Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road, Concord, California 94520 • 510-689-7000 • FAX 510-689-7006

September 8, 1995

Michael Marr & Associates
27737 Fallen Leaf Court
Hayward, California 94542

Attention: Mr. Michael Marr

Subject: Report on Phase II Subsurface Investigation
2504 MacArthur Boulevard,
Oakland, California
Project # 4872

(510) 451-4793
(510) 482-1536

Dear Mr. Marr:

Eichleay Engineers Inc. of California, (Eichleay) is pleased to submit the report on the Phase II Subsurface Investigation for the site, located at 2504 MacArthur Boulevard, Oakland, California. We recommend that a copy of this report be forwarded to the Alameda County Department of Environmental Health, Hazardous Material Division. We are also sending a copy of this report to the Zone 7 Water Resources Management.

Please do not hesitate to call our office if you have any questions or comments regarding this report.

Very truly yours,
EICHLEAY ENGINEERS INC. OF CALIFORNIA

Fred Serafin, REA # 01088
Manager, Environmental Services

John M. Sakamoto, RCE # 37142
Manager, Industrial Operations

cc: RJM, FILE 4872

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MICHAEL MARR & ASSOCIATES
PHASE II SUBSURFACE INVESTIGATION
2504 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

SEPTEMBER 1995

EICHLEAY ENGINEERS INC. OF CALIFORNIA
1390 WILLOW PASS ROAD
CONCORD, CALIFORNIA 94520
(510) 689-7000

PROJECT NO. 4872

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PHASE II SUBSURFACE INVESTIGATION

2504 MACARTHUR BOULEVARD

OAKLAND, CALIFORNIA

A. INTRODUCTION

Eichleay Engineers Inc. of California (Eichleay) was retained by Michael Marr & Associates to perform a Phase II subsurface investigation at the site located at 2504 MacArthur Boulevard, Oakland, California (Site). Client was found to be in compliance with corrective action orders and directives, and consequently was admitted to the Underground Storage Tank Cleanup Fund Program (Cleanup Fund). A workplan to reasonably delineate the spatial extent of soil and groundwater contamination in and around the area of former underground storage tanks was prepared and subsequently was approved by the Alameda County Health Care Services Agency, Department of Environmental Health (County) for implementation. This report provides the technical services rendered by Eichleay in accordance with the requirements of the said workplan.

B. BACKGROUND

Four underground storage tanks were removed from the Site on June 27, 1994. Soil samples obtained from the tank excavation area indicated that the subsurface had been impacted by fuel hydrocarbons. Eichleay Engineers Inc. of California at the request of the owner and in response to the County's letter dated October 27, 1994, provided a workplan to characterize the fuel hydrocarbon pollutants in the subsurface of the property. The workplan was based on the requirements of the County and the California Regional Water Quality Control Board (RWQCB). It was intended that the proposed services would reasonably define the horizontal and vertical extent of the pollutants in the subsurface, and would also initially define the geologic and hydrogeologic parameters needed for determining an effective and feasible remedial action for this site.

C. SCOPE OF SERVICES

The proposed scope of services for the investigation of pollutants in the soil and groundwater at the previous fuel tanks area was to define the boundary of potential contamination plume and consisted of:

- Site Reconnaissance and Review,
- Site Safety Plan,
- Soil Borings, Groundwater Monitoring Wells Installation, and Soil and Groundwater Sampling. This included:
    - Employ the services of a professional underground locator to attempt to determine the existence and location of any underground utilities or obstructions in the vicinity of proposed soil borings and monitoring well locations. Notify Underground Service Alert (USA).
    - Obtain soil borings and monitoring wells installation permit.
    - Employ the services of a licensed drilling company to drill soil borings at selected locations.
    - Obtain undisturbed soil samples at 5-foot intervals or more frequently, if required.

- Convert three (3) soil borings to groundwater monitoring wells by installing two-inch diameter threaded PVC well casing through the hollow-stem augers.

- Develop the newly installed groundwater monitoring wells by a combination of surging, pumping and bailing. Purge the newly installed wells and collect groundwater samples for chemical analyses.

- Submit groundwater samples to laboratory for analyses.

- Employ a subcontractor to professionally survey all monitoring well casings for horizontal and vertical control.

