 mg/Kg benzene, 0.150 mg/Kg toluene, 0.010 mg/Kg ethylbenzene and 0.056 mg/Kg xylenes.

Organic Lead

Samples T2-W and T2-E were analyzed for organic lead. Neither sample contained detectable quantities of organic lead (Table 3.2; Appendix E).



LEGEND

MFE-1 ⊗ SAMPLE LOCATION

(67) TPH CONCENTRATION (mg/Kg)

FUEL OIL EXCAVATION
ANALYTICAL RESULTS
MINAMI NURSERY SITE
Hayward, California

OVERBURDEN SOIL STOCKPILE ANALYTICAL RESULTS

Soil from the overburden soil stockpile was used to backfill the Tank 2 excavation. Seven soil samples were collected from the stockpile of overburden and composited into one sample for analyzed of TPH and BTEX (Appendix E). TPH as gasoline and kerosene were not detected; however, 14 mg/Kg TPH reported as diesel was detected. The TPH quantified did not match the standard for diesel and quantification was based on an area sum within the C12 to C26 boiling range (Appendix E). BTEX was not detected in the composite sample.

The TPH results can be interpreted using two end members. Either every individual soil sample contained 14 mg/Kg TPH, or only one of the soil samples contained 98 mg/Kg TPH and the remaining six samples had TPH concentrations below the detection limit.

GEOTECHNICAL RESULTS

Geotechnical tests were performed during and following backfilling of the excavations. These tests concerned the characteristics of the material used to backfill the excavations. Tests performed included: particle size distribution analysis; laboratory compaction curve; and in-situ field compaction tests.

Particle Size Distribution Analysis

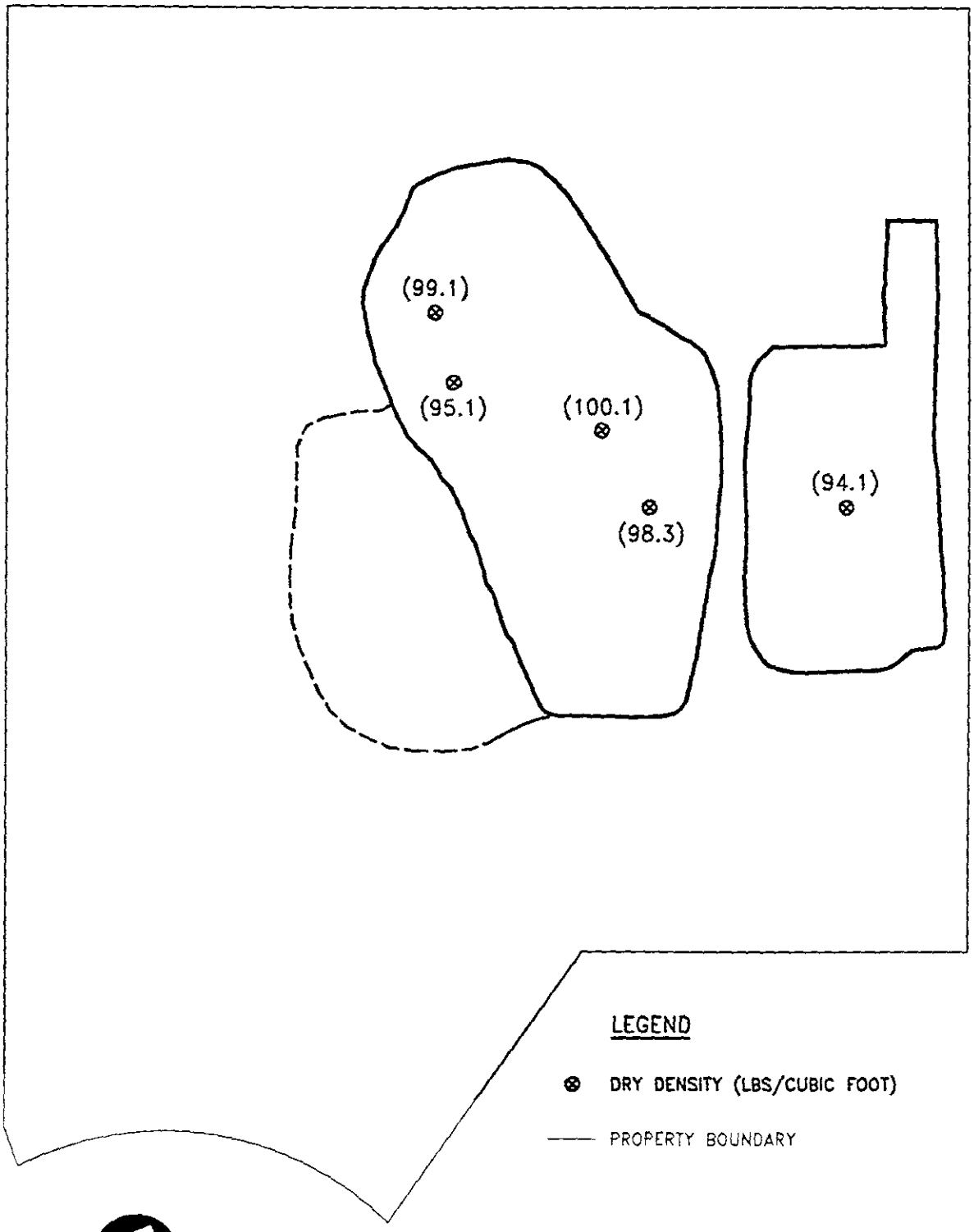
The particle size distribution of the fill material was characterized using ASTM Test D422-63 (dry sieve/hydrometer). Tables 3.3 (dry sieve) and 3.4 (hydrometer) summarize the distribution of particle sizes for the random sample of fill material collected on 19 March 1990. Results indicate that the fill material is uniformly graded, with 100 percent passing through a 3-inch sieve, 89 percent passing through a No. 4 sieve, and 39 percent passing through a No. 200 sieve.

Laboratory Compaction Curve

The maximum density of the fill material was evaluated using ASTM Test D1557 (modified proctor). The maximum dry density of the fill material was measured at 104.0 pounds per cubic foot at an optimum moisture content of 18.5 percent (Appendix E).

In-situ Field Compaction Tests

The relative in-situ compaction was evaluated using ASTM Test D2992-71. Table 3.5 summarizes the results of the field compaction tests. The locations of the in-situ field compaction tests with results are displayed on Figure 3-3. The relative compaction at each field compaction test location was characterized at 90 percent dry weight or above (Appendix E).



IN-SITU COMPACTION TEST RESULTS MINAMI NURSERY SITE Hayward, California

SECTION 4

SUMMARY AND CONCLUSIONS

The summary and conclusions presented in this section are based on field work implementations, data collected, and interpretations developed in this report. The data analyzed were collected by Engineering-Science, Inc. between 6 November 1989 and 22 March 1990. The summary and conclusions are presented in sections on: 1) remedial work implementation; and 2) soil chemistry.

Remedial Work Implementation

- On 6 November 1989, two UFSTs were located and uncovered at the Minami Nursery site, Hayward, California. A 1,000-gallon gasoline tank (Tank 1) and a 2,000-gallon fuel oil tank (Tank 2) were excavated;
- The integrity of the gasoline tank (Tank 1) appeared to be sound; no apparent weak-points or cracks were observed along the tank sidewalls or bottom. A 1/2-inch layer of sludge was observed along the interior of the tank bottom;
- Two holes, one along the side and one in the bottom, were observed in the fuel oil tank (Tank 2). A black, oily liquid was discovered to be leaking from the hole in the side. This hole was plugged to prevent the escape of the remaining unknown volume of liquid. On 8 November 1989, approximately 750 gallons of the liquid were pumped into a vacuum truck for transport and proper disposal;
- After removal of the residual tank products, the tanks were "inerted" with dry ice (solid carbon dioxide). When the LEL was measured at less than 20% for each tank, they were removed from their excavation pits. Representatives of the ACHCSA and the ECFPD witnessed the tank removals;
- Between 9 November and 5 December 1989, the lateral and vertical extent of contaminated soil associated with each tank was characterized and excavated. The extent of soil contamination was assessed with a PID, used to measure TIV. When the TIV measurements were below 2 ppm, excavation was stopped and confirmatory soil samples were collected;
- A blue-green layer of clay was correlated with the highest PID measurements (up to 2,400 ppm). This layer of clay was initially encountered at a depth of 12.5 feet and extended down to groundwater (approximately 18 to 20 feet);
- A total of 9 samples was collected from the Tank 1 excavation. Two of these samples, T1-W and T1-E, were collected from beneath Tank 1. The remaining samples (MGN-1, MGN-2, MGE-1, MGSE-1, MGS-1, MGW-1, and MGNW-

1) were collected from the perimeter of the excavation as confirmatory samples;

- A total of 7 samples was collected from the Tank 2 excavation. Samples T2-W and T2-E were collected from directly beneath Tank 2, whereas the remaining 5 samples (MFE-1, MFS-1, MFW-1, MFN-1, and MFN-2) were collected from the excavation perimeter;
- After the contaminated soil was removed from the Tank 1 excavation, it measured 75 feet (northwest-southeast) by 36 feet (northeast-southeast), with a maximum depth of 18 feet. Approximately 977 cubic yards of material were excavated, including an estimated 545 cubic yards (in-bank) of contaminated soil;
- The Tank 2 excavation measured 58 feet (north-south) by 24 feet (east-west). It reached a maximum depth of 18 feet. Approximately 723 cubic yards of material were removed, including an estimated 130 cubic yards (in-bank) of contaminated soil;
- Contaminated soil from both the Tank 1 and Tank 2 excavations were stockpiled on-site on bermed, plastic-lined areas. A total of 1,255 cubic yards of contaminated soil was stockpiled along the perimeter of the excavations. The volume of the contaminated soil expanded in relation to the in-bank yardage because of pressure release, mechanical breakup, and mixing with uncontaminated material. The material was covered with plastic sheeting;
- Groundwater was encountered between 18 and 20 feet with no visible free-product layer on it but with a visible oily sheen;
- The excavations were backfilled with uncontaminated overburden and imported fill materials. Over 1,820 cubic yards of imported fill were required to backfill and compact the excavations to grade. The fill material was placed in the excavations in 12-inch layers. Each layer was mechanically compacted with self-propelled tamping equipment;
- Geotechnical tests were employed to characterize the backfill material and to field check the effectiveness of the compaction work. Particle size, compaction curve, and in-situ compaction tests were performed. Particle size analysis showed that the material used to backfill the excavations was evenly graded. The maximum dry density of the fill material was measured at 104.0 pounds per cubic foot at an optimum moisture content of 18.5 percent. Field compaction tests indicated that the backfill material was compacted to at least 90 percent of the dry weight.

Soil Chemistry

- The samples collected from beneath the tanks were analyzed for TPH as gasoline, diesel and/or kerosene, BTEX, and organic lead, using analytical techniques approved by the EPA and/or the LUFT Manual;
- Sample T1-W, collected from the western end of Tank 1, contained 3,900 mg/Kg TPH as gasoline, 13 mg/Kg benzene, 210 mg/Kg toluene, 85 mg/Kg

ethylbenzene and 210 mg/Kg total xylenes. TPH was not detected in Sample T1-E, but toluene was detected at a concentration of 0.023 mg/Kg. Organic lead was not detected in either sample;

- TPH was not detected in any of the 7 confirmatory sidewall samples collected from the Tank 1 excavation. Xylene was detected in 1 sample, MGE-1, at a concentration of 0.015 mg/KG;
- Samples T2-E and T2-W did not contain detectable concentrations of TPH. However, toluene (0.052 mg/Kg) was detected in Sample T2-W. Organic lead was not detected in either sample;
- TPH was detected in two of the 5 sidewall samples collected from Tank 2. Sample MFN-1 contained 1,200 mg/Kg TPH. This material was removed during expansion of the excavation 15 feet to the north. Sample MFN-2 was collected at this location and TPH was not detected in this sample. Sample MFE-1 contained 67 mg/Kg TPH; the excavation could not be expanded to the east as the excavation coincided approximately with the property boundary (fence line). Benzene (0.032 mg/Kg), toluene (0.024 mg/Kg), and total xylenes (0.200 mg/Kg) were detected in Sample MFW-1. Sample MFN-1 contained 0.030 mg/Kg benzene, 0.150 mg/Kg toluene, 0.010 mg/Kg ethylbenzene and 0.056 mg/Kg xylenes.

