TETRA TECH, INC.
180 Howard Street, Suite 250
San Francisco, CA 94105-1661
Telephone (415) 974-1221
FAX (415) 974-5914

To: Brian Oliva

Enclosed is the Work Plan and Health and Safety Plan for the Caltrans - Ettie Street tank removal. We are trying to schedule the work for sometime next week. I will let you know when the date is finalized.

Bob Cotton

Cal Trans
Removal

ACCUTITE
Contractor's License #843881

Accutite Environmental Engineering
35 So. Linden Avenue
South San Francisco, CA 94080

Tel: (415) 952-5551
Fax: (415) 952-7631
Tank Testing: (415) 952-0327

Ron Breckenridge
Estimator

W. Robert Cotton Jr., P.E.
Senior Engineer

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TC -0637-01

WORK PLAN

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

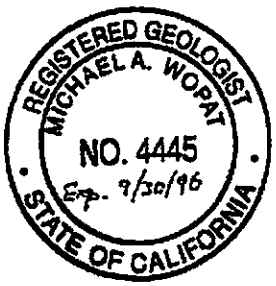
Contract No. 56S067
Work Order No. 04-56S067-17

Prepared for

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

Prepared by:

W. Robert Cotton, PE
Senior Hydrogeologist



Mike Wopat, RG
California Registered Geologist No. 4445

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

September, 1995

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1. INTRODUCTION

This Work Plan has been prepared as guidance for conducting an underground storage tank (UST) removal and disposal, at the Ettie Street Maintenance Facility, 3465 Ettie Street, Alameda County, Oakland, 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, as presented in the Work Order and discussed during the pre-work site visit, include:

- Perform an initial site visit, including file review, and prepare a work plan and health and safety plan for the tank removal;
- Remove one 4,000-gallon and one 7,500 gallon underground fuel tank, and ancillary piping, vent lines, dispenser islands, fill ports, etc.;
- Sample the soil beneath the tanks and the ground water in the excavation (if present); and
- Backfill the excavation and repair the asphalt or concrete.

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 1-1 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; 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 3 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 plan is located one-third mile west northwest of the facility. The Oakland Army Base is located one-half mile to the west.

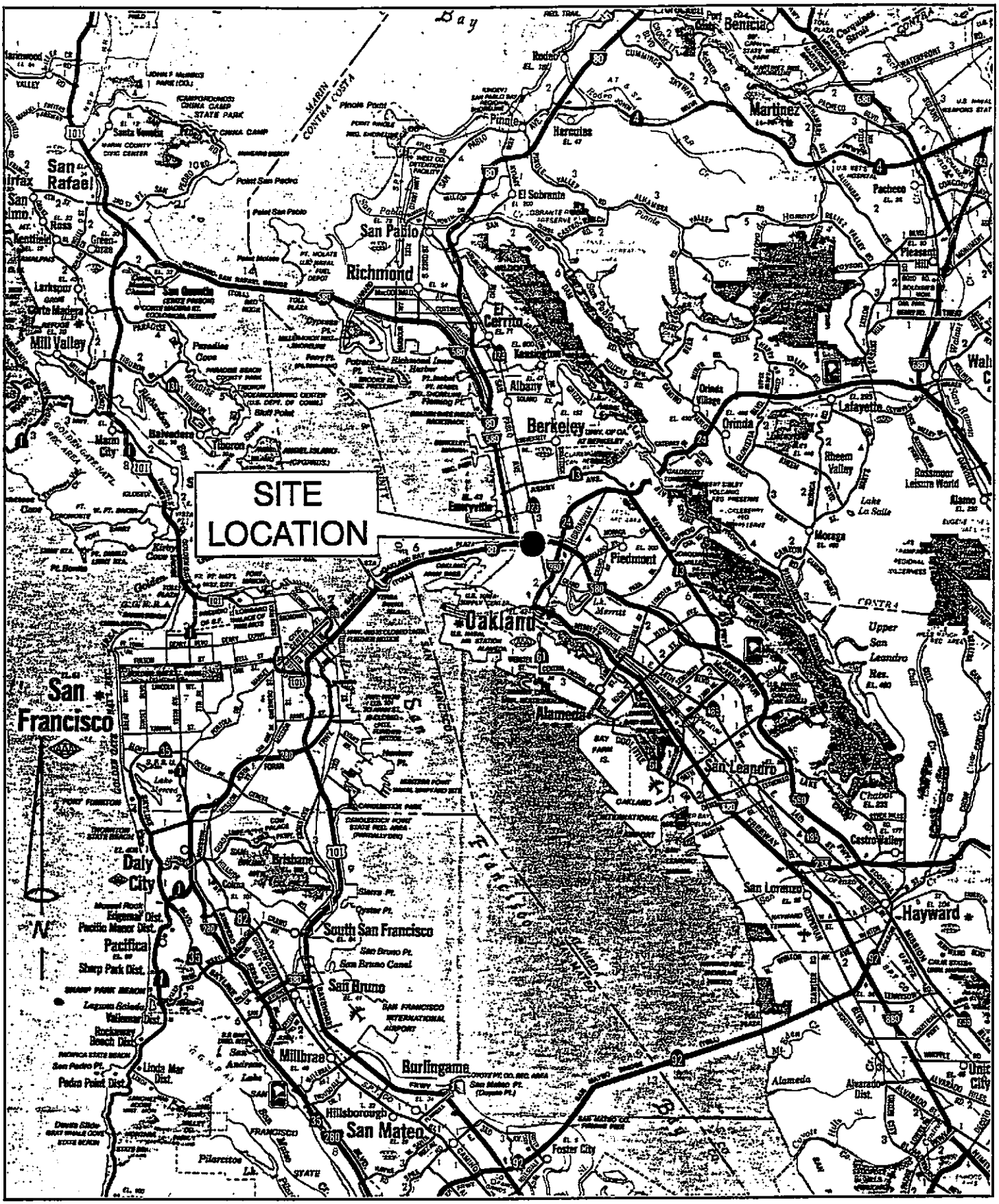

Figure 1-1 Regional Site Location

Scale: 1" = 4 miles

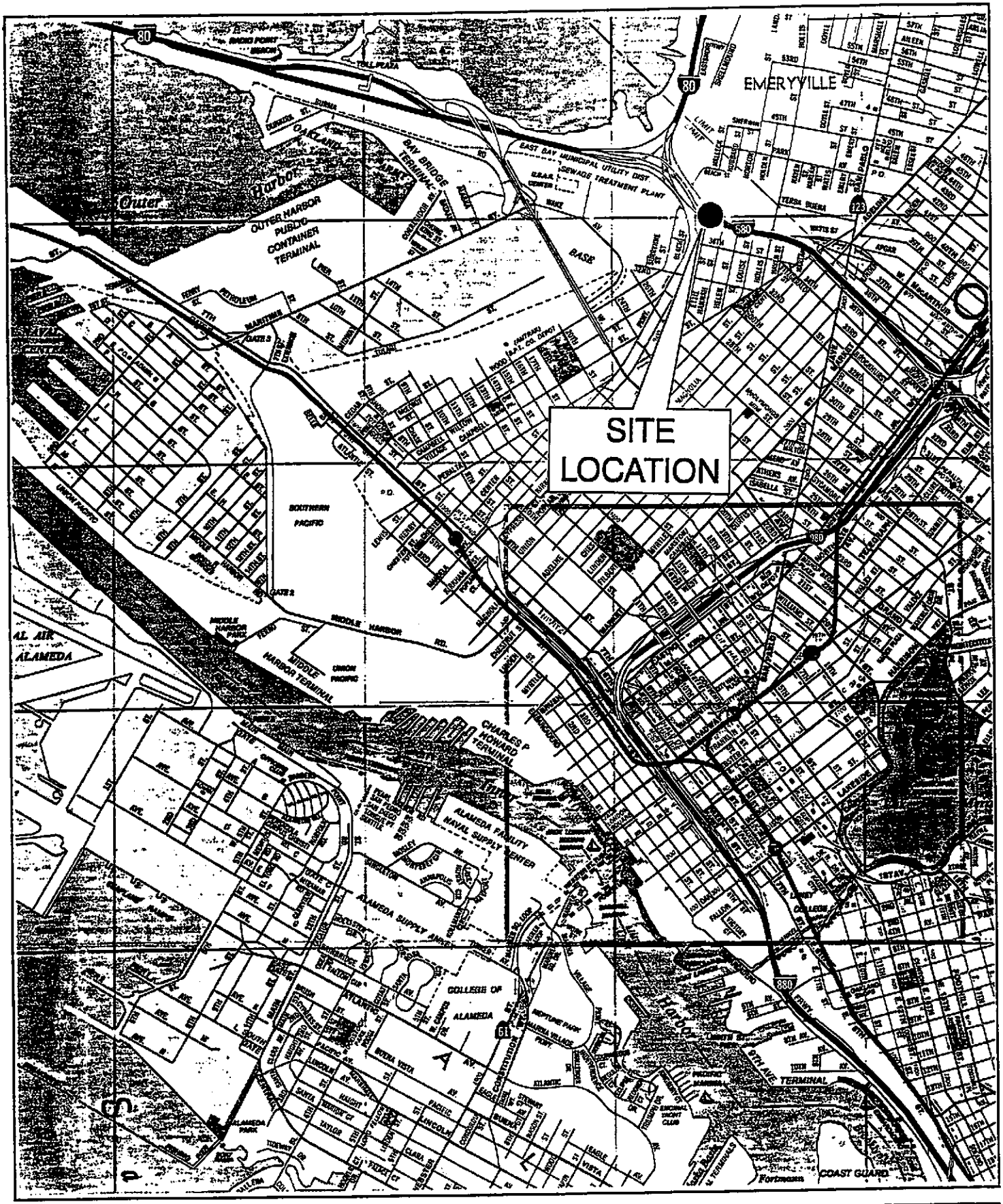

Figure 1-2 Site Location

N

Scale: 1" = 1/2 mile

1.2.2 Geologic Setting

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, 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 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 the 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 August 30 site visit the water table was measured in a leak detection monitoring well at a depth of approximately 8 feet below ground surface.

2. TANK REMOVAL

2.1 DESCRIPTION OF UNDERGROUND STORAGE TANKS

The underground storage tanks were reportedly installed in 1959, when the Ettie Street Maintenance Facility was built. The tanks are reported to be of single-walled steel construction. No plans showing the construction details of the tanks are available.

2.2 SITE PREPARATION

Site preparation activities include obtaining all applicable permits, notifying the County Health Department at least 48-hours prior to the removal, and locating underground utilities. A staging area for excavated soil will be prepared near the tank removal site. Pea gravel and road base will be staged near the excavation so that it is available in a timely manner. The tank removal will be rescheduled in the event that greater than a 40 percent chance of rain is forecast.

2.2.1 Permits

An Underground Storage Tank removal permit is required from the Alameda County Department of Health for closure of underground storage tanks. An application for a tank closure permit will be submitted by Tetra Tech. Permits are also needed from the Oakland Fire Department and the Bay Area Air Quality Management District.