- Chemical Analyses

  - Perform chemical analyses of selected soil and groundwater samples for total petroleum hydrocarbons as gasoline (TPH-G), benzene, toluene, ethylbenzene and total xylenes (BTEX), total petroleum hydrocarbon as diesel (TPH-D), and oil and grease (O&G).

- Data Evaluation and Report Preparation

  - Prepare a formal report, based on field observations, laboratory data, and evaluation of generated data. Document and summarize

the work performed, and discuss the findings. Make recommendations and note remediation alternatives.

D. METHODOLOGIES

1. Pollutants of Concern

This investigation was primarily concerned with petroleum hydrocarbons, since the original pollutant source appeared to be leaking underground fuel storage tanks. Specifically, samples were tested for TPH-G/ BTEX (EPA Method 5030/8020); TPH-D (EPA Method 3550/8015); and O&G.

2. Analytical Laboratory

For this project, Eichleay utilized the services of Chromalab, Inc. in Pleasanton, California. Chromalab is a State-certified environmental laboratory; certification # E694. Soil and groundwater samples were analyzed on a five-day turnaround time.

3. Selection of Monitoring Wells and Soil Boring Locations

The selection of monitoring well and soil boring locations was based on the anticipated location of pollutant hot spots, and on the goal of obtaining average representative pollutant concentrations from non-hot spot area. These locations were subsequently reviewed and approved by the County. The sampling protocol and methodology were based on guidance from the following:

* Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites, California Regional Water Quality Control Board, San Francisco Bay Region, August 10, 1990.

* Test Methods for evaluating Solid Waste, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency.

* Drilling, Sealing, and Sampling Protocol, Eichleay Engineers Inc. of California.

E. FIELD INVESTIGATIONS

1. Soil Borings - Soil Sampling

Eichleay completed five (5) soil borings on June 20, 21, and 26, 1995 (see Figure 2). All utilities were located and marked using the services of a private locator, as well as the services of "Underground Services Alert." Also, prior to drilling activities, a Site Safety Plan was prepared and discussed with all field personnel (See Appendix C).

Soil borings B-1 and B-4 were advanced with a truck mounted mobile B-61 drill rig. Due to space limitation and/or overhead power lines, soil borings B-3, B-5 and B-6 were advanced with a Rhino confined space drill rig. Both rigs used 6-5/8 inch diameter hollow stem augers. During drilling operations, soil samples were collected every five feet or other appropriate intervals (see boring logs in Appendix B). The samples were obtained with a 2.0 inch I.D. split-barrel, ring-lined sampler.

Most of the samples were obtained in brass liners. With the B-61 drill rig, the sampler was advanced into the subsurface at the target depths with a 140 pound hammer, dropping 30 inches. The number of blows required to advance the sampler 18 inches was recorded on the boring logs for the three, 6-inch driving intervals. This procedure provides an indication of the relative density or consistency of the subsurface material. With the Rhino drill rig, the sampler was pushed into the subsurface by applying a pressure of approximately 1,000 psi.

Soil cuttings and samples were logged in the field by an experienced engineer. Selected soil samples were screened in the field with a photoionization detector (PID) using head space analysis. For the head space analysis, the sample was placed in a zip-lock bag and exposed to sunlight to enhance volatilization of any hydrocarbon pollutants in the soil samples. The head space in the zip-lock bag was then tested for hydrocarbon content using the PID.

Soil samples (liners) selected for laboratory analysis were sealed and stored in an ice-filled cooler prior to transport under chain-of-custody to Chromalab, Inc. The samples were then analyzed for the pollutants of concern by the previously discussed appropriate EPA test methods. The augers and other such equipment were steam-cleaned prior to use at each boring. Other sampling equipment was cold-cleaned between borings with inorganic detergent and clean tap water. All borings not converted to monitoring wells were backfilled to the near surface with a cement slurry and topped with concrete. Eichleay's Drilling and Sampling Protocol is presented Appendix A.

2. Monitoring Wells

Eichleay converted three of the borings to groundwater monitoring wells. The wells are identified as monitoring wells B-1, B-3 and B-5, and are shown on Figure 2. All wells were screened with 2-inch diameter, 0.010 inch slotted PVC pipe. The well construction details are shown on the boring logs

presented in Appendix B of this report. The drilling and well installation was performed by subcontractor Gregg Drilling & Testing, Inc. of Martinez, California.