SECTION 5

REFERENCES

Baker & Hostetler, McCutchen Black, 1990, California Environmental Law Handbook, 4th Edition: Rockville, MD, Government Institutes, Inc., 264 p.

California Department of Health Services, 1986, California Site Mitigation Decision Tree Manual, May 1986

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Title 26, California Code of Regulations, Division 22, Section 66084.

Title 26, California Code of Regulations, Division 22, Section 66206.

Title 26, California Code of Regulations, Division 22, Section 66194.

Title 26, California Code of Regulations, Division 22, Section 66700.

APPENDIX A
PHOTODOCUMENTATION

APPENDIX A
PHOTODOCUMENTATION

PHOTO 1

THE SITE PRIOR TO EXCAVATION

NOVEMBER 6, 1989

PHOTO 2

GASOLINE TANK AFTER UNCOVERING

NOVEMBER 8, 1989

PHOTO 3

FUEL OIL TANK AFTER UNCOVERING

NOVEMBER 8, 1989

PHOTO 4

VACUUM TRUCK PUMPING LIQUID

FROM FUEL OIL TANK

NOVEMBER 8, 1989

PHOTO 5

FUEL OIL TANK BEING PULLED FROM EXCAVATION

NOVEMBER 8, 1989

PHOTO 6

FUEL OIL TANK AFTER EXCAVATION

NOVEMBER 8, 1989

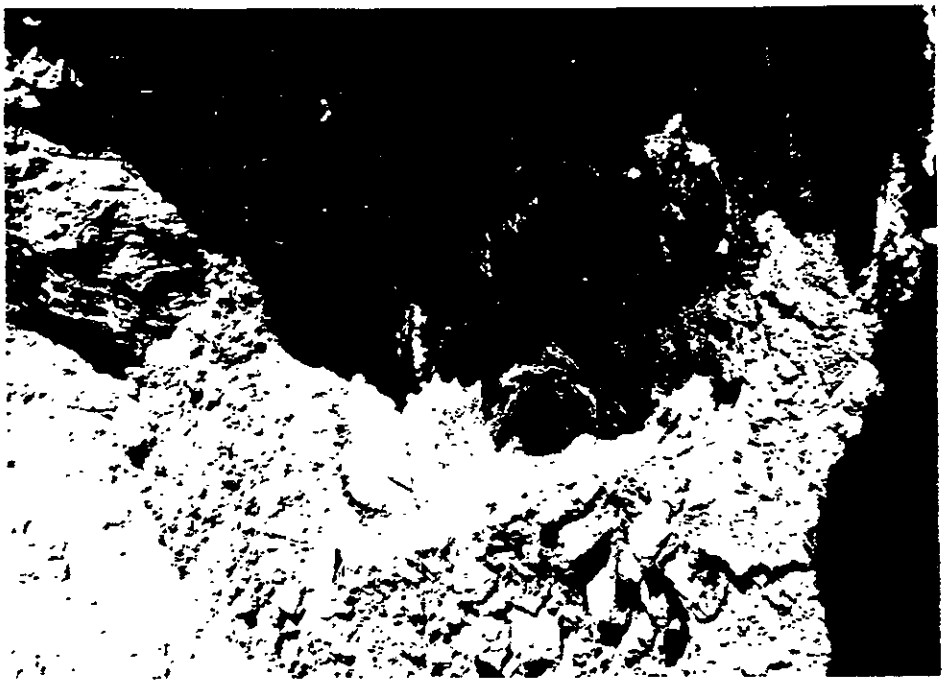


PHOTO 7

FUEL OIL TANK EXCAVATION AREA

AFTER TANK REMOVAL

NOVEMBER 8, 1989

PHOTO 8

GASOLINE TANK AFTER REMOVAL FROM EXCAVATION

NOVEMBER 8, 1989

PHOTO 9

GASOLINE TANK LOADED ON TRUCK

NOVEMBER 8, 1989

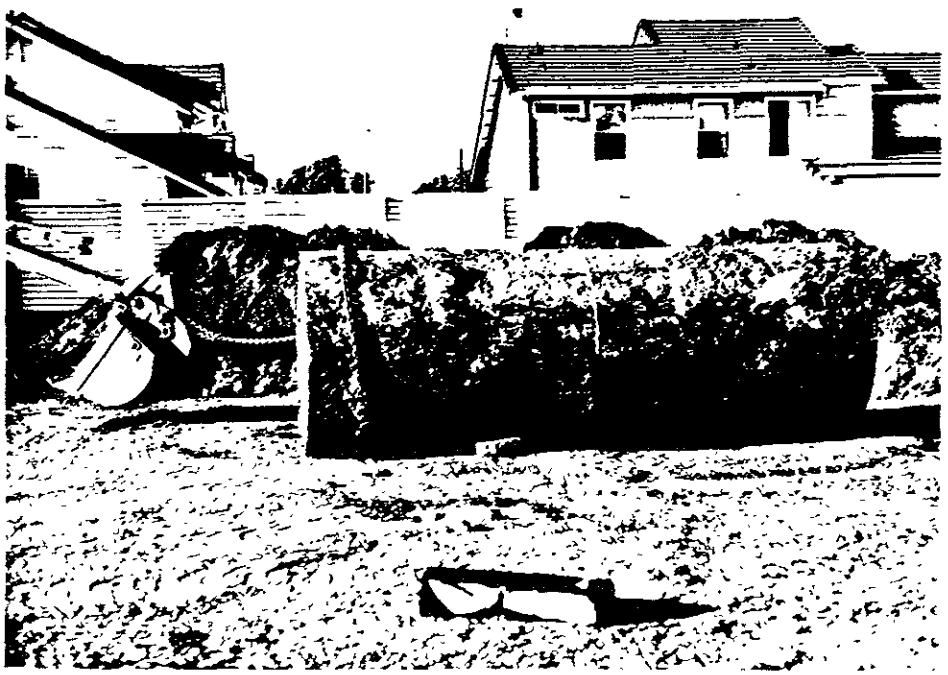


PHOTO 10

FUEL OIL TANK AFTER REMOVAL FROM EXCAVATION

NOVEMBER 8, 1989

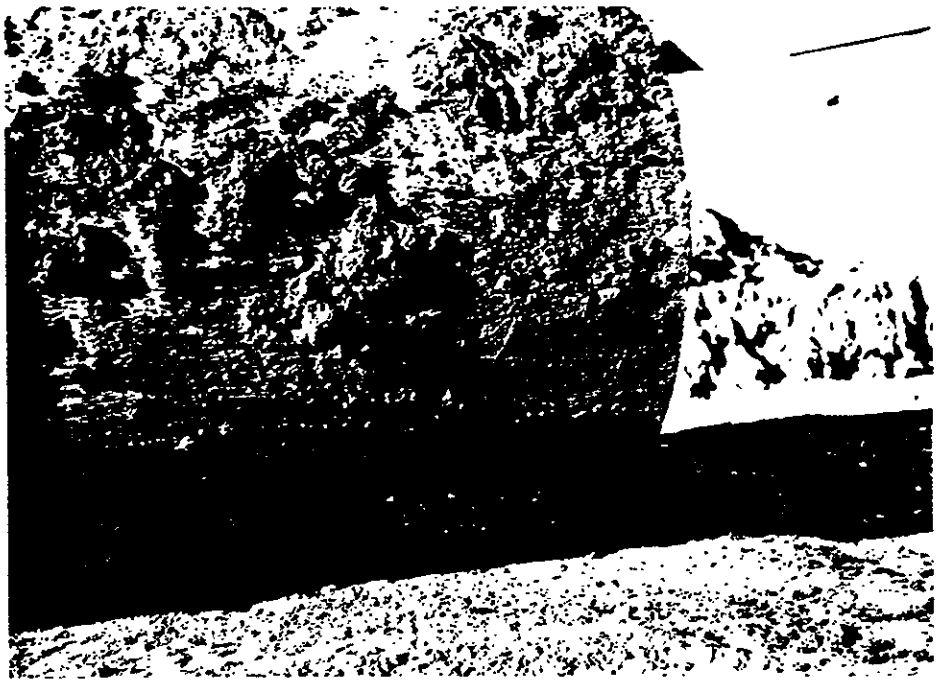


