TC 0637-06

WORK PLAN ADDENDUM

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

January 1996

Prepared by

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

TETRA TECH

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ENVIRONMENTAL PROTECTION
96 JAN 22 AM 9:00

STID 3980

January 19, 1996

Susan Hugo
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Submittal of the Work Plan Addendum for the Ettie Street Maintenance Facility, Contract No. 56S067, Work Order No. 04-56S067-17
TC 0637-01

Dear Ms. Hugo:

Enclosed for review find one copy of the Work Plan Addendum for the additional work at the Ettie Street Maintenance Facility. Please review and respond with comments to:

Mike Hilliard
Office of Maintenance Services
Caltrans, District 4
Box 23660
Oakland, CA 94623-0660

If you have any questions, or if I may otherwise be of assistance, please call me at (415) 974-1221.

Very truly yours,

Michael Wopat, RG
Project Manager

enclosures

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January 19, 1996

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

Subject: Submittal of the Work Plan Addendum for the Ettie Street Maintenance Facility, Contract No. 56S067, Work Order No. 04-56S067-17
TC 0637-01

Dear Mr. Hilliard:

I have enclosed copies of the Work Plan Addendum for the additional work at the Ettie Street Maintenance Facility. If you have any questions, please do not hesitate to call me at (415) 974-1221.

Very truly yours,

Michael Wopat, RG
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Prepared by:

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January 1996

TABLE OF CONTENTS

		Page
1.	**INTRODUCTION**	**1-1**
1.1	OBJECTIVES	1-1
1.2	SITE DESCRIPTION	1-2
1.2.1	Land Use	1-5
1.2.2	Geologic Setting	1-5
1.2.3	Hydrogeology	1-6
1.3	PREVIOUS ENVIRONMENTAL ACTIVITIES	1-6
1.3.1	Previous Soil and Ground Water Sample Analyses Results	1-7
2.	**PROPOSED CLEANUP GOALS AND HANDLING OF STOCKPILED SOIL**	**2-1**
2.1	PROPOSED CLEANUP GOALS FOR TPH-D AND TPH-OIL	2-1
2.1.1	Summary of Relevant Contamination	2-1
2.1.2	Proposed Cleanup Goals (PCGs)	2-1
2.2	HANDLING OF STOCKPILED SOIL FROM GASOLINE UST PIT	2-4
3.	**WORK TASKS**	**3-1**
3.1	SOIL BORINGS	3-1
3.1.1	Rationale for Boring Placement	3-2
3.1.2	Drilling Permits	3-2
3.1.3	Soil Borings Installation	3-2
3.1.4	Decontamination	3-4
3.1.5	Ground Water Sample Collection	3-4
3.1.6	Ground Water Sample Documentation	3-5
3.2	SOIL EXCAVATION AND DISPOSAL	3-5
3.2.1	Soil Staging Area	3-5
3.2.2	Soil Excavation Under the Former Diesel Dispenser	3-6
3.2.3	Soil Sample Collection Procedure	3-6
3.2.4	Stockpiled Soil Composite Samples	3-7
3.3	BACKFILL AND COMPACTION	3-8
4.	**LABORATORY ANALYSIS**	**4-1**
5.	**DELIVERABLES**	**5-1**
5.1	FINAL REPORT	5-1
5.2	TENTATIVE SCHEDULE	5-1
6.	**REFERENCES CITED**	**6-1**

LIST OF FIGURES

Page

FIGURE 1 REGIONAL SITE LOCATION 1-3
FIGURE 2 LOCATION MAP 1-4
FIGURE 3 SITE PLAN SHOWING LOCATIONS OF SOIL SAMPLES 1-10
FIGURE 4 SITE MAP SHOWING PROPOSED SOIL BORING LOCATIONS 3-3

LIST OF TABLES

TABLE 1 ANALYTICAL RESULTS FOR SOIL SAMPLES 1-8
TABLE 2 ANALYTICAL RESULTS FOR GRAB GROUND WATER SAMPLES 1-9

1. INTRODUCTION

This work plan has been prepared as guidance for setting cleanup goals, handling soil previously excavated from the gasoline UST pit, advancing soil borings, collecting and analyzing ground water samples, and excavating and disposing of soil from under the diesel dispenser island 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 OBJECTIVES

The objectives of the site investigation include:

- Conduct a site inspection to verify and mark soil boring locations, site access, concrete cutting, and other logistical factors.
- Verify utility locations with on-site personnel and/or an approved utility locating service.
- Drill and sample up to two soil borings to a maximum depth of 20 feet below ground surface (bgs).
- Containerize all rinse water in U.S. Department of Transportation approved containers, pending waste characterization.
- Backfill all soil borings with a cement/bentonite grout and repair the ground surface to its original condition.

- Arrange transport and disposal of rinse water in compliance with applicable state and federal regulations.
- Excavate soil beneath the former diesel fuel dispenser that has been impacted by leaking fuel.
- Backfill the excavation with clean fill material.
- Arrange transport and disposal of excavated soil in compliance with applicable state and federal regulations.