The monitoring wells were developed on July 7, 1995, by over pumping until the formation water was essentially free of sand. Water samples were subsequently collected. The water samples were obtained using brand new disposable bailers in accordance with standard groundwater sampling protocol. The groundwater samples were stored on ice and shipped to Chromalab for chemical analyses.

3. Geology and Hydrogeology

a. Geology

The Site is located between the heel of gently sloping Oakland Hills and the east shore of the San Francisco Bay. The lithologic sequences of alluvial deposits are fairly variable and consist mostly of interbedded strata of silty and sandy clay with some thin layers of silty and clayey sand. The top three to four feet of soil under the asphalt consists of dark brown and gray silty clay. Below this layer, the color changes to brown to light brown silty clay with some mottling.

b. Hydrogeology

Analyses of data collected during this investigation indicate that a layer of water-bearing zone exists at a depth of about 30 feet below ground surface (bgs). After penetrating into this aquifer the water rose to about 10 feet bgs suggesting the existence of a confined condition. The soil samples from the vadose zone were medium stiff and damp, suggesting tight ceiling conditions of the

aquifer. Groundwater levels were measured on July 11, 1995, after the horizontal and vertical controls of the monitoring wells had been established by a State of California Certified Surveyor. The SURFER software program by Golden Software, Inc. was used to calculate the groundwater potentiometric levels. They were also checked long-hand for conformity. The groundwater flow direction was assessed to be in a south-southwest direction with a gradient of 0.067 ft./ft. Table 3 presents summary of groundwater measurements and Figure 3 depicts the flow direction.

4. Chemical Analysis

a. Soil

Of the soil borings advanced on this property, a total of 26 soil samples were collected. In addition, two samples were lost in the hole when the drill rig broke down. A total of nine soil samples were analyzed for pollutants of concern. Laboratory analyses of these samples indicate the existence of moderately impacted soil in the vicinity of the exploration points. Table 1 summarizes the soil analyses data.

b. Groundwater

Three groundwater samples collected from the monitoring wells were analyzed for TPH-G, TPH-D, and BTEX . Laboratory analyses indicate that groundwater beneath the Site has been slightly impacted. Table 2 summarizes the groundwater test results.

F. FINDINGS AND DISCUSSION

a. Soil

Evaluation of data generated during the field exploration, coupled with the review and analysis of findings during the tank excavation operation indicate that three separate areas of the Site contain contaminated soil. A brief discussion of each area follows:

1. The area in the northern part of the Site in the vicinity of monitoring well B-3 and the Boston Avenue sidewalk. Laboratory analyses of the samples and evaluation of field observations reveal that the depth of the impacted zone is between one foot to about seven feet below ground surface (bgs). Contamination in this area could be attributed to the potential leakage from the existing fill-pipe of the former tank(s) that passes through this area. The sample taken from a depth of 10 feet bgs did not detect any contaminants except a very minor amount of xylenes (8.7 part per billion). The sample taken from the depth of 30 feet bgs did not detect any contaminants above the laboratory detection limits. Several confirmatory soil samples taken during the overexcavation of former tanks' pit, just a few feet west of this zone at a depth of about 8.5 feet bgs detected no or low concentration level of contaminants. This contaminated zone is not believed to be laterally extensive and, therefore, is not anticipated to contribute to the degradation of groundwater.

2. The area in the southwest of the Site, in the vicinity of monitoring well B-1 and the MacArthur Boulevard sidewalk. Laboratory analyses of samples collected in this area, coupled with field testing and screening of soil cuttings indicate the existence of a contaminated zone, extending from underneath the asphalt pavement to an approximate depth of 15 feet bgs. A sample collected and tested at the depth of 40 feet bgs (under the groundwater table) did not detect any contaminants. Given the Site's features and topography, as well as the nature of business and past practices of former tenants, it is possible that this contamination, has been the result of

repeated surface spills and penetration of contaminants into the subsurface through cracks and fissures.

