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April 2, 1993

Ms. Susan Hugo  
Alameda County Department of Environmental Health  
80 Swan Way, Room 200  
Oakland, California 94621

RE: Greyhound Terminal  
Location #8934  
Oakland, California

Dear Ms. Hugo:

Engineering-Science, Inc. (ES) is pleased to submit to you, on behalf of Greyhound Lines, a work plan to conduct a supplemental site assessment investigation at the Greyhound Terminal in Oakland, California. This work plan has been prepared in accordance with a letter from the Alameda County Department of Environmental Health (ACDEH) to Greyhound dated October 23, 1992. The purpose of the proposed work is to better define the lateral extent of dissolved contamination both on and off-site.

Greyhound looks forward to your favorable review of this work plan. In the interim, if you have any questions or require additional information, please contact us at (315) 451-9560.

Sincerely,

ENGINEERING-SCIENCE, INC.

Jeffrey Poulsen  
Project Geologist

David A. Nickerson  
Project Manager

David L. Chaffin  
California Registered Geologist

JSP/DAn/DLC/lml

*Workplan For:*

**SUPPLEMENTAL SITE ASSESSMENT INVESTIGATION  
GREYHOUND LINES, INC.  
GREYHOUND TERMINAL  
LOCATION 8934  
2103 SAN PABLO AVENUE  
OAKLAND, CALIFORNIA**

*Submitted To:*

**ALAMEDA COUNTY DEPARTMENT OF  
ENVIRONMENTAL HEALTH**

**MARCH 1993**

*Prepared By:*

**ENGINEERING-SCIENCE, INC.  
290 ELWOOD DAVIS ROAD  
SUITE 312  
LIVERPOOL, NY 13088**

**WORKPLAN FOR**  
**SUPPLEMENTAL SITE ASSESSMENT INVESTIGATION**  
**GREYHOUND TERMINAL**  
**OAKLAND, CALIFORNIA**

**INTRODUCTION**

This workplan describes the purpose, objectives, tasks and methods for conducting Supplemental Site Assessment Investigation activities associated with former diesel underground fuel storage tanks (UFSTs) at the Greyhound Lines, Inc. (Greyhound) Terminal, Location 8934, 2103 San Pablo Avenue, Oakland, California. This work plan has been prepared in accordance with the request by the Alameda County Department of Environmental Health (ACDEH) in a letter to Greyhound dated October 23, 1992 in which the ACDEH requested that Greyhound conduct additional site assessment activities to completely define the extent of the dissolved contaminant plume at and near the facility. The proposed work included in this workplan follows guidelines set forth in:

- Leaking Underground Fuel Tank (LUFT) Field Manual - Guidelines for Site Assessment, Cleanup, and Underground Storage Tank (UST) Closure, State of California LUFT Task Force, October 1989, and
- Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites, Regional Water Quality Control Board, 10 August 1990.

**PURPOSE AND SCOPE OF WORK**

The primary purpose of this investigation is to further define the lateral and vertical extent of soil and groundwater contamination associated with the past operation of UFSTs on-site. In addition, specific remedial actions for mitigating the contamination associated with the site soils and groundwater will be assessed.

**SITE DESCRIPTION**

This section presents a description of the site, including surrounding land use, climate, geology, hydrogeology, and surface and groundwater use.

**Local Description, Surrounding Land Use, and Climate**

The site is an active bus terminal located at the corner of San Pablo Avenue and Castro Street near the central business district in Oakland, California (Figure 1). The site encompasses an area of approximately 1.4 acres and is entirely paved with asphalt and concrete. Land uses in the immediate vicinity of the terminal are commercial and residential. The terminal is bordered to the west by Castro Street, on the east by San Pablo Avenue and Martin Luther King Way, on the south by 20th Street, and on the north by Castro Street and San Pablo Avenue (Figures 1 and 2).

The Oakland area has a climate characterized by mild, wet winters and warm dry summers. Precipitation is seasonal, falling mostly between November and March. Average annual precipitation recorded over a ninety year period (1885-1975) for the Oakland area is 20 inches. (Alameda County Flood Control and Water Conservation District, 1988). However, the area has experienced seven years of below normal rainfall and a much dryer climate has been characteristic until recently.