PHOTO 11

HOLE ON BOTTOM OF EAST

END OF FUEL OIL TANK

NOVEMBER 8, 1989

PHOTO 12

PEAGRAVEL AND OILY WATER LEAKING FROM

HOLE ON BOTTOM OF FUEL OIL TANK

NOVEMBER 8, 1989

PHOTO 13

FUEL OIL TANK LOADED ON TRUCK

NOVEMBER 8, 1989

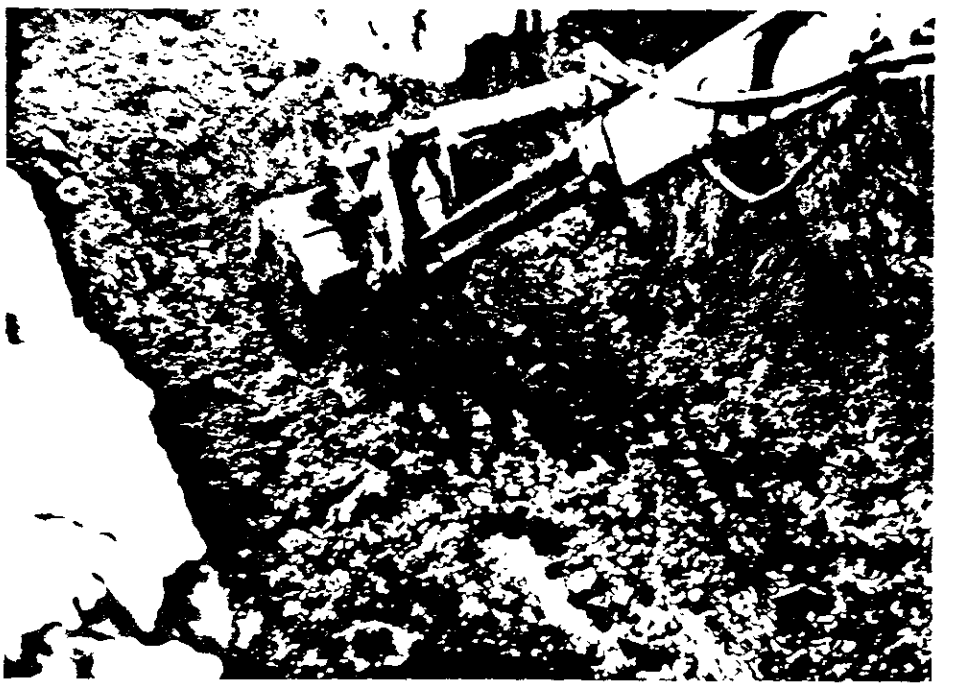


PHOTO 14

MIXING OILY WATER WITH SOIL IN BOTTOM

OF FUEL OIL TANK EXCAVATION

NOVEMBER 8, 1989

PHOTO 15

STOCKPILE AREA FOR SOIL/OILY WATER MIXTURE
FROM FUEL OIL TANK EXCAVATION
NOVEMBER 8, 1989

PHOTO 16

DIGGING NORTHWEST TRENCH FROM
GASOLINE TANK EXCAVATION
NOVEMBER 9, 1989

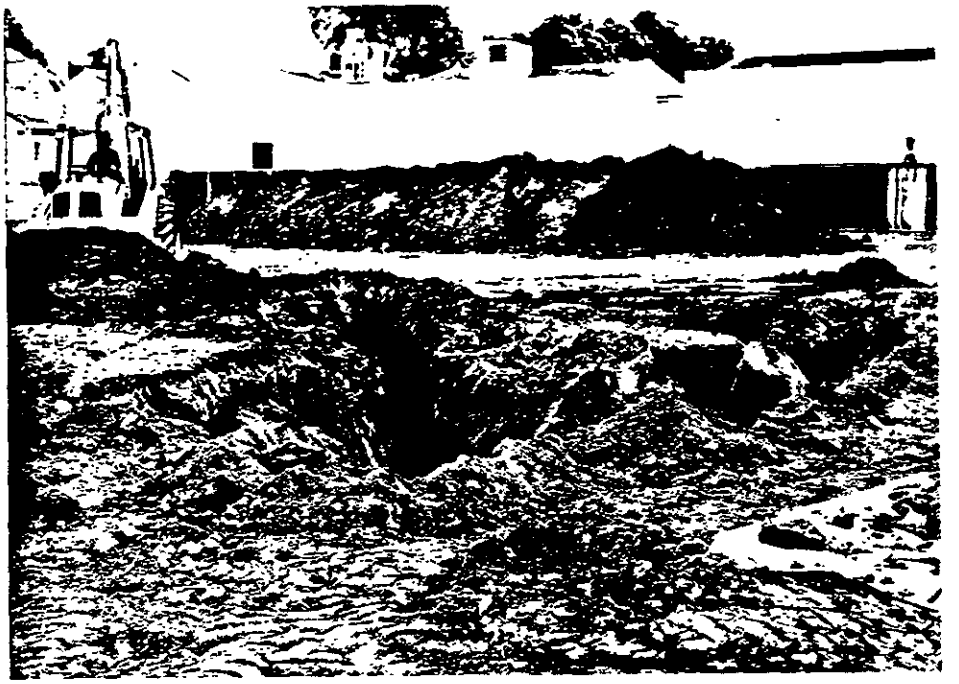


PHOTO 17

SOUTHWEST TRENCH FROM GASOLINE TANK EXCAVATION

NOVEMBER 13, 1989

PHOTO 18

BEGINNING SOUTH TRENCH FROM GASOLINE TANK EXCAVATION

NOVEMBER 14, 1989

PHOTO 19

REMOVING CLEAN SOIL ABOVE CONTAMINATED
SOIL IN FUEL OIL TANK EXCAVATION
NOVEMBER 14, 1989

PHOTO 20

REMOVING CLEAN SOIL ABOVE CONTAMINATED
SOIL IN FUEL OIL TANK EXCAVATION
NOVEMBER 14, 1989

PHOTO 21

TRENCHING TOWARDS THE NORTH AT
FUEL OIL TANK EXCAVATION
NOVEMBER 14, 1989

PHOTO 22

CLEAN SOIL STOCKPILE
NOVEMBER 14, 1989

PHOTO 23

BEGINNING TRENCH INTO NORTH WALL OF
FUEL OIL TANK EXCAVATION
NOVEMBER 27, 1989

PHOTO 24

BEGINNING TRENCH INTO NORTH WALL OF
FUEL OIL TANK EXCAVATION
NOVEMBER 27, 1989

PHOTO 25

TRENCHING NORTHWARD FROM
FUEL OIL TANK EXCAVATION
NOVEMBER 27, 1989

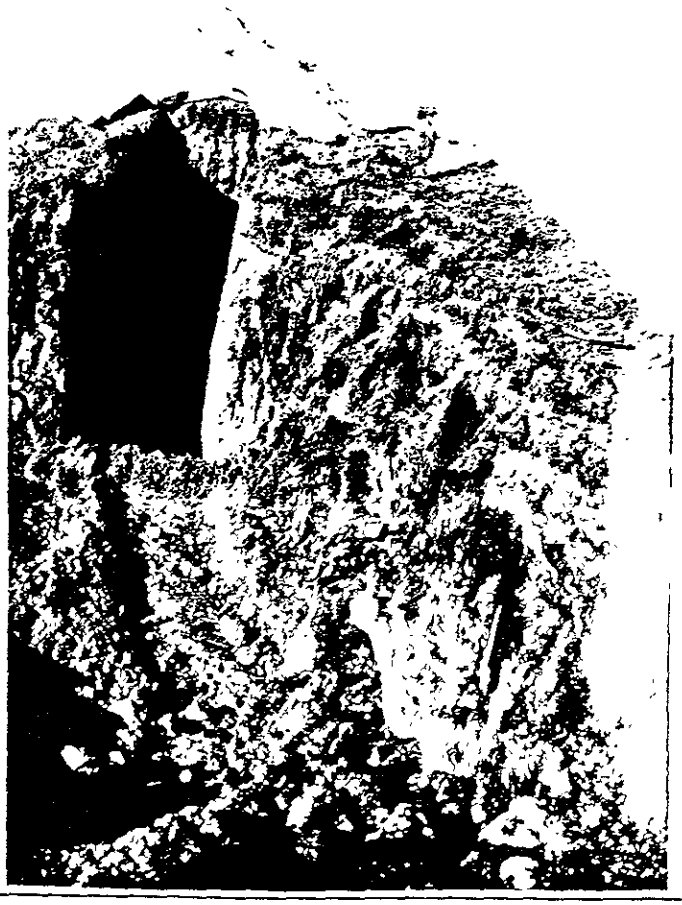
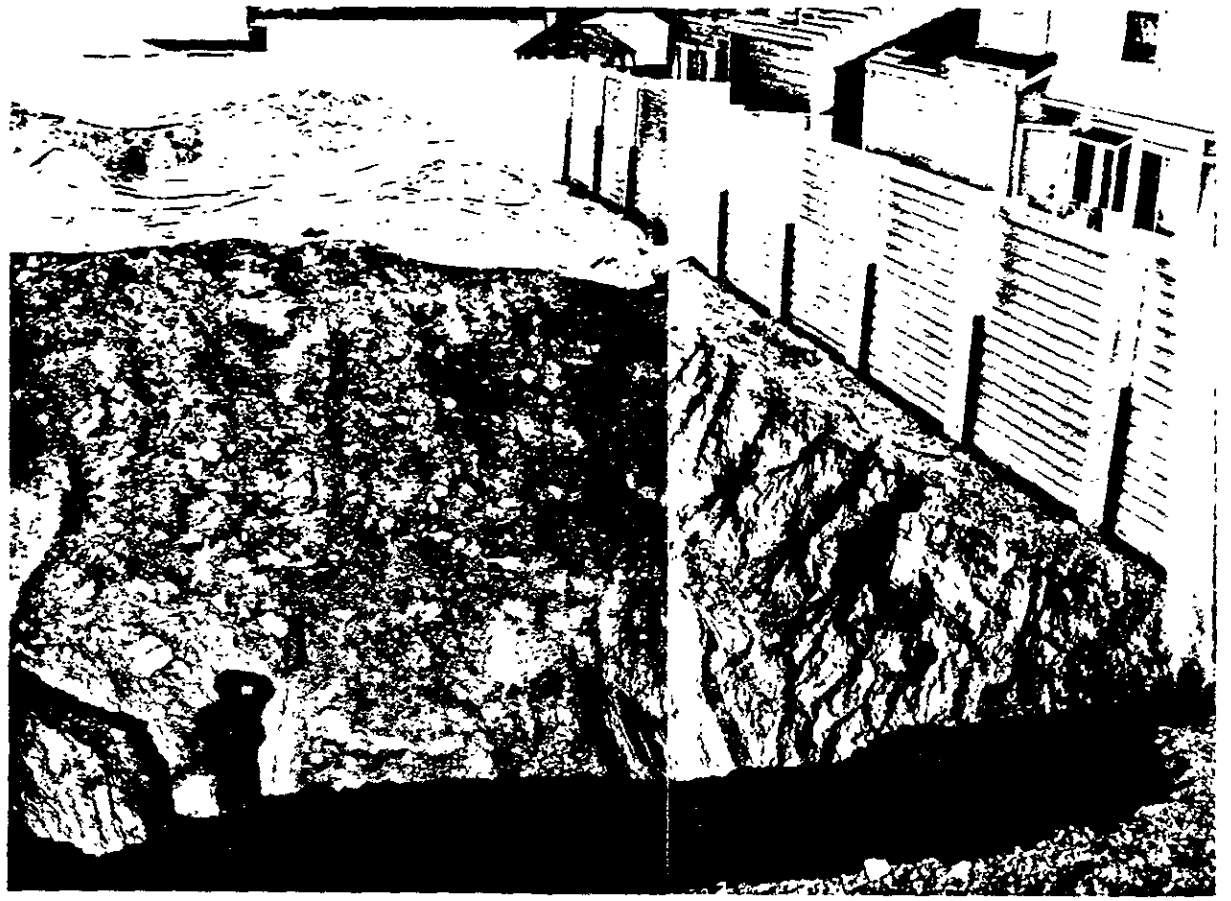