3. The area immediately north of the former pump island location. Review of the tank removal report reveals the existence of contaminated soil directly underneath the leaking tank. Most of this contaminated zone has already been removed during overexcavation and replaced with clean imported fill; but confirmatory samples collected during the tank excavation operation indicate that some contaminated soil has remained in place. Physical site constraints may prevent any further soil excavation at this area. The contamination plume of this remaining soil and its impact on degradation of groundwater could not be evaluated at this time.

b. Groundwater

During the performance of this investigation, groundwater was encountered at a depth of 34 feet bgs in both borings B-1 and B-3, but immediately started to rise. Boring B-5, drilled to a depth of 20 feet bgs, was dry when the drilling rig broke down. Five days later, upon resumption of drilling activities, groundwater was encountered at the depth of 10 feet. This indicates the potential existence of a confined water zone. The ceiling of the wet zone (capillary fringe) was found to be fairly impermeable and damp. The regional groundwater flows generally in a west/southwesterly direction toward the San Francisco Bay. Based on the groundwater level measurements on July 11, 1995, the site-specific groundwater flow direction was assessed to be in a southerly direction with a gradient of about 0.067 ft/ft. The groundwater potentiometric levels are depicted on Figure 3.

The original source of contamination (the tanks) has already been removed from the Site, but the impacted soil remaining around the former tanks location may now act as the primary source. If the groundwater comes in contact with the contaminated soil (either through normal seasonal groundwater fluctuations or through penetrating the aquifer), the pollutants may become mobilized and begin to migrate. A quarterly monitoring program at the Site will establish the seasonal

groundwater fluctuations and other groundwater data, as well as determine any changes in the concentration levels.

G. BENEFICIAL USES/CLEANUP GOALS FOR SITE RESOURCES

Cleanup of soil and groundwater at the Site is driven by the (current or potential) beneficial use of the resource. The goal is to return usable groundwaters to beneficial uses within a reasonable time-frame. The Regional Water Quality Control Board (RWQCB), as required by the California Porter-Cologne Water Quality Control Act, has defined the beneficial uses of various water bodies in the greater San Francisco Bay Area. The beneficial uses of the water bodies are presented in the Water Quality Control Plan for the San Francisco Basin (Basin Plan). The Basin Plan was adopted on December 16, 1986 by the RWQCB, and was approved on May 21, 1987 by the State Water Resources Control Board (SWRCB). The Basin Plan identifies various uses for water bodies in the area of the Site including recreation, wildlife habitat, preservation of rare and endangered species, marine habitat, fish spawning, and estuarine habitat. In addition, the Basin Plan states that the "use of waters in the vicinity represent the best information on beneficial uses."

In addition to the Basin plan, the SWRCB has established the "Sources of Drinking Water" policy to provide guidance for municipal and domestic supply designation for State waters. According to the SWRCB Policy, all groundwaters are considered suitable or potentially suitable for municipal or domestic supply with two exceptions. The first exception states that if total dissolved solids (TDS) in the groundwater exceed 3000 mg/l then the groundwater will not be considered for municipal or domestic use. The second exception states that if a single well does not provide sufficient water to produce a sustained average yield of 200 gallons per day, then the groundwater will not be considered for municipal or domestic use. Eichleay anticipates that these exceptions apply to this site.

Another source of regulatory oversight for the Site is found in the California Code of Regulations, Title 22, Articles 2 through 5. According to the Title 22, Cal EPA Department of Toxic Substance Control (DTSC) sets forth criteria for identifying hazardous waste defined as Resource Conservation and Recovery Act (RCRA) hazardous waste. Title 22 classifies a material as a RCRA waste if it has been discarded at an unauthorized facility and is either toxic (based on the Total Threshold Limit Concentration, and/or the Toxicity Characteristic Leaching Procedure, or the Solubility Threshold Limit Concentration), ignitable, reactive, or corrosive.

Chemicals found in the soil and groundwater at the Site are subject to Federal and State of California standards. The chemicals (and concentrations) found in the soil and groundwater at the Site are presented in Table 1 and Table 2, respectively.

H. IDENTIFICATION OF REMEDIAL TECHNOLOGIES

Various technologies are available to remediate soil and groundwater. Applicable technologies are identified and briefly described in this section.

1. Soil

Listed and discussed below are remedial technologies available to cleanup soil at the Site.

- Excavation and Off-site Disposal

- Excavation and Treatment
  - aeration

- enhanced biodegradation
- chemical oxidation
- incineration
- solidification/stabilization

- In-situ Treatments
  - biodegradation
  - soil venting
  - steam injection

- Physical Containment

a. Excavation and Off-Site Disposal

Soils containing elevated concentrations of petroleum hydrocarbons can be excavated and transported to a Class I, or Class II landfill for disposal. Disposal by this method does not reduce the chemical concentrations in the soil or transfer ownership of the soil; it just transfers it to a different location.

b. Excavation and Treatment

Before treatment can occur by any of the methods discussed, the pollutant-laden soil has to first be excavated and placed in an approved staging area.