### **Local Geology**

The site is located in the San Francisco Bay Region of the Coast Ranges Geomorphic Province of California (Norris and Webb, 1990). The City of Oakland, including the Greyhound facility, is underlain by a thick sequence of unconsolidated Pleistocene deposits that include the Merritt Sand and older alluvium. The Merritt Sand is present below the site, and consists of loose, moderate- to well-sorted, fine- to medium grained, clayey to silty sand and lenses of sandy clay and clay. It has a maximum thickness of 65 feet in the East Bay Plain Area. Underlying the Merritt Sand is 700-800 feet of older alluvium comprised of poorly consolidated to unconsolidated clay, silt, sand and gravel (Helley, Lajoie and Burke, 1972; Alameda County Flood Control and Water Conservation District, 1988).

The subsurface materials encountered beneath the Greyhound facility during previous investigations include sand, silt and clay. The predominant materials encountered were silty, sandy clay with layers and lenses of fine-to medium-grained sand, and silty and clayey sand interbedded with layers of clay and silty clay. Hydraulic conductivity values for silty, sandy clays are expected to range from  $10^{-9}$  to  $10^{-4}$  cm/sec.

### **Hydrology**

The nearest surface water body to the Greyhound site is Lake Merritt (Figure 1), located approximately 1,700 feet east of the site. Lake Merritt is a brackish-water estuarine environment, connected to and influenced by the tidal fluctuations of San Francisco Bay. The Oakland Inner Harbor, the closest portion of the bay, is located approximately 2,700 feet south-southwest of the site.

The Greyhound facility lies within the Merritt Sand subarea of the East Bay Plain groundwater basin. At this site, groundwater is encountered under water-table conditions at a depth of 19 to 20 feet below ground surface. Groundwater flow at the site has been determined to be in a north-northwesterly direction with a hydraulic gradient of 0.002 feet per foot. Regional groundwater flow is to the west-southwest (Alameda County Flood Control and Water Conservation District, 1988).

### **Surface Water and Groundwater Use**

The City of Oakland obtains its municipal and industrial water from the East Bay Municipal Utility District (EBMUD). EBMUD imports this water primarily from the surface waters of the Sierra Nevada Mountain Range, located approximately 200 miles east of the site.

Groundwater in the area is utilized for limited irrigation and industrial purposes. The area is not considered a primary source of water supply because of the limited areal extent and thickness of the water bearing unit (Alameda County Flood Control and Water Conservation District, 1988). Approximately 384 wells are located within Section 26, Township 1S, Range 4W which includes the site (ACPWA, 1991). The vast majority (99%) of these wells are used to monitor or extract contaminated groundwater at commercial/industrial sites. One of the wells is used to supply water for irrigation. None of the wells located in Section 26 are used for municipal water supply.

## PREVIOUS SITE INVESTIGATIONS

Six UFSTs, once used to store diesel fuel, were removed from the site in 1989. These UFSTs were not in service between 1969 and 1989 (Brown and Caldwell Consulting Engineers, 1989). In 1989, the number, size and geometry of these UFSTs were characterized during an initial investigation of the site by Brown and Caldwell. The tank contents were analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX). Based on the analytical results, Brown and Caldwell concluded that the tanks contained a mixture of degraded diesel fuel and water. The initial investigation included a soil boring/sampling program to assess the potential for environmental contamination associated with the past operation of the UFSTs. A total of three soil borings were advanced and two samples were collected from each boring for analysis of BTEX and total fuel hydrocarbons (TFH). The three borings were later converted to monitoring wells (BC-1 through BC-3, Figure 2): TFH concentrations ranged from non-detect to 4,260 mg/Kg (soil boring BC-2, 16-16.5 feet depth). Toluene, ethylbenzene and total xylene concentrations ranged from non-detect to 49.5 ug/Kg.

The six UFSTs were removed following the 1989 investigation. Documentation of the tank closure activities was submitted by Engineering-Science, Inc. (ES) to the ACDEH and the Regional Water Quality Control Board (RWQCB) in December of 1992. The perimeter of the excavation boundary is shown on Figure 2. Two additional monitoring wells (No. 65 and No. 66, Figure 2) were identified 35 to 50 feet west of the site in Castro Street (Figure 2). These wells are not listed in the Alameda County Public Works Agency (ACPWA) well inventory (1991).