The following sections describe the historical background and environmental setting of the site and the procedures to be 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 and 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; the property is owned by and was formerly operated by Caltrans but 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.

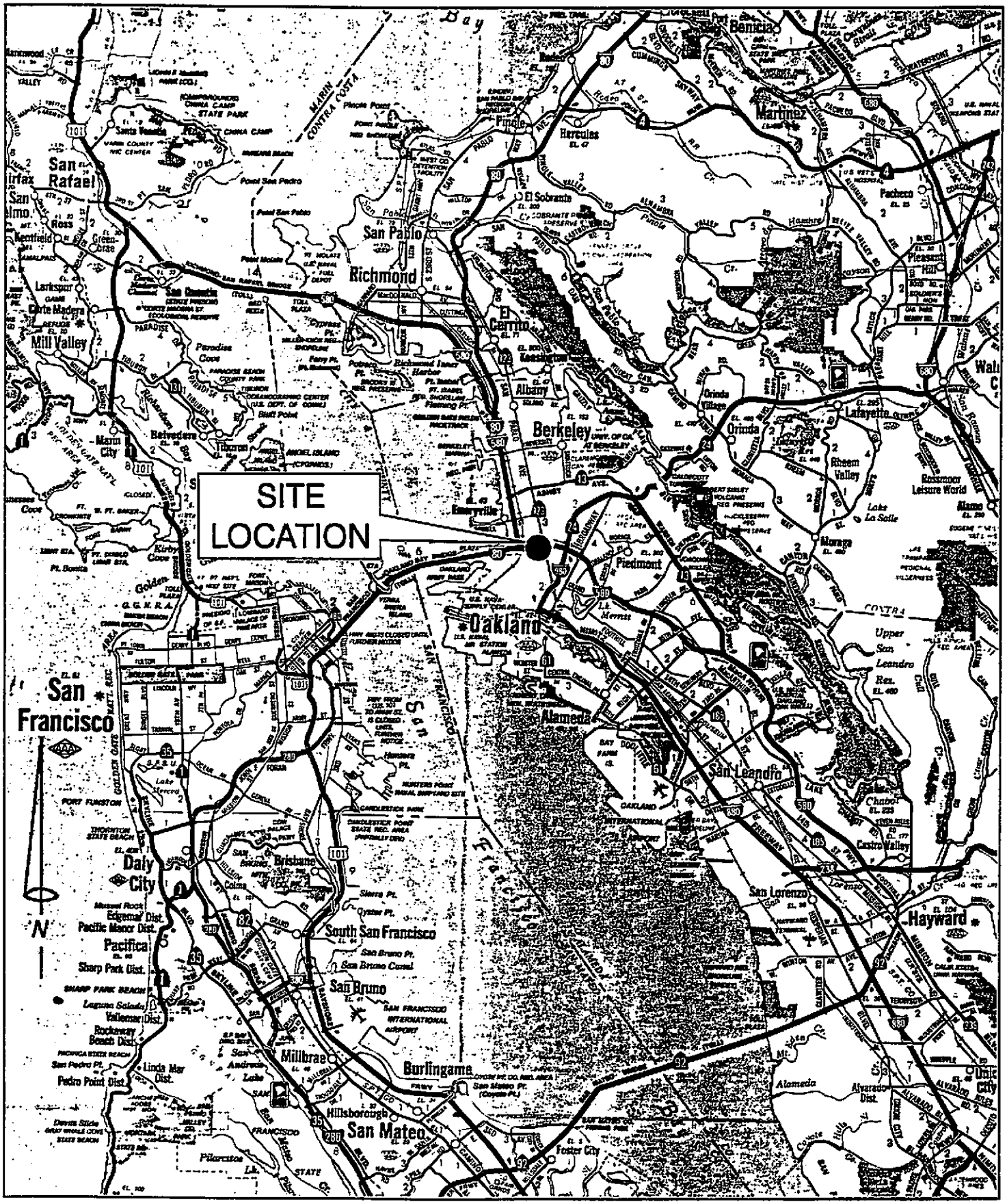


Figure 1 Regional Site Location

Scale: 1" = 4 miles

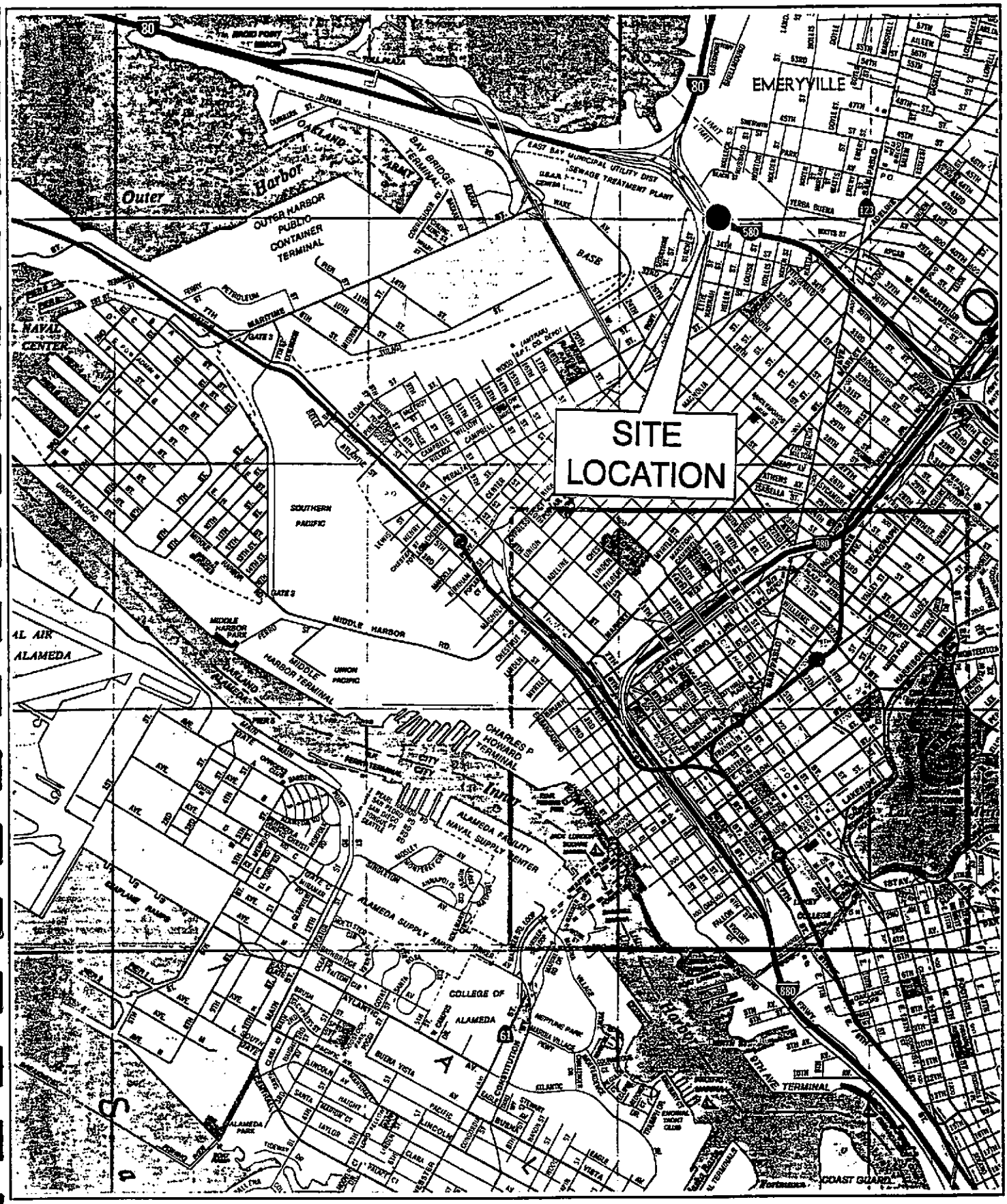


Figure 2 Site Location

N

Scale: 1" = 1/2 mile

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 plan is located one-third mile west northwest of the facility. The Oakland Army Base is located one-half mile to the west.

1.2.2 Geologic Setting

1.2.2.1 Soils

The surface soils at the site have been mapped as Urban land (USDA 1980), a miscellaneous area consisting of land covered by 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 and poorly drained and has a low permeability.

1.2.2.2 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 thickness of the fill at the site was revealed during excavation of the tank pit to be about four

to five feet. 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 at the site 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 presented in an unconfined water table aquifer, with ground water flow generally west and northwest, towards the bay. During the August 30 site visit, the water table was measured in a leak detection monitoring well at a depth of approximately eight feet below ground surface. During excavation of the tank pits in October 1995, the depth to ground water was also approximately eight feet below ground surface.

1.3 PREVIOUS ENVIRONMENTAL ACTIVITIES

On October 19 and 20, 1995, two underground storage tanks were removed from the site, and soil and ground water samples were collected and analyzed. The work included the following tasks:

- Conducting an initial site visit 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;

- Sampling the soil beneath the tanks and sampling 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.

1.3.1 Previous Soil and Ground Water Sample Analyses Results

The results of soil and ground water analyses for samples collected during the UST removals are summarized on Tables 1 and 2 and described below. The approximate locations of the samples are shown in Figure 3.

- Confirmation soil samples collected from the west and east end (G-7W and G-7E) of the gasoline UST tank pit contained no total petroleum hydrocarbons as gasoline (TPH-g) above the method detection limit.

- Confirmation soil samples collected from the west and east end (G-7E and D-7W) of the diesel UST tank pit contained no TPH as diesel (TPH-d) 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.