Soil Aeration - At the approved area, the excavated soil is spread to a depth of 1 to 3 feet and mixed periodically by equipment. During this aeration process volatile hydrocarbons in

the soil are released to the atmosphere. Once the TPH levels have been reduced to acceptable levels (generally less than 100 ppm) in the soil, it can be disposed of at a landfill or possibly contained on-site. The aeration process is conducted under auspices of the Bay Area Air Quality Management District (BAAQMD).

Enhanced Biodegradation - This process destroys petroleum hydrocarbons in the soil by adding nutrients to enhance natural bacterial metabolism. The bacteria reduces the hydrocarbons in the soil by using them for growth. To initiate this process the excavated soil containing pollutants would be taken to an approved area for treatment at which time the nutrients would be added.

Chemical Oxidation - This process involves adding hydrogen peroxide and a catalyst to the excavated soils. The hydrogen peroxide oxidizes the pollutants in the soil and forms carbon dioxide and water. In order for this process to be successful, adequate contact between the pollutants and the hydrogen peroxide is necessary.

Incineration - Incineration achieves destruction of pollutants in the soil through thermal destruction. The excavated soil is placed in a kiln and heated to a temperature of 1,500°F. At this temperature oxidation of the pollutants are achieved, with carbon dioxide and water as the by-products.

Solidification/Stabilization - Solidification/stabilization involves the reduction in mobility or leachability of contaminants in hazardous waste soils. This process consists of reduction in total concentration of contaminants by chemical treatment and then introduction of a cement type adhesive agent to achieve solidification.

c. In-Situ Treatments

Soils treated by any of these methods remain in a relatively undisturbed state and without excavation.

Biodegradation - This process encourages bacteria, indigenous to the soil, to metabolize pollutants in the soil. Nutrients are added to the subsurface soils by the infiltration or injection of nutrient-enriched water. This solution usually contains nitrogen, phosphorous, and hydrogen peroxide or sparged oxygen. Either groundwater from the Site or tap water could be used in the solution.

Soil Venting - In this process, volatile pollutants are removed from the soil by applying a vacuum system to the subsurface. Air in the soil mass, which has been in contact with volatile pollutants, contains vapors which are extracted by the vacuum system. Depending

on vapor concentrations, the air is either passed through an emissions control system or vented directly to the atmosphere.

Steam Injection - With this process, steam is injected to the subsurface via injection wells. As a result, volatile pollutants and water are volatilized by the steam and recovered by extraction wells. The gases, vapors, and liquid can be treated with liquid and vapor-phase carbon treatment prior to discharge.

d. Physical Containment

For soil, this method is used to impede the movement of pollutants in the subsurface, or from the subsurface to the atmosphere. For this application, an impermeable cap could be placed over the impacted area, and thereby stop or significantly reduce the transfer of volatile pollutants in the subsurface to the atmosphere. A cap would also reduce the likelihood that subsurface pollutants could migrate as a result of site-derived surface waters.

2. Groundwater

Remedial technologies which are available to clean up site groundwater are listed and briefly discussed below:

- Groundwater Extraction
  - air stripping
  - liquid phase, granular activated carbon
  - biodegradation
  - UV oxidation
- In-Situ Treatment
  - biological
  - chemical oxidation

a. Groundwater Extraction

A typical way to clean up groundwater containing pollutants is to first extract it via extraction wells. To determine the rate of extraction and to verify that all of the impacted groundwater is within the range of influence of the extraction well, aquifer pump testing should be conducted. Once the groundwater is extracted it can be treated by one or a combination of the following methods.

Air Stripping - Air stripping removes volatile compounds from the groundwater through the process of volatilization. Air and the groundwater containing pollutants contact each other in countercurrent flow within a vertical column packed with specially shaped pieces, the packing, that improve the effective surface area for mass transfer. The packing can be composed of individual pieces, or it can be a structure stacked in the column. The air is blown upward, and the water flows down the column; both travel through the packing material. The size of the column is dictated by the flow rates of groundwater and air. Packed columns can achieve removal efficiency greater than 99.9 percent. Airstripping as a treatment method can tolerate a wide range of concentrations in the influent. However, low concentrations are generally more economically treated with carbon adsorption. The compounds are transferred into the air and discharged into the atmosphere under conditions controlled by air pollution regulations.