On November 11, 1991, a preliminary site investigation was initiated by ES at the site. A total of five soil borings were advanced to evaluate the type, magnitude, lateral and vertical extent of any soil contamination that might be present as a result of past fueling operations. The soil borings were converted into groundwater monitoring wells (ES-1 through ES-5, Figure 2) which were also sampled as part of the investigation. Results were presented to the ACDEH in the Preliminary Site Investigation report, January, 1992. Soil samples were collected from each boring. The soil samples were analyzed for total petroleum hydrocarbons as diesel (TPHD) and BTEX. BTEX and TPHD were not detected in ES-3 and ES-4. TPH was only detected in ES-5 at a concentration of 160 mg/Kg. Benzene was not detected in any of the soil samples. Samples from ES-1, ES-2 and ES-5 had concentrations of toluene, ethylbenzene, and total xylenes ranging from 0.065 ug/Kg to 205 ug/Kg. Groundwater samples were collected and analyzed for TPHD and BTEX. The depth to groundwater at the site was

approximately 19.5 feet below ground surface. BTEX was detected in the groundwater sample from all of the wells except ES-4, with concentrations ranging from 0.124 and 12.89 ug/L. TPHD was detected in the sample from ES-5 at a concentration of 950 mg/L. At that time, no groundwater contamination was detected in samples collected from downgradient monitoring well ES-4.

In June 1992, Greyhound implemented a voluntary program of monthly groundwater monitoring and quarterly groundwater sampling at the Oakland terminal to better define the extent and migration of the dissolved-phase plume. During monthly monitoring, free phase hydrocarbons have been encountered in monitoring wells ES-2, ES-5 and BC-1. The depth to groundwater has ranged from 18.55 to 20.75 feet below the top of the well casings.

In December 1992, Greyhound installed a hydrocarbon recovery and groundwater treatment system at the Oakland terminal. Presently, the system is recovering free product and groundwater from four of the on-site wells (ES-1, ES-2, ES-5 and BC-1). Details of the recovery system installations and operation were presented in a report submitted to the ACDEH in December 1992.

## **PROPOSED WORK**

### **Introduction**

The following is a summary of additional work proposed at the Greyhound Terminal:

1. Liaison with concerned regulatory agencies, utility clearance, and permit acquisition.
2. Installation of 6 to 8 additional soil borings which will be converted to groundwater monitoring wells located at positions appropriate to evaluate the extent for the contaminant plume (Figure 2).
3. Field screening the subsurface soil samples during the installation of the soil borings/monitoring wells for immediate on-site verification of elevated volatile organic compound (VOC) levels using a PID.
4. Monitoring of groundwater at newly installed wells consisting of measurement of free product thicknesses, if present, and depth to water, and the collection of water quality samples from the wells. Previously existing monitoring wells which do not contain measurable thicknesses of free product will also be sampled.
5. Preparation of a Supplemental Site Assessment Report that will completely define the extent of soil and groundwater contamination this location.

All field activities will be conducted under the direct supervision of a California Registered Geologist (RG) or Professional Engineer (PE) per regulatory agency requirements. All field activities will be documented in bound notebooks and with photographs. This documentation will be incorporated into the Supplemental Site Assessment Report.

### **Task 1 - Regulatory Liaison/Permit Acquisition**

The ACDEH is the lead implementing agency for investigations concerning the Greyhound Terminal in Oakland. All plans and documents describing the environmental investigations described herein will be transmitted to the ACDEH. In addition, the RWQCB will receive copies of all pertinent environmental documentation.

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

Prior to the implementation of any field activities, a utility location service (USA Locator) will be contacted. USA Locator will notify concerned utilities (power, telephone, water, sewer, etc.) of the proposed work and arrange for delineation of underground and aboveground utilities that may be impacted by the proposed work.

### **Task 2 - Soil Boring and Well Installation Program**

Prior to any drilling activities and between boreholes, all down-hole drilling equipment coming into contact with the subsurface will be thoroughly decontaminated by steam-cleaning.

A total of six to eight exploratory boreholes will be drilled at the locations shown in Figure 2, to a depth of 30 to 35 feet using hollow-stem auger drilling and five-foot interval split-spoon sampling techniques in accordance with ASTM Standard D-1586. All soil samples retrieved from the boreholes will be logged in the field by an experienced ES geologist and visually inspected for signs of staining or the presence of hydrocarbon odors and screened for the evolution of organic vapors with a photoionization detector (PID). Based on PID readings, the soil sample with the highest PID reading from each boring will be selected for laboratory analysis. All drill cuttings, decontamination rinsates and purge water will be collected and stored on-site in DOT-approved 55-gallon drums for future disposal in accordance with all regulatory requirements.