2.2.2 Utilities

Utilities will be located and marked prior to beginning any excavation or drilling activities. Underground Service Alert (USA) will be contacted at least 48 hours before the excavation is scheduled to identify and mark underground utilities installed by utility companies. Caltrans and Tetra Tech personnel will survey the site property and mark known utility locations.

2.2.3 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. Concrete and asphalt will be staged separately, and will be covered.

2.3 TANK REMOVAL

The general procedure for tank removal will be as follows:

- The gate to the facility will be closed and locked to keep out onlookers. The electric power will be shut off. No smoking signs will be placed in conspicuous areas;
- Remove pumpable contents of the tanks to a vacuum truck;
- Saw-cut concrete/asphalt surface and remove;

- Purge (inert) tank with dry ice;

- Excavate to expose the top of the tank; If utilities are encountered hand excavation will proceed until utilities can be properly marked.

- Remove piping, fixtures, drop tube, pump, etc.,

- Excavate to bottom of tank to free sides of tank, and hoist from excavation;

- Label and manifest the tank, and haul as hazardous waste to a disposal facility.

2.3.1 Cleaning

Although the tanks have been emptied, there is likely to be a small quantity of residual product and sludge in the tanks. As much of the product as possible will be pumped out to a vacuum truck prior to uncovering the tanks.

2.3.2 Excavation to Expose the Top of the Tank

The asphalt and concrete surfacing will be saw cut and removed in sections to gain access to the top of the tanks. If present the concrete deadmen and cables holding the tank down will be cut. After removing the concrete (and concrete pad, if present) and asphalt, the top of each tank will be carefully uncovered by the backhoe operator, being careful not to disturb the external piping. The fill pipes are located directly over the tanks. The product lines from the valve boxes to the dispenser island will be disconnected and pulled underneath the pad. Also, the vent lines, from the tanks will be cut at the bridge columns, removed from the bridge columns, and the underground portion pulled from the ground. The remaining external piping, the drop tube,

submersible pumps, etc, will be removed. The two dispenser islands and crash bollards will also be removed at this time.

2.3.3 Purging

To eliminate potential for explosion, the tanks will be inerted in place by pouring crushed dry ice into each tank (20 lb./1000 gal of tank volume) as required by the Alameda County Health Department. The atmosphere in and around the tanks and connected piping will be monitored by the excavation contractor using a combustible gas meter to ensure that it is maintained at less than 10 percent of the lower explosive limit (L.E.L.), and oxygen content is less than 10 percent. The openings to the tank will be capped, except for a small vent hole (1/8-inch) in one of the plugs, to allow the internal pressure to equilibrate with atmospheric pressure. When the proper atmosphere has been achieved, the remaining excavation will be performed.

2.3.4 Tank Removal

The soil along one side of the tanks will be removed to the depth of the bottom of the tanks (estimated to be 11 ft below the ground surface), to a distance of approximately 2 ft from the wall of the tank, or more, depending on the stability of the walls of the excavation. The soil will be placed in the staging area prepared for this purpose. An attempt will be made to segregate any grossly contaminated soil from soil that appears to be generally uncontaminated.

An estimated 110 cubic yards of soil will be removed from the excavation and stockpiled. The soil removed from around the former diesel storage tank will be kept in a separate pile from the soil excavated from around the gasoline tank.

The tank will be lifted using appropriate lifting equipment and chains secured to the tank lift lugs. Prior to lifting the tank, monitoring will be performed with a combustible gas/oxygen meter to ensure that the oxygen concentration in the tank is less than 10 percent, and the combustible gas concentration in and around the tank is less than 10 percent of the lower explosive limit.

Barricades and or hazard tape will be placed around the excavation pit while it remains open.

2.3.5 Removal of Underground Piping

Underground vent and product piping will be removed by pulling them at the excavation.. The piping and surrounding soil will be examined for evidence of leaks. After inspection, the tank and lines will be placed on a truck licensed to carry hazardous waste.

2.3.6 Tank Disposal

The tanks will be inspected and labeled and properly manifested as hazardous waste. They will be transported by Erickson, Inc. (a State licensed hazardous waste hauler) for disposal at Erickson's permitted facility in Richmond, California. The hazardous waste manifest will be signed by a representative of Caltrans.

2.4 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 the sample is taken. Additional description of the sample location will be noted in the field log.

After the samples are described, labeled, and packaged, they will be placed in a cooler and maintained at a temperature of about 4 degrees Celsius. Samples will be maintained under chain of custody from time of collection to receipt by the laboratory.

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.

2.4.1 Soil Samples

Samples must be 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 Board guidelines require that a least two samples be collected from each tank pit, one from under each end of the tank, within 2 ft of the bottom of the tank.

The underground piping from each tank is les than 20 feet in length, therefore one sample must be collected from beneath each pipe. The samples will be collected from visibly contaminated areas, or other locations (such as at pipe joints, if present) as determined by the field geologist. The sample points will be accessed by coring through or saw cutting the cement surface.

If possible, soil samples will be collected in stainless steel sample liners using a drive sampler. Alternatively, the sample liners may be pushed or hammered by hand into undisturbed soil, such as in shallow trenches of the underground piping. Where the sampling site is otherwise inaccessible, such as at the bottom of the tank pits, samples may be collected by pushing a liner tube into soil excavated and removed 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.

Sample locations will be determined in the field by the regulator or the field geologist. A flame ionization detector (FID) or a photoionization detector (PID) will be used to screen for soil vapor containing low concentrations of organic vapors, to help determine where to collect samples, and to help identify relative concentrations of volatiles.

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 Unified Soil Classification System.

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

All soil samples will be analyzed by a state certified laboratory using the methods specified in Section 3.0.

2.4.2 Ground Water Samples

In the event that ground water is encountered in the tank pits, one sample will be collected from each contiguous body of ponded water. If the ground water is not isolated in individual tank pits, but runs together, then only one sample may be collected. Ground water samples will be collected from the water which collects in the excavation pit using a glass sample container or a disposable polyethylene bailer. Observations of ground water depth, rate of flow, time observed, presence or absence of sheen or odor, and other observations, will be noted in the field log. All ground water samples will be analyzed by the methods specified in Section 3.0.

2.4.3 Stockpiled Soil Composite Samples

Four discrete soil samples will be collected from the each of the two excavated soil stockpiles. The purpose of these samples is to obtain a preliminary characterization of the stockpiled soil for evaluation of soil disposal options. The laboratory will be instructed to composite discrete samples. 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 samples will be analyzed as specified in Section 3.0.

2.5 BACKFILL AND COMPACTION

The excavation will be backfilled with clean pea gravel or and compacted to Caltrans' specifications as soon as the excavation is completed and all samples are collected. Backfill will be staged on site prior to the start of work. The upper one foot of fill will consist of compacted road base. The tank excavation will be resurfaced with at least 3 inches of asphalt or concrete.

3. LABORATORY ANALYSIS

Samples will be analyzed by a California-certified laboratory. Samples will be shipped under chain of custody. The chain of custody form will identify the samples, the date collected, and the analyses to be performed. The samples will be analyzed by the following methods:

- Soil samples collected from the diesel tank excavation, underneath the piping, and stockpile will be analyzed by EPA Method 8015/3550 modified, for Total Extractable Hydrocarbons as diesel; and EPA Method 8020 for benzene, toluene, ethylbenzene and total xylenes (BTEX);

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

- Soil samples collected from the gasoline tank excavation, underneath the piping and stockpile will be analyzed by EPA Method 8015/5030, modified for Total Extractable Hydrocarbons as gasoline, by EPA Method 6010 or 7420 for total lead, and by EPA Method 8020 to determine BTEX concentrations;

- The ground water sample collected from the gasoline tank excavation will be analyzed by EPA Method 602 for BTEX, total lead by EPA Method 6010 or 7421, method 8015/5030 modified, to determine TPH as gasoline; and
- In order to characterize the waste for disposal, additional parameter analyses are required by facilities permitted to accept and dispose of petroleum-impacted soils. A disposal facility will be selected after the excavation is complete, when the volume of contaminated soils, and

relative severity of contamination is known. The number of required additional parameters and number of samples varies by each disposal facility. It is likely that in addition to the analyses previously discussed, each stockpile will also need to at have least one additional sample collected and analyzed for Soluble Limit Threshold Concentration (SLTC), for lead (gasoline stockpile), Reactivity, Corrosivity and Ingnitability (RCI) and possibly Toxicity Characteristic Leaching Procedure (TCLP) for lead.

The laboratory will be required to perform the appropriate QA/QC procedures for each method used. If the particular method does not specify a QA/QC procedure, then the lab will perform analysis on one spiked sample for each 10 samples analyzed, and will determine percent recovery on at least one of every ten samples analyzed.

4. DELIVERABLES

4.1 WRITTEN RESULTS OF LABORATORY ANALYSES

As required by the Site Investigation Completion Schedule, Tetra Tech will provide Caltrans with a brief letter report of the analytical laboratory results shortly after they are reported to us. The results are expected to be reported approximately 2 weeks following receipt of the samples by the laboratory. The letter report will include a site map showing the locations of sample locations , and a summary table showing the results. A copy of the laboratory report will also be submitted to Caltrans.

4.2 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 appropriate documentation will be included as appendices. Documentation of the tank removal will include copies of manifests and certificates of disposal for the tanks, as well as copies of laboratory reports, field logs, and photodocumentation. 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.

4.3 TENTATIVE SCHEDULE

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

September 13 - Draft Work Plan Submitted to Caltrans
September 25 - Begin Tank Removal
October 27 - Final Report

5. REFERENCES CITED

Helley, E. J., Lajoie, K. R., Spangle, W.E., and Blair, M.L., 1979. Flatland Deposits of the San Francisco Bay Region, California - Their Geology and Engineering Properties, and Their Importance to Comprehensive Planning. United States Geological Survey Professional Paper 943. 88 pages.

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

Tri-Regional Board Staff. 1990. Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites. Prepared by Staff of North Coast Regional Water Quality Control Board, San Francisco Regional Water Quality Control Board, Central Valley Regional Water Quality Control Board. August 10, 1990, with Clarification Letter to Underground Tank Owners and Regulators, issued October 2, 1990 by Thomas J. Callaghan, Toxics Cleanup Division.

United States Department of Agriculture, Soil Conservation Service. 1980. Soil Survey of Alameda County, California, Western Part.

D Workers Comp Insurance

ACCUTITE
LIC. NO. 247322
260 MICHELLE CT 952-5551
SOUTH SAN FRANCISCO, CA 94080

1973

9/18 19 95

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San Mateo, CA 94401-0870

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COUNTY OF ALAMEDA
OFFICE OF THE AUDITOR-CONTROLLER

DATE: 09/21/95

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№ 759871

$894

DOLLARS

RECEIVED FROM: Accutite Lic No. 643881 260 Michelle Ct. South San Fran 94080

FOR: 2 Ugt Removal at 3465 Ettie St. Oakland 94608

RECEIVED BY: Josephine Hallum

DEPT. NO.: 430-4530

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TC 0637-02

HEALTH AND SAFETY PLAN

UNDERGROUND STORAGE TANKS REMOVAL
CALTRANS MAINTENANCE FACILITY
3465 ETTIE STREET
OAKLAND, CALIFORNIA

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

Prepared for

State of California
Department of Transportation
Caltrans-Office of Maintenance Services-District 04
111 Grand Avenue
Oakland, CA 94612

September 1995

Prepared by

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

UNDERGROUND STORAGE TANKS REMOVAL
AT
CALTRANS MAINTENANCE FACILITY

HEALTH AND SAFETY PLAN

Contract No. 56S067

PREPARED BY:

TETRA TECH, INC.

