Environmental Geotechnical Construction
Consulting • Engineering • Testing

HAZARDOUS WASTE PRELIMINARY SITE INVESTIGATION WORKPLAN TASK ORDER NUMBER: 04-911175-47

ETTIE MAINTENANCE STATION OAKLAND, CALIFORNIA

prepared for

CALIFORNIA DEPARTMENT OF TRANSPORTATION
District 4
111 Grand Avenue
Oakland, California

prepared by

Professional Service Industries, Inc.
3777 Depot Road, Suite 418
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July 9, 1997
575-71022

F Transfer\Project\Calty097\71022\ETTIE DWP

Information To Build On

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STATEMENT OF LIMITATIONS AND PROFESSIONAL CERTIFICATION

Information provided in this Workplan, for Professional Service Industries, Inc. (PSI), is intended exclusively for the use of Caltrans for the evaluation of subsurface conditions as it pertains to the subject site. The professional services provided have been performed in accordance with practices generally accepted by other geologists, hydrologists, hydrogeologists, engineers, and environmental scientists practicing in this field. No other warranty, either expressed or implied, is made. As with all subsurface investigations, there is no guarantee that the work conducted will identify any or all sources or locations of contamination.

PSI reserves the right to deviate from the proposed scope of services outlined in this Workplan as needed to obtain the required information. If such deviation is necessary, PSI will make every attempt to seek prior approval from the client and the regulatory agency overseeing this project.

This Workplan is issued with the understanding that Caltrans is responsible for ensuring that the information contained herein is brought to the attention of the appropriate regulatory agency. This Workplan has been reviewed by a geologist who is registered in the State of California and whose signature and license number appear below.

Frank R. Poss
Associate Hydrogeologist

John D. Whiting
John D. Whiting, RG #5951
Senior Geologist

REGISTERED GEOLOGIST
JOHN D WHITING
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No 5951
EXP 3-31-98
STATE OF CALIFORNIA

1.0 INTRODUCTION

Professional Service Industries, Inc. (PSI) has been retained by the California Department of Transportation (Caltrans), under Task Order Number 04-911175-47 and Contract Number 43Y097, to prepare a detailed Workplan to assess current soil and groundwater conditions at the Ettie Maintenance Station, Oakland, California (subject site; Figure 1). The scope of work for this investigation includes:

- Preparation of a Workplan and a Health and Safety Plan;
- Completion of soil and ground-water sampling at the above referenced properties;
- Preparation of a draft report for the project describing the methodology and results of the investigation and recommendations; and
- Preparation of a final report for the entire project.

1.1 SITE BACKGROUND

Information provided by Caltrans in the Task Order, dated May 28, 1997, indicates that two underground fuel tanks (UST) at the Ettie Maintenance Station were removed from the site on October 19 and 20, 1995. Laboratory analyses of soil and groundwater samples collected from the UST excavation indicated the presence of diesel and waste oil hydrocarbons.

On February 8, 1996, soil and groundwater samples were collected from two borings drilled down gradient from the former USTs and dispensers. The results of the soil analyses indicated that detectable concentrations of total petroleum hydrocarbons as oil (TPH-Oil) were as high as 1,200 milligrams per kilogram (mg/kg), while detectable concentrations of TPH-oil and TPH as diesel (TPH-D) were as high as 2,300 milligrams per liter (mg/l) and 62.5 mg/l, respectively. A copy of the Tetra Tech Final Report dated June 1996 is presented in Appendix A.

An additional investigation of the site area was completed by PSI in February and March 1996 for seismic retrofitting of the freeway columns and bents. PSI drilled over 100 borings in the general area with four of the borings (BM-29 through BM-32) being adjacent to the bents found in Figure 2. Soil samples were collected at 0.15, 0.3, 0.6, and 1.5 meters (0.5, 1, 2, and 5 feet) bgs. The soil samples from borings BM-29 and BM-30 were analyzed for selected metals; benzene, toluene, ethylbenzene, and total xylenes (BTEX); and total recoverable petroleum hydrocarbons (TRPH). The soil samples from borings BM-31 and BM-32 were analyzed for selected metals, BTEX, TPH-G, TPH-D, and TRPH. The results of the soil analyses indicated that two soil samples from these four borings had soluble lead concentrations greater than the soluble threshold limit concentration (STLC) for lead (5 milligrams per liter (mg/l)). These samples were collected at 0.6 meters (2 feet) in boring BM-30 and at 0.3 meters (1 foot) in boring BM-32. None of the organic compounds were detected with the exception of TRPH. TRPH concentrations ranged from not detected to 400 milligrams per kilogram (mg/kg). The conclusion of the report stated that there was no correlation between lead and TRPH concentrations and their spatial distribution.

1.2 PROJECT OBJECTIVE

The objective of the project is to determine the horizontal and vertical extent of petroleum hydrocarbon contamination in subsurface soil and groundwater as related to the two underground storage tanks (USTs) removed from the site. The concentrations of selected potentially hazardous constituents in soil and water will be determined, and will be evaluated for their potential impacts. The purpose of this Workplan is to delineate the scope of work for this project and to describe the methodology utilized to complete the scope of work. Additionally, the investigative methodology and interpretation of results will follow the ASTM E1739-95 *Standard Guide for Risk Based Corrective Action (RBCA) Applied at Petroleum Release Sites.* ✓

2.0 PRE-FIELD ACTIVITIES

This section describes the tasks the contracted consultant (Contractor) will perform prior to initiating any field activities. These tasks include: 1) attending the Caltrans Task Order Meeting; 2) identifying borehole locations; 3) preparing the Pre-Work Site Visit Checklist; 4) locating any underground utility lines in conjunction with Underground Service Alert (USA); and 5) completing the Investigation Completion Schedule.

This section describes the activities PSI has performed or will perform prior to initiating the soil and groundwater investigation. These activities include: attendance at the Task Order meeting, identification of borehole locations, preparation of a Pre-Work Site Visit Checklist, utility clearance, and preparation of an Investigation Completion Schedule.

2.1 TASK ORDER MEETING

A Task Order Meeting was conducted on June 6, 1997, with Mr. Frank Poss of PSI and Ms. Chris Zdunkiewicz and Mr. Howell Chan of Caltrans in attendance. The primary purpose of the meeting was to familiarize PSI with site conditions that may impact field operations.

A secondary purpose of the Task Order Meeting was to identify the boring locations and to prepare a Pre-Work Site Visit Checklist (Appendix B). Topics specified in the Checklist include identification of borehole location, confirmation of underground utility clearance, location of water/power supply sources, and storage areas for drill cuttings.

2.2 HEALTH AND SAFETY PLAN

Prior to the commencement of field activities at the site, a site specific Health and Safety Plan (HSP) will be developed in compliance with 29 CFR 1910.120, and reviewed and signed by a Certified Industrial Hygienist. The HSP is designed to address the potential hazardous materials that may be encountered during field activities at the site. Further, the HSP will be designed to minimize the exposure to potentially hazardous materials and unsafe working conditions to on-site personnel.

2.3 UTILITY CLEARANCE

At least 48 hours prior to drilling activities, PSI will contact Underground Service Alert (USA) to identify utility lines that may underlie the areas of investigation.

2.4 INVESTIGATION COMPLETION SCHEDULE

At the Task Order Meeting, Mr. Poss and Ms. Zdunkiewicz agreed that the Investigation Completion Schedule, prepared by Caltrans, appears to be feasible under the observed site conditions (Appendix B). In the event that field conditions encountered during the investigation are judged to impact the Schedule, PSI may request that the Schedule be revised

3.0 SUBSURFACE INVESTIGATION

This section describes the methodology implemented to conduct a soil and groundwater investigation at the site. The objectives of these sampling procedures are to establish protocols for conducting an investigation that will provide an accurate assessment of the current soil and groundwater conditions and to minimize the potential for cross-contamination during sampling operations.

3.1 SOIL BORINGS

Six soil borings have been identified at the site to investigate the soil and groundwater concentrations across the site (Figure 2). PSI will use V&W Drilling of Rio Vista, California, to complete the borings at this site. Borings B1 through B6 will be advanced by simultaneously pushing or driving a small-diameter drive casing and an inner sample barrel. The borings will be sampled at 1.5 meter intervals (5 foot) until first detected groundwater. Soil samples will also be collected at any sign of contamination, any change in lithology, and at the groundwater interface. The field work for drilling and soil sampling activities will be conducted in accordance with the field procedures outlined in Appendix C. If obstructions are encountered during drilling, the borehole location will be relocated several feet from the obstruction. Upon completion of drilling, borings not scheduled to be utilized for the installation of monitoring wells will be backfilled with concrete/bentonite slurry, in accordance with Caltrans and local requirements.

3.2 SOIL SAMPLING PROTOCOL

Soil samples will be collected by a PSI geologist working under the supervision of a State of California registered geologist. The samples will be collected in clean, 6-inch-long stainless-steel tubes. Upon retrieval of the sampler, a minimum of one stainless steel tube will be preserved for chemical analyses. Soil samples will be collected according to PSI procedures as outlined in Appendix C. The soil samples will be logged on chain-of-custody records and transported to GEOTEST of Long Beach, California, a California Department of Health Services certified hazardous materials testing laboratory, following chain-of-custody protocol.

3.3 SOIL CLASSIFICATION

Soil will be described by a PSI Geologist and recorded on a field boring log for each boring drilled. The data recorded on the logs will be based on examination of soil samples retrieved in the stainless-steel tubes, cuttings obtained from the auger, and drilling conditions observed in the field. Boring logs will include information regarding the location of the boring, type of sampler used, and geologic descriptions of materials encountered. Special attention will be paid to the contact between the fill and native soil.

Soils will be classified according to the Unified Soil Classification System (USCS). Other information to be recorded on the logs includes indications of potential contaminants and the occurrence of and depth-to-water. Organic vapor analyzer (OVA) measurements for soil samples and/or auger cuttings will be recorded on the field boring logs.

7/28/97 - Per Frank Ross - this pump will only be used to purge & a disp. bailer will be used to sample.

not suitable for volatile constituents!

3.4 GRAB WATER SAMPLING

Following the drilling of the borings, disposable polyethylene tubing will be lowered through the drill stem with a groundwater sample collected using a peristaltic pump. Field work for groundwater sampling will be conducted in accordance with the procedures outlined in Appendix C.

3.5 WELL INSTALLATION

why?

Following grab groundwater sampling, borings B1, B3, B4, and B6 will be converted to 2.5 centimeter (cm) (1-inch) groundwater monitoring wells. The wells will be constructed with schedule 40 PVC casing with 0.0508 cm (0.020-inch) machine-slotted and will be screened from 1.5 to 4.5 meters (5 to 15 feet) bgs. The filter pack will be #3 Monterey sand and will be pre-packed to insure the installation of a good sand pack. The annulus grout will be Portland cement mixed at a ratio of 5 gallons of water per 94-pound sack of cement and emplaced using a tremie pipe. The well will be completed to surface with a 45.72 cm (18-inch) outside diameter well box. Subsequent to completion, the well will be developed by surging the well with a surge block and purging the well of approximately 3 to 5 well volumes with a bailer, or until water clarity indicates that development is complete. Following completion of the well installation, the newly installed well will be surveyed by correlating its elevation and location to two other existing wells at the site. Accuracy will be to 0.003 m (0.01 foot) vertically and to 0.003 m (0.1 foot) horizontally. Surveying will be conducted by a State of California certified surveyor.

3.6 MONITORING WELL SAMPLING

The four newly installed monitoring wells will be sampled a minimum of 72 hours after their installation. Prior to groundwater sampling, groundwater elevations will be measured using the surveyed mark at the top of the well head for reference in each of the monitoring wells at the site. The monitoring wells will then will be purged of a minimum of three well volumes, and until pH, conductivity, and temperature stabilizes. The purging will be completed by hand bailing or submersible pump. Groundwater samples will be collected with a disposable polyethylene bailer with volatile organic samples collected first. The groundwater samples will be collected according to PSI's standard protocol, which can be found in Appendix C.

Following groundwater sample collection, the samples will be logged on a Chain-of-Custody Record and stored in an ice chest at 4 degrees Celsius. The samples will be stored so as not to allow cross contamination. Sampling bottles with preservative will be utilized as instructed by the analytical laboratory. All transportation and handling of the groundwater samples will follow Chain-of-Custody protocol.