- The confirmation soil sample collected from beneath the gasoline dispenser island did not contain TPH-g above the method detection limit.

- The confirmation soil sample collected from beneath the diesel dispenser island contained TPH-d at a concentration of 64,000 mg/kg. 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 in this work plan, is necessary.

Table 1: Analytical results for soil samples collected 10/19-20/95 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)	Lead (239.1) (mg/kg)	Benzene (8020) (mg/kg)	Toluene (8020) (mg/kg)	Ethylbenzene (8020) (mg/kg)	Xylenes (8020) (mg/kg)	MTBE (8020) (mg/kg)
Samples collected from beneath USTs										
G-7W	10/19/95	na	na	ND	6.5	ND	ND	ND	ND	ND
G-7E	10/19/95	23	ND	ND	11	ND	ND	ND	ND	ND
D-7E	10/19/95	13	ND	na	na	ND	ND	ND	ND	na
Samples collected from beneath dispensers										
W-DISP	10/20/95	na	na	ND	18	ND	ND	ND	ND	ND
E-DISP	10/20/95	na	64000	na	na	ND	ND	ND	ND	na
Sample composited from soil from gasoline UST excavation										
COMP	10/20/95	na	na	ND	28	ND	ND	ND	ND	ND
Samples collected from pea gravel removed from around diesel UST										
DS-1	10/19/95	ND	35	na	na	ND	ND	ND	ND	ND
DS-2	10/19/95	ND	71	na	na	ND	ND	ND	ND	ND
DS-3	10/19/95	ND	31	na	na	ND	ND	ND	ND	ND
DS-4	10/19/95	110	39	na	na	ND	ND	ND	ND	ND
DS-5	10/19/95	62	39	na	na	ND	ND	ND	ND	ND
DS-6	10/19/95	29	12	na	na	ND	ND	ND	ND	ND
DS-7	10/19/95	72	ND	na	na	ND	ND	ND	ND	ND
DS-8	10/19/95	660	ND	na	na	ND	ND	ND	ND	ND
DS-9	10/19/95	91	24	na	na	ND	ND	ND	ND	ND
DS-10	10/19/95	49	ND	na	na	ND	ND	ND	ND	ND
DS-11	10/19/95	30	ND	na	na	ND	ND	ND	ND	ND
Method Detection Limit		1.0	1.0	1.0	0.5	0.005	0.005	0.005	0.005	0.05

NOTES:

ug/kg	milligrams per kilogram
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 was not performed
ND	Analyte not detected (ND) at or above the laboratory reporting limits
COMP	Composite of four samples collected from the soil removed from the gasoline UST excavation

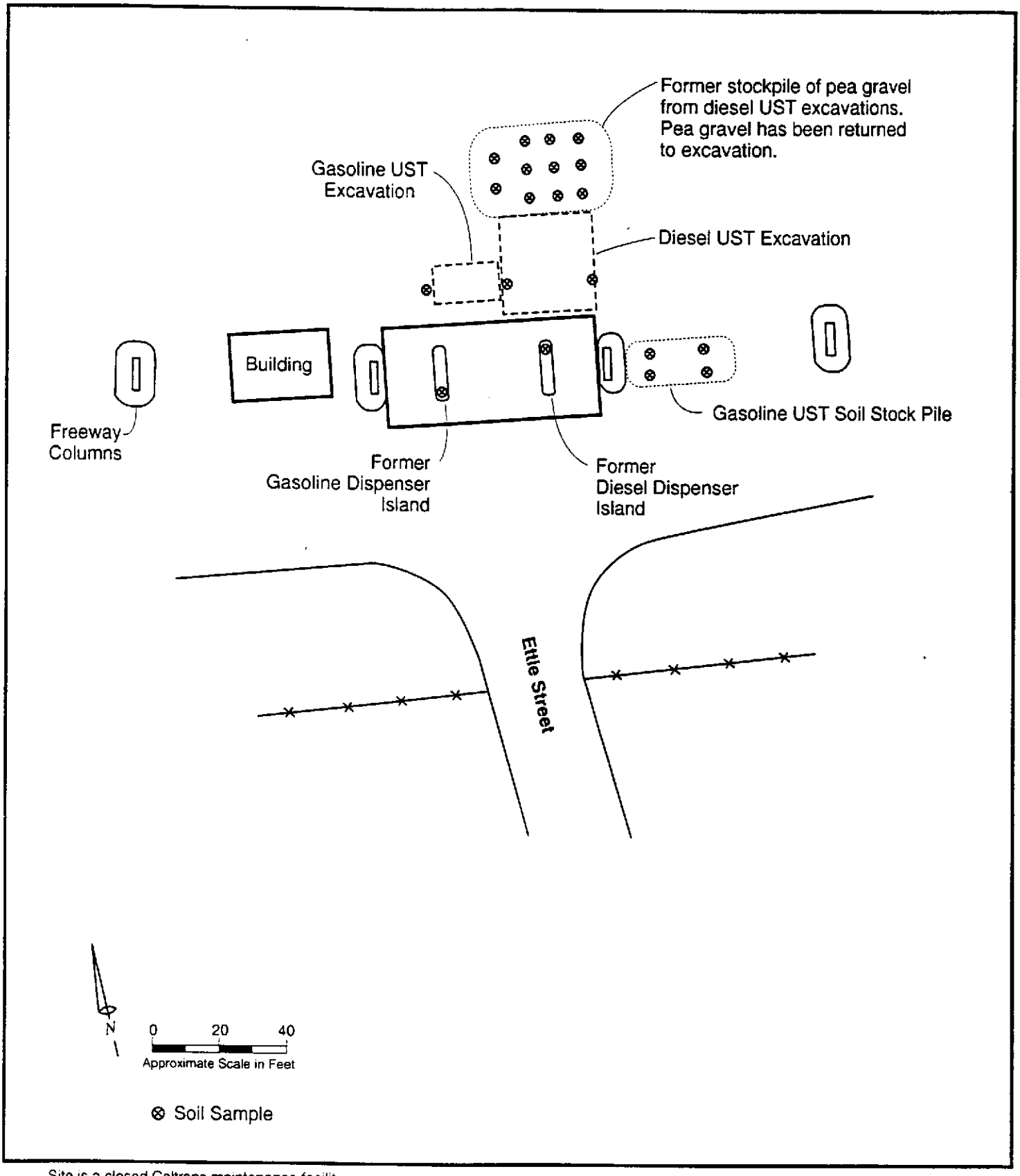
Table 2: Analytical results for grab ground water samples collected 10/19/95 at Caltrans' Ettie Street Maintenance Facility 3465 Ettie Street, Oakland, California