Approved by: _____ 9-15-95
Mr. Michael A. Hilliard
Caltrans Project Manager
Date

Approved by: _____ 9/8/95
Michael Wopat, RG
Project Manager
Tetra Tech, Inc.
Date

Approved by: _____ 9/8/95
W. Robert Cotton
Senior Geologist/Field Coordinator
Tetra Tech, Inc.
Date

Approved by: _____ 9/9/95
John King, CIH
Project Health and Safety Officer
Tetra Tech, Inc.
Date

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SITE SAFETY PLAN SUMMARY

Site:	4,000-gallon underground diesel storage tank and 7,500 gallon underground gasoline storage tank removal
Location:	Caltrans Maintenance Yard, 3465 Ettie Street, Oakland, California
Proposed Dates of Investigation:	September 25 and 26, 1995
Objective of Investigation:	To remove underground storage tanks, lines and vent piping and collect confirmation soil samples per LUFT, Tri-Regional Board Guidelines
Factors Prompting Investigation:	Out of service tanks
Chemical Category:	Petroleum hydrocarbons, lead
Route of Exposure:	Inhalation, ingestion, and skin contact
Physical Hazards:	Tripping and falling hazards, heavy equipment operation, explosion
Levels of Protection:	Level D, upgrade to Level C
Factors Prompting Air Monitoring:	Monitoring of breathing space for volatile organics, monitoring of interior of tank for explosive atmosphere
Primary Emergency Contact:	Summit Medical Center 350 Hawthorne Avenue Oakland, CA (510) 869-4000 (Hospital) (510) 869-6777 (Emergency Room)

1. PURPOSE

This site safety plan establishes policies and procedures to protect all site personnel from the potential hazards posed by the underground storage tank removal at the Ettie Street facility. The site safety plan provides measures to minimize potential exposure, accidents, and physical injuries that may occur during daily activities on site and during adverse conditions. It also provides contingencies for emergency situations.

This plan must be observed by all personnel directly involved in the site investigations. Medical surveillance, personal protection, respirator fit testing, and hazardous waste operations training requirements according to California Occupational Safety and Health regulations shall be met by all personnel working in any control zone established at this site. All observers present during these activities must also comply with all safety requirements of the plan. To help ensure safety compliance, all Tetra Tech field participants and observers must read this plan and sign a certification stating that they agree to comply with all the plan conditions.

2. SITE DESCRIPTION AND INVESTIGATION HISTORY

2.1 Site Description

The site is a former maintenance facility operated by Caltrans. All maintenance operations have been transferred to other facilities, the property is presently unused. The tanks are located in the center of the former maintenance facility property. The site address is 3465 Ettie Street, Oakland, CA 94608. The location of the site is shown on Figures 2-1, and 2-2.

A visual inspection of the site was conducted by Tetra Tech personnel on August 29, 1995. The tanks lie located inside a cyclone fenced perimeter. The tank lies under a concrete and asphalt surface. Adjacent to the tanks are the pump islands; the dispensers have been removed. The vent pipe from the tanks terminate at the side of the Highway 580 support caissons. The area inside the fence is paved with asphalt and concrete.

Depth to ground water in the area is about 8 ft, based on a measurement from a nearby monitoring well. However, shallower perched ground water may be present during the rainy season.

2.2 Investigation History

Both tanks and their associated lines are part of the Caltrans tightness testing program, and have recently tested tight. The tanks currently contain four to eight inches of product.

Figure 2-1 Regional Site Location

Scale: 1" = 4 miles

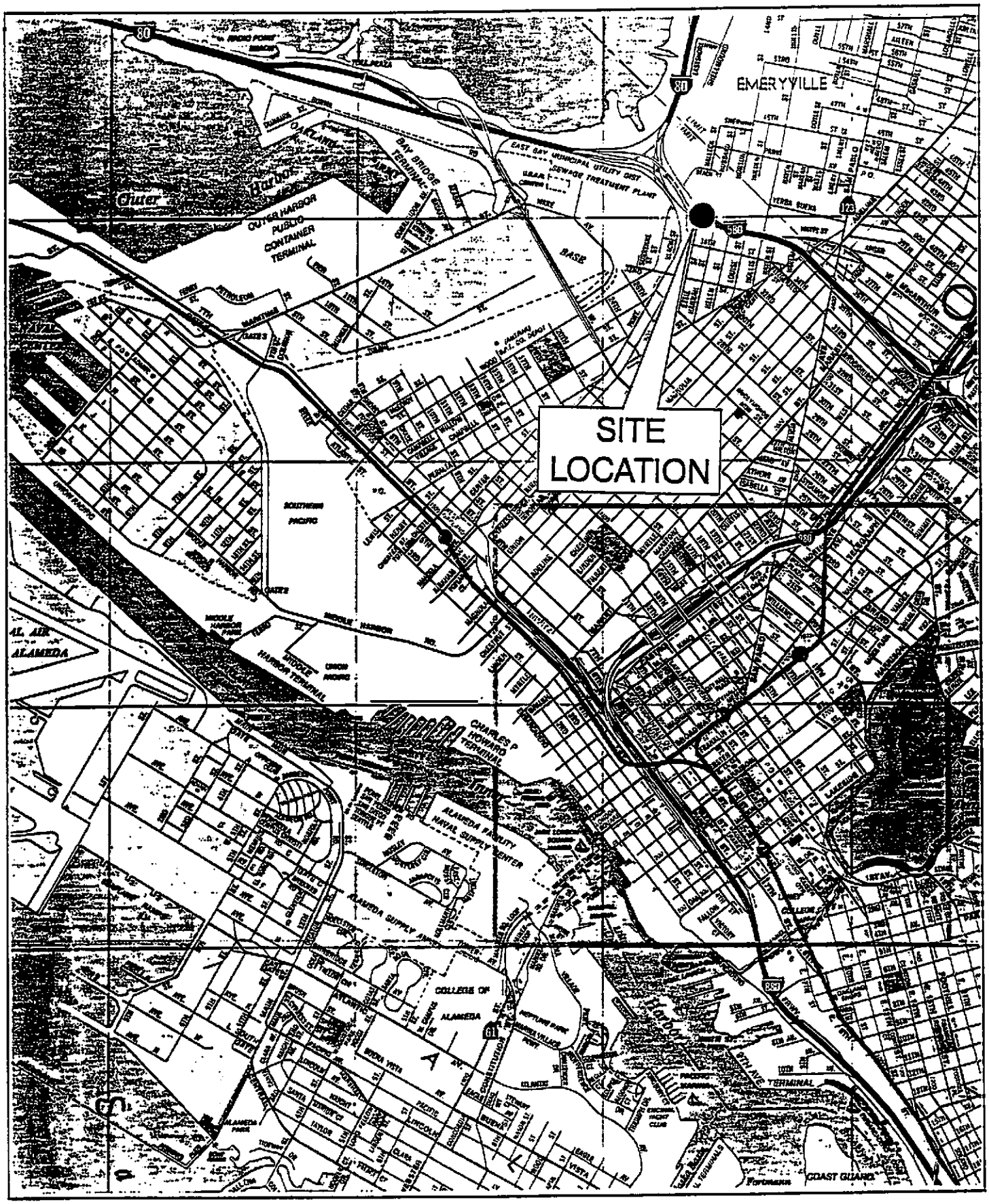

Figure 2-2 Site Location

N

Scale: 1" = 1/2 mile

3. KEY MANAGEMENT AND HEALTH AND SAFETY PERSONNEL

Efficient on-site operation requires that key personnel be identified and their roles, responsibilities, and scope of authority be clearly defined.

3.1 Project Manager

Mr. Michael Wopat, RG is the Project Manager for Tetra Tech and will be responsible for project oversight. He or his designee will interact with Caltrans and with regulatory agency personnel to ensure proper implementation of the Health and Safety Plan.

3.2 Field Coordinator and Site Safety Officer

Mr. Bob Cotton, PE is the Field Coordinator and Site Safety Officer (FC/SSO), and will have the primary responsibility for ensuring personnel health and safety, correcting improper conditions, and following accepted safety practices. The FC/SSO will be directly responsible for implementing this safety plan and will act to correct any safety deficiencies. Unless an emergency is involved, Tetra Tech's Project Health and Safety Officer will be notified prior to modifying any safety procedures detailed in this plan. Lastly, the FC/SSO will act as the liaison with local agencies and will notify agencies in the event of hazardous materials release into the environment.

3.3 Project Health and Safety Officer

Mr. John King, CIH is Tetra Tech's Project Health and Safety Officer. His responsibilities will be to review and approve the site safety plan and any subsequent changes to the plan. He will provide technical guidance to the Field Activities Manager to ensure that all requirements of this plan are followed. In addition, if warranted, he will

conduct site safety audits to ensure that the site safety plan is being implemented correctly.

4. TANK REMOVAL

4.1 Scope of Work

This Health and Safety Plan has been prepared as guidance for safely conducting the removal of a 4,000-gallon diesel and a 7,500-gallon gasoline underground storage tanks (undeground storage tanks (USTs) at the former Ettie Street Maintenance Facility. The scope of work for this contract calls for the following actions, which will be performed in accordance with requirements of the City of Oakland Fire Department.

- Removal of the concrete pads, underground tanks, vent lines, piping, and dispenser islands; disposal of the tank as hazardous waste, and proper disposal of the remaining materials, as required.

- Collection of a minimum of two soil samples, one from under each end of the tank, no deeper than two feet below the bottom of each tank, as well as one sample per 20 ft of piping. (If water is present in the tank pit, then one sample of the water in each pit will be collected, and the soil samples will be collected at the soil/water interface at each end of each tank).

- If contaminated soil is observed, the supervising Tetra Tech representative will determine whether overexcavation of the soil is warranted, and up to 110 cubic yards of soil may be excavated. The soil will be stockpiled inside the fenced area, and will be covered with plastic sheeting pending disposal or treatment.

- The tank pit will be backfilled with pea gravel, and resurfaced with cement or asphalt.

4.2 Site Control

The Site Safety Officer or a designated representative will be available to accompany Caltrans personnel and representatives of regulatory agencies while they are on-site. The Site Safety Officer shall enforce compliance with the Health and Safety Plan by all persons while they are within the site perimeter.

The Site Safety Officer will establish, as necessary, the command post, support zone, decontamination zone, and exclusion or control zone within the work site to ensure that personnel are properly protected against hazards and that soil contaminants are confined to appropriate areas. Designated observation areas outside the work zone will be established for authorized site visitors.

4.3 Hazards

This Health and Safety Plan is designated to reduce risks associated with both chemical and physical hazards associated with the investigation.