PHOTO 26

TRENCHING NORTHWARD FROM
FUEL OIL TANK EXCAVATION
NOVEMBER 27, 1989



PHOTOS 27 AND 28

THE FUEL OIL TANK EXCAVATION

DURING BACKFILLING

NOVEMBER 28, 1989

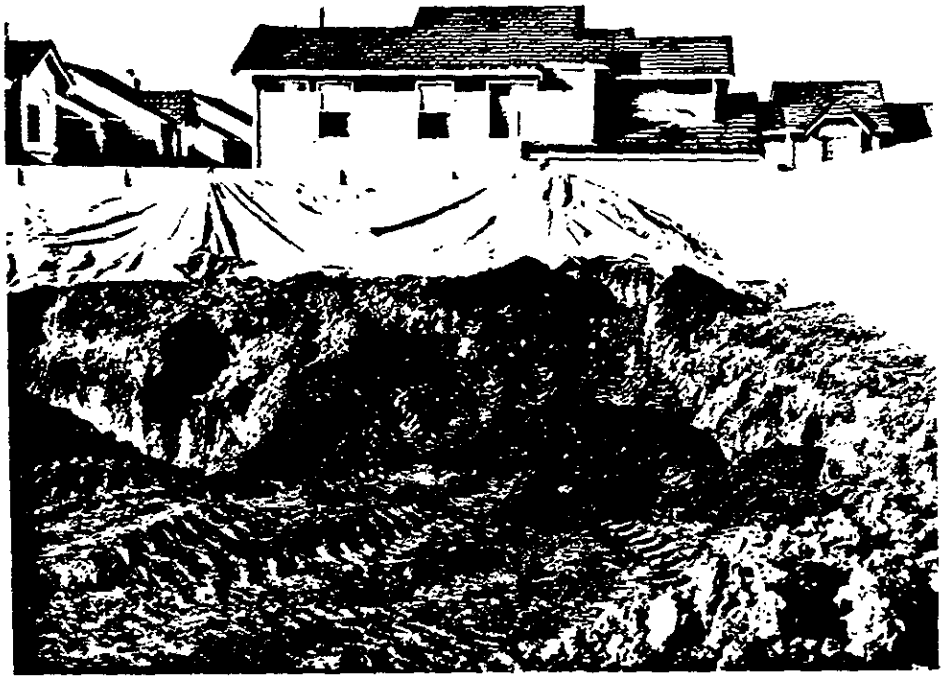


PHOTO 29

THE FUEL OIL TANK EXCAVATION;
MOSTLY FILLED
NOVEMBER 28, 1989

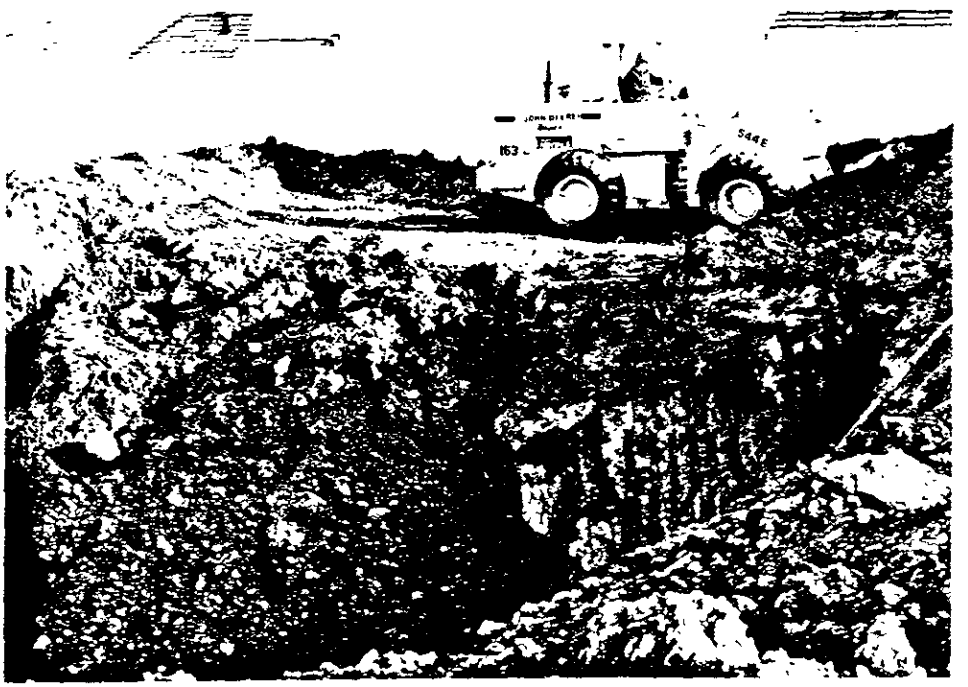


PHOTO 30

LOADER SITTING ON TOP OF FILLED FUEL
TANK EXCAVATION; LOOKING EASTWARD
OVER GASOLINE TANK EXCAVATION
NOVEMBER 28, 1989

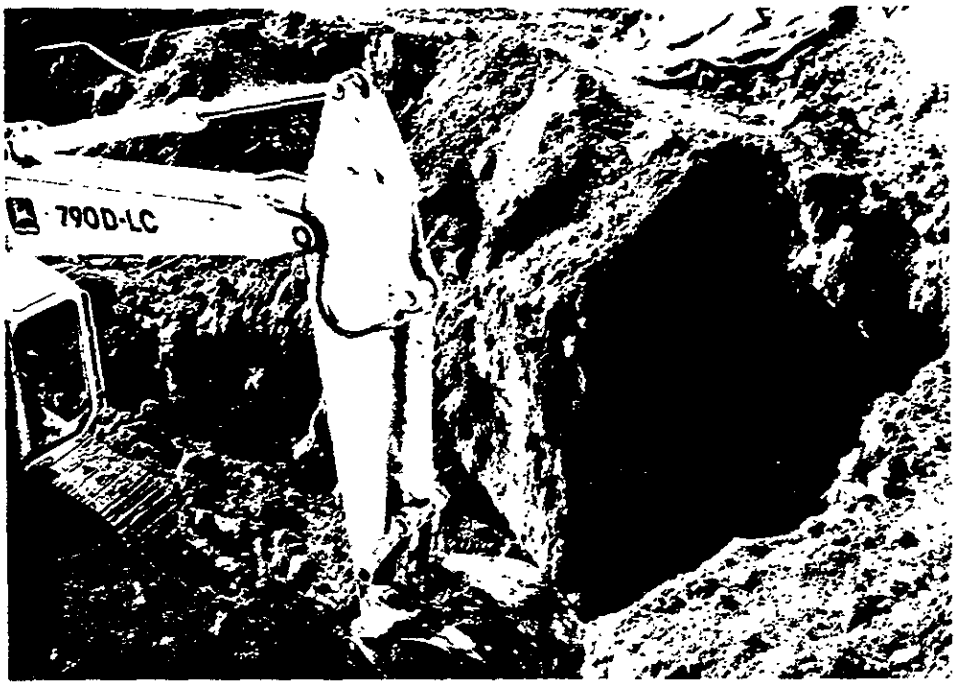


PHOTO 31

EXCAVATING NORTHWARD FROM THE
GASOLINE TANK EXCAVATION
NOVEMBER 30, 1989

PHOTO 32

EXCAVATING NORTHWARD FROM THE
GASOLINE TANK EXCAVATION
NOVEMBER 30, 1989

PHOTO 33

THE SITE AFTER EXCAVATION

AND PRIOR TO BACKFILLING

PHOTO 34

THE SITE AFTER EXCAVATION

AND PRIOR TO BACKFILLING

PHOTO 35

TYPICAL BACKFILL MATERIAL

PHOTO 36

BACKFILL MATERIAL BEING UNLOADED AT SITE

PHOTO 37

INITIAL BACKFILL LAYERS AFTER BEING SPREAD IN EXCAVATION

PHOTO 38

SELF-PROPELLED TAMPING FOOT COMPACTOR

PHOTO 39

FRONT-END LOADER AND
TAMPING FOOT COMPACTOR

PHOTO 40

TOP LAYERS OF "CLEAN" MATERIAL FROM FUEL
OIL EXCAVATION BEING SPREAD AND COMPACTED
IN GASOLINE TANK EXCAVATION

PHOTO 41

GASOLINE EXCAVATION NEAR COMPLETION

PHOTO 42

SITE BACKFILL AND COMPACTION

WORK COMPLETED

APPENDIX B

ACHCSA APPROVED WORK PLAN

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS DIVISION
80 SWAN WAY, ROOM 200
OAKLAND, CA 94621
PHONE NO. 415/271-4320

ACCEPTED
DEPARTMENT OF ENVIRONMENTAL HEALTH
Oakland, CA
Telephone: (415) 271-4320

These plans have been reviewed and found to be acceptable and essentially meet the requirements of State and local health laws. Changes to your plans indicated by this Department are to assure compliance with State and local laws. The project proponent herein is now released for issuance of any required building permits for construction.

One copy of these accepted plans must be on the job and available to all contractors and craftsmen involved with this removal.

Any changes or alterations of these plans and specifications must be submitted to this Department and to the Fire and Building Inspection Department to determine if such changes are acceptable to all of State and local laws. Notify this Department at least 48 hours prior to the following required inspections:

_____ Removal of Tank and Piping
_____ Sampling
_____ Final Inspection

Issuance of a permit to operate is dependent on compliance with accepted plans and all applicable laws, regulations.

THERE IS A FINANCIAL PENALTY FOR NOT OBTAINING THESE INSPECTIONS

10-14-89

Project # U552922
Fee Paid $498.
Date 10/10/89

UNDERGROUND TANK CLOSURE/MODIFICATION PLANS

1. Business Name Minami Nursery
   Business Owner Mr. George Minami
2. Site Address 600 Shirley Avenue
   City Hayward Zip _____ Phone none on site
3. Mailing Address 29640 Vanderbilt
   City Hayward Zip 94544 Phone (415) 581-1836
4. Land Owner Mr. George Minami
   Address 29640 Vanderbilt City, State Hayward, CA Zip 94544
5. EPA I.D. No. CAC 000209448
6. Contractor Engineering-Science, Inc.
   Address 600 Bancroft Way
   City Berkeley, CA 94710 Phone (415) 548-7970
   License Type A,B, Haz ID# 509158
7. Consultant Aqua Science Engineers (Subcontractor)
   Address P.O. Box 535,
   City San Ramon, CA Phone (415) 820-9391

8. Contact Person for Investigation

Name Mr. Neal Siler Title Project Manager

Phone (415) 548-7970

9. Total No. of Tanks at facility 2

10. Have permit applications for all tanks been submitted to this office? Yes [ ] No [X] Unknown [ ]

11. State Registered Hazardous Waste Transporters/Facilities

a) Product/Waste Tranporter

Name Tanks have been empty since 1985 EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

b) Rinsate Transporter

Name Not going to rinse tanks-will haul as hazardous waste EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

c) Tank Transporter

Name H&H Ship Services EPA I.D. No. CAD 004771168

Address 220 China Basin

City San Francisco State CA Zip 94107

d) Tank Disposal Site

Name H&H Ship Services EPA I.D. No. CAD 004771168

Address 220 China Basin

City San Francisco State CA Zip 94107

e) Contaminated Soil Transporter

Name Soil disposal will be determined after receipt of analytical results EPA I.D. No. _____

Address _____

City _____ State _____ Zip _____

12. Sample Collector

Name Eric N. Storrs, Ajay Singh

Company Engineering-Science, Inc.

Address 600 Bancroft Way

City Berkeley State CA Zip 94710 Phone (415) 548-7970

13. Sampling Information for each tank or area

Tank or Area		Material sampled	Location & Depth
Capacity	Historic Contents (past 5 years)		
500 gal.	leaded gasoline	soil & groundwater	see attached figures
1,000 gal.	fuel oil	soil & groundwater	see attached figures (soil samples up to 14.5 feet depth)

14. Have tanks or pipes leaked in the past? Yes [X] No [ ]

If yes, describe. Soil and groundwater assessment by EMCON Associates: Preliminary Soil and Ground-Water Assessment, Minami Property 15 December 1988. Groundwater and Soil contamination from gasoline tank, soil contamination from fuel oil tank.

15. NFPA methods used for rendering tank inert? Yes [X] No [ ]

If yes, describe. Dry ice added at rate of 1.5 pounds per 100 gallon tank volume. Lower Explosive Limit (LEL) checked prior to removing tank.

An explosion proof combustible gas meter shall be used to verify tank inertness.

16. Laboratories

Name Curtis & Tompkins Labs

Address 2323 Fifth Street

City Berkeley State CA Zip 94710

State Certification No. 159

17. Chemical Methods to be used for Analyzing Samples

Contaminant Sought	EPA, DHS, or Other Sample Preparation Method Number	EPA, DHS, or Other Analysis Number
TPH Gasoline	GCFID (5030)	GCFID
TPH Diesel	GCFID (5030)	GCFID
BTX&E	EPA 8020	EPA 8020
TEL	DHS-LUFT	DHS-LUFT

18. Submit Site Safety Plan

19. Workman's Compensation: Yes [X] No [ ]

Copy of Certificate enclosed? Yes [X] No [ ]

Name of Insurer National Union Fire Insurance, Inc.
WC5246582 (CA); Expires 6/19/90

20. Plot Plan submitted? Yes [X] No [ ]

21. Deposit enclosed? Yes [X] No [ ]

22. Please forward to this office the following information within 60 days after receipt of sample results.

a) Chain of Custody Sheets

b) Original Signed Laboratory Reports

c) TSD to Generator copies of wastes shipped and received

d) Attachment A summarizing laboratory results

I declare that to the best of my knowledge and belief the statements and information provided above are correct and true. I understand that information in addition to that provided above may be needed in order to obtain an approval from the Department of Environmental Health and that no work is to begin on this project until this plan is approved.

I understand that any changes in design, materials or equipment will void this plan if prior approval is not obtained.

I understand that all work performed during this project will be done in compliance with all applicable OSHA (Occupational Saftey and Health Administration) requirements concerning personnel and safety.

I will notify the Department of Environmental Health at least two (2) working days (48 hours) after approval of this closure plan in advance to schedule any required inspections. I understand that site and worker safety are solely the responsibility of the property owner or his agent and that this responsibility is not shared nor assumed by the County of Alameda.