Soil sampling protocol will consist of collecting samples in brass tubes and sealing the brass tubes with Teflon tape and non-reactive end caps in accordance with Regional Water Quality Control Board (RWQCB) and Alameda County Department of Environmental Health requirements. A Chain-of-Custody record will accompany each sample from collection in the field to the laboratory. All laboratory analyses will be performed by a California Department of Toxic Substance Control (DTSC)-certified hazardous waste laboratory. Soil samples will be analyzed for BTEX by EPA Method 8020, TPHD, and TPHG by DTSC/LUFT Method (modified EPA Method 8015).

### **Task 3 - Groundwater Sampling**

After the wells have been developed and water levels have returned to static or near static levels, groundwater monitoring of the newly installed wells and all existing wells will be performed. Groundwater monitoring will consist of measurement of depth to water and free product thickness, if present, and the collection of water

samples from those wells which do not contain a measurable thickness of free phase hydrocarbons. These measurements will be made in each well using an electronic oil-water interface probe and a water level indicator. After each measurement, the water level indicator and the oil waster interface probe will be washed in analconox solution followed by two rinsings in deionized water to prevent the possibility of cross-contamination between well locations.

Water quality samples will be collected using dedicated high density polyethylene (HDPE) bailers after purging a minimum of three times the submerged volume of the well casing from each well. Wells will be purged by hand bailing with dedicated HDPE bailers. During the purging of the wells, physical parameters (temperature, pH, and electrical conductivity), will be recorded to characterize the stability of the sampled groundwater.

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

#### **Task 4 - Supplemental Site Assessment Report**

Following the completion of the investigation, a Supplemental Site Assessment Report will be prepared.

The report will include the following:

- A brief history of the environmental investigations conducted to date.
- A summary of the information collected during the Supplemental Site Assessment.
- A discussion of procedures and protocols used for soil boring/sampling and monitoring well installations.
- A description of the lateral and vertical extent of soil and groundwater contamination.
- Presentation of soil and groundwater analytical results (tables, figures) in the context of regulatory agency "action levels" and guidelines.
- Certified laboratory analytical reports including chain-of-custody records.
- Photographic documentation of site activities.
- Proposed further corrective actions.

#### **QUALITY ASSURANCE/QUALITY CONTROL**

The quality of the data collected during this study will be assured by following the soil boring/sampling collection procedures presented below.

##### **Field Quality Assurance/Quality Control**

Four kinds of records will be used to document the field activities:



- Field log book,
- Field data sheets,
- Sample labels, and
- Chain-of-custody forms.

### **Field Log Book**

All data will be initially recorded in a bound field log book while in the field. The following information will be recorded in the field book: sample ID, date, and time, matrix and location; and client; analytical method; samplers' initials, and the name of the analytical laboratory. Any other pertinent information, such as conversations with concerned parties (site custodians, regulatory agency personnel) or descriptions of anomalous conditions, are entered.

### **Field Data Sheets**

Field data sheets will be completed in the field for organization and documentation of relevant data. These data sheets include daily field reports, daily trip reports, sampling field note forms, air monitoring data forms, if applicable, and geologic boring logs.

### **Sample Labels**

Sample labels will be completed in waterproof ink at the time of sample collection and before the sample is placed in the cooler. The following information is recorded on each label: sample ID, date, time, and location; client; analyses; laboratory; preservative, if any; samplers' initials; and project number.

### **Chain-of-Custody Records**

A chain-of-custody record will be completed as soil samples are collected, so that samples do not have to be removed from the cooler. No sample will be placed in the cooler before all documents for that sample have been completed. The record will be checked for completeness at the end of the day and signed. It will either be hand-delivered with the samples to the laboratory, or placed in a sealable plastic freezer bag and taped to the inside lid of the cooler, if shipped. Information on the chain-of-custody record will include: sample date, time, ID, location, and matrix; number of containers; required analyses; preservative, if any; instructions for composite samples; turnaround time; project manager; number, name and location; client and laboratory names; and sampler signatures.