4.3.1 Chemical Hazards

Various regulatory limits have been set for the maximum human exposure to various chemicals. These limits include the permissible exposure limit (PEL), threshold limit value (TLV), immediate danger to life and health (IDLH) concentration, and the action level. The PEL is an 8-hour time-weighted average that may not be exceeded in any 8-hour shift of a 40-hour work week and is set by the Occupation Safety and Health Administration (OSHA). The TLV is an 8-hour time weighted average published by the American Conference of Governmental Industrial Hygienists. Unless otherwise stated. the TLV for a

given chemical is equal to the PEL. The IDLH concentration is the maximum concentration one can be exposed to for 30 minutes without respiratory protection without experiencing escape impairing or irreversible health effects. The action level is defined as the concentration above which compliance activities must be conducted.

The contaminants known to have been present at this site are gasoline and diesel. Lead may have been present in the gasoline. The properties and hazards associated with each of these contaminants are discussed below. Table 4-1 presents the exposure limits for each of these contaminants.

Diesel

Diesel is one of the fuel oils, which are petroleum distillates, composed of a range of hydrocarbons. Diesel fuel components mostly lie with the range of hydrocarbons containing 10 to 22 carbon atoms (C-10 to C-22). Diesel fuel has a kerosene-like odor, is flammable, and has a flashpoint between 254-285 degrees Celsius. Routes of exposure include dermal, ingestion, and inhalation. Very little is known about the human health effects caused by fuel oils. Animal studies suggest that respiratory impairment may occur in humans at high inhalation or dermal exposure levels. Mild hypertension and palpitations have been reported in humans from acute inhalation of JP-5 or diesel fuel vapors. Ingestion or dermal exposure may produce gastrointestinal effects. Hematological effects have been reported for exposures to sustained exposures to diesel vapor.

Table 4-1

Exposure Limits for Suspected Contaminants at Ettie Street UST Site

Compound	OSHA PEL	ACGIH TLV	OSHA STEL	IDLH	Level C Criterion	Stop Work Criterion	Monitoring Instrument
Benzene	3.25 mg/m^3 1 ppm	32.5 mg/m^3 10 ppm	16 mg/m^3 5 ppm	9750 mg/m^3 3000 ppm	32.5 mg/m^3 5 ppm (1)	162 mg/m^3 50 ppm (2)	Draeger pump with 0.5A tube
Gasoline	900 mg/m^3 300 ppm	890 mg/m^3 300 ppm	1,500 mg/m^3 500 ppm	13,000 ppm (LEL) (3)	900 mg/m^3 300 ppm	3,000 g/m^3 1,000 ppm (4)	FID
Diesel	na	1,370 mg/m^3 300 ppm (5)	500 ppm (5)	6,000 ppm (LEL) (6)	300 ppm	600 ppm (7)	FID
Lead, Organic	75 $\mu g/m^3$ (8)	na	na	40 mg/m^3	na	na	na
Lead, Inorganic	50 $\mu g/m^3$	na	na	700 mg/m^3	continuous, visible dust	dust control ineffective	particulate impinger

na = Not Available

(1) TLV-C OSHA ceiling level = 25 ppm
(2) Maximum limit for respiratory protection against vapors containing benzene
(3) LEL = 13,000 ppm
(4) Maximum recommended for full-face air-purifying respirator with MSA GMC-H cartridge; 10% of lower explosive limit (LEL) = 1,300 ppm by volume
(5) Based on petroleum distillates (naphtha, VM&P naphtha)
(6) MSDS value for LEL for diesel no. 2
(7) 10% of LEL = 600 ppm
(8) Skin exposure level. Tetraethyl or tetramethyl lead.

Note: Site personnel should not assume that all hazards have been identified.

Gasoline

Gasoline is a complex mixture of petroleum hydrocarbons which fall mostly within the C-4 to C-12 range. It is a blend of a number of refinery product streams and its composition can vary widely. The concentration of benzene, a carcinogen, in gasoline is typically less than 5 percent, but can be much higher. Gasoline is a highly flammable liquid. Acute vapor exposure symptoms are eye, nose, and throat irritation, dizziness, headaches, breathing difficulty, and, with very high exposure, loss of consciousness. The odor threshold for gasoline is approximately 0.25 ppm in air. Gasoline in liquid form is an eye and skin irritant. The benzene present in gasoline presents the most significant chronic health hazard. Leaded gasoline normally contains tetraethyl or tetramethyl lead, which can be absorbed through the skin and can cause damage to the central nervous system.

Benzene

Benzene is an aromatic hydrocarbon containing six carbon atoms. It is a component of gasoline, and is typically present in gasoline at concentrations less than 5 percent, although the concentration may be much higher. Due to its high volatility the most common route of exposure is inhalation. Benzene may also be absorbed dermally, or ingested. Benzene is a suspected human carcinogen. Therefore, there is no safe exposure level to benzene.

Lead

Lead may be present as an additive in gasoline. The principal lead additives to gasoline are tetramethyl and tetraethyl lead. The principal exposure route of concern is dermal exposure. Lead is a naturally occurring element in many soils.

Inorganic lead is a degradation product of organic lead. Lead may also be present due to precipitation from the atmosphere from automobile exhaust.

Lead may be inhaled or ingested with particulates if it is present in soils. The ACGIH TLV for particulates is 10 mg/m^3. Assuming that the particulate concentration is at the TLV, the concentration of lead in the dust (or soil) that would need to be present in order to exceed the PEL for inorganic lead, is 5,000 ppm. This is a relatively high concentration in soil (compare with the TTLC for lead of 1,000 ppm), and is not expected to be present at the site. Therefore no monitoring for lead will be performed. Instead, dust-control measures will be used if significant (visible) particulate levels are observed.

4.3.2 Physical Hazards

Physical hazards associated with this site include:

- fire and explosion hazards;
- tripping, falling, and slipping hazards;
- disturbance of underground utilities during excavation;
- hazards associated with projectiles, heavy falling objects, or machinery,
- cave-ins and other excavation hazards;
- noise;
- heat stress; and
- vehicle traffic.

4.3.2.1 Fire and Explosion Hazards

The flash point of gasoline is -45 degrees Fahrenheit. The lower explosive limit (LEL) for gasoline is 1.3 percent. The upper explosive

limit is 6 percent. The gasoline concentration in the atmosphere should be maintained below ten percent of the LEL (1,300 ppm) for protection against explosion.

The explosion hazard for diesel is less than for gasoline. Diesel is less volatile than gasoline and its flashpoint is higher. The flashpoint of diesel is 125 degrees Fahrenheit. The lower flammability limit of diesel in air is 0.6 percent (6000 ppm). The upper flammability limit in air is 4.7 percent.

The Oakland Fire Department requires that the tank be inerted with 2.0 pounds of solid carbon dioxide (dry ice) for each 100 gallons of tank volume. A combustible gas meter will be used to verify that the oxygen content in the tank is less than 10 percent, and that the atmosphere in the tank is less than 10 percent of the lower explosive limit.

4.3.2.2 Trips, Slips, and Falls

Personnel may encounter wet or uneven walking surfaces at the site. Proper footwear and attention to the condition of the ground surfaces will help prevent injuries.

4.3.2.3 Disturbance of Underground Utilities During Excavation

Numerous serious accidents and extensive property damage have occurred when power excavating equipment has encountered unexpected utility lines. Such utilities include gas lines, electrical lines, sewers, telephone lines. etc. The potential for accidentally encountering

limit is 6 percent. The gasoline concentration in the atmosphere should be maintained below ten percent of the LEL (1,300 ppm) for protection against explosion.

The explosion hazard for diesel is less than for gasoline. Diesel is less volatile than gasoline and its flashpoint is higher. The flashpoint of diesel is 125 degrees Fahrenheit. The lower flammability limit of diesel in air is 0.6 percent (6000 ppm). The upper flammability limit in air is 4.7 percent.

The Oakland Fire Department requires that the tank be inerted with 2.0 pounds of solid carbon dioxide (dry ice) for each 100 gallons of tank volume. A combustible gas meter will be used to verify that the oxygen content in the tank is less than 10 percent, and that the atmosphere in the tank is less than 10 percent of the lower explosive limit.

A fire extinguisher will be kept on the site during all work activities.

4.3.2.2 Trips, Slips, and Falls

Personnel may encounter wet or uneven walking surfaces at the site. Proper footwear and attention to the condition of the ground surfaces will help prevent injuries.

4.3.2.3 Disturbance of Underground Utilities During Excavation

Numerous serious accidents and extensive property damage have occurred when power excavating equipment has encountered unexpected utility lines. Such utilities include gas lines, electrical lines,

sewers, telephone lines, etc. The potential for accidentally encountering these lines is minimized if the lines are marked by Underground Service Alert, or a similar line-locating service.

4.3.2.4 Projectiles, Heavy Falling Objects, and Machinery Hazards

Heavy equipment presents a number of physical hazards to personnel who work near them. Cables may break under stress; rocks or metal parts may become projectiles during operation of equipment; equipment may fall on unprotected appendages; clothing or body parts may become tangled in moving parts of machinery; and steam cleaning equipment can cause severe burns. All personnel who work near equipment should know how to turn the equipment off in the event of an emergency. All personnel on-site are required to wear hard hats and steel-toed boots or shoes. Safety glasses are required when working near projectile hazards or splash or spray hazards. Personnel should be aware of the potential for loose clothing to become caught in moving machinery.

4.3.2.5 Excavations

The safety rules for trenches, shoring, and excavations may be found in the *California Code of Regulations, Title 8, Construction Code, Section 1541*. Underground Service Alert (USA) will be contacted at least two working days before trenching, boring, or excavation work is begun. In Northern California, the number for Underground Service Alert is **(800) 642-2444.**

4.3.2.6 Noise

Construction site noise levels may frequently exceed the 90 dbA sound pressure level. Personnel should remember to bring hearing protection with them to the site.

4.3.2.7 Heat Stress

Because heat stress is one of the most common and potentially serious illnesses that hazardous operations workers encounter, regular monitoring and other preventative measures are vital. The potential exists for heat rash, heat cramps, heat exhaustion, and heat stroke. At most sites, the action level for heat stress is any temperature greater than 75 degrees F. Whenever the action level for heat stress has been reached, the Site Supervisor will alert all site workers to watch for the symptoms of heat stress. Site personnel should drink at least 16 ounces of water before beginning work, such as in the morning or after lunch. Adequate supplies of cool (50-60 °F) water or *Gatorade* and disposable 4 ounce paper cups should always be available near the work site. Further information on heat stress prevention may be found in the Tetra Tech *Corporate Health and Safety Program Manual.*

4.4 Levels of Protection

Protective clothing is necessary to prevent injuries due to physical hazards and to prevent contact with potentially hazardous concentrations of chemical agents. The required protective clothing and safety equipment ensembles for Level D and Level C are shown on Table 2.

4.4.1 Level C

This level is designated for tasks which are expected to present respiratory hazards and may or may not present skin hazards. Level C protection is not expected to be utilized for any of the work planned for this investigation.