Signature of Contractor

Name (please type) T. Gerald Cole, Vice President

Signature T. Gerald Cole

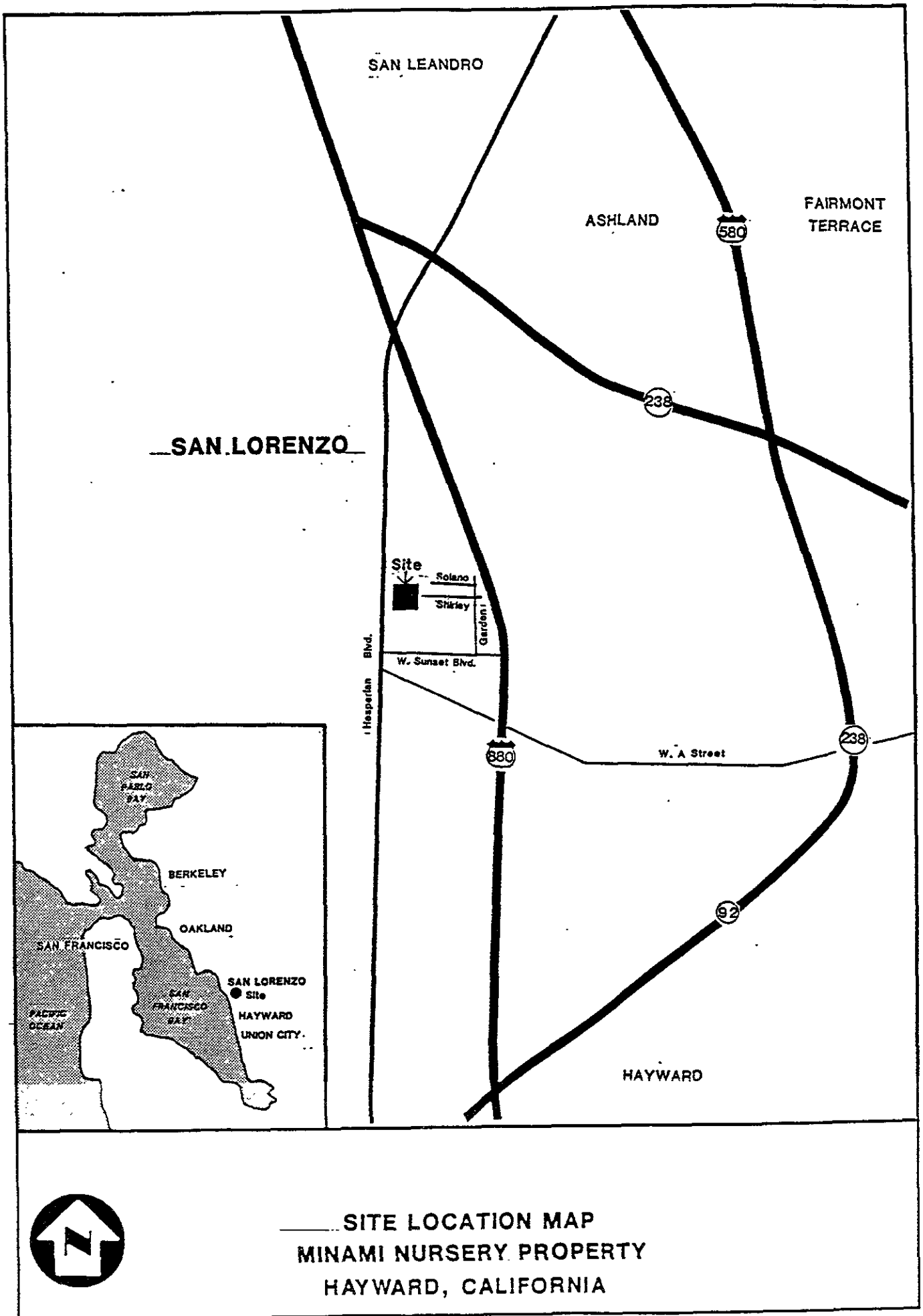
Date 10/6/89

Signature of Site Owner or Operator

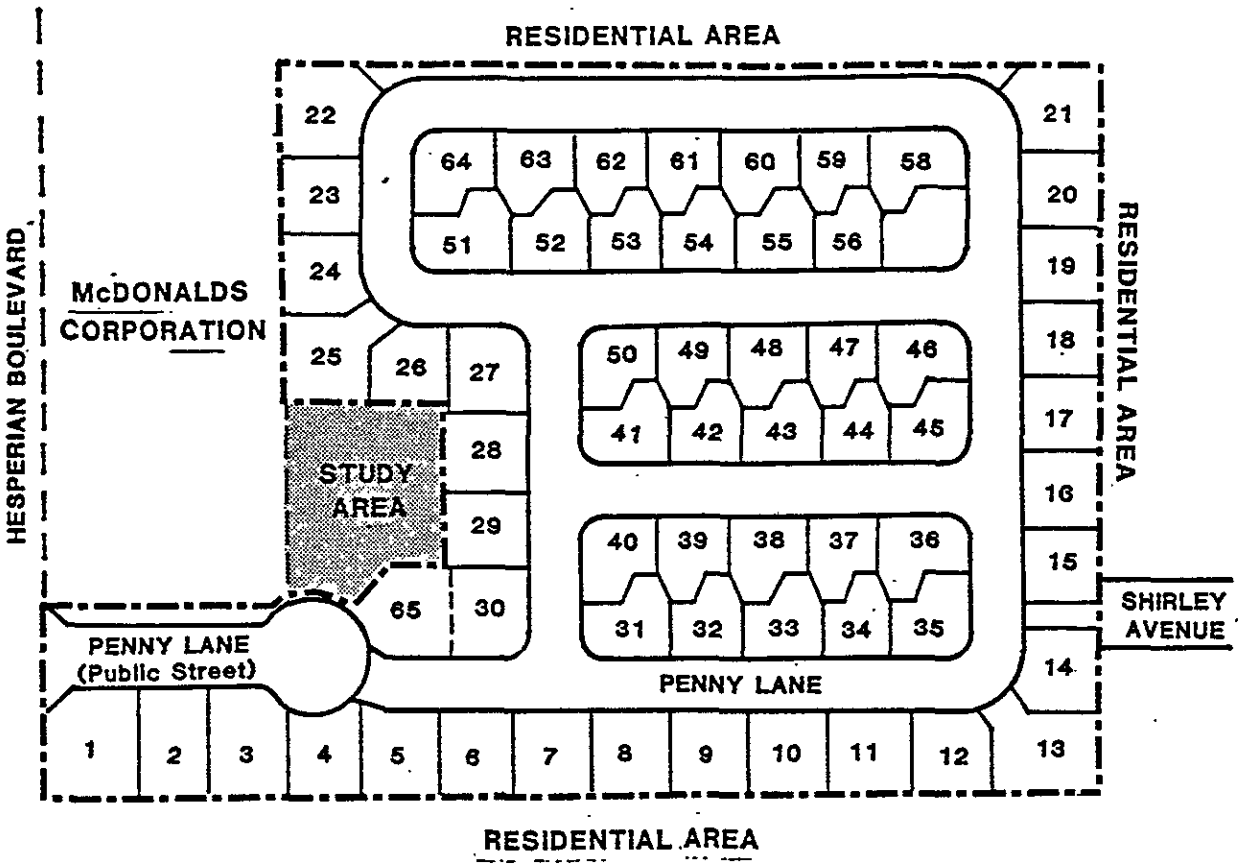
Name (please type) Mr. George Minami

Signature George Minami Jr.

Date Oct 5, 1989



SITE LOCATION MAP
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA



LEGEND

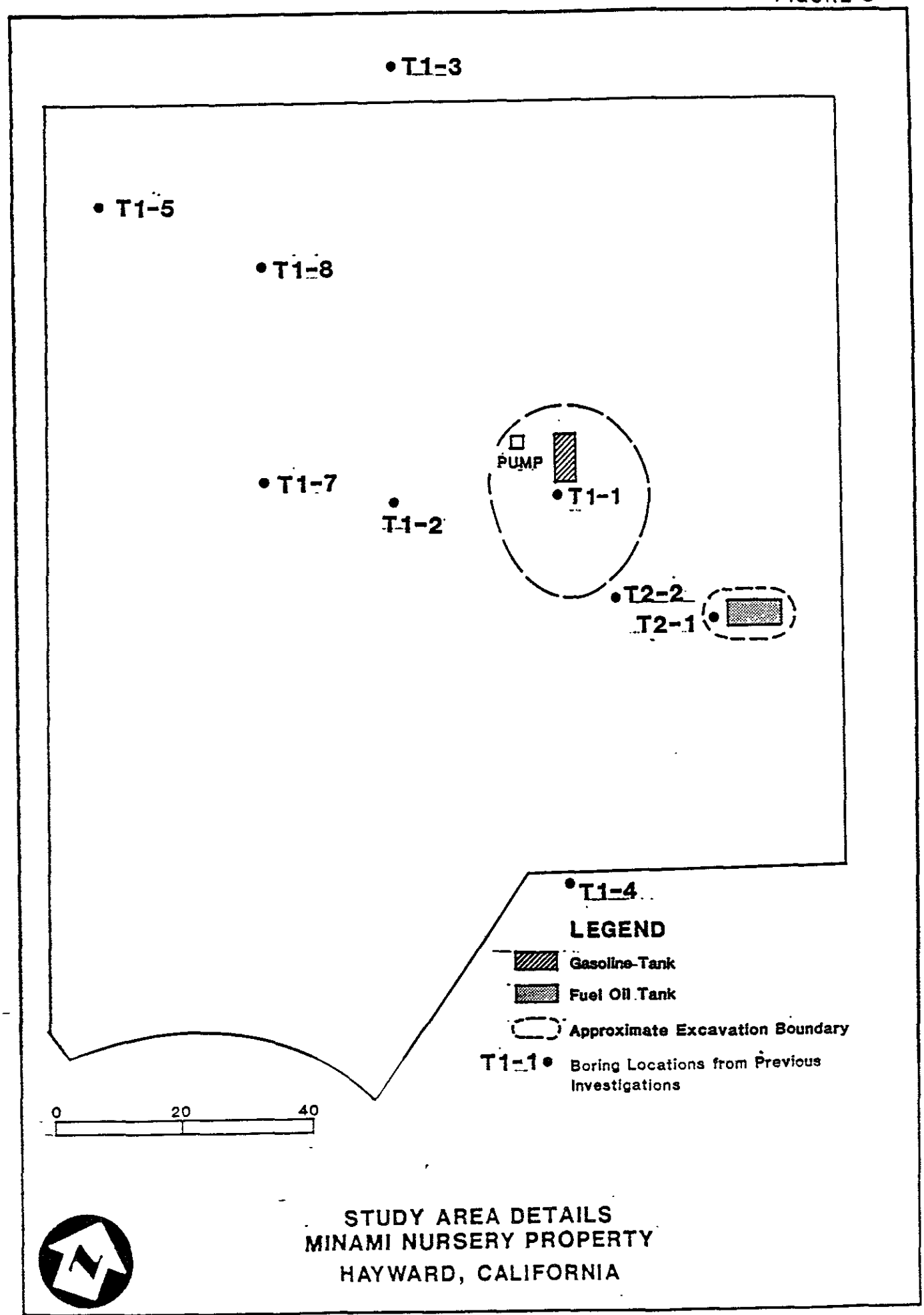
Exterior Boundary Line

Lot Line

Study Area

0 90 180
scale feet

SITE PLAN
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA



STUDY AREA DETAILS
MINAMI NURSERY PROPERTY
HAYWARD, CALIFORNIA

APPENDIX C

PERMITS AND MANIFESTS

PERMITS

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
415-771-6000

Aeration of Contaminanted Soil and Removal of Underground Storage Tanks

NOTIFICATION FORM

- [ ] Removal or Replacement of Tanks
- [X] Excavation of Contaminated Soil

SITE INFORMATION

SITE ADDRESS 600 Shirley Avenue

CITY, STATE, ZIP Hayward, California

OWNER NAME Mr. George Minami

SPECIFIC LOCATION OF PROJECT Northeastern portion of site, just north of the current Penny Lane (see Figures 2 & 3 attached)

TANK REMOVAL

SCHEDULED STARTUP DATE _____

VAPORS REMOVED BY:

- [ ] WATER WASH
- [X] VAPOR FREEING (CO^2)
- [ ] VENTILATION

CONTAMINATED SOIL EXCAVATION

SCHEDULED STARTUP DATE _____

STOCKPILES WILL BE COVERED? YES X NO ____

ALTERNATIVE METHOD OF AERATION (DESCRIBE BELOW):

_____ (MAY REQUIRE PERMIT)

CONTRACTOR INFORMATION

NAME Engineering-Science, Inc. CONTACT Mr. Neal Siler, Project Manager

ADDRESS 600 Bancroft Way PHONE (415) 548-7970

CITY, STATE, ZIP Berkeley, CA 94710

CONSULTANT INFORMATION
(IF APPLICABLE)

NAME Aqua Science Engineers (Subcontractors) CONTACT Mr. Greg Burg

ADDRESS P.O. Box 535 PHONE (415) 820-9391

CITY, STATE, ZIP San Ramon, CA 94583

FOR OFFICE USE ONLY

DATE RECEIVED _____ BY _____ (INIT.)

CC: INSPECTOR NO. _____ DATE _____ BY _____ (INIT.)