Sample ID	Date Collected	TPH-oil (8015 mod) (ug/L)	TPH-d (8015 mod) (ug/L)	TPH-g (8015 mod) (ug/L)	Lead (239.1) (mg/L)	Benzene (8020) (ug/L)	Toluene (8020) (ug/L)	Ethylbenzene (8020) (ug/L)	Xylenes (8020) (ug/L)	MTBE (8020) (ug/L)
Gas	10/19/95	na	na	ND	ND	ND	ND	ND	36	260
Diesel	10/19/95	170[1]	2000	na	na	ND	ND	ND	ND	na
Method Detection Limit		50.0	50.0	50.0	0.05	0.5	0.5	0.5	0.5	5.0

NOTES:

Gas	Sample ID for grab ground water sample collected from the excavated gasoline UST pit
Diesel	Sample ID for grab ground water sample collected from the excavated diesel UST pit
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
ug/L	micrograms per liter
mg/L	milligrams per liter
na	Not applicable, analysis was not performed
ND	Analyte not detected (ND) at or above the laboratory reporting limits

(1) The 170 ug/l TPH-oil represents the carry over from the adjacent Diesel Fuel range rather than the presence of M
This is a common occurrance with TPH analysis by Gas Chromatography (Entech Analytical labs, Inc., Dec. 12, 1



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Site is a closed Caltrans maintenance facility

TETRA TECH

Site Plan Showing Locations of Soil Samples

Figure 3

- The composite soil sample collected from soil excavated and stockpiled from around the gasoline UST contained no detectable concentration of TPH-g. 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 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.

- The ground water sample collected from the gasoline UST pit contained no TPH-g above the method detection limits. The analyses did detect 36 µg/L xylenes and 260 µg/L methyl-tert-butyl ether (MTBE). The California Department of Public Service's 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 is not an issue of concern. There is no primary or secondary MCL for MTBE; therefore, it is not an issue of concern.

- The ground water sample collected from the diesel UST pit contained 2,000 µg/l TPH-d. This concentration is the reason why additional ground water assessment, as described in this work plan, is required. Although 170 µg/l of TPH-oil was quantitated in this sample, review of the chromatogram demonstrates that the detection of TPH-oil is due to overlap of diesel fuel into that range and does not result from motor oil contamination. All other analytes were below the method detection limits.

2. PROPOSED CLEANUP GOALS AND HANDLING OF STOCKPILED SOIL

The following sections describe the rationale for the proposed cleanup goals for TPH-d and TPH-oil and for handling the stockpile of soil excavated from the gasoline UST pit.

2.1 PROPOSED CLEANUP GOALS FOR TPH-D AND TPH-OIL

2.1.1 Summary of Relevant Contamination

Soil at the site is contaminated with TPH-d and TPH-oil. Soil under the diesel-fuel dispenser island has been shown to contain as much as 64,000 mg/kg TPH-d. Native soil represented by confirmation soil samples from the diesel UST pit was shown to contain up to 23 mg/kg TPH-oil and no detectable TPH-d. Pea gravel that was excavated from the diesel UST pit to allow removal of the UST and then returned to the tank pit has been shown to contain an average of 23.0 mg/kg TPH-d (maximum = 71 mg/kg) and 91.3 mg/kg TPH-oil (maximum = 560 mg/kg).