TABLE 4-2. REQUIRED PROTECTIVE CLOTHING AND SAFETY EQUIPMENT

LEVEL D

Protective Clothing

- Steel toe, steel shank shoes or neoprene boots
- Safety glasses or goggles
- Hard hat

Safety Equipment

- Photoionization detector (PID) or O_2 / LEL Meter
- Decontamination equipment
- First aid kit

LEVEL C

Protective Clothing

- Full-face, air-purifying respirator with combination organic vapor/HEPA dust cartridges (e.g., MSA # GMC-H)
- Saran-coated (SARANEX) Tyvek coveralls
- Nitrilated butyl rubber (NBR) outer gloves
- Vinyl inner gloves
- Steel toe, steel shank neoprene boots or steel toe shoes with boot covers
- Hard hat

Safety Equipment

- PID or O_2 / LEL Meter
- Decontamination equipment
- Pressurized eyewash

- First aid kit
- Combustible gas indicator (optional with FID)

4.4.2 Level D

All personnel, including subcontractors and visitors, present during or performing field work shall utilize Level D protection. Level D protection will be utilized for all activities planned during this investigation, but may be elevated to Level C if conditions warrant. Level D protection shall include at a minimum:

- Work apparel appropriate for the task to be performed. This generally means a sleeved shirt and long pants;
- Steel-toed leather or neoprene boots (ANSI 41.1);
- Safety glasses or goggles (ANSI 87.1); and
- Hard-hat when overhead hazards are present, e.g. during excavation operations.

4.5 Selection of Respiratory Protection

Selection of the proper level of respiratory protection is facilitated by an understanding of the concept of the four types of exposure thresholds.

(1) Permissible Exposure Limit (PEL) and *Threshold Limit Value (TLV):* The PEL and the TLV are time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. The PEL represents a regulatory limit, set by OSHA, which represents the maximum daily exposure allowed. The TLV is an industry standard of the American Conference of Governmental Industrial

Hygienists (ACGIH). The TLV is generally only significant if it is lower than the PEL.

(2) *Short Term Exposure Limit (STEL):* a 15 minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the PEL-TWA. Exposures above the PEL-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. For any continuous exposures at this level or greater, site workers should upgrade to Level C Respiratory Protection, and monitor their exposures periodically to determine if their level of protection is adequate.

(3) *Immediately Dangerous to Life or Health (IDLH):* This is the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

4.6 Upgraded PPE

Level of protection shall be upgraded from Level D to Level C when respiratory and/or dermal contact hazards dictate this action. When monitoring equipment indicates elevated or increasing levels of contamination in the work area, the site manager and his/her designee will take immediate action to:

- Warn the workers of this condition;
- Stop work if an action level has been reached or exceeded; and
- Decide to either upgrade PPE and continue work, halt work until contamination levels return to safe levels, or terminate work if work cannot continue in a safe manner.

If the "halt work until safe" option is chosen, work will not resume until the cause of the increased concentrations of contaminants is determined, appropriate measures have

been taken to prevent a reoccurrence of increased contamination levels, and stable, safe levels have been achieved. For example, if the cause of the increased particulate levels is determined to be windy conditions, work will not resume until wind conditions improve or work practices are altered to reduce airborne particulates to a safe level. If conditions warrant upgraded PPE, work will only be continued after it is determined that work can continue safely at the new PPE level. All readings from monitoring equipment and actions taken will be documented. Use of monitoring equipment is discussed in Section 4.6.

4.7 Field Monitoring Requirements

Air monitoring will be conducted to determine employee exposure to airborne contaminants during investigation activities. The monitoring results will dictate the selection and appropriateness of personal protective equipment as discussed in Sections 4.4 and 4.5.

4.7.1 Airborne Contaminants

When conditions warrant, organic vapors will be monitored using a photoionization detector.

4.7.2 Monitoring Frequency

Monitoring for contaminants will be conducted by the SSO or his designee. Results will be recorded every 30 minutes during sampling operations. Monitoring will also be conducted whenever there is the potential for increased employee exposures or if new contaminants have been encountered. Periodic monitoring of the support zone, decontamination zone, and the site perimeter will

be conducted to assure that site zone boundaries are appropriately placed. Visitors and employees who are in a service capacity and who remain outside the work area will not receive periodic exposure monitoring nor will they be required to wear personal protection.

4.7.3 Heat Stress Monitoring

The stress of working in a hot environment can cause a variety of illnesses including heat exhaustion or heat stroke; the latter can be fatal. Personal protective equipment (USEPA Level C protection) can significantly increase heat stress. To reduce or prevent heat stress, frequent rest periods and controlled beverage consumption to replace body fluids and salts may be required.

Additionally, quantitative physiological monitoring for heat stress may be conducted. Physiological monitoring for heat stress includes heart rate as a primary indicator and oral temperature as a secondary indicator. Heat stress monitoring should begin when the temperature reaches 70° F. The frequency of monitoring depends on the ambient temperature and the level of protection used on site. To determine the initial monitoring frequency, after a work period of moderate exertion, use the following information:

Temperature*	Level D	Level C
90°F or above	after 45 minutes	after 15 minutes
87.5 to 90°F	after 60 minutes	after 30 minutes
82.5 to 87.5°F	after 90 minutes	after 60 minutes
77.5 to 82.5°F	after 120 minutes	after 90 minutes
72.5 to 77.5°F	after 150 minutes	after 120 minutes

* Adjusted air temperature (°F) = observed temp + (13 x percent sunshine)

Air temperature is measured with bulb shielded from radiant heat; percent sunshine is the time sun is not covered by clouds thick enough to produce a shadow (100 percent = no cloud cover and a sharp, distinct shadow; 0 percent = no shadows) (Department of Health and Human Services, 1973).

The following procedures and action levels are to be used for the physiological monitoring of heat stress:

Heart rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle one-third and keep the rest period the same. If the heart rate exceeds the 110 beats per minute at the next rest period, shorten the following work cycle by another one-third and also monitor oral temperature.

Oral temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6 °F, shorten the next work cycle by one-third without changing the rest period. If oral temperature exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one-third. **DO NOT** allow a field team member to wear USEPA Level C protection when oral temperature exceeds 100.6°F.

Personnel will be trained to recognize the symptoms of heat stress and the appropriate action to take upon recognition. Even though physiological monitoring is not always necessary, it is essential that personnel understand the significance of heat stress and its recognition.

Some of the symptoms which indicate heat exhaustion are:

- Clammy skin
- Weakness, fatigue
- Lightheadedness
- Confusion
- Slurred speech
- Fainting
- Rapid pulse
- Nausea (vomiting)

If these conditions are noted, the following steps should be performed:

- Remove the victim to a cool and uncontaminated area.
- Remove protective clothing.
- Give water to drink, if conscious.

Symptoms that indicate heat stroke include:

- Staggering gait
- Mental confusion
- Hot, dry skin, temperature rise
- Convulsions
- (yet may feel chilled)
- Incoherent, delirious
- Unconsciousness

If heat stroke conditions are noted, immediately perform the following steps:

- Remove victim to a cool, uncontaminated area.
- Cool the victim, whole body, with water, compresses and/or rapid fanning.
- Give water to drink, if conscious.

Transport the victim to the designated medical facility for further cooling and monitoring of body functions. **HEAT STROKE IS A MEDICAL EMERGENCY!**

4.7.4 Monitoring Recordkeeping

The project manager will be responsible for establishing and maintaining records of all monitoring required as described below:

- Employee name and task description;
- The date, time, pertinent task information (such as boring number, depth of hole, meter reading, etc.), and relevant comments will be written in an instrument logbook that will be available for inspection at all times;
- A description of the analytical methods, equipment used, and calibration data;
- Type of personal protective equipment worn; and
- Any engineering controls used to reduce exposure.

4.7.5 Calibration

Organic vapor analyzers, sound level meters, and personnel pumps will be calibrated in accordance with manufacturer's recommendations before use by the SSO or his designee.

4.8 Decontamination

The purpose of decontamination is to limit the spread of contaminated materials from the exclusion zone. This is accomplished through a step-by-step procedure whereby

the protective clothing and equipment is either washed or disposed of. The SSO will exercise judgment in establishing the contamination reduction zone.

4.8.1 Personnel

Prior to commencing fieldwork, the Project Health and Safety Officer will establish the decontamination layout and procedures for the site. All personnel leaving zones designated by the Safety Officer as having potentially come into contact with petroleum hydrocarbon constituents must follow the decontamination procedures established by the Site Safety Officer. Most of the protective clothing for Level C protection is disposable and should be removed, bagged, labeled as hazardous waste and disposed in accordance with California hazardous waste regulations. If nondisposable clothing is used, it must be decontaminated with detergent and water before reuse. If respirators are worn, they must be cleaned and disinfected on a daily basis.

4.8.2 Equipment

The slag sampling equipment will be decontaminated with Alconox or a similar detergent, rinsed in potable water, then rinsed in distilled water and air dried before each use. Backhoes and other equipment that potentially comes into contact with subsurface contaminants will be steam cleaned prior to use at the site and prior to leaving the site.

TABLE 4-3. DECONTAMINATION PROCEDURES

Level C Decontamination

The following decontamination procedures will be followed:

Segregated equipment drop	Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Segregation at the drop site reduces the probability of cross-contamination. During hot weather operations, a cool-down station may be set up within this area.
Tape removal	Remove tape around boots and gloves and deposit in container with plastic liner.
Outer glove removal	Remove outer gloves and deposit in container with plastic liner.
Suit and boot wash	Wash splash suit, gloves, and safety boots. Scrub with long-handled scrub brush and decontamination solution.
Suit, boot, and glove rinse	Rinse off decontamination solution with water. Repeat as many times as necessary.
Canister or mask change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and joints tape, worker returns to duty.
Safety boot removal	Remove safety boots and deposit in container with plastic liner.
Splash suit removal	With assistance of helper, remove splash suit. Deposit in container with plastic liner.
Facepiece removal	Remove facepiece. Deposit in container with plastic liner. Avoid touching face with fingers.
Inner glove removal	Remove inner gloves and deposit in lined container.
Inner clothing removal	Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off site.
Field wash	Shower if highly toxic, skin-corrosive, or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.
Re-dress	Put on clean clothes.

5. TRAINING AND MEDICAL MONITORING REQUIREMENTS

5.1 Training Requirements

All Tetra Tech employees are trained to understand the potential hazards at the job site. All field personnel and the Field Coordinator have received 40 hours of training covering site safety plans; safe work practices; nature of anticipated hazards; handling emergencies and self-rescue; rules and regulations for vehicle use; safe use of field equipment; handling, storage, and transportation of hazardous materials; employee rights and responsibilities; use, care, and limitations of personal protective clothing and equipment; and safe sampling techniques.

All Tetra Tech field personnel will be instructed in the use of all field safety equipment before any field sampling takes place. In addition, all Tetra Tech employees will be properly trained in the use of an air-purifying respirator and in its capabilities, limitations, and maintenance. As required under Occupational Safety and Health Administration standards, all personnel must be qualitatively fit-tested prior to wearing a respirator.

The Tetra Tech Health and Safety Officer will be trained in the proper selection of respiratory protection, protective clothing, fit-testing procedures, air monitoring instruments and techniques, confined space entry, hazard recognition and evaluation, and exposure symptoms for the petroleum hydrocarbon constituents of concern. The Health and Safety Officer will conduct a safety briefing prior to the start of work as well as daily on-site safety briefings.