TELEPHONE UPDATE: CALLER _____ CHANGE MADE _____

BAAQMD N # _____

3/89

EDEN CONSOLIDATED
FIRE PROTECTION DISTRICT

427 PASEO GRANDE • SAN LORENZO, CALIFORNIA 94580
(415) 670-5853

FIRE PERMIT APPLICATION

INSTRUCTIONS

The Fire Code of Alameda County requires a Permit from the Fire Prevention Bureau be obtained by individuals or businesses engaged in operations listed on the reverse side of this application. Please complete this application as required and submit it to above address.

BUSINESS NAME	BUSINESS PHONE NO.
Minami Nursery	415/581-1836
BUSINESS ADDRESS	**ZIP CODE**
600 Shirley Avenue, Hayward, California	
MAILING ADDRESS	**ZIP CODE**
29640 Vanderbilt, Hayward, California 94544	94544
OWNER OR AUTHORIZED REPRESENTATIVE	
Mr. George Minami, Jr.	

The above named Business/Individual hereby makes application for a Permit in accordance with applicable Codes and Ordinances for the following type of operation (refer to reverse side for appropriate category):

ENTER ITEM NUMBER • DESCRIPTION • FIRE CODE ARTICLE NO.

ITEM NO	DESCRIPTION	FIRE CODE ARTICLE NO
18	Removal of two underground fuel storage tanks	79
COMMENTS		

NOTE

Once issued, this Permit must be kept on the premises, and shall not take the place of any License required by law. Permits must be renewed on or before the expiration date, and shall not be transferable and any change in use, occupancy, operation, or ownership shall require a new Permit. Upon acceptance of a Permit, the Permittee agrees to comply with all Ordinance provisions now adopted or that may be hereafter adopted.

SIGNATURE OF APPLICANT	DATE
George Minami Jr.	11-6-89

DO NOT FILL IN BELOW — FOR FIRE DEPARTMENT USE ONLY

PERMIT NUMBER	EXPIRATION DATE	PERMIT APPROVED	PERMIT DENIED
891106	11-8-89	☑	☐
COMMENTS			
PERMIT ISSUED BY		DATE	
Ellen Edwards		11-6-89	

EDEN CONSOLIDATED
FIRE PROTECTION DISTRICT

427 PASEO GRANDE • SAN LORENZO, CALIFORNIA 94580
(415) 670-5853

FIRE PERMIT

NO. 891106
ISSUE DATE 11-6-89
EXPIRATION DATE 11-8-89

NAME OF BUSINESS
Engineering-Science, Inc.

BUSINESS ADDRESS
600 Bancroft Way, Berkeley, CA 548-7970

THE BUSINESS (AND ITS LOCATION, LISTED ABOVE) PURSUANT TO THE PROVISIONS OF THE ALAMEDA COUNTY FIRE CODE, HAVING MADE APPLICATION IN DUE FORM AND BEING IN COMPLIANCE WITH APPLICABLE CODES, AND ORDINANCES, IS HEREBY GRANTED PERMISSION FOR THE FOLLOWING TYPES OF OPERATIONS:

Removal of two (2) underground fuel tanks from the property located at 600 Shirley Ave. 1 - 500 Gal. ledded gasoline and 1 - 1000 Gal. fuel oil tank.

UPON ACCEPTANCE OF THIS PERMIT, THE PERMITTEE AGREES TO COMPLY WITH ALL ORDINANCE PROVISIONS NOW ADOPTED OR THAT MAY BE HEREAFTER ADOPTED.

THIS PERMIT MUST BE KEPT ON THE PREMISES AT ALL TIMES

FIRE PREVENTION BUREAU James R. Ferdinand

MANIFESTS

Form Approved OMB No. 2050—0039 (Expires 9-30-91)
Please print or type. *(Form designed for use on elite (12-pitch typewriter).*

Toxic Substances Control Division
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No.: CA D 0 0 0 2 0 9 4 6 9 0 3

2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
MR. GEORGE MINAMI
29640 Vanderbilt
Hayward, CA 94544
4. Generator's Phone (415) 581-1836

JOB SITE: MINAMI NURSERY
(600 Shirley Ave.)
Penney Lane off
Hesperian, Hayward

A. State Manifest Document Number: 89492603
B. State Generator's ID:

5. Transporter 1 Company Name: H & H Ship Service Company
6. US EPA ID Number: CA D 0 0 0 4 7 7 1 1 6 8
C. State Transporter's ID: 003745
D. Transporter's Phone: (415) 543-4835

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address
H & H Ship Service Company
220 China Basin Street
San Francisco, CA 94107
10. US EPA ID Number: CA D 0 0 0 4 7 7 1 1 6 8
G. State Facility's ID: CA D 0 0 0 4 7 7 1 1 6 8
H. Facility's Phone: (415) 543-4835

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RESIDUE ~~GASOLINE TANK~~ FUEL OIL TANK (CALIFORNIA ONLY REGULATED WASTE)	0 0 1	T P	0 2 0 0 0	P	State EPA/Other 512
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other

J. Additional Descriptions for Materials Listed Above
PUMPED OUT 2,000 GALLON TANK LAST CONTAINING GASOLINE.

TANK INERTED WITH DRY ICE ~~FOR~~ TRANSPORT.

K. Handling Codes for Wastes Listed Above
a. 01 | b. | c. | d.

15. Special Handling Instructions and Additional Information
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name: Eric N. Stern's agent
Signature: [signature] | Month Day Year: 1 0 0 6 9 0

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: MARTIN J. COSTELLO
Signature: [signature] | Month Day Year: 1 0 0 6 9 0

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature: | Month Day Year:

FACILITY

19 Discrepancy Indication Space

20 Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name:
Signature: | Month Day Year:

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

89492603

DHS 8022 A (1/88)
EPA 8700—22
(Rev 9-88) Previous editions are obsolete

Do Not Write Below This Line

YELLOW GENERATOR RETAINS

State of California—Health and Welfare Agency
Form Approved OMB No. 2050—0039 (Expires 9-30-91)
Please print or type. *(Form designed for use on elite (12-pitch typewriter).*

Department of Health Service.
Toxic Substances Control Divisio
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No.: CA|CD|0|0|2|0|9|4|4|8 | 0|0|0|2

2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
MR. GEORGE MINAMI
29640 Vanderbilt
Hayward, CA 94544

JOB SITE: MINAMI NURSERY
(600 Shirley Ave.,)
Penney Lane off
Hesperian, Hayward

4. Generator's Phone (415) 581-1836

A. State Manifest Document Number: 89492596

B. State Generator's ID:

5. Transporter 1 Company Name: H & H Ship Service Company

6. US EPA ID Number: CA|D|0|0|4|7|7|1|1|6|8

C. State Transporter's ID: 003776

D. Transporter's Phone: (415) 543-4835

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address
H & H Ship Service Company
220 China Basin Street
San Francisco, CA 94107

10. US EPA ID Number: CA|D|0|0|4|7|7|1|1|6|8

G. State Facility's ID: CA|D|0|0|4|7|7|1|1|6|8

H. Facility's Phone: (415) 543-4835

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RESIDUE WASTE OIL TANK (FUEL OIL) (CALIFORNIA ONLY REGULATED WASTE)	001	TP	01100	P	State 512 / EPA/Other
b. ~~RESIDUE GASOLINE TANK (CALIFORNIA ONLY REGULATED WASTE)~~	~~001~~	~~TP~~	~~01100~~	~~P~~	State ~~512~~ / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above
PUMPED OUT 1,000 gallon tanks last containing fuel oil and gasoline. Tanks inerted with dry ice for transport.

K. Handling Codes for Wastes Listed Above
a. 01 b. 01
c. d.

15. Special Handling Instructions and Additional Information
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment, OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name: [illegible] | Signature: [illegible] | Month Day Year: 11|6|8|9

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: WENDELL C. BOUIE | Signature: [illegible] | Month Day Year: 11|6|8|9

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

FACILITY

19 Discrepancy Indication Space

20 Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name | Signature | Month Day Year

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

89492596

DHS 8022 A (1/88)
EPA 8700—22
(Rev 9-88) Previous editions are obsolete

Do Not Write Below This Line

YELLOW GENERATOR RETAINS

Form Approved OMB No. 2050—0039 (expires 9-30-91)

Toxic Substances Control Division
Sacramento, California

Please print or type. *(Form designed for use on elite (12-pitch typewriter).*

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No.

2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
MR. GEORGE MINAMI
29640 Vanderbilt
Hayward, CA 94544
JOB SITE: MINAMI NURSERY
(600 Shirley Ave.)
Penney Lane off
Hesperian, Hayward.

4. Generator's Phone (415) 581-1836

A. State Manifest Document Number: 89492595

B. State Generator's ID:

5. Transporter 1 Company Name: H & H Ship Service Company

6. US EPA ID Number: CAD041711168

C. State Transporter's ID: 003752/003755/54

D. Transporter's Phone: (415) 543-4835

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Transporter's ID:

F. Transporter's Phone:

9. Designated Facility Name and Site Address
H & H Ship Service Company
220 China Basin Street
San Francisco, CA 94107

10. US EPA ID Number: CAD041711168

G. State Facility's ID: CAD041711168

H. Facility's Phone: (415) 543-4835

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. HAZARDOUS WASTE LIQUID, N.O.S. ORM-E NA 9189	001	T	00750	G	State 241 / EPA/Other
b.					State / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above
FUEL OIL AND WATER

K. Handling Codes for Wastes Listed Above
a. 01 b.
c. d.

15. Special Handling Instructions and Additional Information
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.

16.

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name: Eric Alstrom Agent for Minami Nursery | Signature | Month Day Year: 1 1 0 6 8 9

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: EDWARD G. MILANO or JAMES R. MORGAN | Signature | Month Day Year: 1 1 0 6 8 9

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

FACILITY

19 Discrepancy Indication Space

20 Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed Typed Name | Signature | Month Day Year

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

89492595

DHS 8022 A (1/88)
EPA 8700—22
(Rev 9-88) Previous editions are obsolete

Do Not Write Below This Line

YELLOW GENERATOR RETAINS

APPENDIX D
CHAIN-OF-CUSTODY RECORDS

1685-1

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Neal Siler	NC191,03

PROJECT NAME / LOCATION: Gasoline Contamination Remediation Minami Nursery Site

SAMPLER(S): (SIGNATURE) Eric N. Storrs

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH gas (GCFID)	TPH diesel (GCFID)	BTX+E (8020)	TEL (DHS-LUFT)	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
T1-E	11/8/89	15:20	Soil	Tank 1 - East End	1	✓	✓	✓	✓			48 hrs.	
T1-W	"	15:30	"	Tank 1 - West End	1	✓	✓	✓	✓			"	
T2-W	"	15:55	"	Tank 2 - West End	1	✓	✓	✓	✓			"	
T2-E	"	16:05	"	Tank 2 - East End	1	✓	✓	✓	✓			"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Eric N. Storrs	11/9/89 16:50	Neal E Siler			
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
Neal E Siler	11/9/89 2:16	Nancy J. Wilson	11/9/89 2:20		

ORIGINAL SHIPMENT COPY TO COORDINATOR FIELD FILES

ENGINEERING-SCIENCE, INC.

CHAIN OF CUSTODY RECORD

PAGE ___ OF ___

CLIENT: ENGINEERING-SCIENCE, INC. BERKELEY	PROJECT MANAGER: NEAL E. SILER	PROJ. NO.: NC191.04
PROJECT NAME / LOCATION: MINAMI NURSERY SITE / SAN LORENZO		
SAMPLER(S): (SIGNATURE) Ajay Singh		

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: 8015 for Gasoline and Diesel	ANALYSES REQUIRED: 8020	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MFS-1	11/15/89	2:30	Soil	Fuel Tank Ex. — South side	1	✓	✓				
MGE-1	11/15/89	4:00	"	Gas. Tank Ex — East side	1	✓	✓				
MFE-1	"	4:25	"	Fuel Tank Ex. — East side	1	✓	✓				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
Ajay Singh	11/15/89				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
		Nancy Patten	11/16/89 9 AM	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

[redacted] ENGINEERING SCIENCE, INC.