Immediately after collection and preparation of sample documentation, each soil and groundwater sample will be labeled and placed in a cooler with ice at 4 degrees Centigrade (samples will not be allowed to freeze) for delivery or shipment to the laboratory. All samples will be analyzed as soon as possible, without exceeding the applicable DTSC-prescribed holding times. A completed chain-of-custody form, as described above, will be submitted to the laboratory.

## **Laboratory Quality Assurance/Quality Control**

A California DTSC-certified hazardous-waste laboratory will be used to analyze the soil and groundwater samples. The laboratory will be responsible for maintaining custody of the samples, and for maintaining all records documenting custody. Upon receipt of the samples, the laboratory will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for accuracy and traceability. The laboratory will check all sample containers for integrity, and will note pertinent observations on the original chain-of-custody record; the chain-of-custody form will be signed, dated, and timed by the laboratory. Each sample will be logged into the laboratory by assigning it a unique sample number. All samples received as part of the same shipment will receive the same work order. Each container of the sample will be identified by appending sequential letters to the end of the sample ID. The laboratory number and the sample ID number will be recorded on the laboratory report. Samples will be stored and analyzed according to approved EPA and DTSC methods.

## **PROPOSED SCHEDULE**

The proposed field work associated with this Supplemental Site Assessment will be conducted within 3 to 6 weeks following ACDEH approval of this work plan. This will allow Greyhound sufficient time to obtain the required permits and schedule the drilling subcontractor. The field work is expected to take approximately 2 weeks to complete. Following receipt of analytical data (approximately 3 to 4 week turnaround), the Supplemental Site Assessment draft will be prepared within 2 weeks and sent to Greyhound for internal review. After a 1 week review by Greyhound, the report will be finalized based on Greyhound's comments and submitted to the ACDEH and RWQCB for review. Therefore, a final Supplemental Site Assessment Report will be submitted approximately 10 to 14 weeks after final approval of this work plan is received from the ACDEH.

## **QUALIFICATIONS**

Engineering-Science, Inc. (ES) is an international, multidisciplinary consulting firm providing a broad range of environmental engineering, planning, and design services. For more than 40 years, ES has concentrated exclusively on environmental engineering and the environmental sciences, conducting projects over a wide area throughout the United States and abroad. Clients include the U.S. Government, foreign governments, state and city governments, communities, special districts, industrial, commercial, institutional and other private interests. ES currently has 32 offices across the nation as well as numerous project and field offices. The total corporate staff includes over 1,500 engineers, scientists, and support personnel.

ES has over 14 years of direct hazardous waste management experience and is a recognized leader in technology development and use in the areas of hazardous waste handling, treatment, and disposal. The ES staff of geologists; hydrogeologists; chemists; environmental; civil, and chemical engineers; meteorologists; industrial hygienists; toxicologists; planners; ecologists; hazardous waste specialists; and other professional personnel are equipped to provide a full spectrum of services from site

characterization, waste auditing, remedial investigations, feasibility studies, and remedial action planning to design and construction management.

ES maintains licenses, certifications and training required for hazardous waste operations in the State of California, including:

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

The drilling contractor selected by ES will have the following certifications and training:

- Class C-57 Contractor's License.
- Financial Bonding in Alameda County.
- Federal Occupational Safety and Health Administration (OSHA) 40-hour health and safety training for hazardous waste operations (29 CFR 1910.120) certifications for all site workers.
- City of Oakland Business License.