3.7 STORAGE AND DISPOSAL OF GENERATED WASTES

All soil cuttings will be temporarily placed on an 2.44 m by 2.44 m (8-foot by 8-foot) plastic sheet, 4 mil or thicker, prior to being stored in 55-gallon drums. No cuttings will be directly deposited onto the ground surface. The disposition of the cuttings will be determined upon receipt of laboratory analytical results.

Water from equipment cleaning will be stored in individually labeled United States Department of Transportation (DOT) approved (17H) 55-gallon drums. Disposition of the water will be determined upon receipt of laboratory analytical results of the soil and water samples. PSI will arrange for the management and appropriate disposal of soil and water generated during the field activities under Special Provision SP-2 of Contract 43Y097.

3.8 DECONTAMINATION PROCEDURES

The following decontamination procedures will be followed to maintain sample integrity and to prevent cross-contamination between sampling locations:

- All soil and surface-water sampling equipment will be cleaned with a non-phosphate detergent and rinsed twice with deionized water prior to use at a new sampling location. Sampling equipment includes:
  - Stainless-steel sample barrel and tubes,
  - Drilling equipment,
  - Groundwater sampling equipment
  - Sounders, and
  - Development equipment.
- The rinsate will be retained and stored in labeled DOT-approved (17H) 55-gallon drums until laboratory results for associated soils and/or water are received and disposition of the stored water may be determined.
- Drilling equipment will be pressure washed between drilling locations.

4.0 LABORATORY ANALYSIS PROGRAM

The soil and groundwater samples collected during this investigation will be submitted to GEOTEST, a State of California EPA-certified hazardous waste laboratory (Environmental Laboratory Accreditation Program [ELAP] #1225) for analysis.

All soil and groundwater samples collected from at the site will be analyzed for the following constituents according to the indicated methods:

- Total Petroleum Hydrocarbons as Gasoline (TPH-G) in accordance with a modified Environmental Protection Agency (EPA) Method 8015 ✓

- TPH-D in accordance with a modified EPA Method 8015 ✓

- Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), and Methyl Tertiary Butyl Ether (MTBE) in accordance with EPA Method 8020, if an EPA Method 8260 analyses for that sample is not already scheduled.

- Oil and Grease (TOG) in accordance with EPA Method 5520 F ✓

Soil and groundwater samples collected from borings B4, B5, and B6 will be analyzed for the following constituents according to the indicated methods:

- Volatile Organic Compounds (VOCs) in accordance with EPA Method 8260

- Semi-volatile organic compounds (SVOCs) using EPA Method 8270 ✓

- Metals (CCR 17) using EPA Method 6010. ✓

Soil samples collected from boring B4 will be analyzed for the following constituents according to the indicated methods:

- Moisture Content in accordance with ASTM-2216 ✓

- Total Organic Carbon in accordance with EPA Method 9060 (The soil sample collected will be confirmed to be not contaminated prior to analyses); and

- Soil Porosity ✓

7/28/97 Per Frank Poss - this analysis will be added for B1, B2 & B3.

F:Transfer\Project\Calty097\71022\ETTIE.DWP

Analysis for PNAs?
→ near former USTs + dispenser area

All Quality Assurance/Quality Control (QA/QC) procedures outlined on page 31 in Contract Number 43Y097 will be strictly adhered to during the performance of the work at the site.

5.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

The following equipment calibration procedure and field documentation procedures will be implemented by PSI field personnel.

5.1 SAMPLE IDENTIFICATION

Soil samples collected in the field will be labeled according to standard protocol, as outlined in Appendix C.

5.2 CHAIN-OF-CUSTODY PROCEDURES

Chain-of-Custody records will be used to document sample handling and shipping procedures. Chain-of-Custody records will trace the sample(s) from collection, through any custody transfers to the analytical laboratory. Information recorded on the Chain-of-Custody records will include location of sample collection, sample identification (I.D.) number, date and time of collection, number and type of sample containers and analyses requested. The shipping conditions will also be described on the Chain-of-Custody records. The name of the sampler(s) as well as the name of the person relinquishing the samples will be documented. Chain-of-custody procedures are outlined in Appendix C.

5.3 FIELD INSTRUMENTS

The following instruments will be used in the field for health and safety, as well as, site assessment purposes.

Organic Vapor Analyzer (OVA)

An organic vapor analyzer with a flame ionization detector (FID) will be calibrated daily using a reference calibration gas. Calibration gas is pre-bottled by a laboratory supply house and has a listed calibration value in parts per million for each specific gas. The field OVA will be used as an indicator of total petroleum hydrocarbons in soil samples and for health and safety purposes.

Temperature, pH, and Conductivity Meter

This meter will be calibrated prior to sampling each day. The meter will be used at every water sample during purging to collect temperature, pH, and conductivity data. Laboratory supplied buffer and standard solutions will be used to calibrate the instrument.

6.0 DATA MANAGEMENT

In accordance with Provision SP12 of Contract 43Y097, a Daily Work Force Log will be completed by on-site personnel for each day in the field. The log will include the following items listed below:

- Task order number and contract number;
- Project name and location;
- Name, Title and Company of person performing the work;
- Date work is being performed;
- Actual begin and end times of work;
- Description of work being performed;
- Additional notations, observations or remarks to further characterize or clarify work being performed;
- Equipment utilized on site; and
- Change orders issued during site activities.

6.1 DATA STORAGE

Project correspondence, field notes, maps, and data will be filed within the main Project File at PSI's Hayward office. Chemical data will be entered onto a spreadsheet program for ease of organization, review, and presentation of data in the report. Hard copy files within the main Project File may include, but not be limited to:

- Basic Data: Soil boring logs, field procedures, forms, maps, analytical data.

- Project Field Logs: The project notebook and all field memorandums.

- Correspondence: All written correspondence and telephone conversation records.

- Data Presentation: All maps and tables generated from basic data analyses.

- Data Verification: Documentation that all tables, maps and texts using basic information have been reviewed.

7.0 INVESTIGATIVE REPORT PREPARATION

Upon completion of the pre-field and field activities described in this Workplan, a Draft Investigation Report will be prepared presenting the investigative methodology implemented, findings, and conclusions for the subject site. The report will include the following elements:

- Title sheet,
- Signature page,
- Table of contents,
- Investigative summary,
- Introductory narrative of the project,
- File review Information,
- Investigative methods,
- Investigative results and field observations,
- Data evaluation and discussion,
- Graphs, Tables and Figures,
- Summary table (s) indicating laboratory results,
- Contaminant concentrations, analytical methods, and detection limits,
- Copies of original laboratory documentation,
- Field procedure forms, and chain-of-custody records,
- Conclusions, and
- Recommendations.

NORTH

0 1/2 1 MILE

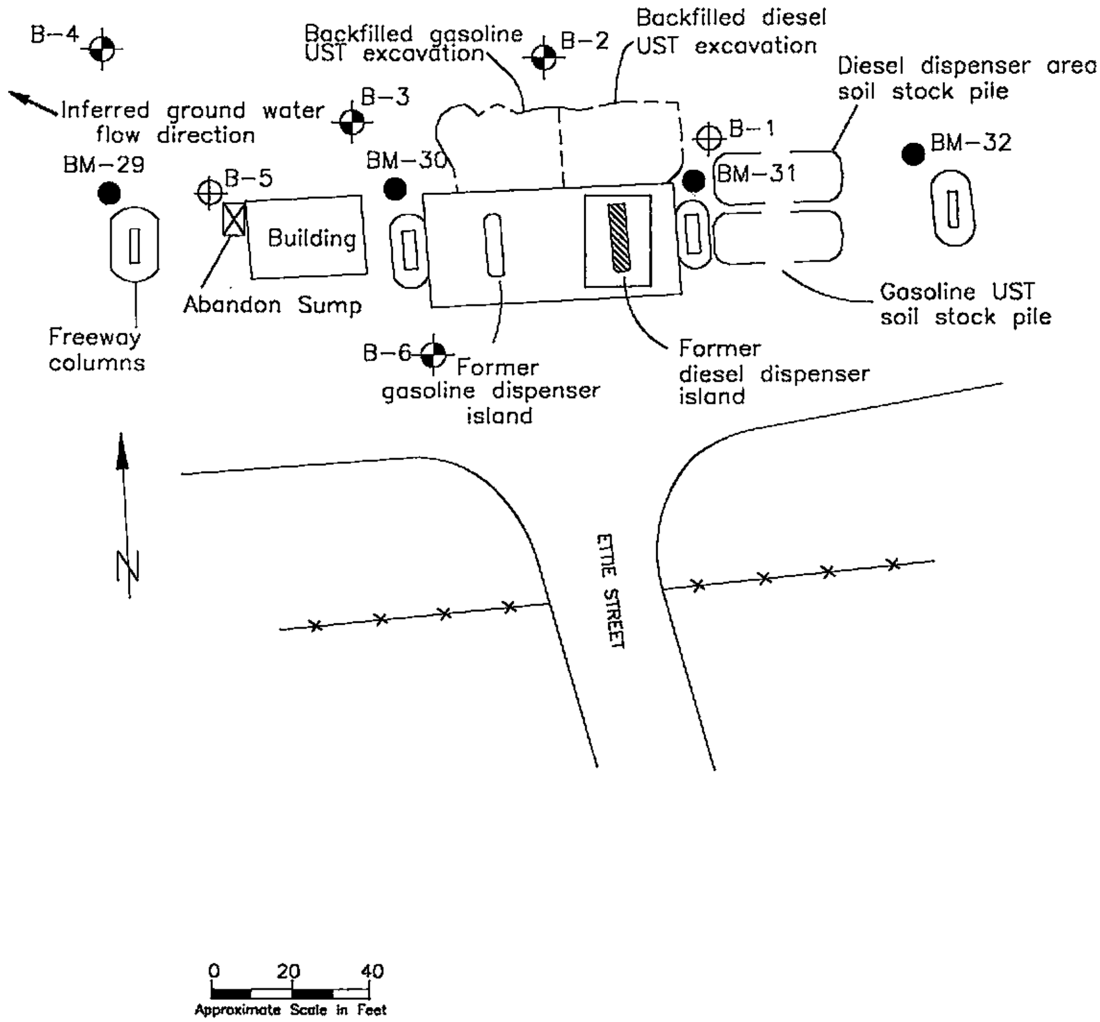
SCALE

REFERENCE:
U.S.G.S. OAKLAND, CALIFORNIA, 1959
PHOTOREVISED 1980

PSI ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION
CONSULTING•ENGINEERING•TESTING

SITE LOCATION
FORMER CALTRANS MAINTENANCE FACILITY
3456 ETTIE STREET
OAKLAND, CALIFORNIA
PROJECT NUMBER: 575-7I022

DATE:	6/13/97	CKD BY:	FIGURE NO: 1
FILE NO:	7-022-1		DRAWN BY: S.BOWERS



LEGEND

B-4 BORING LOCATION AND DESIGNATION

B-6 BORING TO BE CONVERTED TO GROUNDWATER MONITORING WELL

PSI BORING (APRIL 4, 1996)

psi ENVIRONMENTAL GEOTECHNICAL CONSTRUCTION
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SITE PLAN
CALTRANS MAINTENANCE STATION
3456 ETTIE STREET
OAKLAND, CALIFORNIA
PROJECT NUMBER: 575-71022

DATE: 06/13/97	CKD BY:	FIGURE NO.: 2
FILE NO: 71022-2		DRAWN BY: S.BOWERS

APPENDIX A

TETRA TECH UNDERGROUND TANK REMOVAL REPORT

TC 0637-08

FINAL REPORT

UNDERGROUND TANK REMOVAL AND SITE INVESTIGATION
ETTIE STREET MAINTENANCE FACILITY
3465 ETTIE STREET
OAKLAND, CALIFORNIA

Contract No. 56S067
Work Order No. 04-56S067-17

Prepared for

Caltrans
District 4
111 Grand Avenue
Oakland, CA 94623

June 1996

Prepared by

Tetra Tech
180 Howard Street, Suite 250
San Francisco, CA 94105

TETRA TECH

TETRA TECH, INC.
180 Howard Street, Suite 250
San Francisco, CA 94105-1617
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June 11, 1996

Mr. Michael Hilliard
California Department of Transportation
District 4
111 Grant Avenue
P.O. Box 23660
Oakland, CA 94623

Subject: Submittal of the Final Report for the Underground Storage Tank Removal at the Ettie Street Maintenance Facility, Contract No. 56S067, Work Order No. 04-56S067-17, TC 0637-08

Dear Mr. Hilliard:

I have enclosed five copies of the final report for the Ettie Street Maintenance Facility tank removal project. If you have any questions, please do not hesitate to call me at (415) 974-1221.