CHAIN OF CUSTODY RECORD

CLIENT: ENGINEERING-SCIENCE, INC. BERKELEY	PROJECT MANAGER: N. E. Sieer	PROJ. NO.: NC191.04

PROJECT NAME / LOCATION: MINAMI NURSERY / HAYWARD

SAMPLER(S): (SIGNATURE) JON HOFFMAN

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH (modified EPA 8015)*	ANALYSES REQUIRED: EPA 8020	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MSP-1	11/16/89	14:15	SOIL	CLEAN OVERBURDEN STOCKPILE	1	X	X	A		48hr.	TO BE COMPOSITED BY LABORATORY
MSP-2	11/16/89	14.17	SOIL	"	1	X	X	A		"	
MSP-3	11/16/89	1418	SOIL	"	1	X	X	A		"	
MSP-4	11/16/89	1420	SOIL	"	1	X	X	A		"	
MSP-5	11/16/89	1445	SOIL	"	1	X	X	A		"	
MSP-6	11/16/89	1447	SOIL	"	1	X	X	A		"	
MSP-7	11/16/89	1450	SOIL	"	1	X	X	A		"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE) Neal E Sieer	DATE/TIME 11/20/89 2:05	RECEIVED FOR LABORATORY BY: (SIGNATURE) Nancy J. Wu	DATE/TIME 11/21/89 2:03	REMARKS * USING GASOLINE & DIESEL AS A STANDARD	

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ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	N. E. Siler	NC191.04

PROJECT NAME / LOCATION: Minami Nursery / Fuel Oil Excavation

SAMPLER(S): (SIGNATURE)

	SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: 8015	ANALYSES REQUIRED: 8015 light & heavy*	ANALYSES REQUIRED: 8020	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
1	MFW-1	11-17-89	1400	Soil	West wall fuel tank excv.	1	✓	✓				24-48h	
	~~MSP-1~~	"	~~1415~~			1	✓	✓					
	~~MSP-2~~	"	~~1417~~			1	✓	✓					
	~~MSP-3~~	"	~~1418~~			1	✓	✓					
	~~MSP-4~~	"	~~1920~~			1	✓	✓					
	~~MSP-5~~	"	~~1945~~			1	✓	✓					
	~~MSP-6~~	"	~~1947~~			1	✓	✓					
	~~MSP-7~~	"	~~1430~~			1	✓	✓					
2	MFN-1	"	1525	Soil	North wall fuel tank excv.	1	✓	✓				24-48h	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	11/16/89				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
	11/17/89 8:35		11/17/89 8:35	* Gasoline & Diesel

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Neal Siler	NC191.04-

PROJECT NAME / LOCATION: Minami Nursery Tank Removal / Hayward, CA

SAMPLER(S) (SIGNATURE): E.N. Stevens

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH Gas	TPH Diesel	BTX&E	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MFN-2	11/27/89	14:25	soil	north wall, fuel oil tank	1	✓	✓	✓			24 hr.	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	11/27/89 15:20				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
	11/27/89 15:55		11/27/89 15:55	

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

CL # 118952

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Neal Siler	NC191.04

PROJECT NAME / LOCATION: Minami Nursery Tank Removal

SAMPLER(S): (SIGNATURE) E.N. Storrs

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: EPA 8015 Gas	EPA 8015 Diesel	EPA 8020 (BTX&E)	PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MGN-1	11/29/89	11:50	soil	Gas Tank - North Wall	1	✓	✓	✓			24 hours	
MGS-1	11/29/89	14:30	"	Gas Tank - South Wall	1	✓	✓	✓			"	
MGSE-1	11/30/89	9:10	"	Gas Tank - Southeast corner	1	✓	✓	✓			"	

FAX: 548-7635

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS	
E.N. Storrs	11/30/89 10:05		11-30-89 10:05		

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT; COPY TO COORDINATOR FIELD FILES

CC# 128002

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

CLIENT:	PROJECT MANAGER:	PROJ. NO.:
ENGINEERING-SCIENCE, INC. BERKELEY	Neal Siler	NC191.04

PROJECT NAME / LOCATION: Minami Nursery

SAMPLER(S): (SIGNATURE) EN Storrs

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH gas	TPH diesel	BTX+E				PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
MGNW-1	11/30/89	14:00	soil	Northwest Wall	1	✓	✓	✓						24 hrs.	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME	REMARKS
E. M. [illegible]	12/1/89 9:55	[illegible]	12/1/89 9.55	

ENGINEERING - SCIENCE, INC.
CHAIN OF CUSTODY RECORD

CL # 1289028

PAGE 1 OF 1

CLIENT: ENGINEERING-SCIENCE, INC. BERKELEY

PROJECT MANAGER: Neal Siler

PROJ. NO.: NC191.04

PROJECT NAME / LOCATION: Minami Nursery Tank Removal

SAMPLER(S): (SIGNATURE) EN Storrs

SAMPLE ID	DATE	TIME	MATRIX	SAMPLE LOCATION	NO. OF CONTAINERS	ANALYSES REQUIRED: TPH gas	TPH diesel	BTX+E				PRESERVED	TO BE COMPOSITED BY LAB	TURNAROUND TIME	REMARKS
1GN-1	12/5/89	8:53	Soil	North Wall	1	✓	✓	✓						24 hours	
1GW-1	"	14:10	"	Trench to south wall	1	✓	✓	✓						"	

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
EN Storrs	12/5/89 16:13	Neal Siler			
Neal Siler	12/5/89 17:00	RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE/TIME: 12-5-89. 17:00	REMARKS	

APPENDIX E
ANALYTICAL RESULTS

CHEMICAL RESULTS

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 11/09/89
DATE REPORTED: 11/13/89

LAB NUMBER: 18667

CLIENT: ENGINEERING-SCIENCE

REPORT ON: 4 SOIL SAMPLES (T1-E, T1-W, T2-W, T2-E)

JOB #: NC 191.03
LOCATION: GASOLINE CONTAMINATION REMEDIATION
MINAMI NURSERY SITE

RESULTS: SEE ATTACHED

M. E. Printeau
QA/QC Officer

Laboratory Director

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18667
CLIENT: ENGINEERING SCIENCE
JOB NUMBER: NC 191.03
JOB LOCATION: MINAMI NURSERY SITE

DATE RECEIVED: 11/09/89
DATE ANALYZED: 11/13/89
DATE REPORTED: 11/13/89

Total Volatile Hydrocarbons (TVH) by EPA 8015
Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
18667-1	T1-E	ND(10)	ND(5)	23	ND(5)	ND(5)
18667-2	T1-W	3,900	13,000	210,000	85,000	210,000
18667-3	T2-W	ND(10)	ND(5)	52	ND(5)	ND(5)
18667-4	T2-E	ND(10)	ND(5)	ND(5)	ND(5)	ND(5)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	<1
%RECOVERY	93

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18667
CLIENT: ENGINEERING SCIENCE
JOB #: NC 191.03
LOCATION: MINAMI NURSERY SITE

DATE RECEIVED: 11/09/89
DATE ANALYZED: 11/12/89
DATE REPORTED: 11/13/89

Extractable Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	KEROSENE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
18667-1	T1-E	ND(10)	ND(10)	ND(10)
18667-2	T1-W	ND(10)	ND(10)	ND(10)
18667-3	T2-W	ND(10)	ND(10)	ND(10)
18667-4	T2-E	ND(10)	ND(10)	ND(10)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	5
Spike: % Recovery	99

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18667
CLIENT: ENGINEERING SCIENCE

DATE RECEIVED: 11/09/89
DATE ANALYZED: 12/21/89
DATE REPORTED: 01/03/90

ORGANIC LEAD
DHS METHOD
MAY 1988 LUFT MANUAL

LAB ID	CLIENT ID	ORGANIC LEAD	UNITS	DETECTION LIMIT
18667-1	T1-E	ND	mg/Kg	0.5
18667-2	T1-W	ND	mg/Kg	0.5
18667-3	T2-W	ND	mg/Kg	0.5
18667-5	T2-E	ND	mg/Kg	0.5

QA/QC SUMMARY

%RPD	6
%RECOVERY	98

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (415) 486-0900

DATE RECEIVED: 11/15/89
DATE REPORTED: 11/28/89

LAB NUMBER: 18715

CLIENT: ENGINEERING-SCIENCE, INC.

REPORT ON: 3 SOIL SAMPLES (MFS-1, MGE-1, MFE-1)

JOB #: NC191.04
LOCATION: MINAMI NURSERY SITE

RESULTS: SEE ATTACHED

M. E. Quinlan
QA/QC Officer

Six Wong for CBb
Laboratory Director

Curtis & Tompkins Ltd

LABORATORY NUMBER: 18715
CLIENT: ENGINEERING-SCIENCE, INC.
JOB #: NC191.04
LOCATION: MINAMI NURSERY SITE

DATE RECEIVED: 11/15/89
DATE ANALYZED: 11/27/89
DATE REPORTED: 11/28/89

Extractable Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	KEROSENE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
18715-1	MFS-1	ND(10)	ND(10)	ND(10)
18715-2	MGE-1	ND(10)	ND(10)	ND(10)
18715-3	MFE-1	ND(10)	67*	ND(10)

*Fingerprint pattern does not match Hydrocarbon standards. Quantitation based on largest peaks within C12-C26 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	3
Spike: % Recovery	96

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18715
CLIENT: ENGINEERING-SCIENCE, INC.
JOB NUMBER: NC191.04
JOB LOCATION: MINAMI NURSERY SITE

DATE RECEIVED: 11/15/89
DATE ANALYZED: 11/28/89
DATE REPORTED: 11/28/89

Total Volatile Hydrocarbons (TVH) by EPA 8015
Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
18715-1	MFS-1	ND(10)	ND(5)	ND(5)	ND(5)	ND(5)
18715-2	MGE-1	ND(10)	ND(5)	ND(5)	ND(5)	15*
18715-3	MFE-1	ND(10)	ND(5)	ND(5)	ND(5)	ND(5)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	1
%RECOVERY	81

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 11/17/89
DATE REPORTED: 11/21/89

LAB NUMBER: 18729

CLIENT: ENGINEERING SCIENCE

REPORT ON: 2 SOIL SAMPLES (MFW-1, MFN-1)

JOB #: NC191.04
LOCATION: MINAMI NURSERY

RESULTS: SEE ATTACHED

QA/QC Officer

Laboratory Director

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 18729
CLIENT: ENGINEERING SCIENCE
JOB #: NC191.04
LOCATION: MINAMI NURSERY

DATE RECEIVED: 11/17/89
DATE ANALYZED: 11/19/89
DATE REPORTED: 11/21/89

Extractable Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	GASOLINE (mg/Kg)	KEROSENE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
18729-1	MFW-1	ND(10)	ND(10)	ND(10)	ND(10)
18729-2	MFN-1	ND(10)	ND(10)	1,200*	ND(10)

ND = Not Detected; Limit of detection in parentheses.

* = Fingerprint Pattern does not match Hydrocarbon Standards.
Quantitation based on area sum within C12 to C26 boiling range.

QA/QC SUMMARY

Duplicate: Relative % Difference	<1
Spike: % Recovery	95

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 18729
CLIENT: ENGINEERING SCIENCE
JOB NUMBER: NC191.04
JOB LOCATION: MINAMI NURSERY

DATE RECEIVED: 11/17/89
DATE ANALYZED: 11/20/89
DATE REPORTED: 11/21/89

Total Volatile Hydrocarbons (TVH) by EPA 8015
Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	TVH AS GASOLINE (mg/Kg)	BENZENE (ug/Kg)	TOLUENE (ug/Kg)	ETHYL BENZENE (ug/Kg)	TOTAL XYLENES (ug/Kg)
18729-1	MFW-1	ND(10)	32	24	ND(5)	200
18729-2	MFN-1	ND(10)	30	150	10	56

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	2
%RECOVERY	87

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (415) 486-0900

DATE RECEIVED: 11/20/89
DATE REPORTED: 12/04/89

LAB NUMBER: 18763

CLIENT: ENGINEERING SCIENCE

REPORT ON: 1 SOIL COMPOSITE SAMPLE (MSP-1 - MSP-7)

JOB #: NC191.04
LOCATION: MINAMI NURSERY/HAYWARD

RESULTS: SEE ATTACHED

M. E. Printera
QA/QC Officer

Jm Waylor CRL
Laboratory Director

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 18763
CLIENT: ENGINEERING-SCIENCE, INC.
JOB #: NC191.04
LOCATION: MINAMI NURSERY/HAYWARD

DATE RECEIVED: 11/20/89
DATE ANALYZED: 11/29/89
DATE REPORTED: 12/04/89

Extractable Petroleum Hydrocarbons in Soils & Wastes
EPA 8015 (Modified)
Extraction Method: EPA 3550

LAB ID	CLIENT ID	GASOLINE (mg/Kg)	KEROSENE (mg/Kg)	DIESEL (mg/Kg)	OTHER (mg/Kg)
18763-1,2,3,4,5,6,7	MSP-1/MSP-2/MSP-3/MSP-4/MSP-5/MSP-6/MSP-7	ND(10)	ND(10)	14*	ND(10)

ND = Not Detected; Limit of detection in parentheses.