## **HEALTH AND SAFETY**

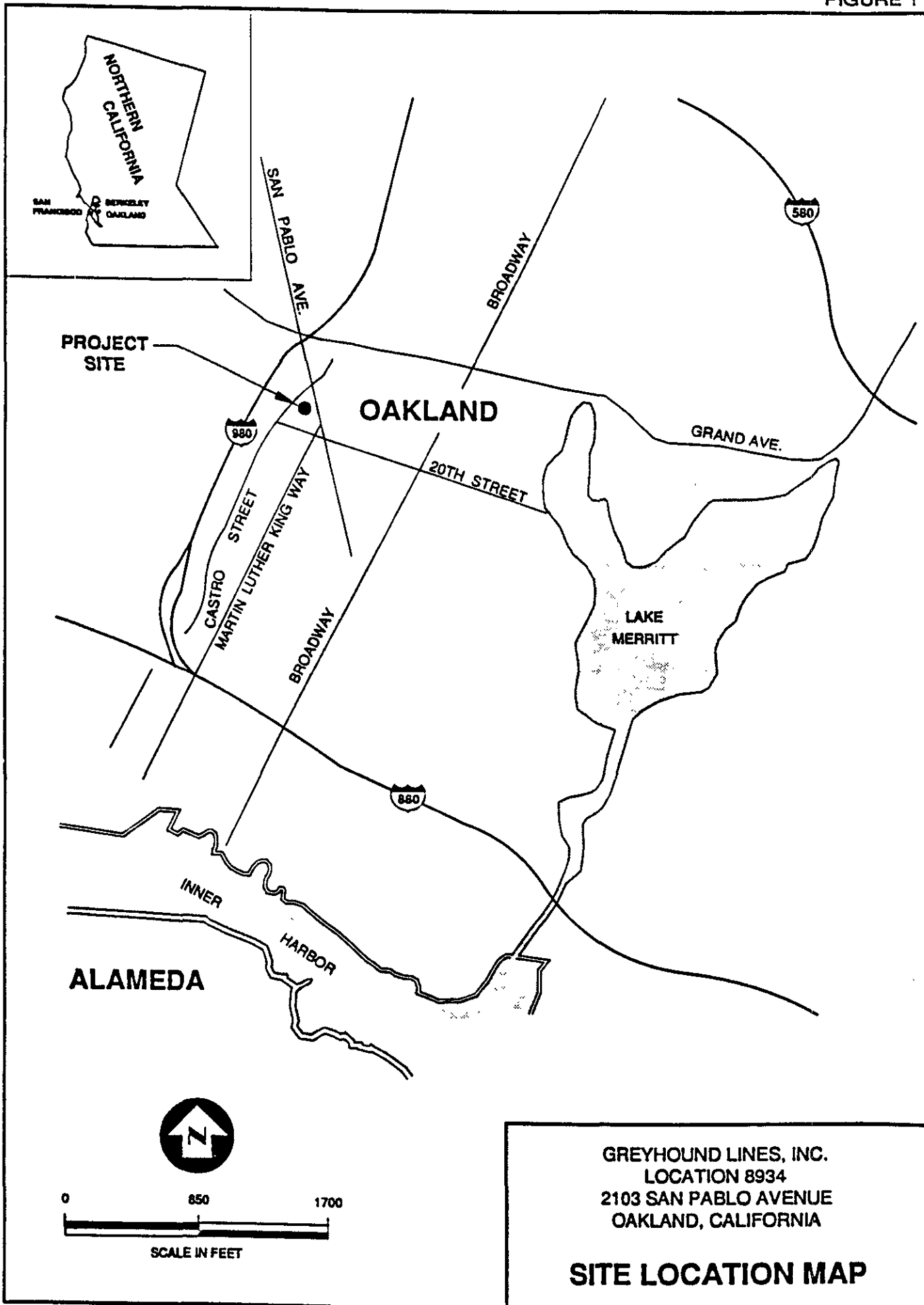
The ES safety policy dictates that a site-specific health and safety plan (HASP) be generated for use by the on-site ES investigative team since the potential for exposure to hazardous materials exists. The provisions of the HASP will be mandatory for all site personnel; all ES subcontractors shall conform to this plan as a minimum. All ES personnel and subcontractors will be enrolled in a medical monitoring surveillance program.

Consistent with standard ES safety policy, ES will update the site-specific HASP prior to implementation of the problem assessment investigation activities. This plan will provide general guidelines for decision points in site safety planning and will establish personnel protection standards and mandatory safety practices and procedures. The HASP will cover the following subjects:

- Emergency contacts to be used in the event of an accident or exposure;
- Description of site hazards, both physical and chemical;
- On-site monitoring and personnel protection;
- Project team organization and responsibilities;
- Site control measures;
- Decontamination procedures; and
- Training and medical monitoring requirements for personnel.