Very truly yours,

Bob Cotton, PE
Senior Hydrogeologist

Michael Wopat, RG
Project Manager

enclosures

email: MWopat@ttsfo.com
world wide web: http://www.ttsfo.com/ttsfo

TC 0637-08

FINAL REPORT

UNDERGROUND TANK REMOVAL AND SITE INVESTIGATION ETTIE STREET MAINTENANCE FACILITY 3465 ETTIE STREET OAKLAND, CALIFORNIA

Contract No. 56S067
Work Order No. 04-56S067-17

Prepared for

Caltrans
District 4
111 Grand Avenue
Oakland, CA 94623

June 1996

Prepared by

Tetra Tech
180 Howard Street, Suite 250
San Francisco, CA 94105

TC -0637-08

FINAL REPORT

UNDERGROUND TANK REMOVAL AND SITE INVESTIGATION
ETTIE STREET MAINTENANCE FACILITY
OAKLAND, CALIFORNIA

Contract No. 56S067
Work Order No. 04-56S067-17

Prepared for

Caltrans
District 4
111 Grand Avenue,
Oakland, CA 94623-0660

Prepared by:

W. Robert Cotton, PE
Senior Hydrogeologist

Michael Wopat, RG
Senior Geologist and Project Manager

REGISTERED GEOLOGIST
MICHAEL A. WOPAT
NO. 4445
Exp. 8-30-96
STATE OF CALIFORNIA

Tetra Tech
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June 1996

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1. INTRODUCTION

This final report has been prepared to document an underground storage tank (UST) removal and disposal at the Ettie Street Maintenance Facility, 3465 Ettie Street, Oakland, Alameda County, California. The work was requested by Caltrans District 4 pursuant to Contract No. 56S067, Work Order No. 56S067-17

1.1 WORK COMPLETED

The work completed during this project, as presented in the work order and discussed during the pre-work site visit, included the following:

- Conducting an initial site visit, including file review, and preparing a work plan and health and safety plan for the tank removal;
- Removing one 4,000-gallon and one 7,500-gallon underground fuel tank and ancillary piping, vent lines, dispenser islands, and fill ports on October 19 and 20, 1995;
- Sampling the soil beneath the tanks and the ground water in the excavation; and
- Backfilling the excavation and bringing the ground surface up to grade with road base rock on November 11, 1995.

Following receipt of the analytical results from the soil and ground water, additional work was requested. The additional work included the following:

- Preparing a UST Unauthorized Release Report (Appendix A) and submitting the report to the RWQCB and Alameda County.
- Excavating TPH-d contaminated soil from beneath the former diesel fuel dispenser island.
- Backfilling the dispenser island excavation with clean fill material.
- Arranging transport and disposal of the fuel-contaminated excavated soil in compliance with applicable state and federal regulations.
- Drilling and sampling two soil borings to depths of 13 to 15 feet below ground surface (bgs).

- Collecting grab ground water samples from temporary monitoring wells installed in the borings.
- Containerizing rinse water from the drilling in U.S. Department of Transportation approved containers, pending waste characterization.
- Backfilling all soil borings with cement/bentonite grout and repairing the ground surface to its original condition.
- Arranging transport and disposal of rinse water in compliance with applicable state and federal regulations.

The following sections describe the historical background and environmental setting of the site and the procedures used in meeting the project objectives.

1.2 SITE DESCRIPTION

The site is located at the north end of Ettie Street, directly under the Interstate 580 structure (Figures 1-1 and 1-2). The site is in northwest Oakland, approximately one-half mile southeast of San Francisco Bay and one-quarter mile south of the Emeryville city limit.

The maintenance facility was built in 1959, and the property is owned and formerly operated by Caltrans; the site is presently unused. The property is about 240 feet (ft) wide and about 480 ft long and covers an area of about three acres.

The elevation of the site is approximately 10 ft above mean sea level (msl). The eastbound and westbound lanes of Interstate 580 are elevated on support structures about 40 to 50 ft above the ground level at the site.

1.2.1 Land Use

The site is located on the Oakland West 7.5 minute U.S. Geological Survey Quadrangle (1979). Topographic relief is about 50 ft within a radius of one mile of the site. The land use in the vicinity of the site is predominantly urban and is relatively densely populated. The East Bay Municipal Utility District sewage treatment plant is located one-third mile west-northwest of the facility, and the Oakland Army Base is located one-half mile to the west.

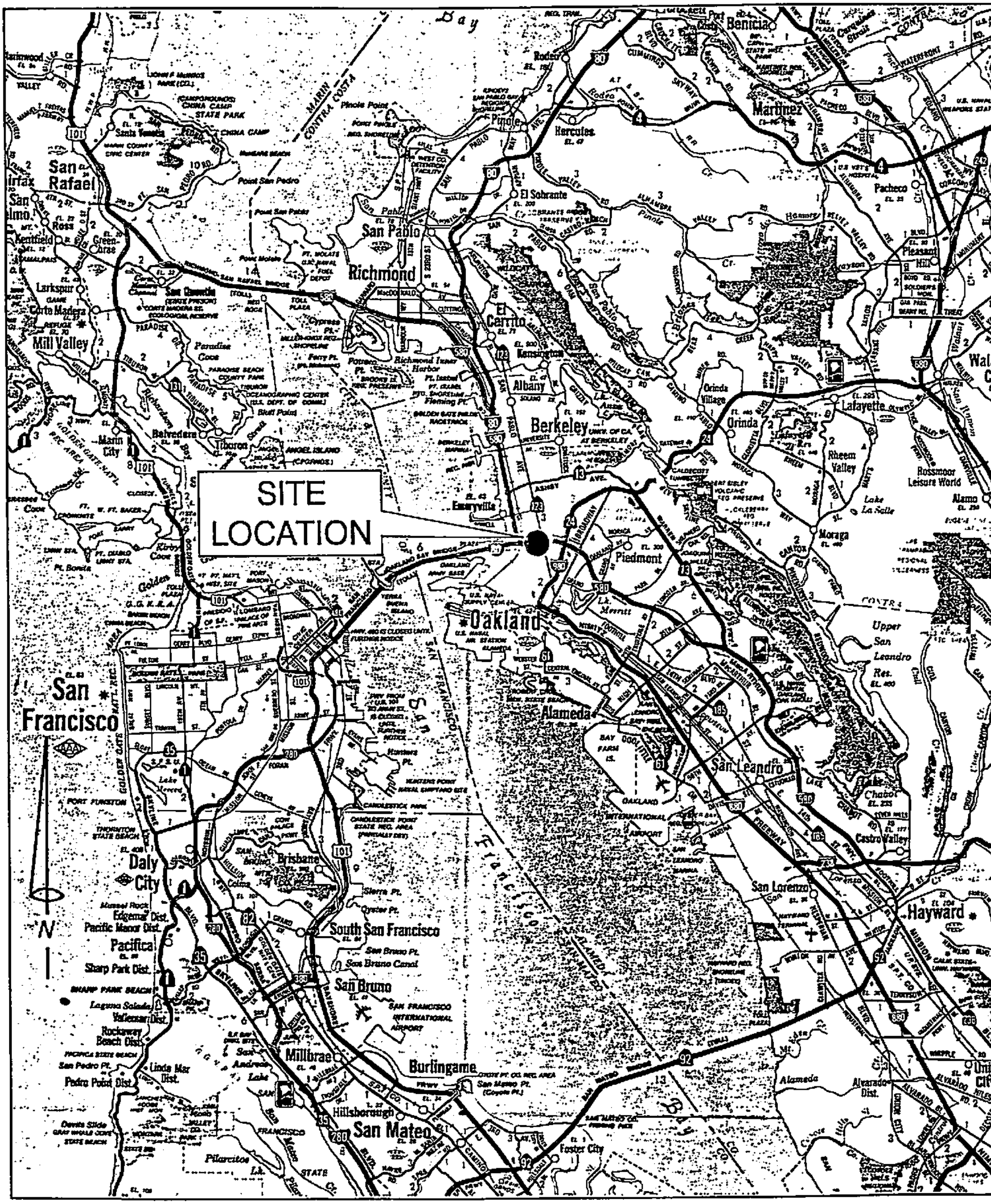


Figure 1-1 Regional Site Location

Scale: 1" = 4 miles

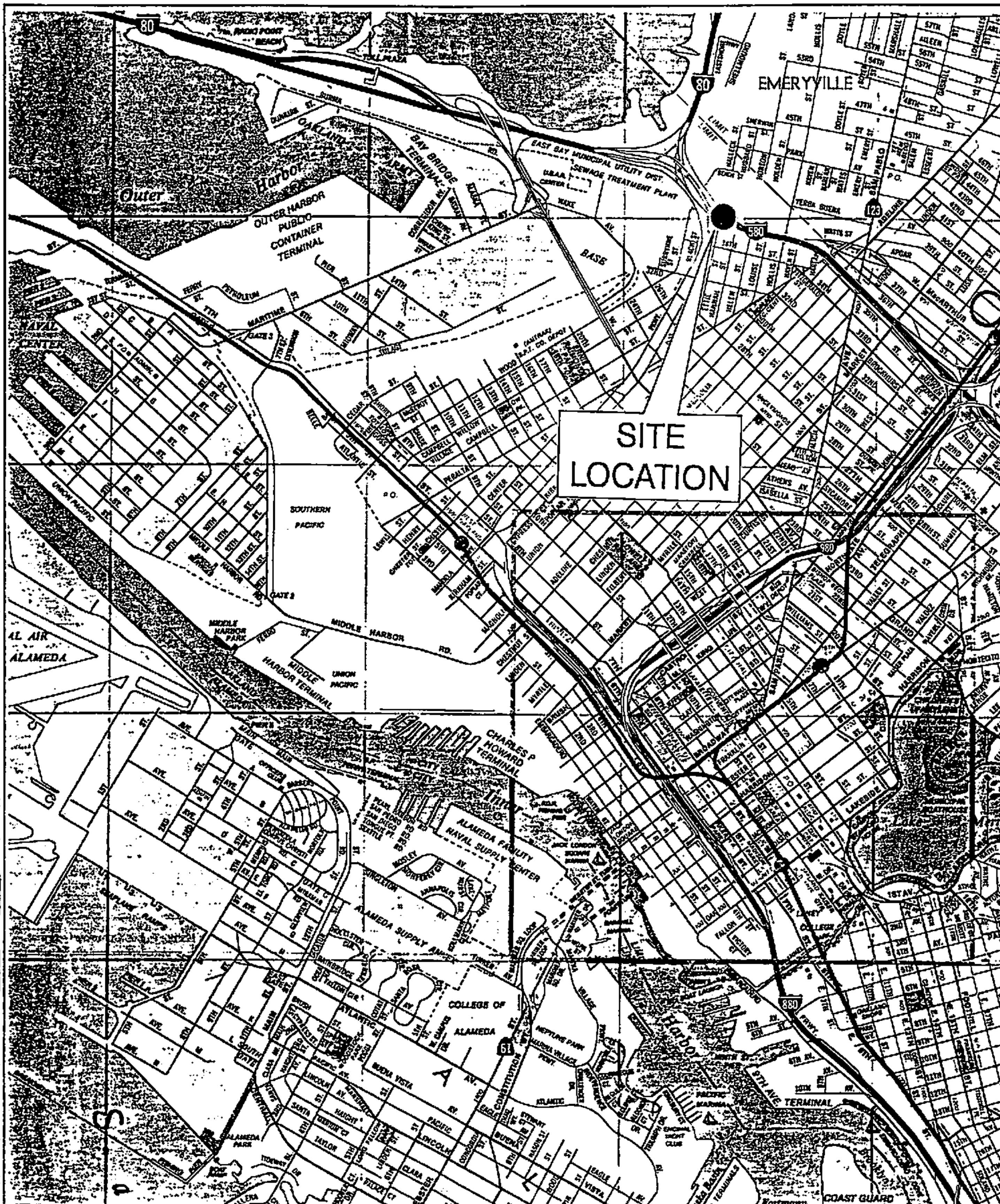


Figure 1-2 Site Location

N

Scale: 1" = 1/2 mile

1.2.2 Geologic Setting

Soils

The surface soils at the site have been mapped as urban land (USDA 1980), a miscellaneous area consisting of land improved with urban structures. The soil material is mostly heterogeneous fill. The Clear Lake complex soils may also underlie portions of the site. Typically, the surface layer of the Clear Lake soil is a very dark clay. The underlying material is dark gray and grayish brown calcareous clay and silty clay that extends to a depth of 60 inches or more. The Clear Lake soil is very deep, poorly drained, and has a low permeability.