The ground water sample collected from the diesel UST pit contained 2,000 µg/l TPH-d, 170 µg/l TPH-oil, and no detectable BTEX compounds. The TPH-oil value results from the overlap of the high concentrations of diesel into the motor oil range and is not indicative of motor oil contamination.

2.1.2 Proposed Cleanup Goals (PCGs)

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 or in the two ground water samples, with the exception of 36 µg/l total xylenes in the ground water sample from the gasoline UST pit. This concentration of xylenes is well below the California DHS primary MCL for xylenes of 1,750 µg/l and therefore is not of concern.

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 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. This suggests that such high concentrations of TPH-oil do not negatively impact the ground water.

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 daylight in 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, then all TPH-d contaminated soil under the former diesel fuel dispenser island that contains more than 100 mg/kg TPH-d will be removed, and the slightly contaminated pea gravel in the diesel UST pit will be left in place.

2.2 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 will 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.

3. WORK TASKS

The following sections describe the rationale, equipment, and procedures for the project work tasks.

3.1 SOIL BORINGS

Two soil borings will be placed downgradient of the tank pit to permit collection of grab ground water samples. Because the soil in the tank pits was shown to be clean by confirmation samples, no soil samples will be submitted for chemical analysts; soil samples will be collected solely for lithologic description.

This investigation will utilize the Enviro-Core™ continuous soil sampling system to drill the soil borings and collect soil samples. The use of the Enviro-Core sampling system will minimize the amount of soil waste generated while ensuring a continuous soil profile for the investigation.

The Enviro-Core system consists of a small diameter drive casing and an inner sample barrel that are simultaneously pushed, driven, or vibrated into the ground, depending on the soils encountered. Continuous soil samples are collected inside the inner sample barrel. After being advanced in intervals of three feet, the inner sample barrel is retrieved, while the drive casing remains in the borehole to prevent collapsing. The drive casing also ensures that subsequent samples are soils collected from the targeted interval, rather than slough from higher up in the borehole. The soil samples collected from the boring will be logged using the Unified Soil Classification System (USCS).

Each soil boring will be drilled and continuously cored to a maximum depth of 20 feet bgs. Upon completion of the soil borings, the boreholes will be backfilled with cement/bentonite

grout. All work at the site will be done within the constraints specified in the approved site health and safety plan.

3.1.1 Rationale for Boring Placement

Boring locations were chosen to provide information on subsurface ground water conditions and to investigate the lateral extent of ground water impacted by diesel fuel, motor oil, and/or gasoline. Both borings are located near the former UST tank pits in what is inferred to be the hydraulically downgradient direction from the former USTs. Figure 4 shows the proposed soil boring locations.