## REFERENCES

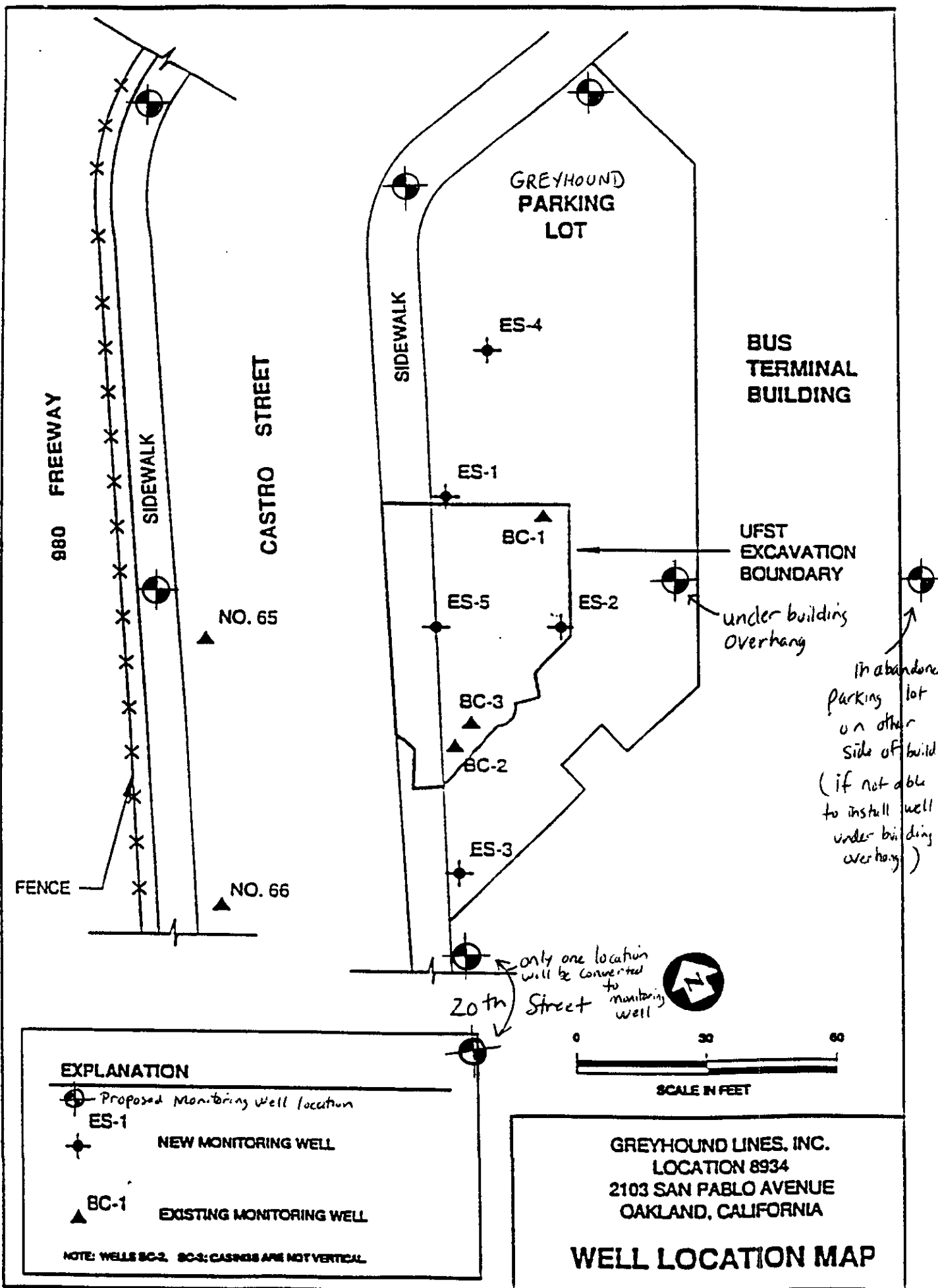
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GREYHOUND LINES, INC.  
 LOCATION 8934  
 2103 SAN PABLO AVENUE  
 OAKLAND, CALIFORNIA

**SITE LOCATION MAP**

FIGURE 2



**EXPLANATION**

- Proposed Monitoring Well location
- ES-1
- NEW MONITORING WELL
- BC-1
- EXISTING MONITORING WELL

NOTE: WELLS BC-2, BC-3; CASINGS ARE NOT VERTICAL

only one location will be converted to monitoring well

20th Street

0 30 60

SCALE IN FEET

GREYHOUND LINES, INC.  
 LOCATION 8934  
 2103 SAN PABLO AVENUE  
 OAKLAND, CALIFORNIA

**WELL LOCATION MAP**