5.2 Medical Monitoring Requirements

In accordance with the Tetra Tech Corporate Health and Safety Program, all employees who may be exposed to hazardous materials in the course of their work are required to participate in the Corporate Medical Monitoring Program. Prior to working at the site all employees must receive a baseline medical examination, including analysis of blood and urine for heavy metals, audiometric testing, as well as direct examination by a physician. All employees must also be certified as fit for working with a respirator. If an employee suspects exposure, additional medical monitoring will be available and the employee must complete a Tetra Tech Employee Exposure/Injury Incident Report. All employees participating in this project will be required to complete Tetra Tech Monthly Exposure/Injury Reports and to undergo annual follow-up medical examinations.

6. EMERGENCY PLANNING

It will be the responsibility of the Tetra Tech Site Safety Officer to determine the appropriate response to an emergency incident. The response sequence will be to 1) remove all personnel from the source of the chemical or physical hazard 2) assess the severity of the incident, 3) contact appropriate emergency assistance, and 4) swiftly move injured or exposed personnel to a rendezvous point for aid.

The following planning measures will be instituted to facilitate responses to emergency situations:

1. The Site Safety Coordinator will conduct a safety briefing prior to the start of work. Copies of this site safety plan will be distributed to all project personnel. After reading the plan, all personnel will be required to sign the site safety plan consent agreement (Appendix A).
2. All Tetra Tech field personnel will be instructed in the use of all field safety equipment before any field sampling takes place.
3. All personnel will be instructed in emergency communication protocols appropriate to the project.
4. The Site Safety Officer will verify that all field personnel have fulfilled the project training and medical monitoring requirements.
5. The Site Safety Officer will check to see that all required safety equipment is at the job site prior to the start of each day's field activities.

6.1 Emergency Communications Protocol

The following visual signals will be used as emergency communication signals:

- Hand clutching throat: out of air/can't breathe
- Hands on top of head: need assistance

- Thumbs up: OK/I'm all right/I understand
- Thumbs down: no/negative
- Grip partner's wrist or both hands around partner's waist: leave area immediately.

6.2 Injury or Exposure

Employees are required to notify the Site Safety Officer of any suspected exposure as soon as possible following the occurrence. In the event of an injury or suspected exposure, the Site Safety Officer will contact the appropriate hospital and ambulance service if necessary, through 911 or the emergency number provided on pages 1 and 19 of this plan. Should an injury or exposure occur while the employee is in either the exclusion or the decontamination zones, emergency decontamination procedures will be implemented. The employee will be brought immediately to the decontamination area where team members will decontaminate the employee.

As soon as possible after an injury or suspected exposure, the Site Safety Officer will report the incident to the Project Health and Safety Officer who shall investigate the circumstances surrounding the injury or exposure and file a Tetra Tech Exposure/Injury Incident Report. This report will include recommendations on how to prevent occurrence of similar events. All Tetra Tech employees participating in the field effort are required to file Monthly Exposure/Injury Reports whenever they have been injured or suspect that they have had an exposure.

7. EMERGENCY CONTACTS

7.1 Local/Site Resources

A cellular phone will be kept onthe site during all work activities for the purpose of calling help in an emergency.

7.1.1 Hospital and Emergency Services (24-hr)

Summit Medical Center	Hospital	*(510) 655-4000*
350 Hawthorne Avenue	Emergency	*(510 420-6080*
Oakland, CA		

Route to the hospital is shown in the emergency route map - Figure 7-1.

7.1.2 Emergency Transportation Systems (Fire, Police, Ambulance)

Oakland Police Department	*911*
Oakland Fire Department (FD)	*911*
Ambulance	*911*

7.2 Tetra Tech Corporate Resources

Site Safety Officer (Bob Cotton)	Work *(415) 974-1221* Home *(415) 299-0182*
Project Health and Safety Officer (John King)	Work *(415) 974-1221* Home *(415) 239-6325*

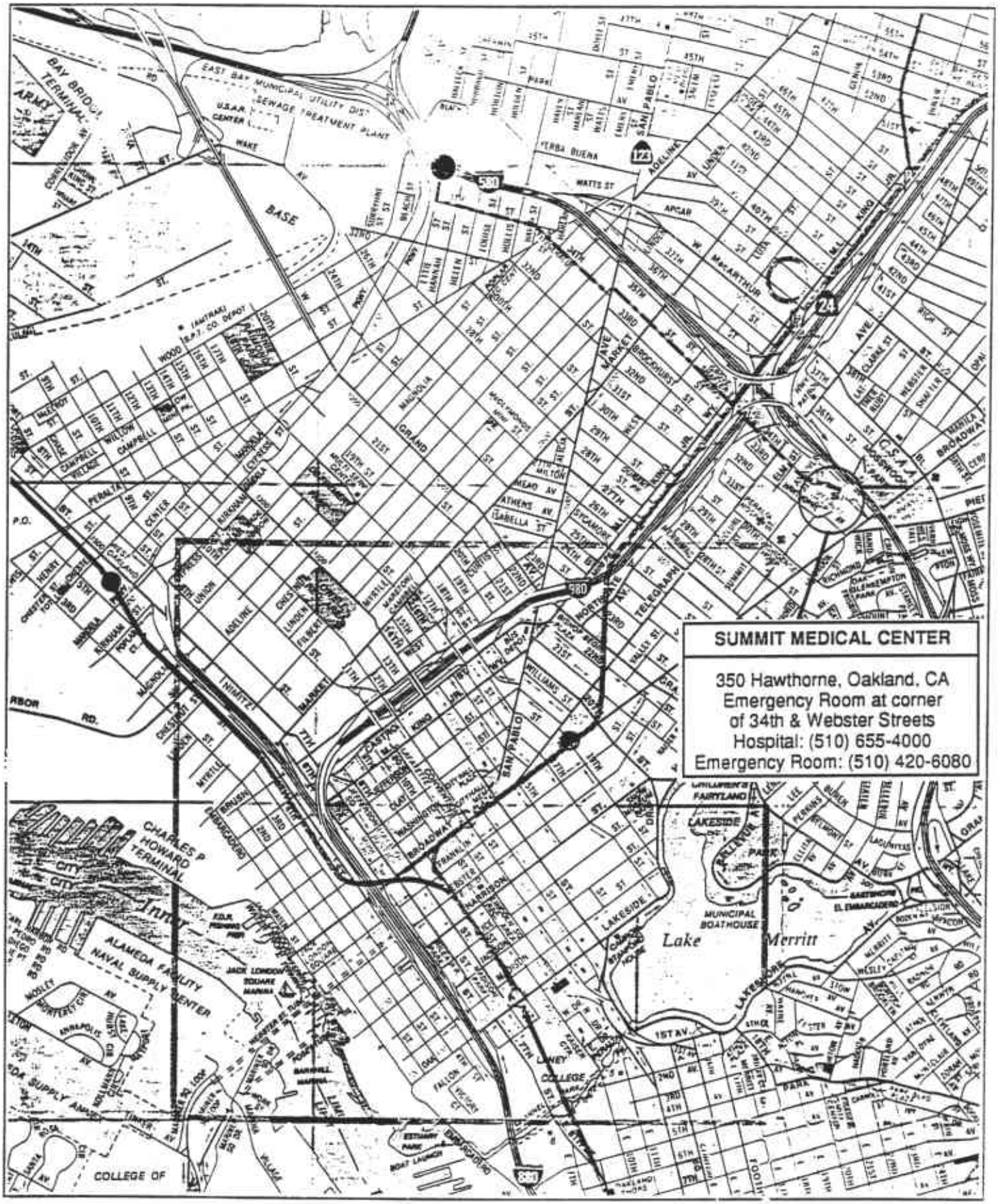

Figure 7-1 Emergency Route

Scale: 1" = 2000 feet

7.3 Other Resources

Caltrans, Mr. Michael Hilliard	*(510) 286-4495*
Caltrans, 24 Hour Office	*(510) 286-0315*
Caltrans, Oakland Dispatch	*(510) 286-6359*
Chemtrec	*(800) 424-9300*
Superfund/RCRA Hotline	*(800) 424-9346*
Underground Service Alert	*(800) 642-2444*

8. REFERENCES

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, 1990. *NIOSH Pocket Guide to Chemical Hazards.*

American Conference of Governmental Industrial Hygienists. 1991-1992 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

ATTACHMENT A

TETRA TECH, INC.
SITE SAFETY PLAN CONSENT AGREEMENT

I have reviewed the Tetra Tech, Inc. Health and Safety Plan for the Caltrans/Ettie Street Maintenance Facility UST Removal. I understand its purpose and consent to adhere to its policies, procedures, and guidelines while an employee of Tetra Tech or its subcontractors.

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Employee Signature _____ Date _____

Copies of this page, with signatures of all field personnel will be submitted to the Project Health and Safety Officer (John King).

ATTACHMENT B

MSD SHEETS

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 470
Diesel Fuel Oil No. 2-D

Issued: 10/81 Revision: A, 11/90

Section 1. Material Identification

Diesel Fuel Oil No. 2-D Description: Diesel fuel is obtained from the middle distillate in petroleum separation; a distillate oil of low sulfur content. It is composed chiefly of unbranched paraffins. Diesel fuel is available in various grades, one of which is synonymous with fuel oil No. 2-D. This diesel fuel oil requires a minimum Cetane No. (efficiency rating for diesel fuel comparable to octane number ratings for gasoline) of 40 (ASTM D613). Used as a fuel for trucks, ships, and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.

Other Designations: CAS No. 68334-30-5, diesel fuel.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(TM) for a suppliers list.

Cautions: Diesel fuel oil No. 2-D is a skin irritant and central nervous depressant with high mist concentrations. It is an environmental hazard and moderate fire risk.

R	1
I	-
S	2
K	2

NFPA: 2 / 0 / 0 / -

HMIS
H 0
F 2
R 0
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Diesel fuel oil No. 2-D*

1989 OSHA PEL	1990-91 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data‡
None established	Mineral Oil Mist TWA: 5 mg/m³† STEL: 10 mg/m³	None established	Rat, oral, LD_{50}: 9 g/kg produces gastrointestinal (hypermotility, diarrhea) effects

* Diesel fuel No. 2-D tends to be low in aromatics and high in paraffinics. This fuel oil is complex mixture of: 1) >95% paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, 2) sulfur (<0.5%), and 3) benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)]. Although low in the fuel itself, benzene concentrations are likely to be much higher in processing areas.
† As sampled by nonvapor-collecting method.
‡ Monitor NIOSH, *RTECS* (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 340 to 675 °F (171 to 358 °C)
Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)
Specific Gravity: <0.86
Water Solubility: Insoluble

Appearance and Odor: Brown, slightly viscous liquid.

Section 4. Fire and Explosion Data

Flash Point: 125 °F (52 °C) min.	Autoignition Temperature: >500 °F (932 °C)	LEL: 0.6% v/v	UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or foam to fight fire. Use a water spray to cool fire exposed containers. Do not use a forced water spray directly on burning oil since this will scatter the fire. Use a smothering technique for extinguishing fire.