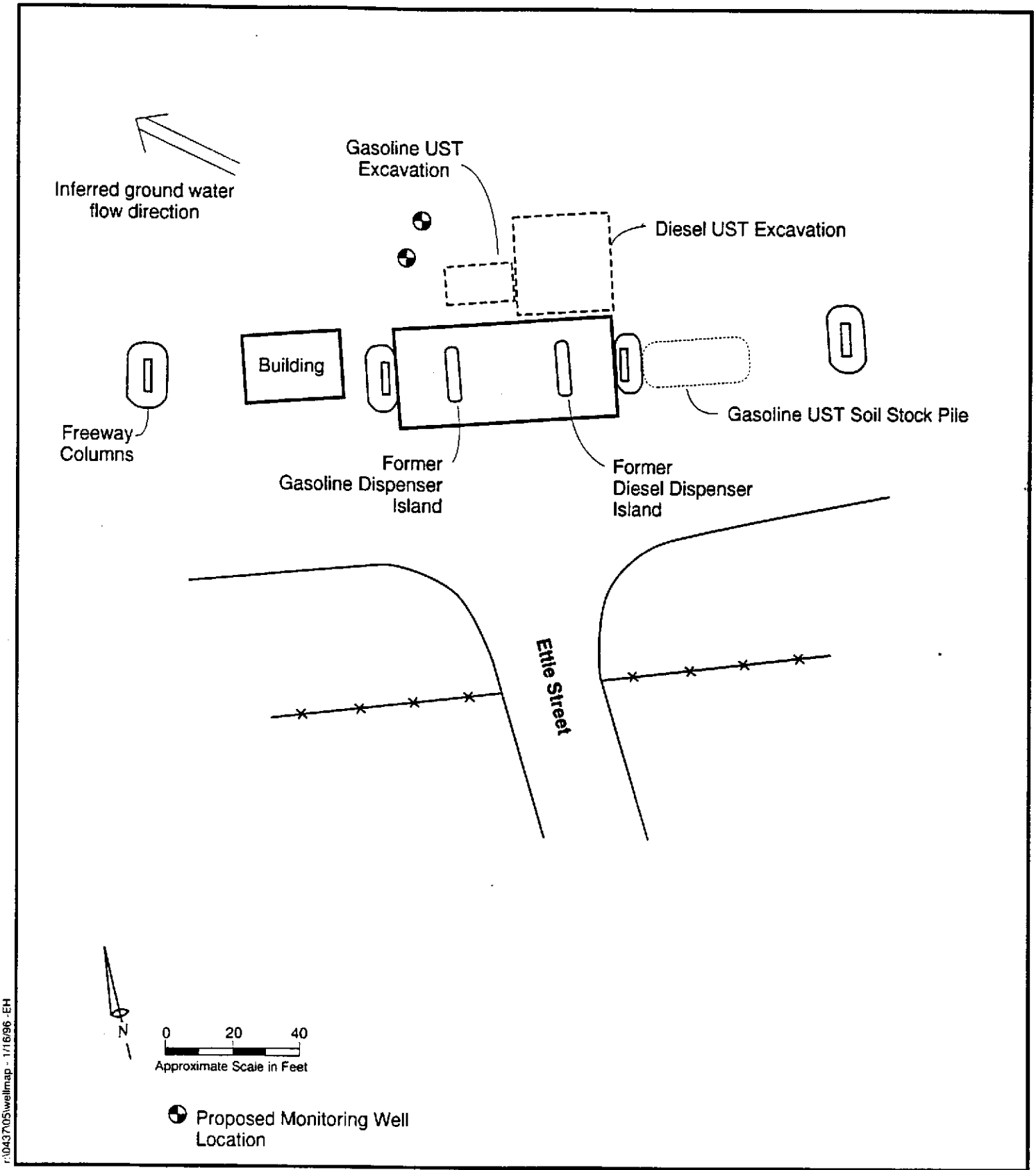
3.1.2 Drilling Permits

Alameda County requires that all soil borings be permitted prior to drilling. All necessary permits will be obtained from Alameda County Flood Control and Water Conservation District Zone and Water Agency prior to drilling the borings.

3.1.3 Soil Borings Installation

The two soil borings will be installed by a Precision Sampling, Inc., a California licensed drilling company. The borings will be installed to a maximum depth of 20 feet bgs using a 2.375-inch diameter drive casing and a 1.5-inch inner sample barrel.

Soil samples will be collected in each borehole continuously for the entire length of the soil boring using a 3-foot sample barrel. The sample barrel will be simultaneously advanced with the drive casing. After collection of each 3-foot sample, the amount of recovery will be recorded in the boring log. Soil will be field screened for contamination by visual examination



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Caption: Site is a closed Caltrans maintenance facility

TETRA TECH

Proposed Monitoring Well Locations

Figure 4

and by headspace analysis with an Photoionization Detector (PID). All PID readings will be recorded on the boring logs. All soils will be classified using the USCS and recorded in the boring log.

The soil generated during drilling will be placed in the soil stockpile created by excavating beneath the former diesel fuel dispenser island.

A grab ground water sample will be collected from each boring prior to backfilling (see Section 3.3.5 for sampling method). After the ground water samples have been collected, the boreholes will be abandoned by backfilling with a cement/bentonite grout mixture. After backfilling, the ground surface will be repaired with concrete or asphalt to match original condition.

3.1.4 Decontamination

Prior to the start of drilling at the site, the drill rig and any other on-site equipment will be thoroughly steam cleaned. The drilling tools (such as the drive casing and shoe) will be steam cleaned prior to use in each soil boring. Soil sampling equipment, such as sample barrels, also will be decontaminated by steam cleaning prior to each use. Steam cleaning of portable equipment will be done in a portable wash rack. Liquids generated during steam cleaning activities will be pumped into a 55-gallon drum, which will be labeled and staged on site pending waste characterization at the completion of the project. After waste characterization, the waste will be appropriately transported and disposed of.

3.1.5 Ground Water Sample Collection

Grab ground water samples will be collected from both monitoring wells. After completion of the boring, 10 feet of one-inch inner diameter PVC screen will be attached to up to 12 feet of one-inch diameter PVC casing and lowered into each borehole to create a temporary well.

Ground water samples will be collected by lowering a 0.75-inch diameter bailer into the casing until it has filled and then retrieving the full bailer. Due to the expected slow recharge, the samples may be collected the day after the casing is installed.

3.1.6 Ground Water Sample Documentation

Each sample will be labeled with the sample I.D., date and time collected, project number, and sampler's initials. Each sample will be accompanied by chain-of-custody documentation from the time of collection until its analyses by the on-site mobile laboratory. During this investigation, on-site analyses of soil and ground water samples will be performed at a state-certified mobile laboratory owned and operated by Geochem Environmental Laboratories of San Jose and Irvine, California.