Geology

The local geology in the area is primarily artificial fill and Quaternary Bay Mud (Radbruch 1957). Several potentially active faults have been identified in the area; the closest is the Hayward Fault, which follows a northwesterly trend at the foot of the Oakland and Berkeley Hills.

The site geology is interpreted as being composed of artificial fill and Bay Mud, similar to the geology of the local area. The artificial fill generally consists of miscellaneous refuse, or Bay Mud, or sand dredged from the bay. Its thickness is variable, and it typically lies above the Bay Mud. The Bay Mud is of Holocene age and consists of unconsolidated, water-saturated, dark plastic clay and silty clay rich in organic material. Its thickness in coastal lagoons and estuaries is estimated to be approximately 10 feet (Helley et al. 1979).

1.2.3 Hydrogeology

Ground water in the vicinity of the site is found at sea level near the shore and roughly follows the topography in higher areas. Recharge is primarily through rainfall and infiltration. Ground water levels may be tidally influenced due to the proximity to San Francisco Bay, located one-half mile to the northwest. Ground water closest to the surface is believed to be present in an unconfined water table aquifer, with ground water flow generally west and northwest towards the bay. During the tank removals, advancement of soil borings, and soil excavations ground water was encountered at depths of five to eight feet below ground surface.

2. TANK REMOVAL

2.1 DESCRIPTION OF UNDERGROUND STORAGE TANKS

The two underground storage tanks reportedly were installed in 1959 when the Ettie Street Maintenance Facility was built. One tank had a 7,500-gallon capacity, was constructed of single-walled steel, and was used to store gasoline. The second tank had a 4,000-gallon capacity, was constructed of single-walled fiberglass, and was used to store diesel fuel. No plans showing the construction details of the tanks were available. A site plan is presented as Figure 2-1.

2.2 SITE PREPARATION

Site preparation activities included obtaining all applicable permits, notifying the county health department and fire department, and locating underground utilities. A staging area for excavated soil was prepared near the tank removal site. Pea gravel was staged near the excavation.

2.2.1 Permits

An underground storage tank removal permit was obtained from the Alameda County Department of Health for closure of the underground storage tanks. Permits also were obtained from the Oakland Fire Department and the Bay Area Air Quality Management District.

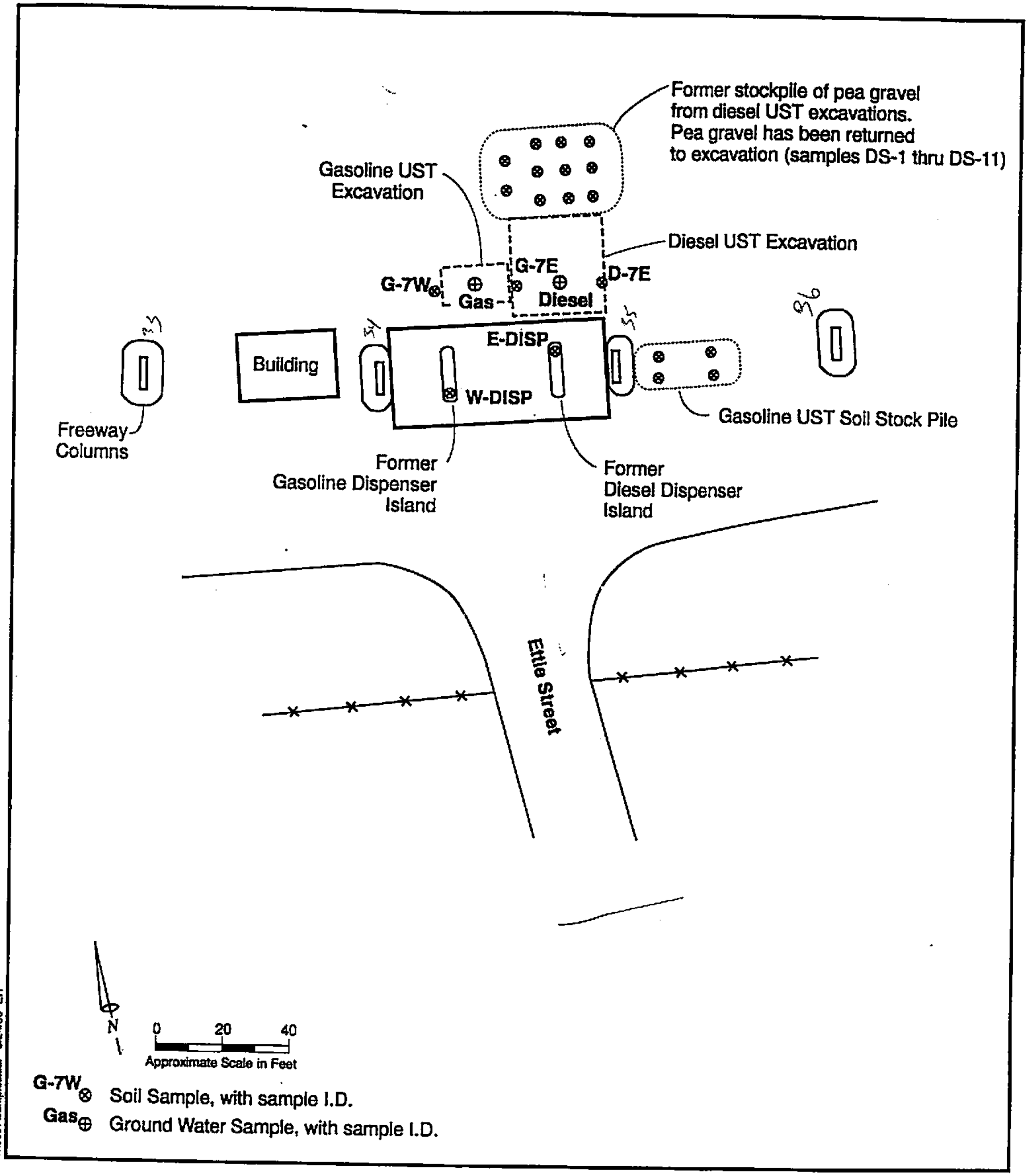
2.2.2 Utilities

Prior to beginning the excavation, utilities were located and marked by Underground Service Alert (USA).

2.3 TANK REMOVAL

The procedure for the tank removals was as follows:

- The electric power was shut off and no smoking signs and barricades were placed in conspicuous areas;



TETRA TECH

Site Plan Showing Locations of Soil and Ground Water Samples Collected October 19 and 20, 1995

Caltrans Ettie Street Maintenance Facility
Oakland, California

Figure 2-1

- Pumpable contents of the tanks were placed in 55-gallon drums;
- The concrete/asphalt surface was removed;
- The soil was excavated to expose the top of the tank;
- After removal of the liquids remaining in the dispenser piping, the piping, fixtures, the drop tube, and pump were removed from the tank;
- The tanks were purged with dry ice;
- Soil was excavated to the bottom of the tank to free the sides of the tank;
- The tanks were hoisted from the excavation; and
- The tanks were labeled, manifested, and hauled as hazardous waste to Erickson, Inc., in Richmond, California.

2.3.1 Cleaning

A total of 250 gallons of gasoline and diesel fuel were pumped out of the tanks. These liquids were removed from the site October 24, 1995, by Enviropur West, Inc., of Patterson, California, and were transported to the Napa Transfer Station in Napa, California (see Appendix B).

2.3.2 Excavation to Expose the Top of the Tank

The asphalt and concrete surfacing were cut using a jackhammer. After removing the concrete and asphalt, the top of each tank was uncovered by the backhoe operator who took care not to disturb the external piping. The fill pipes were located directly over the tanks. The product lines from the valve boxes to the dispenser island were drained of remaining fuel, disconnected, and pulled from underneath the pad. Also, the vent lines from the tanks were cut at the bridge columns, the aboveground portion removed, and the underground portion pulled from the ground. The remaining external piping, the drop tube, and submersible pumps were removed. The two dispenser islands and crash bollards were broken up and removed.

2.3.3 Purging

The tanks were rendered inert in place by pouring crushed dry ice into each tank (20 lb./1000 gallons of tank volume), as required by the Alameda County Health

Department. The atmosphere within the tanks was monitored by the excavation contractor using a combustible gas meter until it was maintained at less than 10 percent of the lower explosive limit, and the oxygen content was less than 10 percent. Susan Hugo of the Alameda County Health Department monitored this process and gave authorization to proceed after the proper atmosphere had been achieved. The tanks were then removed from the excavation.

2.3.4 Tank Removal

The soil along one side of the tanks was removed to the depth of the bottom of the tanks (approximately 11 ft below the ground surface) to a distance of approximately two feet from the wall of the gasoline tank. It was necessary to remove more sidewall soils from around the diesel tank since pea gravel that had been placed around the tank was sloughing against the tank. The soil from around the gasoline UST was placed in the staging area prepared for this purpose.

Approximately 50 to 70 cubic yards of soil were removed from the gasoline UST excavation and stockpiled. The soil removed from around the former diesel storage tank was composed almost entirely of pea gravel. Eleven soil samples were collected from the pea gravel, as directed by the Susan Hugo. Her approval to replace the soil into the diesel UST excavation is contained within the hazardous materials inspection form attached in Appendix A.

2.3.5 Removal of Underground Piping

Underground vent and product piping were removed by pulling them out from under the pavement. After inspection, the tank and lines were placed on a truck licensed to carry hazardous waste.

2.3.6 Tank Disposal

The tanks were inspected, labeled, and properly manifested (Manifest #95592426) as hazardous waste. They were transported by Erickson, Inc., a state-licensed hazardous waste hauler, for disposal at Erickson's permitted facility in Richmond, California. The hazardous waste manifest was signed by a representative of Caltrans. Copies of all manifests for all wastes are attached as Appendix B.

2.4 SAMPLE COLLECTION PROCEDURE

The following sections describe soil and ground water sample collection procedures.

2.4.1 Soil Samples from Tank Pits

Samples were collected of the soil around the tanks to confirm the presence or absence of contamination and to help identify the source(s) of the contamination, if present. LUFT Manual and Regional Water Quality Control Board guidelines require that at least two samples be collected from each tank pit, one from under each end of the tank, within two ft of the bottom of the tank. The underground piping from each tank was less than 20 feet in length; therefore one soil sample was collected from beneath each dispenser island.

Soil samples were collected in stainless steel sample liners. As directed by Susan Hugo, one soil sample was collected from each end of the gasoline excavation from a depth of approximately seven feet. This depth was chosen as there was ground water present in both tank excavations at a depth of approximately eight feet. Samples were collected from the east and west end of the gasoline UST pit and from the east end of the diesel UST pit. No sample was collected from the west end of the diesel pit as this was a point common to the west end of the gasoline UST. The samples were collected by pushing a liner tube into soil excavated and removed to the surface with a backhoe bucket.

Each sample was prepared by placing Teflon film over the ends of the sample liner covering the film with plastic end caps, and then sealing the tube with cohesive silicon rubber tape. Each sample was labeled with the sample ID number, the date, and time collected, and stored on ice in a cooler under chain of custody until received by the laboratory.

All soil samples were analyzed by a state-certified laboratory using the methods specified in Section 2.6.

2.4.2 Ground Water Samples from Tank Pits

Ground water samples were collected from the water, which collected in the excavation pits, using a glass sample container. The water samples were then transferred to containers supplied by the laboratory. No sheen or odor was observed on the samples or the water in the excavations. Samples were labeled, stored, and shipped as described in the previous section and were analyzed by the methods specified in Section 2.6.