Liquid Phase, Granular Activated Carbons - This is a typical off-the-shelf type of technology which is available for treatment of extracted groundwater. With this treatment method, extracted groundwater is passed directly through a bed of granular activated carbon. The carbon adsorbs the organic pollutants, and when the adsorption capacity is spent, the carbon is disposed of at a Class I landfill, or sent to be regenerated.

Biodegradation - With this treatment method, extracted groundwater is passed through a bioreactor which metabolizes the organic pollutants. Nutrients such as nitrogen, phosphorus, and oxygen are added to the groundwater at the bioreactor. Typical byproducts of biodegradation are carbon dioxide, water, and non-hazardous cellular material.

UV Oxidation - In this process extracted groundwater is passed through UV light. While the UV light has the ability to oxidize the pollutants by itself, it is generally used with hydrogen peroxide or ozone which enhances the oxidation process. Typical byproducts of UV oxidation are carbon dioxide and water.

b. In-Situ Treatment (Groundwater)

Groundwater can also be cleaned up by in-situ methods such as biodegradation and chemical oxidation. Instead of extracting the groundwater and then treating and discharging it, the groundwater is treated in place.

Biodegradation - As with the other biodegradation methods, groundwater containing organic pollutants is treated with nutrients which serve to encourage metabolism by indigenous bacteria. This application is similar to the soil biodegradation, in that site groundwater is usually extracted, enhanced with nutrients and then injected through wells back into the subsurface.

Chemical Oxidation - In-situ chemical oxidation is similar to in-situ biodegradation. However, instead of adding nutrients to the groundwater, hydrogen peroxide is added to oxidize the pollutants.

Biodegradation - With this treatment method, extracted groundwater is passed through a bioreactor which metabolizes the organic pollutants. Nutrients such as nitrogen, phosphorus, and oxygen are added to the groundwater at the bioreactor. Typical byproducts of biodegradation are carbon dioxide, water, and non-hazardous cellular material.

UV Oxidation - In this process extracted groundwater is passed through UV light. While the UV light has the ability to oxidize the pollutants by itself, it is generally used with hydrogen peroxide or ozone which enhances the oxidation process. Typical byproducts of UV oxidation are carbon dioxide and water.

b. In-Situ Treatment (Groundwater)

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I. SCREENING OF REMEDIAL TECHNOLOGIES

Criteria for screening of the remedial technologies are based on the following:

Implementability - Site application of technologies must be relatively easy to construct, as simple as possible, and appropriate to implement at the Site.

Demonstrated Performance - The technologies selected for application at the Site must have been previously and successfully applied to similar pollutants and in similar circumstances.

Regulatory Acceptance - The selected technology must meet the project objectives and conform to regulatory requirements.

For soils containing elevated levels of TPH, current RWQCB guidance generally allows soils with TPH to remain in place if concentrations are below 100 ppm. Soils with TPH concentrations above 100 ppm and below 1000 ppm are classified as designated waste. Soils with TPH concentrations above 1000 ppm are classified as hazardous waste. Soils classified as designated or hazardous waste are required to be disposed of at a Class I or Class II landfill or treated to reduce concentrations to less than 100 ppm and then disposed of at a Class II or Class III landfill. In some cases, and on a site specific basis, the RWQCB has allowed soils treated to below 100 ppm to be left and/or contained on-site.

1. Soil

a. Excavation and Off-Site Disposal

Off-site disposal of excavated soil to a Class I landfill will require the services of a hazardous waste hauler to transport the impacted soils. As this method of disposal usually just transfers the pollutant problem to another source, current regulatory policy does not usually favor this type of action unless the soil can first be treated to reduce the TPH concentrations to below 100 ppm.
This technology meets the demonstrated performance criteria, and with some qualifications, meets the Implementability and regulatory acceptance criteria. As a result, this technology will be considered further .

b. Excavation and Treatment

Due to the Site's physical restricting features, limited volume of the contaminated soil and other parameters, none of the alternatives in this category appear practical or cost-effective. Therefore, they could be eliminated from consideration.