* = Fingerprint Pattern does not match Hydrocarbon Standards.
Quantitation based on area sum within C12 to C26 boiling range.

QA/QC SUMMARY

Duplicate: Relative % Difference	6
Spike: % Recovery	83

Curtis & Tompkins, Ltd

LABORATORY NUMBER: 18763
CLIENT: ENGINEERING-SCIENCE, INC.
JOB NUMBER: NC191.04
JOB LOCATION: MINAMI NURSERY/HAYWARD

DATE RECEIVED: 11/20/89
DATE ANALYZED: 11/30/89
DATE REPORTED: 12/04/89

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/kg)	TOLUENE (ug/kg)	TOTAL XYLENES (ug/kg)	ETHYL BENZENE (ug/kg)
18763-1,2,3,4,5,6,7	MSP-1/MSP-2/MSP-3/MSP-4/MSP-5/MSP-6/MSP-7	ND(5)	ND(5)	ND(5)	ND(5)

ND = None Detected; Limit of detection in Parentheses.

QA/QC SUMMARY

%RPD	1
%RECOVERY	88

CHROMALAB, INC.
Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#936)
- Waste Water
- Consultation

Novembr 28, 1989 ChromaLab File No.: 1189132

Aqua Science Engineers, Inc.

Attn: Greg Burg

RE: One rush soil sample for Diesel, Gasoline/BTEX analysis

Project No.: NC191.04
Project Name: MINAMI Nursery Tank Removal
Project Location: Hayward, CA
Durationof Analysis: November 27-28, 1989

RESULTS:

Sample No.	Diesel (mg/Kg)	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
MPN-2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE RECOVERY	84.1%	102.1%	103.1%	94.7%	81.9%	96.8%
DETECTION LIMIT	5.0	2.5	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	MOD.8015	MOD.8015	8020	8020	8020	8020

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Laboratory Director

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#955)
- Waste Water
- Consultation

December 1, 1989 ChromaLab File No.: 1189152

Engineering-Science, Inc.

Attn: Neal Siler

RE: Three rush soil samples for Gasoline/BTEX and Diesel analyses

Project No.: NC191.04
Project Name: MINAMI Nursery Tank Removal
Duration of Analysis: November 30-December 1, 1989

RESULTS:

Sample No.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
MGN-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
MGS-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
MGSE-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKED RECOVERY	102.2%	84.1%	103.3%	94.7%	81.9%	96.8%
DETECTION LIMIT	2.5	5	5	5	5	5
METHOD OF ANALYSIS	MOD. 8015	MOD. 8015	8020	8020	8020	8020

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Laboratory Director

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#955)
- Waste Water
- Consultation

December 4, 1989 ChromaLab File # 1289002

Engineering Science, Inc.

Attn: Neal Siler

Re: One rush soil sample for Gasoline/BTEX and Diesel analyses

Project Name: Minami Nursery
Project No.: NC191.04
Duration of Analysis: Dec. 3-4, 1989

Results:

Sample No.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
MGNW-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKE RECOVERY	102.2%	108.3%	103.1%	94.7%	81.9%	96.8%
DETECTION LIMIT	2.5	5.0	5.0	5.0	5.0	5.0
METHOD OF ANALYSIS	MOD.8015	MOD.8015	8020	8020	8020	8020

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Laboratory Director

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#238)
- Drinking Water (#955)
- Waste Water
- Consultation

December 6, 1989 ChromaLab File No.: 1289028

Engineering-Science, Inc.

Attn: Neal Siler

RE: Two rush soil samples for Gasoline/BTEX and Diesel analysis

Project Name: NINAMI NURSERY TANK REMOVAL
Project No.: NC 191.04
Duration of Analysis: December 5-6, 1989

RESULTS:

Sample No.	Gasoline (mg/Kg)	Diesel (mg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethyl Benzene (µg/Kg)	Total Xylenes (µg/Kg)
MGN-2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
MGW-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
SPIKED RECOVERY	102.2%	108.3%	103.1%	94.7%	81.9%	96.8%
DETECTION LIMIT	2.5	5	5	5	5	5
METHOD OF ANALYSIS	MOD. 8015	MOD. 8015	8020	8020	8020	8020

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Laboratory Director

GEOTECHNICAL RESULTS

CMT CONSTRUCTION MATERIALS TESTING, INC.

Job Name: MINAMI NURSERY
Sample Description:
Source:

Job No.: 89412
Sample No.: 1
Date: 3-22-90
By:

SIEVE ANALYSIS

Sieve Size	Wt. Retained	% Retained	Cumulative % Retained	Cumulative % Passing
3				
2-1/2				
2				
1-1/2				
1				
3/4	0	0	0	100
1/2	10	2	2	98
3/8	12	3	5	95
No. 4	29	6	11	89
No. 8				
No. 10	44	9	20	80
No. 16				
No. 30				
No. 40	54	12	32	68
No. 50				
No. 100				
No. 200	138	29	61	39
PAN	181	39	100	
TOTAL	468			

REMARKS:

1000-U Detroit Avenue . Concord, California, 94518 . Telephone (415) 825-2840

CMT CONSTRUCTION MATERIALS TESTING, INC.

Job Name: MINAMI NURSERY
Sample Description:
Source:

Job No.: 85482
Sample No.: 1
Date: 3-22-90
By:

HYDROMETER ANALYSIS
ASTM D-422

Date 1990	Actual Time	Elapse Time (min.)	R/H	Temp. C	C	% Pass	L	K	Dia.
3-21	10:00	2	43	19	6.2	33.6	9.2	.01382	.0296
	10:03	5	39			29.9	9.9		.0194
	10:13	15	33			24.5	10.9		.0118
	10:28	30	30			21.7	11.4		.0085
	10:58	60	26			18.1	12.0		.0062
	2:08	250	20	20	6.0	12.8	13.0	.01365	.0031
3-22	9:58	1440	18	2.0	6.0	11.0	13.3	.01365	.0013

Dry Weight of Soil 109.56 Assumed Specific Gravity 2.65

Remarks:

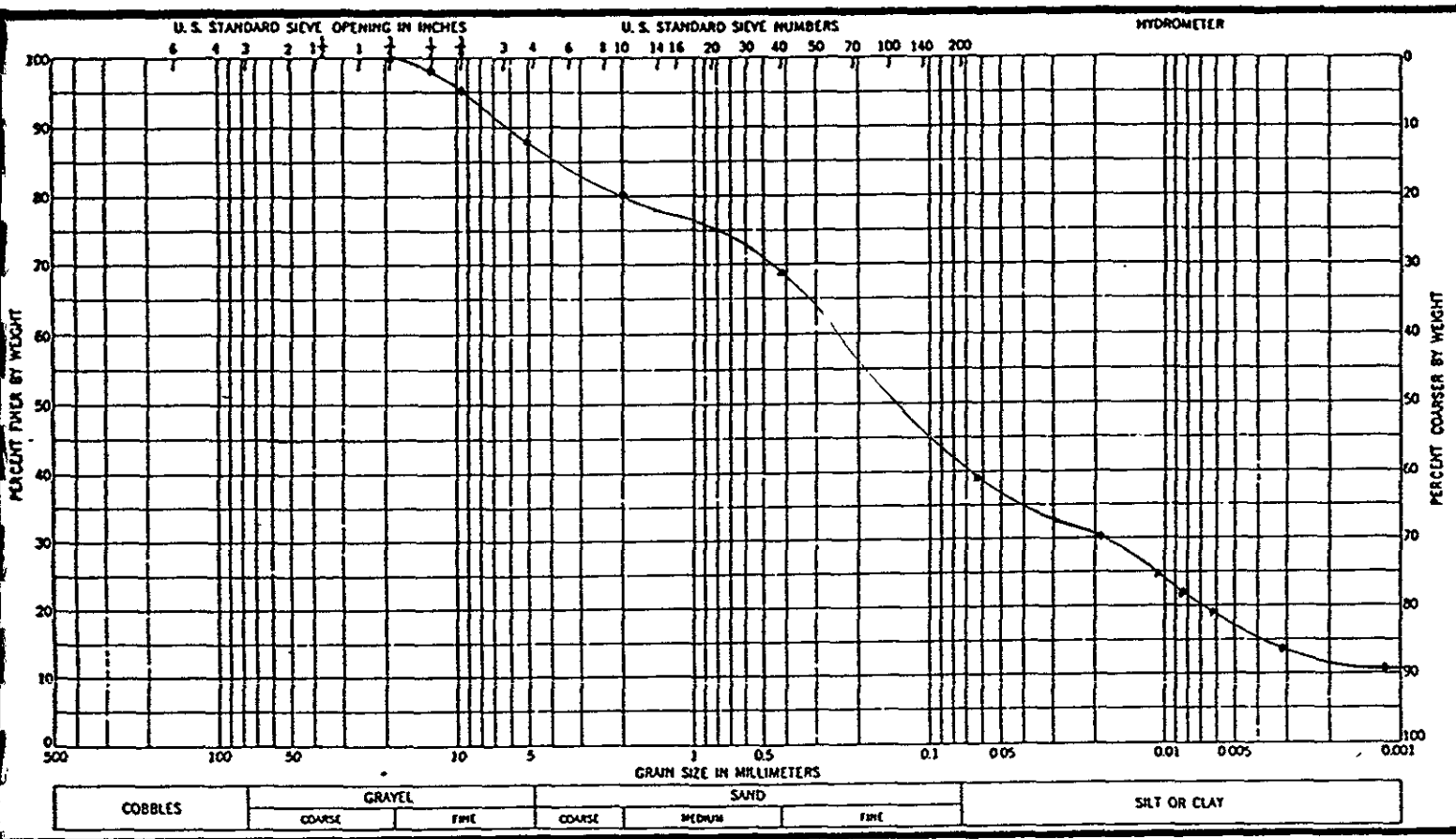
1000-U Detroit Avenue . Concord, California 94518 . Telephone (415) 825-2840

CONSTRUCTION MATERIALS TESTING, INC.

Job Name: MINAMI NURSERY
Sample Description: CL BR SO SI - SISI
Source: SITE

Job No.: 89482
Sample No.: 1
Date: 3-22-90
By: [illegible]

HYDROMETER ANALYSIS
ASTM D-422



Remarks: _____

1000-U Detroit Avenue . Concord, California 94518 . Telephone (415) 825-2840

TABLE I

Summary of Laboratory Compaction Test Results

Sample No.	Source & Description	Max. Dry Density p.c.f.	Optimum-Moisture % dry wt.
1	Import: Olive brown sandy silt with silty stone	104.0	18.5

TABLE II

Summary of Field Density Tests Results

Test No.	Date 1990	Location	Elev. ft.	Moisture % dry wt	Dry Density p.c.f.	Rel. Comp. % dry wt.
1	3/20	Subexcavated area, west side	FG-2	99.7	18.3	95
2	3/20	Subexcavated area, east side	FG-5	100.1	17.8	96
3	3/22	Fuel oil tank area	FG	94.1	20.2	90
4	3/22	East side of gas tank area	FG	98.3	18.2	95
5	3/22	Northwest side of gas tank area	FG	95.1	16.9	91

Note: FG= Finished grade