2.4.3 Soil Samples from Stockpiled Soil

Four discrete soil samples were collected from the stockpile of soil excavated from the gasoline pit. The purpose of these samples was to obtain a preliminary characterization of the stockpiled soil for evaluation of soil disposal options. The laboratory was instructed to composite the discrete samples. The samples were collected at selected representative locations by removing about 1 foot of soil to expose fresh material and then pushing a sample liner into the newly exposed soil. The sample liners were sealed and labeled as described in Section 2.4.1. A sketch of the sample points on the soil pile was recorded in the field log. The approximate locations of the samples are shown on Figure 2-1. The 220 cubic yards of samples were analyzed as specified in Section 3.0.

Eleven discrete samples were collected from the soil removed from around the diesel UST. Susan Hugo requested that one discrete sample be collected for every 20 cubic yards of soil removed. These samples were required as Caltrans preferred to replace the soil into the excavation. As an estimated 220 cubic yards of soil were removed, 11 samples were necessary (see Figure 2-1 for approximate locations). The sampling procedure was the same as described in the preceding paragraph. The 220 cubic yards of excavated pea gravel was then replaced into the diesel UST pit.

2.4.4 Soil Samples from Under Dispenser Islands

Following removal of the dispenser islands, a single soil sample was collected from under each island at a location approved by Susan Hugo. Each sample was collected by first scraping away several inches of soil, then driving a soil sampler containing a 2 inch x 6 inch sample liner into the ground using a slide hammer. The sample liner then was retrieved and was sealed and labeled as described in Section 2.4.1.

2.5 BACKFILL AND COMPACTION

The remaining diesel tank excavation and the gasoline excavation were backfilled with clean pea gravel to within 15 inches of the ground surface. The excavation was then filled to grade with compacted road base. At the instruction of Caltrans, the ground surface was not paved with asphalt or concrete because additional excavation and/or drilling may be required.

2.6 LABORATORY ANALYSIS

Samples were analyzed by Entech Analytical Labs (formerly Hull Development Labs), a California-certified laboratory in Sunnyvale, California. Samples were shipped to Entech under a chain of custody that identified the samples, the date collected, and the analyses to be performed. The samples were analyzed by the following methods:

- Soil samples collected from the diesel tank excavation, underneath the diesel dispenser island, and from the stockpile were analyzed by EPA

Method 3550/8015 modified, for total petroleum hydrocarbons as diesel (TPH-d), and by EPA Method 8020 for benzene, toluene, ethylbenzene, and total xylenes (BTEX);

- The ground water sample collected from the diesel tank excavation was analyzed by EPA Method 602 for BTEX and by EPA Method 3550/8015 modified, to determine TPH-d;

- Soil samples collected from the gasoline tank excavation, underneath the gasoline dispenser island and from the stockpile of soil from the gasoline UST pit were analyzed by EPA Method 5030/8015 modified, for total petroleum hydrocarbons as gasoline (TPH-g), by EPA Method 7420 for total lead, and by EPA Method 8020 to determine BTEX and methyl-tert-butyl ether (MTBE) concentrations;

- The ground water sample collected from the gasoline tank excavation was analyzed by EPA Method 602 for BTEX and MTBE, total lead by EPA Method 239.1 and by EPA Method 5030/8015 modified, to determine TPH-g; and

- Analysis for reactivity, corrosivity, and ignitability (RCI) were performed to characterize for disposal the soil stockpile from the gasoline UST pit.

2.7 ANALYTICAL RESULTS FROM INITIAL SOIL AND GROUND WATER SAMPLING

2.7.1 Soil Samples

The results of soil sample analyses are summarized in Table 1.

- Confirmation soil samples collected from the west and east ends of the gasoline UST tank pit (G-7W and G-7E) contained no total petroleum hydrocarbons as gasoline (TPH-g), BTEX compounds, or methyl-tert-butyl ether (MTBE) above the method detection limits. Total lead concentrations were 6.5 and 11 mg/kg, and probably represent normal soil concentrations.

- Confirmation soil samples collected from the west and east ends of the diesel UST tank pit (G-7E and D-7W) contained no TPH as diesel (TPH-d) or BTEX compounds above the method detection limits. The samples did contain 23 and 13 mg/kg TPH as motor oil (TPH-oil). The source and volume of the motor oil release is unknown.

Table 1
Analytical results for soil samples collected October 19 and 20, 1995, at Caltrans' Ettie Street Maintenance Facility
3465 Ettie Street, Oakland, California

Sample ID	Date Collected	TPH-oil (8015 mod) (mg/kg)	TPH-d (8015 mod) (mg/kg)	TPH-gas (8015 mod) (mg/kg)	Benzene (8020) (mg/kg)	Toluene (8020) (mg/kg)	Ethylbenzene (8020) (mg/kg)	Xylenes (8020) (mg/kg)	MTBE (8020) (mg/kg)	Lead (7420) (mg/kg)
Samples collected from beneath USTs										
G-7W	10/19/95	na	na	ND	ND	ND	ND	ND	ND	*6.5*
G-7E	10/19/95	*23*	ND	ND	ND	ND	ND	ND	ND	*11*
D-7E	10/19/95	*13*	ND	na	ND	ND	ND	ND	na	na
Samples collected from beneath dispensers										
W-DISP	10/20/95	na	na	ND	ND	ND	ND	ND	ND	*18*
E-DISP	10/20/95	na	*64000*	na	ND	ND	ND	ND	na	na
Sample composited from soil from gasoline UST excavation										
COMP	10/20/95	na	na	ND	ND	ND	ND	ND	ND	*26*
Samples collected from pea gravel removed from around diesel UST										
DS-1	10/19/95	ND	*35*	na	ND	ND	ND	ND	ND	na
DS-2	10/19/95	ND	*71*	na	ND	ND	ND	ND	ND	na
DS-3	10/19/95	ND	*31*	na	ND	ND	ND	ND	ND	na
DS-4	10/19/95	*110*	*39*	na	ND	ND	ND	ND	ND	na
DS-5	10/19/95	*62*	*39*	na	ND	ND	ND	ND	ND	na
DS-6	10/19/95	*29*	*12*	na	ND	ND	ND	ND	ND	na
DS-7	10/19/95	*72*	ND	na	ND	ND	ND	ND	ND	na
DS-8	10/19/95	*560*	ND	na	ND	ND	ND	ND	ND	na
DS-9	10/19/95	*91*	*24*	na	ND	ND	ND	ND	ND	na
DS-10	10/19/95	*49*	ND	na	ND	ND	ND	ND	ND	na
DS-11	10/19/95	*30*	ND	na	ND	ND	ND	ND	ND	na
Method Detection Limit		1.0	1.0	1.0	0.005	0.005	0.005	0.005	0.05	0.5

NOTES:

mg/kg	milligrams per kilogram (ppm)
TPH-oil	total petroleum hydrocarbons quantified as motor oil
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-g	total petroleum hydrocarbons quantified as gasoline
na	not applicable, analysis not performed for this analyte
ND	analyte not detected (ND) at or above the laboratory reporting limits
COMP	composite of four samples (SP-SW, SP-SE, SP-NW, SP-NE) collected from the soil removed from the gasoline UST excavation

- The confirmation soil sample collected from beneath the gasoline dispenser island (W-DISP) did not contain TPH-g, BTEX compounds, or MTBE above the method detection limits. Total lead content was 18 mg/kg.

- The confirmation soil sample collected from beneath the diesel dispenser island (E-DISP) contained TPH-d at a concentration of 64,000 mg/kg and no BTEX compounds above the method detection limits.

This indicates that there was a release of diesel fuel in the vicinity of the sample collection point and is the reason why additional soil excavation and confirmatory sampling, as described below in this report, was necessary.

- The composite soil sample collected from the stockpile of soil excavated from around the gasoline UST (COMP) contained no detectable concentration of TPH-g, BTEX compounds, or MTBE. Total lead content is 26 mg/kg, well below concentrations of regulatory concern. Therefore, this soil can be treated as ordinary clean fill material.

- Most of the soil samples collected from the pea gravel removed from around the diesel UST (OS-1-DS-11) contained quantifiable concentrations of TPH-d and TPH-oil. The average concentration of TPH-d was 23.0 mg/kg, and the average concentration of TPH-oil was 91.3 mg/kg. This pea gravel was returned to the tank pit.

2.7.2 Ground Water Samples

The results of ground water sample analyses are summarized in Table 2.

Table 2
Analytical results for petroleum hydrocarbons in grab ground water samples collected October 19, 1995, at Caltrans' Ettie Street Maintenance Facility

Sample ID	TPH-oil (8015 mod) (µg/L)	TPH-d (8015 mod) (µg/L)	TPH-g (8015 mod) (µg/L)	Benzene (602) (µg/L)	Toluene (602) (µg/L)	Ethylbenzene (602) (µg/L)	Xylenes (602) (µg/L)	MTBE (602) (µg/L)	Lead (602) (mg/L)
Gas	na	na	ND	ND	ND	ND	*36*	*260*	ND
Diesel	170*	*2000*	na	ND	ND	ND	ND	na	na
Method Detection Limit	50	50	50	0.5	0.5	0.5	0.5	5.0	0.05

Notes:

TPH-oil	total petroleum hydrocarbons quantified as motor oil.
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-g	total petroleum hydrocarbons quantified as gasoline
µg/L	micrograms per liter (= ppb)
mg/L	milligrams per liter (= ppm)
na	not applicable, analysis not performed for this analyte
ND	analyte not detected (ND) at or above the laboratory reporting limit
Gas	ID for water sample from pit resulting from removal of gasoline UST
Diesel	ID for water sample from pit resulting from removal of diesel UST
*	TPH in motor oil range does not match typical motor oil pattern (see Appendix C).

- The ground water sample collected from the gasoline UST tank pit (Sample ID = "Gas") contained no TPH-g, benzene, toluene, ethylbenzene, or dissolved lead above the method detection limits. The analyses did detect 36 µg/L xylenes and 260 µg/L MTBE. The California Department of Public Services Primary Maximum Contaminant Level (MCL, also known as the drinking water standard) for xylenes is 1,750 µg/L, well above the level found in the Ettie Street sample; therefore it should not be an issue of concern. There is no primary or secondary MCL for MTBE; therefore it is not an issue of concern.

- The water sample collected from the diesel UST pit (Sample ID = "Diesel") contained 170 µg/L TPH-oil and 2,000 µg/L TPH-d. The TPH-d concentration could trigger a requirement for additional ground water assessment by the lead regulatory agency. The TPH-oil concentration represents a carry over from the adjacent diesel fuel range rather than the presence of motor oil (see December 21, 1995, report in Appendix C). Concentrations of BTEX compounds were below the method detection limits.