c. In-Situ Treatments

Biodegradation - This alternative usually requires a system for groundwater injection and/or extraction. This provides hydraulic control in the treatment area, as well as providing for nutrient addition to the treatment system. In place of a groundwater injection and extraction system, a passive infiltration trench is sometimes used to introduce the biomass into the subsurface. Before this alternative could be implemented, a treatability study would be

required to determine site-specific parameters. Regulatory agency approval and/or permits would be required, including the RWQCB and Cal EPA Department of Toxic Substances Control (DTSC). This has been successfully applied at many sites and is gaining acceptance in industry as well as with some regulatory agencies, the process can be rather lengthy with frequent delays. Keeping hydraulic control of the injected water would be mandatory and would need to be demonstrated before nutrients would be allowed to be added to the system. High levels of TPH are required to keep the bacteria alive. This treatment does not fully meet all of the screening criteria and will be eliminated from further consideration.

Soil Venting - Soil venting is a proven simple and effective means for removing volatile compounds from subsurface soils. Airflow is induced through the soil by maintaining a vacuum on wells constructed for this purpose. The airflow carries the volatilized pollutants out of the well. In order to implement soil venting at a site, the performance of a vacuum extraction test is usually necessary to develop design information specific to the site. Eichleay has not performed a vacuum extraction test at this Site. However, due to the Site's limited volume of contaminated soil at shallow depths, this technology does not meet the screening criteria, and therefore, it will not be considered for technical and cost evaluations.

Steam Injection - This technology has been applied at sites successfully but does not have the demonstrated performance/acceptance as other technologies. Eichleay anticipates that significant time would be spent obtaining regulatory approval from the BAAQMD, the RWQCB, and the DTSC. This technology does not meet the screening criteria for this site and therefore can be eliminated from further consideration.

d. Physical Containment

Slurry Wall - While this is a proven and reliable technology, its application at the Site at this time is not warranted and does not meet the implementability criteria. Therefore it can be eliminated from further consideration.

Soil Cap - This technology is proven, reliable, and has a wide range of application. Earth materials used for a soil cap usually are compacted until a coefficient of permeability of 1 x 10^{-6} cm/sec or less is obtained. It is desirable to use on-site soil for this process if it is available and meets the necessary specifications, as this minimizes costs. However, the soil at the Site is already covered with asphalt, which in essence serves to cap the pollutants. It is not anticipated that this cap will be removed. Therefore, this technology is considered already in place at the Site.

2. Groundwater Extraction and Treatment

a. Groundwater Extraction

Groundwater extraction is a proven and reliable method to remove subsurface water prior to treatment. Groundwater performance tests would need to evaluate the hydraulic parameters of the water-bearing zone before implementation. Groundwater extraction meets the screening criteria and will be considered for further technical evaluation. Groundwater extraction is conducted in conjunction with each groundwater treatment alternative.

b. Groundwater Treatment Alternatives

Air Stripping - Air stripping is an off-the-shelf technology which is widely used, accepted, and available. Air stripping is effective in removing up to 99.9 percent of volatile compounds from groundwater. The design of the column is determined by a cost and efficiency analysis, based on contaminant influent and required regulatory effluent levels. With the limited extent of available groundwater, this technology does not meet the screening criteria and will be eliminated from further consideration.

Liquid Phase, Granular Activated Carbon (GAC) - GAC is another off-the-shelf technology which is widely used, accepted, and available. GAC vessels, used alone or as a polishing unit with an air stripper, can remove up to 100 percent of volatile compounds from groundwater. Regeneration of the carbon can occur on- or off-site. If regenerated on-site, capital, operational, and maintenance costs will increase, and may not be economical unless high carbon usage is anticipated. If regenerated off-site, the responsibility for transportation and removal of the spent carbon is the vendor's. This technology meets the screening criteria and will be considered for technical evaluation.

Biological Treatment - This technology is acceptable in many applications for the destruction of petroleum hydrocarbons in groundwater. When completely functional, this system has the ability to remove approximately 90 percent of petroleum hydrocarbons in the water. However, if unanticipated chemicals are introduced, then the biomass may be susceptible to "shock" with the result being partially-treated or untreated water being discharged. This technology requires frequent monitoring of the system and may not be appropriate for this application. Therefore, biological treatment does not meet the demonstrated/reliable performance criteria for this application and can be eliminated from further consideration.