Unusual Fire or Explosion Hazards: Diesel fuel oil No. 2-D is a OSHA Class II combustible liquid. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to pollution and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Diesel fuel oil No. 2-D is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: It is incompatible with strong oxidizing agents; heating greatly increases the fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of diesel fuel oil No. 2-D can produce various hydrocarbons and hydrocarbon derivatives, and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

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1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 467
Automotive Gasoline, Lead-free

Issued: 10/81 Revision: A, 9/91

Section 1. Material Identification

35

Automotive Gasoline, Lead-free, Description: A mixture of volatile hydrocarbons composed mainly of branched-chain paraffins, cycloparaffins, olefins, naphthenes, and aromatics. In general, gasoline is produced from petroleum, shale oil, Athabasca tar sands, and coal. Motor gasolines are made chiefly by cracking processes, which convert heavier petroleum fractions into more volatile fractions by thermal or catalytic decomposition. Widely used as fuel in internal combustion engines of the spark-ignited, reciprocating type. Automotive gasoline has an octane number of approximately 90. A high content of aromatic hydrocarbons and a consequent high toxicity are also associated with a high octane rating. Some gasolines sold in the US contain a minor proportion of tetraethyllead, which is added in concentrations not exceeding 3 ml per gallon to prevent engine "knock." However, methyl-tert-butyl ether (MTBE) has almost completely replaced tetraethyllead.

Other Designations: CAS No. 8006-61-9, benzin, gasoline, gasolene, motor spirits, natural gasoline, petrol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

R 1
I 2
S 2*
K 4
* Skin absorption

NFPA

HMIS
H 2
F 3
R 1
PPG†
† Sec. 8

Cautions: Inhalation of automotive gasoline vapors can cause intense burning in throat and lungs, central nervous system (CNS) depression, and possible fatal pulmonary edema. Gasoline is a dangerous fire and explosion hazard when exposed to heat and flames.

Section 2. Ingredients and Occupational Exposure Limits

Automotive gasoline, lead-free*

1990 OSHA PELs
8-hr TWA: 300 ppm, 900 mg/m³
15-min STEL: 500 ppm, 1500 mg/m³

1990-91 ACGIH TLVs
TWA: 300 ppm, 890 mg/m³
STEL: 500 ppm, 1480 mg/m³

1990 NIOSH REL
None established

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 900 ppm/1 hr; toxic effects include sense organs and special senses (conjunctiva irritation), behavioral (hallucinations, distorted perceptions), lungs, thorax, or respiration (cough)
Human, eye: 140 ppm/8 hr; toxic effects include mild irritation
Rat, inhalation, LC_{50}: 300 g/m³/5 min

* A typical modern gasoline composition is 80% paraffins, 14% aromatics, and 6% olefins. The mean benzene content is approximately 1%. Other additives include sulfur, phosphorus, and MTBE.
† See NIOSH, *RTECS* (LX3300000), for additional toxicity data.

Section 3. Physical Data

Boiling Point: Initially, 102 °F (39 °C); after 10% distilled, 140 °F (60 °C); after 50% distilled, 230 °F (110 °C); after 90% distilled, 338 °F (170 °C); final boiling point, 399 °F (204 °C)

Vapor Density (air = 1): 3.0 to 4.0

Density/Specific Gravity: 0.72 to 0.76 at 60 °F (15.6 °C)

Water Solubility: Insoluble

Appearance and Odor: A clear (gasoline may be colored with dye), mobile liquid with a characteristic odor recognizable at about 10 ppm in air.

Section 4. Fire and Explosion Data

Flash Point: -45 °F (-43 °C)	Autoignition Temperature: 536 to 853 °F (280 to 456 °C)	LEL: 1.3% v/v	UEL: 6.0% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or alcohol foam as extinguishing media. Use of water may be ineffective to extinguish fire, but use water spray to knock down vapors and to cool fire-exposed drums and tanks to prevent pressure rupture. Do not use a solid stream of water since it may spread the fuel.

Unusual Fire or Explosion Hazards: Automobile gasoline is an OSHA Class IB flammable liquid and a dangerous fire and explosion hazard when exposed to heat and flames. Vapors can flow to an ignition source and flash back. Automobile gasoline can also react violently with oxidizing agents.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode, and full protective clothing. When the fire is extinguished, use nonsparking tools for cleanup. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Automotive gasoline is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Automotive gasoline can react with oxidizing materials such as peroxides, nitric acid, and perchlorates.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of automotive gasoline can produce oxides of carbon and partially oxidized hydrocarbons.

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Material Safety Data Sheets Collection:

Sheet No. 713
Lead (Inorganic)

Issued: 8/90

Section 1. Material Identification

32

Lead (Inorganic) (Pb) Description: Exists widely throughout the world in a number of ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, drossing, or electrolytic refining. Lead is used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyllead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a constuction material for the tank linings, piping, and equipment used to handle the corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection.

R 0
I 4
S -
K 0

Genium

HMIS
H 3
F 1
R 0
PPG*

Other Designations: CAS No. 7439-92-1, lead oxide; lead salts, inorganic; metallic lead; plumbum.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

Cautions: *Inorganic lead is a potent systemic poison.* Organic lead (for example, tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is due to inhalation of dust and fumes. Major affected organ systems are the nervous, blood, and reproductive systems, and kidneys. Health impairment or disease may result from a severe acute short- or long-term exposure.

* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Lead (inorganic) fumes and dusts, as Pb, ca 100%

1989 OSHA PELs (Lead, inorganic compounds)
8-hr TWA: 50 µg/m³
Action Level TWA*: 30 µg/m³

29 CFR 1910.1025 Lead Standard
Blood Lead Level: 40 µg/100 g

1989-90 ACGIH TLV (Lead, inorganic, fumes and dusts)
TLV-TWA: 150 µg/m³

1988 NIOSH REL
10-hr TWA: <100 µg/m³

1985-86 Toxicity Data†
Human, inhalation, TC_{Lo}: 10 µg/m³ affects gastrointestinal tract and liver
Human, oral, TD_{Lo}: 450 mg/kg ingested over 6 yr affects peripheral and central nervous systems
Rat, oral, TD_{Lo}: 790 mg/kg affects multigeneration reproduction

* Action level applies to employee exposure without regard to respirator use.
† See NIOSH, *RTECS* (OF7525000), for additional mutative, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 3164 °F (1740 °C)
Melting Point: 621.3 °F (327.4 °C)
Vapor Pressure: 1.77 mm Hg at 1832 °F (1000 °C)
Viscosity: 3.2 cp at 621.3 °F (327.4 °C)
Molecular Weight: 207.20
Specific Gravity (20 °C/4 °C): 11.34
Water Solubility: Relatively insoluble in hot or cold water*

Appearance and Odor: Bluish-white, silvery, gray, very soft metal.

* Lead dissolves more easily at a low pH.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.
Unusual Fire or Explosion Hazards: Flammable and moderately explosive in the form of dust when exposed to heat or flame.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Lead is stable at room temperature in closed containers under normal storage and handling conditions. It tarnishes on exposure to air. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Mixtures of hydrogen peroxide + trioxane explode on contact with lead. Lead is incompatible with sodium azide, zirconium, disodium acetylide, and oxidants. A violent reaction on ignition may occur with concentrated hydrogen peroxide, chlorine trifluoride, sodium acetylide (with powdered lead), ammonium nitrate (below 200 °C with powdered lead). Lead is attacked by pure water and weak organic acids in the presence of oxygen. Lead is resistant to tap water, hydrofluoric acid, brine, and solvents.
Conditions to Avoid: Rubber gloves containing lead may ignite in nitric acid.
Hazardous Products of Decomposition: Thermal oxidative decomposition of lead can produce highly toxic fumes of lead.

Section 6. Health Hazard Data

Carcinogenicity: Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, the literature reports instances of lead-induced neoplasms, both benign and malignant, of the kidney and other organs in laboratory rodents. Excessive exposure to lead has resulted in neurologic disorders in infants. Experimental studies show lead has reproductive and teratogenic effects in laboratory animals. Human male and female reproductive effects are also documented.
Summary of Risks: Lead is a potent, systemic poison that affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal (GI) system . The most important way lead enters the body is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Much of ingested lead passes through feces without absorption into the body. Adults may absorb only 5 to 15% of ingested lead; children may absorb a much larger fraction. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).
Medical Conditions Aggravated by Exposure: Lead may aggravate nervous system disorders (e.g., epilepsy, neuropathies), kidney diseases, high blood pressure (hypertension), infertility, and anemia. Lead-induced anemia and its effect on blood presssure can aggravate cardiovascular disease.

Continue on next page

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Material Safety Data Sheets Collection:

Sheet No. 316
Benzene

Issued: 11/78 Revision: E, 8/90

Section 1. Material Identification

32

Benzene (C_6H_6) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*™ for a suppliers list.

R 1
I 4
S 2*
K 4
*Skin absorption

NFPA
3
2 0
-

HMIS
H 3
F 3
R 0
PPG†
† Sec. 8

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs
(29 CFR 1910.1000, Table Z-1-A)
8-hr TWA: 1 ppm, 3 mg/m³
15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)
8-hr TWA: 10 ppm
Acceptable Ceiling Concentration: 25 ppm
Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH
TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs
TWA: 0.1 ppm, 0.3 mg/m³
Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data‡
Man, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted
Man, inhalation, TC_{Lo}: 150 ppm inhaled intermittently over 1 yr in a number of discrete, separate doses affects the blood (other changes) and nutritional and gross metabolism (body temperature increase)
Rabbit, eye: 2 mg administered over 24 hr produces severe irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.
† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.
‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)
Melting Point: 42 °F (5.5 °C)
Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)
Vapor Density (Air = 1): 2.7
Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11
Specific Gravity (15 °C/4 °C): 0.8787
Water Solubility: Slightly (0.180 g/100 g of H_2O at 25 °C)
% Volatile by Volume: 100
Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is approximately 5 ppm (unfatigued) in air. Odor *is not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC	Autoignition Temperature: 928 °F (498 °C)	LEL: 1.3% v/v	UEL: 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benzene vapor, and protect personnel attempting to stop an unignited benzene leak.

Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potential fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explosive and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled, or stored.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, and peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium peroxide + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitric acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel (above 410 °F (210 °C)). Benzene is incompatible with oxidizing materials.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.

Material Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200).
(Formerly Called MATERIAL INFORMATION BULLETIN)

Chevron

TETRA ALKYL LEAD REACTION MIX (25% TEL-75% TML)
(INACTIVE, see last page of this MSDS)

DANGER! **HARMFUL OR FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH THE SKIN**
MAY CAUSE EYE AND SKIN IRRITATION
COMBUSTIBLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Mixed lead alkyls*	53%
Ethylene dibromide (CAS 106-93-4)	18%
Ethylene dichloride (CAS 107-06-2)**	19%
Toluene, antioxidant, dye and inerts	10%

*The OSHA exposure standard is 0.075 mg/m^3; the TLV is 0.10-0.15 mg/m^3 (as Pb). **The TLV is 40 mg/m^3.