3. SOIL EXCAVATION FROM BENEATH FORMER DIESEL DISPENSER ISLAND AND SOIL DISPOSAL

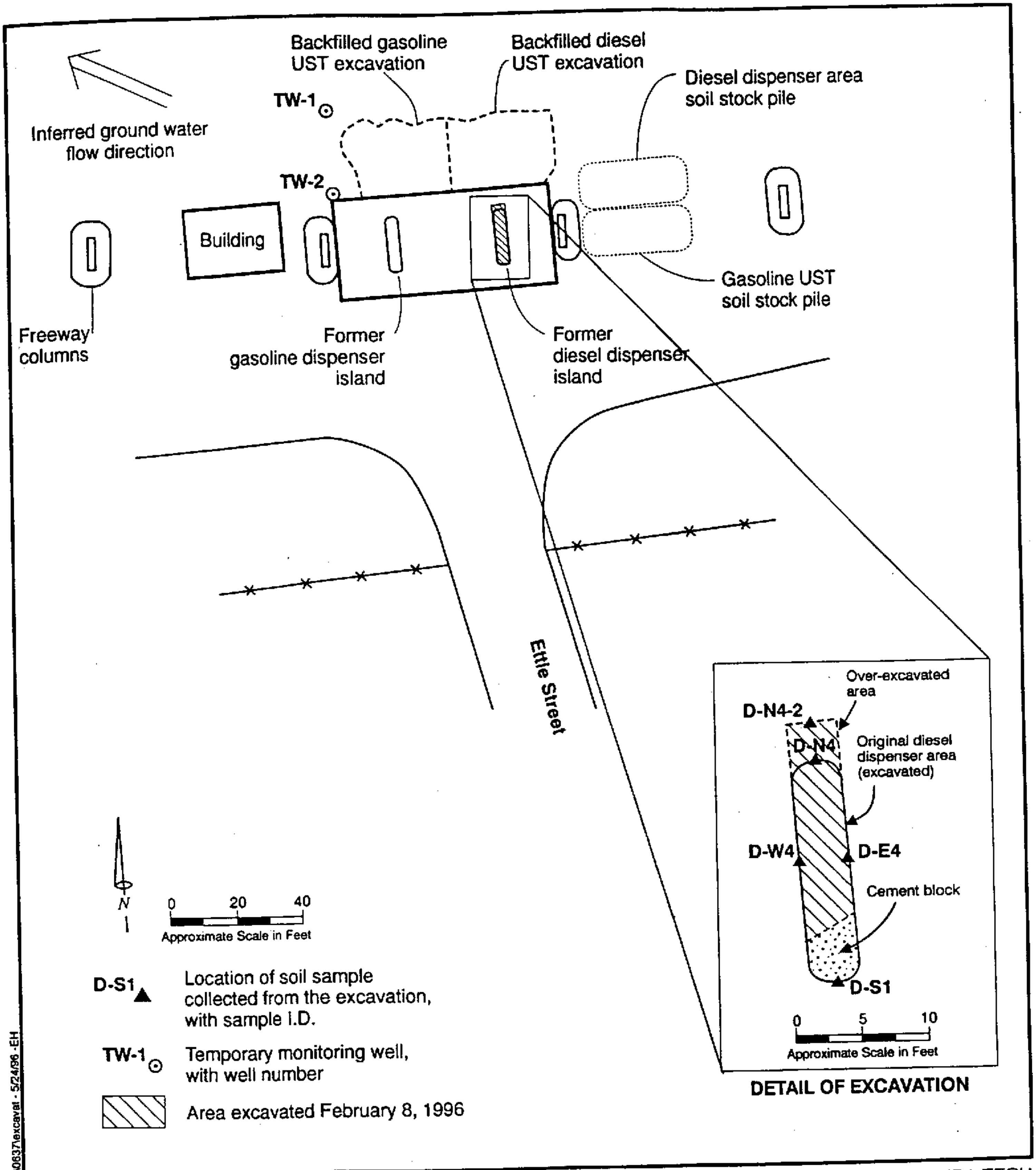
The following sections describe the methods used during the excavation, stockpiling, transport, and disposal of soil removed from beneath of the former diesel dispenser island. The soil excavation and stockpiling was completed on February 8, 1996. On April 16, 1996, the soil was loaded and transported to REMCO in Richmond, California, for treatment.

3.1 SOIL STAGING AREA

A soil staging area for the soils excavated from under the former diesel dispenser island was prepared in the vicinity of the tank excavation site at the location shown on Figure 3-1. The staging area was constructed by first placing 6-mil plastic sheeting on the ground surface. Contaminated soil was placed on the plastic sheeting and was covered with plastic sheeting at the end of the work day.

3.2 SOIL EXCAVATION UNDER THE FORMER DIESEL DISPENSER

When the cement diesel dispenser island was removed on October 19, 1995, the resulting shallow excavation was brought to grade by backfilling with clean road base sized gravel. This material was removed and separately staged before removing the contaminated soil. Soil was then removed from beneath the former diesel dispenser using a backhoe. Excavation work was directed by a Tetra Tech representative. Excavated soils were visually inspected and screened with a photoionization detector (PID). Obviously contaminated soils were placed on the soil staging area. The depth of excavation extended to the depth of the water table, which was encountered at 5.5 feet from ground surface. A plan view of the location and size of the initial excavation is shown on Figure 3-1. A large cement block was encountered in the southern end of the excavation. The top of the block was at 2.25 feet bgs and the block extended downward below the base of the excavation at 5.5 feet. This cement block was left in place in the excavation. After all obviously contaminated soils were removed, samples were collected from the four sidewalls (see Figure 3-1 for sample locations). The samples collected from the north, east, and west excavation walls were collected from a depth of four feet. The presence of the cement block on the south end prohibited sampling below its top face; therefore



TETRA TECH

Site Plan Showing Locations of Temporary Monitoring Wells and Excavation Sampled February 8, 1996

Caltrans Ettie Street Maintenance Facility
Oakland, California

Figure 3-1

the southern soil sample was collected from a depth of one foot. These samples were analyzed for the parameters described in Section 2.7. Results of the north sample analysis was 180 mg/kg TPH-d, greater than the proposed closure goal (Section 5.1), therefore the excavation was extended three feet to the north and the excavation wall was resampled. The results of soil analyses from the south, west, and east sidewalls and the resampling of the north sidewall were all less than the analysis method detection limit and the proposed closure goals; therefore the soil removal was halted at that point. The total estimated volume of removed soils is 12 cubic yards.

After completion of the soil excavation, the resulting pit was backfilled with clean pea gravel to a depth of approximately 15 inches. The excavation was then brought to grade by filling with the previously removed clean roadbase sized gravel, and the gravels were compacted using the backhoe.

3.3 SOIL SAMPLE COLLECTION AND ANALYSIS PROCEDURES

3.3.1 Soil Samples from the Excavation

Soil samples collected from the excavation were labeled with a sample number descriptive of the location and depth of the sample and the date and time of collection. Sample numbers were composed of the sample or tank pit location followed by a number corresponding to the depth of the sample and a letter corresponding to the direction (N,E,S,W) from the center of the pit that the sample was taken from.

After the samples were described, labeled, and packaged, they were transported to the on-site mobile laboratory where they were logged in, placed in a cooler or refrigerator, and maintained at a temperature of about 4 degrees Celsius until analysis. A chain of custody was maintained at the on-site laboratory.

Soil samples were collected by pushing a liner tube into soil excavated and brought to the surface with a backhoe bucket. All soil samples were analyzed for TPH-d using modified EPA Method 8015/3550 by a mobile state-certified laboratory operated by Geochem Environmental Laboratories of San Jose, California.

3.3.2 Composite Soil Samples from the Soil Stockpile

Four discrete soil samples were collected from the stockpile of soil excavated from under the former diesel dispenser island. The purpose of the soil samples was to obtain a preliminary characterization of the stockpiled soil for evaluation of soil disposal options. The samples were collected by pushing a sample liner into the stockpiled soil at four quadrants within the stockpile. The discrete samples were identified with separate sample numbers. A sketch of the sample points on the soil pile was recorded in the field log. The laboratory was instructed to composite the discrete samples and analyze the composite.

The composite sample was analyzed for TPH-d using modified EPA Method 8015/3550 by the mobile state-certified laboratory operated by Geochem Environmental Laboratories. Analyses for BTEX compounds, reactivity (cyanide and sulfide), corrosivity (pH), and ignitability (flash point), the LUFT metals (cadmium, chromium, lead, nickel, and zinc), and soluble lead were conducted by Entech Analytical Labs.

3.4 BACKFILL AND COMPACTION

The excavation was backfilled with clean pea gravel and was compacted to Caltrans' specifications as soon as the excavation was completed and all samples were collected and analyzed. Backfill was staged on site prior to the start of work. The upper one foot of fill consisted of compacted road base.

3.5 RESULTS OF ANALYSES FROM DIESEL DISPENSER ISLAND EXCAVATION AND SOIL STOCKPILE

The results of the soil analyses are summarized on Table 3.

- The soil samples collected from the south, west, and east ends (D-S1, D-E4, and D-W4) of the diesel dispenser island excavation contained no TPH-d above the method detection limit.

- The first soil sample collected from the north end (D-N4) of the diesel dispenser island excavation contained 180 mg/kg TPH as diesel. After excavating an additional three feet northward, another soil sample (D-N4-2) was collected. This sample contained no detectable TPH-d.

- The composite sample (SS-NW, NE, SW, SE) was collected from the stockpile composed of soil removed from beneath the former diesel dispenser for the purpose of characterizing the soil for disposal. The composite sample was found to contain 150 mg/kg TPH-d and no detectable BTEX compounds. None of the other parameters shown on Table 3 were at levels that would qualify the soil as a hazardous waste.

Table 3
Analytical results for soil samples collected February 8, 1996 at Caltrans' Ettie Street Maintenance Facility
3465 Ettie Street, Oakland, California

Sample ID	TPH-d (8015 mod) (mg/kg)	Benzene (8020) (mg/kg)	Toluene (8020) (mg/kg)	Ethylbenzene (8020) (mg/kg)	Xylenes (8020) (mg/kg)	Cyanide (9030) (mg/kg)	Sulfide (9030) (mg/kg)	pH (9045) (units)	Flash Point (1010) (°F)
Confirmation samples collected from the excavation beneath the former diesel dispenser island									
D-S1	ND	na	na	na	na	na	na	na	na
D-E4	ND	na	na	na	na	na	na	na	na
D-W4	ND	na	na	na	na	na	na	na	na
D-N4	*180*	na	na	na	na	na	na	na	na
D-N4-2	ND	na	na	na	na	na	na	na	na
Composite sample collected from the diesel soil stockpile									
SS-NW,NE,SW,SE	*150*	ND	ND	ND	ND	ND	ND	9.1	>200
Method Detection Limit	10	0.005	0.005	0.005	0.005	0.2	0.5	na	na

Sample ID	Cadmium (7130) (mg/kg)	Chromium (7190) (mg/kg)	Lead (7420) (mg/kg)	Soluble Lead* (7420) (mg/l)	Nickel (7520) (mg/kg)	Zinc (7950) (mg/kg)
Composite sample collected from the diesel soil stockpile (cont'd)						
SS-NW,NE,SW,SE	0.61	19	74	2.7	26	120
Method Detection Limit	0.5	0.5	0.5	0.10	0.5	0.5

NOTES:

mg/kg	milligrams per kilogram (ppm)
TPH-d	total petroleum hydrocarbons quantified as diesel
na	not applicable; analysis not performed for this analyte
ND	analyte not detected (ND) at or above the laboratory reporting limits
*	soluble lead extracted following procedures of the California waste extraction test (Cal WET)

3.6 DISPOSAL OF SOIL EXCAVATED FROM BENEATH THE FORMER DIESEL DISPENSER ISLAND

On April 16, 1996, Tetra Tech supervised the loading of the soil onto two roll-off boxes. The soil was transported by Alhambra Environmental Services of Richmond, California, to the rotary kiln disposal facility owned and operated by Remedial Environmental Marketing Company, Inc., in Richmond, California. The weight of the soil was 20.6 tons, indicating a total soil volume of about 16 cubic yards. The soil was remediated by passing it through the rotary kiln. A copy of the nonhazardous waste manifest is included in Appendix B.

4. DRILLING AND SAMPLING SOIL BORINGS

Two soil borings were placed downgradient of the tank pit and the diesel dispenser island to permit collection of soil and grab ground water samples. The northernmost boring (TW-1) was located near the former gasoline UST tank pit in what was inferred to be the hydraulically downgradient direction from both the gasoline and diesel former USTs. The other soil boring (TW-2) was located further south in an area inferred to be the hydraulically downgradient direction from the diesel dispenser island. Figure 3-1 shows the proposed soil boring locations.

4.1 DRILLING

The two soil borings were installed by Precision Sampling, Inc., a California licensed drilling company (License No. C-57 636387). The borings were installed using the Enviro-Core™ continuous soil sampling system, which uses a 2.375-inch diameter drive casing to drill the soil borings and a 3-foot long, 1.5-inch diameter inner sample barrel containing six 6-inch long stainless-steel sample liners to collect the soil samples. The 3-foot sample barrel is simultaneously advanced with the drive casing. Soil samples were collected continuously in each borehole for the entire length of the soil boring. After collection of each 3-foot sample, the amount of recovery was recorded in the boring log. Soil was field-screened for contamination by visual examination and with a PID. All PID readings were recorded on the boring logs. All soils descriptions were recorded in the boring log. Soil boring logs are presented in Appendix D.

The soil generated during drilling was placed on the soil stockpile that resulted from excavating beneath the former diesel fuel dispenser island. Upon completion of the ground water sampling (described below), the boreholes were backfilled with cement/bentonite grout that was tremied to the bottom of the borehole. After backfilling, the ground surface was repaired with asphalt patch to match the original condition.