3.2 SOIL EXCAVATION AND DISPOSAL

The following sections describe the methods to be used during the soil excavation, stockpiling, transport, and disposal.

3.2.1 Soil Staging Area

A soil staging area for the excavated soils will be prepared in the vicinity of the tank excavation site, where the stockpile of excavated soil will not interfere with Caltrans activities. The staging area will be constructed by first placing 10 mil plastic sheeting on the ground surface. Potentially contaminated soil will be placed on the plastic sheeting and will be covered with 10 mil plastic sheeting at the end of each work day. The staging area will be designed to contain at least 110 cubic yards of soil. If it is necessary to remove concrete or asphalt, it will be staged separately and will be covered.

3.2.2 Soil Excavation Under the Former Diesel Dispenser

Soil will be removed from beneath the former diesel dispenser using a backhoe or similar equipment. Excavation work will be directed by a Tetra Tech representative. Excavated soils will be visually inspected and screened with a PID. Obviously contaminated soils will be placed on the soil staging area. The depth of excavation will not exceed the depth of the water table from ground surface; during the tank removals this depth was approximately eight feet. After all obviously contaminated soils are removed, samples will be collected from the four sidewalls and the bottom of the excavation. These samples will be analyzed for the parameters described in Section 4 by the on-site mobile laboratory. If the results of analyses are greater than the proposed closure goals (Section 2.1), additional soil will be removed from the sample location. The sampling and analysis procedure will be repeated until the results of all analyses from all four sidewalls and the bottom of the excavation are less than the proposed closure goals.

Barricades, hazard tape, or both will be placed around the excavation pit while it remains open. After completion of the soil excavation, the resulting pit will be backfilled with clean pea gravel.

3.2.3 Soil Sample Collection Procedure

Samples will be labeled with a sample number descriptive of the location and depth of the sample and the date and time of collection. Sample numbers will be 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,C) from the center of the pit that the sample is taken. Additional description of the sample locations will be noted in the field log.

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

Sample locations will be determined in the field by the regulator or the field geologist. Sample locations will be photographed or sketched, showing pertinent distances to fixed reference points. An attempt will be made to include as much contextual reference as needed to show the orientation and scale of the subject matter. The date and time of the photographs will be recorded.

Soil samples will be collected by pushing a liner tube into soil excavated and brought to the surface with a backhoe bucket. An attempt will be made to collect an adequate volume of soil and to ensure that the sample is as undisturbed as possible.

The field geologist will record the date, time, depth, location, field screening instrument readings, and geological description of each sample in the field log. Samples will be described using the USCS.

Each sample will be labeled with the sample ID number and the date and time collected, placed in a plastic zip-lock bag, and stored on ice in a cooler under chain of custody until received by the mobile laboratory.

All soil samples will be analyzed by a mobile state-certified laboratory using the methods specified in Section 4.0.

3.2.4 Stockpiled Soil Composite Samples

Four discrete soil samples will be collected from the stockpile of excavated soil. The purpose of these samples is to obtain a preliminary characterization of the stockpiled soil for evaluation of soil disposal options. The samples will be collected by pushing a sample liner into the stockpiled soil at selected representative locations. The discrete samples will be identified with separate sample numbers. A sketch of the sample points on the soil pile will be recorded in the field log. The

laboratory will be instructed to composite the discrete samples, and the samples will be analyzed as specified in Section 4.0.

3.3 BACKFILL AND COMPACTION

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

4. LABORATORY ANALYSIS

Samples will be analyzed by a mobile on-site California-certified laboratory. The samples will be analyzed by the following methods:

- The ground water samples collected from the soil borings will be submitted to an off-site state-certified laboratory for analysis for benzene, toluene, ethylbenzene, and xylenes (BTEX compounds) using EPA Method 602; for TPH-d, TPH-oil, and TPH-g using EPA Method 8015 modified; and for dissolved lead using EPA Method 6010 or 7421.

- Soil samples collected from the excavation and stockpile will be analyzed by the on-site state-certified mobile laboratory for TPH-d using EPA Method 8015/3550 modified.

- It is likely that in addition to TPH-d analyses, samples of the stockpiled soil will also be submitted to an off-site lab for analysis for BTEX compounds using EPA Method 8020, and for reactivity, corrosivity and ignitability (RCI).

Each laboratory will be required to perform the appropriate QA/QC procedures for each method used.

5. DELIVERABLES

5.1 FINAL REPORT

Tetra Tech will prepare a final report, which includes the elements specified in the contract. The report will summarize all methodologies used during the course of site work as well as all analytical results. Copies of laboratory reports, field logs, and photodocumentation will be included as appendices. All reference materials used in preparation of the report will be listed. The report will evaluate and discuss the analytical results and will present conclusions and recommendations.

5.2 TENTATIVE SCHEDULE

The following schedule is proposed to accomplish the work described above:

January 19 - draft work plan submitted to Caltrans
January 30 - begin field work
February 20 - final report

6. REFERENCES CITED

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