EXPOSURE STANDARD

No OSHA exposure standard or Threshold Limit Value (TLV) has been established for this material. The OSHA exposure standard for ethylene dibromide (EDB) is 20 ppm (parts of vapor per million parts of air) for a daily 8-hour exposure. (See page 3)

PHYSIOLOGICAL & HEALTH EFFECTS	EMERGENCY & FIRST AID PROCEDURES
Eyes	
May cause eye irritation. Absorption from contact with eye and surrounding tissue can produce systemic effects. See Addtitional Health Data.	Wash eyes immediately with fresh water for at least 15 minutes and see a doctor.
Skin	
May cause skin irritation. May produce systemic toxicity by skin absorption. See Additional Health Data.	DO NOT ATTEMPT RESCUE WITHOUT ADEQUATE SKIN PROTECTION. Wash skin thoroughly with kerosene, then with plenty of soap and water. Get medical attention immediately. Rinse contaminated rubber gloves, boots, etc. repeatedly with kerosene; then wash with soap and water. Discard contaminated clothing and nonwaterproof shoes and boots.
Inhalation	
Breathing vapor at concentrations above the exposure standard may be irritating to the respiratory tract and may cause systemic toxicity. See Additional Health Data.	DO NOT ATTEMPT RESCUE WITHOUT ADEQUATE RESPIRATORY PROTECTION. If there is any reason to suspect that a person has breathed the vapor or mist of thims material, move the person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor.
Ingestion	
Ingestion may be irritating to the digestive tract and lead to serious systemic consequences. See Additional Health Data.	If swallowed and the person is conscious, give a large amount of water to drink and make person vomit. Call a doctor immediately.

ADDITIONAL HEALTH DATA

See Page 3.

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Chemical safety goggles and a full face shield must be worn if there is a likelihood of exposure.
Skin Protection: When handling this material, wear impervious protective clothing, which may include gloves, apron, overshoes, goggles and complete facial protection.
Respiratory Protection: Wear approved respiratory protection such as an organic vapor cartridge respirator or an air-supplying respirator unless ventilation is adequate.
Ventilation: Use adequate ventilation to keep the airborne concentrations of this material below the exposure standard.
Comment: If eye or skin contact can occur, washing facilities for eyes and skin should be available nearby.

FIRE PROTECTION

Flash Point: (TOC)109°F
Autoignition Temp.: NDA
Flammability Limits: NDA
Extinguishing Media: CO_2, Dry Chemical, Foam, Water Spray (flood with minimum agitation).
Special Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. See Hazardous Decomposition Products. Read the entire bulletin.

SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

Store in tightly covered containers. Isolate in a cool location.

ENVIRONMENTAL PROTECTION

X-IRC031 (04-85

Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situations which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used. This material is toxic to aquatic organisms. It is classed as a water pollutant and should be kept out of sewage and drainage systems and all bodies of water.
Precautions if Material is Released or Spilled: If this material is released into a work area, evacuate the area immediately and do not allow anyone to return until it is safe to do so. Persons entering the area to correct the problem and determine whether it is safe for normal activities to resume must comply with all instructions in Special Protective Information. Spills may be absorbed with absorbent clay, diatomaceous earth or other suitable material, and shoveled into disposable containers. A 5% aqueous solution of potassium permanganate (2 pounds per 5 gallons), applied in excess and left in contact, has proved effective in decomposing TEL into nonvolatile forms of lead, except in the presence of oil solutions, with which it does not mix.
Waste Disposal Methods: Place contaminated materials in disposable containers and bury in an approved dumping area.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.
Conditions to Avoid: Explosion may occur if bulk termperature exceeds 212°F, or if material is distilled.
Incompatibility (Materials to Avoid): May react with oxidizing agents, active metals, iron oxide and concentrated acids.
Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor and may form lead fumes and toxic bromine and chlorine compounds; imcomplete combustion can produce carbon monoxide.
Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES

See Page 3.

NDA = No Data Available

Material Safety Data Sheet

TETRA ALKYL LEAD REACTION MIX (25% TEL-75% TML)
(INACTIVE, see last page of this MSDS)

ADDITIONAL HEALTH DATA

This material is toxic by ingestion, inhalation, and skin contact. Signs and symptoms of chronic or subacute poisoning may initially include insomnia and restlessness; progressing into nausea, vomiting, loss of appetite, dizziness, subnormal bood pressure and temperature, increased respiratory rate, and skin pallor. In addition, continued exposure or acute poisoning may result in weakness, loss of weight, visual and auditory halucinations, violent or maniacal type attacks, increased excitability, coarse tremors, convulsions and death. For information on the toxicity of ethylene dibromide, see MIB No. 1789.

EXPOSURE STANDARD (Cont'd)

Due to the possible carcinogenicity of EDB, this level is not considered to be adequately protective. The National Institute for Occupational Safety and Health (NIOSH) has recommended an exposure ceiling of 0.13 ppm to be determined during a 15-minute sampling period. Several government agencies have adopted the NIOSH standard.

PHYSICAL PROPERTIES

Solubility: Soluble in most organic solvents and fats; insoluble in water.
Appearance (Color, Odor, etc.): Mobile heavy liquid with a sweet odor. Typically dyed red or some other color.
Boiling Point: 212°F
Melting Point: n/a
Specific Gravity: 1.59 @ 68°F
Vapor Pressure: 39 mm Hg @ 68°F
Vapor Density (Air=1): 4.7
Percent Volatile (Volume %): 100
Evaporation: (Water=1) 2.22
Initial Freezing Point: -44°F

n/a = Not Applicable

per H&S Plan by Ultra Tech

SITE SAFETY PLAN

CALTRANS FACILITY
3465 ETTIE STREET
OAKLAND, CA

PURPOSE:
This Site Safety Plan establishes the general safety requirements necessary to protect the public, contractor, employees, owner/operator and properties involved in this project.

SCOPE OF WORK:

- Accutite will excavate, remove and dispose of one 7,500 gallon diesel and one 4,000 gallon unleaded gasoline fuel storage tank.
- The tanks will be loaded and hauled off site to a licensed TSD facility where it will be steamed cleaned, cut, and disposed of as scrap metal.
- Two soil samples will be taken from underneath the each fuel storage tank and one soil sample will be taken from the excavated soil stockpile of each tank. Please see permit application for sampling analysis.
- Excavation will be backfilled and compacted on the same day with excavated material and imported material up to go.

ACCUTITE PERSONNEL:

Project Manager: Willie Green (designated Health & Safety Coordinator (HSC)
Foreman: _____
Laborer/s: _____
Equipment Operator: _____
Engineer/s: _____

*Accutite personnel have taken the 40 hour Hazardous Waste Operations and Emergency Response Class and, as required by OSHA 29 CFR 1910.120.

The Health and Safety Coordinator will be on site during all work to verify adherence with the Site Safety Plan. The Health and Safety Coordinator will also coordinate all work with Local and State Health and Safety Representative as needed.

SAFETY AND PROTECTIVE PROCEDURES:

1. Accutite personnel fills out daily, an on-site Job Site Safety Meeting Report and a Daily Inspection Checklist and Correction Form. (Sample copies attached).

2. If required, Accutite will notify USA 48 hours before the scheduled removal to locate underground utilities.

3. If required, Accutite will notify Bay Area Air Quality Management District 5 days prior to the scheduled removal.

4. The Health and Safety Coordinator will monitor the site during all work for the presence of gasoline vapors utilizing a combustible Gas Detector (GasTech Model 1314).

5. The Health and Safety Coordinator will mark the exclusion zone and monitor the site for the presence of non-OSHA trained personnel on-site. All visitors shall sign in, If non-OSHA trained visitors or personnel is on site the HSC will kindly remove the individual/s from the exclusion zone.

6. **No smoking, drinking or eating will be allowed in work areas.**

7. All personnel are properly trained and will wear half-mask air purifying cartridge respirators (organic cartridge with dust prefilter) when significant detector readings are recorded, or if a significant gasoline odor is detected.

8. Should any emergency arise, work shall be halted:

   (1) San Francisco Division of Fire Prevention (415) 861-8000.

   (2) California Regional Water Quality Control Board San Francisco Region (510) 464-1036.

   (3) City and County of San Francisco Department of Public Health/Toxics (415) 554-2780.

Personnel required to work in the area of gasoline pooling will wear neoprene rubber gloves, chemical goggles, protective clothing, chemical resistant safety boots and a cartridge respirator.

In the event of emergency, personnel will be taken to the nearest hospital, in this case:

Peralta Hospital
Telegraph and 30th Avenue
Oakland
(see map for directions)

Note: Information will be listed on site.

If any of the following exist, please list:

Physical Hazards:_____

Chemical Hazards:_____

Level of Protection (A to D):_____

Nearest Phone and Emergency Numbers:_____

DEPARTMENT/JOBSITE SAFETY MEETING REPORT

DEPARTMENT:_____ MEETING DATE:_____

JOBSITE:_____ TIME:_____A.M./P.M.

EMPLOYEES IN ATTENDANCE:

ACCIDENTS:

REVIEW OF ANY ACCIDENTS THAT HAVE OCCURRED SINCE LAST MEETING:

UNSAFE ACTS/CONDITIONS FROM INSPECTION:

REVIEW OF UNSAFE ACTS/CONDITIONS FROM LAST MEETING:

SAFETY TOPICS DISCUSSED:

EMPLOYEE/SUBCONTRACTOR/SUGGESTIONS/RECOMMENDATIONS/REMARKS:

JOBSITE FOREMAN/SUGGESTIONS/RECOMMENDATIONS/REMARKS:

OLYMPIAN/ACCUTITE ENVIRONMENTAL ENGINEERING
INSPECTION CHECKLIST AND CORRECTION FORM

MONTHLY:_____
DAILY:_____
WEEKLY:_____

GENERAL AREA OR JOB SAFETY CLASS: TANK INSTALLATIONS, REMOVALS, OVEREXCAVATIONS & DRILLING

DATE PREPARED_____ PREPARER_____

SAFE WORK CONDITION, SAFE WORK PRACTICES OR PERSONAL PROTECTIVE EQUIPMENT	CHECKED (INITIAL)
1. CAL/OSHA PERMIT ON SITE (IF REQUIRED)	
2. U.G. UTILITIES MARKED BY U.S.A.	
3. EXCAVATION BARRICADED	
4. SPOILS PILES 2 FEET OR MORE FROM EDGE	
5. EMPLOYEES WEARING PROPER PROTECTION	
5A. HARD HATS	
5B. SAFETY SHOES	
5C. RESPIRATORS AVAILABLE	
6. FIRE EXTINGUISHERS WITHIN 75 FEET OF EXCAVATION	
7. FIRST AID KITS ON SITE	
8. ALL VEHICLES, EQUIPMENT, AND POWER TOOLS IN SAFE OPERATING ORDER	
9. POTABLE WATER AVAILABLE	
10. EMERGENCY MEDICAL SERVICES AVAILABLE	

CORRECTIVE ACTION NEEDED/TAKEN:_____

IS EQUIPMENT LOCKED OUT DUE TO IMMINENT HAZARD?_____

PERSON RESPONSIBLE FOR CORRECTION:_____

COPY PROVIDED:_____
(DATE) (TIME)

CORRECTED:_____

REVIEWED BY:_____ DATE:_____