4.1.1 Drilling Permits

Alameda County requires that all soil borings be permitted prior to drilling. A drilling permit was obtained from Alameda County Flood Control and Water Conservation District. A copy of the permit is shown in Appendix D.

4.2 SAMPLING AND ANALYSIS

4.2.1 Soil Sampling and Analysis

Because native soil in the tank pit walls was shown by confirmation samples to contain only low concentrations of TPH-d and TPH-motor oil below the proposed cleanup goals (PCGs), only one soil sample was collected from each boring for chemical analysis. Each soil sample was collected across the interval where the top of the saturated zone was found in the boring.

Samples were collected within the 1.5-inch diameter core barrel in 1.5-inch diameter by 6-inch long stainless steel sample sleeves. After the sample sleeves were screened with a PID, the sample sleeve containing the appropriate soil interval was chosen by the geologist and prepared for shipment to the laboratory by covering the ends of the sleeves with Teflon film, securing the file with plastic caps, and sealing the film and caps with adhesiveless (cohesive) tape. Each sample sleeve was then labeled with the site name, date, time, samples number, and sampler's initials and placed in a cooler with sufficient blue ice to lower the sample temperature to 4° C for transport to the state-certified laboratory for analysis. The soil samples were submitted to Entech Analytical Laboratories for analysis for TPH-g, TPH-d, and TPH-motor oil using EPA Method 8015 modified, BTEX using EPA Method 8020, and total lead using either EPA method 7420 or 6010.

4.2.2 Ground Water Sampling and Analysis

Grab ground water samples were collected from both monitoring wells. After completion of the boring, 10 feet of one-inch inner diameter PVC screen was attached to one-inch diameter PVC casing and lowered into each borehole to create a temporary well. Ground water samples were collected by lowering a 0.75-inch diameter stainless-steel bailer into the casing until it was filled and then retrieving the full bailer.

Ground water samples were collected into the appropriate containers for each analysis. Each container was labeled with the sample ID, date and time collected, site name, and sampler's initials and placed in a cooler with sufficient blue ice to lower the sample temperature to 4° C for transport to the state-certified laboratory for analysis. The samples were submitted to Entech Analytical Laboratories for analysis for TPH-g, TPH-d, and TPH-motor oil using EPA Method 8015 modified, BTEX using EPA Method 602, and dissolved lead using EPA Method 7420. The lead sample was filtered by the laboratory prior to analysis to eliminate any lead resulting from suspended sediment in the water. The natural background lead concentration in soil and sediment is several-fold higher than the Cal/EPA MCL for lead in drinking water of 0.05 mg/l and can cause significantly elevated lead concentrations in water samples unless the sediment is removed.

4.2.3 Sample Documentation

The depth of each soil sample is shown on the soil boring log (Appendix D) and is coded into the soil-sample ID along with the boring number. The boring from which each water sample was collected is also coded into the water-sample ID. All samples from the borings were accompanied by chain-of-custody documentation from the time of collection until their delivery to Entech Analytical Laboratories.

4.3 DECONTAMINATION

The drilling tools, such as the drive casing and shoe, were steam-cleaned prior to use in each soil boring and after the final boring. Soil and ground water sampling equipment, such as sample barrels and the bailer, also were decontaminated by steam cleaning prior to each use and following the final use. Steam cleaning of portable equipment was done in a portable wash rack. Liquids generated during steam cleaning activities were pumped into a DOT-approved 55-gallon drum, which was labeled and staged on site pending disposal (see Section 4.5).

4.4 ANALYTICAL RESULTS

4.4.1 Soil Samples

The soil samples collected from each soil boring contained no concentrations above the practical quantitation limit (PQL) of TPH-d, TPH-g, or BTEX compounds (Table 4). TPH as motor oil (TPH-oil) was detected in elevated concentrations of 1,200 mg/kg in TW1-6.5 and 380 mg/kg in TW2-09. Lead was present at a background concentration of 11 mg/kg in TW1-6.5 and at an elevated concentration of 120 mg/kg in TW2-09.

4.4.2 Ground Water Samples

The ground water samples contained no TPH-d or dissolved lead above their respective PQLs (Table 4). Sample TW1-W1 contained low concentrations of TPH-g (52 μg/l) and BTEX compounds (3.9 μg/l benzene, 8.9 μg/l toluene,

Table 4
Analytical results for soil and ground water samples collected February 8, 1996
from soil borings and temporary wells at
Caltrans' Ettie Street Maintenance Facility
3465 Ettie Street, Oakland, California

Sample ID	Depth (feet)	TPH-oil (8015 mod) (mg/kg)	TPH-d (8015 mod) (mg/kg)	TPH-gas (8015 mod) (mg/kg)	Benzene (8020) (mg/kg)	Toluene (8020) (mg/kg)	Ethylbenzene (8020) (mg/kg)	Xylenes (8020) (mg/kg)	Lead (7420) (mg/kg)
Soil samples									
TW1-6.5	6.5-7.0	*1,200*	ND<25	ND	ND	ND	ND	ND	*11*
TW2-09	9.0-9.5	*380*	ND<5	ND	ND	ND	ND	ND	*120*
Method Detection Limit		*1.0*	*1.0*	*1.0*	*0.005*	*0.005*	*0.005*	*0.005*	*0.50*

Sample ID	Depth to water (feet)	TPH-oil (8015 mod) (µg/l)	TPH-d (8015 mod) (µg/l)	TPH-gas (8015 mod) (µg/l)	Benzene (8020) (µg/l)	Toluene (8020) (µg/l)	Ethylbenzene (8020) (µg/l)	Xylenes (8020) (µg/l)	Lead (7420) (mg/l)
Ground water samples									
TW1-W1	3.8	*2,400*	ND	*52*	*3.9*	*8.9*	*1.3*	*2.4*	ND
TW2-W2	3.8	*2,300,000*	ND<62,500	ND	ND	ND	ND	ND	ND
Method Detection Limit		50.0	50.0	50.0	*0.5*	*0.5*	*0.5*	*0.5*	*0.005*

NOTES:

µg/kg	milligrams per kilogram (ppm)
TPH-oil	total petroleum hydrocarbons quantified as motor oil
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-g	total petroleum hydrocarbons quantified as gasoline
na	not applicable, analysis not performed for this analyte
ND	analyte not detected (ND) at or above the laboratory reporting limits

1.3 µg/l ethylbenzene, and 2.4 µg/l total xylenes), and 2,400 µg/l (2.4 mg/l) TPH-oil. Sample TW2-W1 contained no concentrations of TPH-g or BTEX compounds above their respective PQLs but did contain 2,300,000 µg/l (2,300 mg/l) TPH-oil.

4.5 DISPOSAL OF RINSATE FROM DECONTAMINATION

On April 16, 1996, Tetra Tech supervised the removal of the DOT-approved 55-drum in which the rinsate was stored and the contents of the drum, which totaled 37 gallons. The drum and its contents were removed by personnel of Armour Petroleum Service and Equipment Corporation, who transported the rinsate to Solano Community College in Vacaville, California (see Appendix B), where the rinsate will be used in a fire-fighting training program.

5. PROPOSED CLEANUP GOALS AND HANDLING OF STOCKPILED SOIL

Section 5 presents the rationales for the proposed cleanup goals for TPH-d and TPH-oil and for handling the stockpile of soil excavated from the gasoline UST pit.

5.1 PROPOSED CLEANUP GOALS (PCG) FOR TPH-D AND TPH-OIL

Tetra Tech proposes the following PCGs for soil at this site:

TPH-d	PCG = 100 mg/kg
TPH-oil	PCG = 1,000 mg/kg

Tetra Tech proposes these PCGs for the following reasons:

1. The October 1995 report "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks," prepared by Lawrence Livermore National Laboratory (LLNL) and submitted to the State Water Resources Control Board (SWRCB), concluded that fuel hydrocarbons have limited impacts on human health, the environment, or California's ground water resources. The costs of cleaning up LUFT fuel hydrocarbons are often inappropriate when compared to the magnitude of the impact on ground water resources.

2. The major chemicals of concern in gasoline and diesel fuel are the BTEX compounds. No BTEX compounds were detected in any of the soil samples.

3. The PCG of 100 mg/kg for TPH-d in soil is based on the concentration of BTEX compounds in diesel fuel and their potential impact on ground water. According to the LUFT Field Manual (LUFT Task Force, 1989, p. 27-28, Table 2-1), concentrations of 100 mg/kg TPH-d in soil are sufficiently low that resulting ground water BTEX concentrations should not exceed California DHS action levels or primary MCLs for drinking water.

   Analytical results for the ground water sample collected from the diesel UST pit support the 100 mg/kg PCG for TPH-d in soil. Even though the diesel-contaminated pea gravel is in contact with the ground water in the pit and a sample of the ground water from the pit contained 2,000 μg/l TPH-d, BTEX compounds were not present in the sample in detectable concentrations.

4. The TPH-oil PCG value of 1,000 mg/kg for soil is proposed because motor oil contains even lower concentrations of BTEX compounds than diesel fuel, and because the ground water samples collected from the diesel UST tank pit contained no TPH-oil that is attributable to motor oil, even though the pea gravel in the pit contains up to 560 mg/kg TPH oil.

5. Any TPH contamination is unlikely to migrate off site. Shallow ground water at the site lies within the low-permeability Bay Mud. The low permeability of the mud and the inferred low hydraulic gradient at the site will result in very slow ground water flow rates. The migration rate of any TPH in the ground water will be even slower because of the high concentration of organic matter and clay in the mud. The constituents of fuel hydrocarbons bind to the organic material and clay and therefore migrate several times more slowly than the ground water. Such slow movement of the fuel hydrocarbons will allow abundant time for mitigation of the contamination by intrinsic *in-situ* aerobic bioremediation before the contaminant plume, if any, could migrate any substantial distance. Consequently, any fuel hydrocarbon contamination from this site is not likely to migrate off site or into nearby surface waters.

6. Because shallow ground water at the site lies within the low-permeability Bay Mud, the ground water at the site is not likely to meet the California State Water Resources Control Board (SWRCB) criterion for municipal or private water supplies of "... provid(ing) sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day" (SWRCB Res. No. 88-63). Therefore, contamination of such water would not impact a potential source of drinking water.

7. At present, the site is completely paved with asphalt or cement concrete except for the backfilled excavations where the UST and dispenser island were removed. These unpaved areas will be paved following the imminent retrofitting of the adjacent freeway support footings. The paving at the site serves as a surface seal to prevent precipitation from infiltrating and leaching contaminants from the soil. This significantly reduces the possibility that any TPH remaining in unexcavated soil will be leached and transported to the saturated zone.

On the basis of the above reasons, Tetra Tech believes that PCGs for TPH-d and TPH-oil are sufficiently protective of potential sources of drinking water and requests that the PCGs be adopted for this site by Alameda County Environmental Protection (ACEP). If ACEP accepts these PCGs, the slightly contaminated pea gravel in the diesel UST pit will be left in place.

5.2 HANDLING OF STOCKPILED SOIL FROM GASOLINE UST PIT

Tetra Tech proposes that the 50 cubic yards or so of soil excavated from the gasoline UST pit and stockpiled on the site be considered clean and be used as ordinary fill material. Therefore, no soil management plan will be required by ACEP.

Analytical results show that the stockpiled soil from the gasoline UST pit contains no detectable petroleum hydrocarbons and 26 mg/kg total lead. Although the lead concentration of the stockpiled soil is somewhat higher than the lead concentrations in the confirmation samples collected from the gasoline UST pit, the concentrations are well below the total threshold limit concentration (TTLC) for total lead of 1,000 mg/kg. The concentrations are also below the threshold of 50 mg/kg total lead above which the soluble lead content could conceivably exceed the soluble threshold limit concentration (STLC) for lead of 5.0 mg/l. Wastes containing total lead exceeding the TTLC or soluble lead exceeding the STLC are defined as hazardous wastes on the basis of the characteristic of toxicity (CCR title 22, Section 6626.24). It is clear the soil cannot be considered hazardous on the basis of its lead content.

The lead content of the stockpiled soil is not believed to be a threat to drinking water supplies for the following reasons:

1. The lead concentrations in the soil are low, being only 1.5 times the mean concentration of 17 mg/kg for lead in soils of the western United States (Shacklette and Boerngen 1984, Table 2) and therefore should not significantly affect the ground water. This is supported by the analytical results for the water sample collected from the gasoline UST pit following excavation of stockpiled soil. The water sample contained no detectable lead above the California DHS primary MCL for drinking water of 50 μg/l.

2. Because shallow ground water at the site lies within the low-permeability Bay Mud, the ground water at the site is not likely to meet the SWRCB criterion for municipal or private water supplies of "...provid(ing) sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day" (SWRCB Res. No. 88-63). Therefore, contamination of such water would not impact a potential source of drinking water.

On the basis of the above discussion, Tetra Tech proposes that the 50 cubic yards or so of soil excavated from the gasoline UST pit and stockpiled on the site be used as ordinary fill material.

6. DISCUSSION

Confirmation sampling demonstrates that the remaining native soil contains no detectable TPH-d, TPH-g, BTEX compounds, or MTBE. Pea gravel excavated from and returned to the diesel UST pit contains low concentrations (less than 100 mg/kg) of TPH-d and TPH-oil.

Low concentrations (<25 mg/kg) of TPH-oil were detected in soil adjacent to the former diesel UST pit, and moderate concentrations (380 to 1,200 mg/kg) were detected in soil from near the top of the saturated zone in the soil borings downgradient from the former UST pits and near the small building.

Total lead concentrations in soil were all below regulatory thresholds. The maximum soil lead concentration was 120 mg/kg in boring TW-2; all other soil lead concentrations were less than 27 mg/kg.

Ground water in the former UST pits contained no TPH-g or BTEX compounds, except for a very low concentration (36 μg/l) of xylenes in water from the gasoline UST pit. Ground water from the diesel UST pit contained 2,000 μg/l of TPH-d.

Ground water from the two soil borings contained elevated concentrations (2,400 to 2,300,000 μg/l) of TPH-oil and no detectable TPH-d or dissolved lead, demonstrating that the elevated soil lead observed in boring TW-2 apparently does not affect ground water. Ground water in the northern well (TW-2), downgradient of the former gasoline UST tank, also contained low concentrations of TPH-g and BTEX compounds. The TPH-g concentration in the TW-2 water was approximately 10 times greater than the 5 μg/l taste and odor threshold for gasoline, and the benzene concentration was approximately 4 times greater than the DHS MCL for benzene in drinking water.

7. CONCLUSIONS AND RECOMMENDATIONS

Tetra Tech concludes that soil contamination associated with the gasoline and diesel USTs and dispensers has been successfully addressed. No further remedial activity is recommended for the soil in the area of the USTs and the dispensers.

The stockpile of soil removed from the former gasoline UST pit contained no detectable TPH-g, BTEX compounds, or MTBE, and a low concentration of total lead. Tetra Tech recommends that this soil be considered clean and usable by Caltrans as ordinary fill material.

Ground water downgradient of the tank pits has been shown to contain elevated concentrations of TPH-oil, TPH-g, and BTEX compounds. Elevated concentrations of TPH-oil also are found in soil from the same area.

The source of the oil in the soil and ground water is not known. TPH-oil concentrations are higher downgradient of the former UST pits, suggesting that the source of the oil is located downgradient of the pits. Possible sources include spillage or leakage from a hydraulic lift near the small building or from present or former above-ground or underground oil storage tanks or from an unknown source.

The TPH observed in the ground water and soil is unlikely to migrate off site or to impact potential sources of drinking water. The TPH is unlikely to migrate off site because the shallow ground water at the site lies within the organic-rich low-permeability Bay Mud and is inferred to have a low hydraulic gradient. These factors result in very slow ground water flow rates and even slower TPH migration rates. Furthermore, the site is almost completely paved with asphalt or cement concrete and will be completely paved following imminent retrofitting of the adjacent freeway support columns. The paving serves as a surface seal to prevent precipitation from infiltrating and leaching into the saturated zone any TPH remaining in the soil.

Sources of ground water are not threatened by the TPH because shallow ground water at the site lies within the low-permeability Bay Mud, and therefore is not likely to meet the SWRCB criterion for municipal or private water supplies of "... provid(ing) sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day" (SWRCB Res. No. 88-63). Therefore, contamination of such water would not impact a potential source of drinking water.

8. REFERENCES CITED

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Radbruch, D.G. 1957. Areal and Engineering Geology of the Oakland West Quadrangle, California. US Geological Survey Miscellaneous Investigations. Map I-239.

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APPENDIX B

PROJECT INFORMATION

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ATTACHMENT B

PRE-WORK SITE VISIT CHECK LIST
Contract No. 43Y097
Task Order 04-911175-47

This check list must be completed by the Contractor, subcontractor(s), and the Contract Manager during the pre-work site visit.

1. Contractor's Name & Phone No. PSI 785-1111
   Contract Manager & Phone No. Chris Zdunkiewicz--510/286-4914
   Designee's Name & Phone No. Howell Chan--510/286-5639
2. Health and Safety Plan--emergency information included:
   Fire Department/Rescue Phone No. 911
   Nearest Hospital In HSP Route ______
3. Site Location/Boundaries, Entry Access/Hours of Access/Parking Understood Yes
4. Underground Utilities Understood Yes
   Marked Yes By Who Frank
   When 6/6/97 Inquiry ID In HSP
5. Drill Sites Marked/Understood Yes
6. Cuttings Storage Yes
7. Water/Power Supply Yes
8. Equipment Cleaning Site Yes
9. Additions to check list by:
   Contractor ______
   Subcontractor(s) ______
   Contract Manager ______
10. Additional items to be resolved ______
11. Worker/public safety addressed Yes

This pre-work site visit was conducted on 6/6/97

[signature] 6/6/97

Signature of Contractor or Designee Date

[signature] 6/6/97

Signature of Contract Manager or Designee Date

ATTACHMENT C

SITE INVESTIGATION COMPLETION SCHEDULE

Contract No. 43Y097

Task Order No. 04-911175-47

		Delivery Day*	Delivery Date
A.	Receive Task Order (by Contractor)		5/23/97
B.	Return of ARD		5/28/97
C.	Do pre-work site visit	day 1	~~5/30/97~~ 6/6/97
D.	Return pre-work site visit check list to Contract Manager	day 1	~~5/30/97~~ 6/6/97
F.	Return Completion Schedule	day 1	~~6/06/97~~ 6/6/97
G.	Provide draft of H&S and work plan	day 3	~~6/06/97~~ 6/13/97
H.	Provide final H&S and work plan*	day 5	~~6/13/97~~ 6/20/97
I.	Begin field work	day 7	~~6/18/97~~ 6/24/97
L.	Complete field work**	day 10	~~6/24/97~~ 6/~~26~~ 30/97 Cut
N.	Provide draft final report**	day 16	~~7/03/97~~ 7/11/97
O.	Provide final report**	day 22	~~7/10/97~~ 7/18/97

Notes: * working days (a working day is defined as any day except, Saturdays, Sundays, and national holidays--Veteran's Day, Thanksgiving; declination that a day is a non-working day for field work due to inclement weather or conditions resulting therefrom will be made by the Contract Manager)

** Penalty of $50/day for each workday these elements are overdue. The contractor agrees to pay said liquidated damages herein provided for and further agrees that Caltrans may deduct the amount form any moneys due or that may become due the Contractor under the task order.

We concur with this Completion Schedule on this date 6 / 6 / 97

[signature]

Signature of Contractor or Designee

[signature]

Signature of Contractor Manager or Designee

APPENDIX C

FIELD PROCEDURES

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APPENDIX C
FIELD PROCEDURES

I. DRILLING OF SOIL BORINGS AND COLLECTION OF SOIL SAMPLES

The following procedures will be used for the drilling and sampling of the soil borings drilled at the site:

1. Drilling will be conducted by V&W Drilling under the supervision of PSI. Drilling equipment will be pressure washed at the beginning of the day and between soil borings.

2. Prior to the commencement of drilling activities at the site, Underground Service Alert (USA) will be contacted to identify underground utilities in the areas that the borings will be located.

3. Boring logs for the soil borings drilled at the site will be prepared under the supervision of a State of California-registered geologist. The soil cuttings observed during drilling will be described in accordance with the Unified Soil Classification System.

4. A split-sample barrel will be used for the collection of soil samples. Soil samples will be collected by driving the sampler approximately 0.3 meters (1.5-feet) into the bottom of the soil boring through the center of the drilling bit. Three stainless steel rings will be placed in the split-sample barrel prior to sample collection.

5. The ends of the sample tubes will be covered with Teflon sheets and capped with polyvinyl chloride (PVC) end caps. The sample will be labeled and placed in a zip-lock bag in a chilled cooler pending delivery to the laboratory for analysis.

6. Soil samples will be assigned identification numbers such as B1-0.9, where B1 indicates boring 1 and -0.9 indicates that the sample was collected at 0.9 meters bgs. The samples will be labeled with the sampling designation, depth, date, client name, and project number.

7. Soil samplers will be washed between sampling intervals with Alconox soap followed by two deionized-water rinses.

8. Chain-of-custody procedures using chain-of-custody forms will be used to document sample handling and transportation.

9. A Century 128 organic vapor analyzer (OVA) will be used to monitor volatile organic compounds (VOCs) in the ambient air during drilling at the site in accordance with the site health and safety plan. VOC concentrations in the soil will be measured and recorded on the borings logs for depths that soil samples were collected. VOCs in the soil will be measured at the sampling depths by partially filling a zip-loc bag with soil. The components of the soil are allowed to volatilize and fill the head space in the tube for approximately 30 minutes prior to inserting the OVA probe through one of the end caps and recording the measurements.

10. Soil cuttings and steam wash water generated during drilling activities at the site will be contained in Department of Transportation (DOT) approved 55-gallon drums. The drums will be labeled with the contents, date, well or boring number, client name, and project number.

II FIELD DOCUMENTATION OF SAMPLING PROCEDURES

The following outline describes the procedures adhered by PSI for proper sampling documentation.

1. Sampling procedures will be documented in a field notebook that will contain:

    1. Sample collection procedures
    2. Date and time of collection
    3. Date of shipping
    4. Sample collection location
    5. Sample identification number(s)
    6. Intended analysis
    7. Quality control samples
    8. Sample preservation
    9. Name of sampler
    10. Any pertinent observations

2. Samples will be labeled with the following information:

    1. Sample number
    2. Well number
    3. Date and time sample was collected
    4. Sampler's name

5. Sample preservatives (if required)

3. The following is the sample designation system for the site:

For Borings and Hand-Auger Borings the samples will be labeled B-(Boring Number)-(Depth) (ie. sample collected from boring 4 at 0.9 meters would be B4-0.9)

For groundwater samples (W) (Boring Number) (ie. WB4)

3. Handling of the samples will be recorded on a chain of custody form which shall include:

1. Site name
2. Signature of Collector
3. Date and time of collection
4. Sample identification number
5. Number of containers in sample set
6. Description of sample and container
7. Name and signature of persons, and the companies or agencies they represent, who are involved in the chain of possession
8. Inclusive dates and times of possession
9. Analyses to be completed

III. GROUND-WATER SAMPLING

The following procedures will be used for ground water sampling:

1. All equipment shall be washed prior to entering the well with an Alconox solution, followed by two tap water rinses and a deionized water rinse.

2. Prior to purging wells, depth-to-water will be measured using an Solinst water-interface probe to an accuracy of approximately 0.01 foot. The measurements will be made to the top of the well casing on the north side.

4. Free floating product thickness and depth-to-ground water will be measured in wells containing free floating product using a Solinst oil-water interface probe to an accuracy of approximately 0.003 meters (0.01 foot). The measurements will be made to the top of the well casing on the north side.

5. Water samples will be collected with a polyethylene disposable bailer. The water collected will be immediately decanted into laboratory-supplied vials and bottles. The containers will be overfilled, capped, labeled, and placed in a chilled cooler, prior to delivery to the laboratory for analysis.

6. Chain-of-custody procedures, including chain-of-custody forms, will be used to document water sample handling and transport from collection to delivery to the laboratory for analysis.

7. Ground-water samples will be delivered to a State-certified hazardous waste laboratory within approximately 24 hours of collection.