UV Oxidation - This relatively new technology has shown destruction of hydrocarbons in water around 90%. Vapors are not emitted, but high energy inputs and the use of hydrogen peroxide make this technology more suitable for use at a facility where it can be constantly monitored. For application at this Site, UV oxidation does not meet the demonstrated/reliable performance criteria and can be eliminated from further consideration.

c. In-Situ Treatment (Groundwater)

Biodegradation - This technology is similar in application to in-situ soil biodegradation. However, high levels of TPH are required to supply the bacteria with nutrients to live. The levels of TPH in groundwater are not anticipated to be extensive enough to make this treatment warranted. Therefore, this treatment method can be eliminated from further consideration.

Chemical Oxidation - This is a relatively new technology. As the oxidants used are chlorine and ozone, this technology does not meet the regulatory or implementability criteria and can be thus eliminated from further consideration.

J. ANALYSIS OF SELECTED ALTERNATIVES

Remedial alternatives that meet the screening criteria are presented in this section. The alternative or combination of alternatives which are feasible are described in detail.

1. In-Situ Soil Treatments

a. Excavation and Off-Site Disposal

It seems that most of the heavily impacted soil has already been excavated and disposed of. The remaining impacted soil at the Site appears to be limited to an area immediately around the old fill-pipe adjacent to the Boston Avenue, at a fairly shallow depth, and to another area adjacent to the monitoring B-1, at a shallow depth. There is also an undetermined volume of impacted soil underneath the excavated tank, adjacent to the former location of pump island. The depth and volume of the contaminated horizons, as well as the limited surface area for equipment maneuvering and other physical features of the Site are major considerations for selection of this alternative.

b. Soil Venting

Based upon the soil type and apparent extent and level of contamination at this site, soil venting used in conjunction with air sparging (air induction into the subsurface to enhance volatilization) will require several vapor extraction wells. In Eichleay's opinion, on the basis of available data, approximately three years will be required for system operations to reduce hydrocarbon concentrations comparable to that obtained from excavation. Upon BAAQMD approval, extracted soil vapors would be pushed through activated carbon vessels prior to discharge to the atmosphere. Determination of well configuration for air injection and vapor extraction, as well as vacuum extraction tests and other specific engineering design specifications, was considered as part of the comparison study. It proved this alternative to be costlier and more time consuming than excavation and disposal.

c. Physical Containment

Soil Cap - As previously discussed, this treatment is considered already in place.

Based upon comparison of workable alternatives and the volume of contaminated soil, it is Eichleay's opinion that a selective excavation program and off-site disposal of contaminated soil at this site is the most practical and cost-effective alternative within a prescribed timeframe.

2. Groundwater Treatment

Due to the minor level of groundwater contamination detected at this Site, it is Eichleay's opinion that a quarterly monitoring program should be implemented to detect and record the variations of contaminants' concentrations for a period of at least one year, prior to making any decision regarding the necessity and/or selection of a remediation alternative.

K. CONCLUSIONS

In this report, Eichleay has outlined the results of a site investigation performed at 2504 MacArthur Boulevard, Oakland, California. Moderate soil and slight groundwater contaminations were identified at the Site. The soil's pollutant concentrations tended to be lower at greater depths, suggesting previous shallow or surface releases. Minor concentrations of hydrocarbon pollutants were detected in the groundwater. Although the geology and hydrogeology of the site make the characterization of potential pathways and conduits difficult to estimate, based on available information it does not appear that the contamination has substantially migrated off-site

at this time. The possibility exists, however, that pollutants may migrate off-site. In order to establish controls for the prevention of possible migration, and in order to eliminate the source of contamination, it is necessary to implement some remedial measures and controls.

In order to identify appropriate remedial technologies for the cleanup of site pollutants, beneficial uses and anticipated cleanup goals were identified using criteria established by the State of California and federal agencies. Various technologies were examined to determine their applicability for site conditions as well as their likelihood of achieving the identified cleanup goals. The excavation and off-site disposal alternative was selected as the treatment technology to use for the remediation of site soils. Due to the low levels of contaminants detected in the groundwater, a program of quarterly monitoring is recommended to gather more data for the future selection of an appropriate treatment technology for the site groundwater.

L. LIMITATIONS

The data, information, interpretations, and recommendations contained in this technical report are presented solely as preliminary bases and guides to the existing environmental conditions of the site, located at 2504 MacArthur Boulevard, Oakland, California. The conclusions and professional opinions presented herein were developed by Eichleay in accordance with generally accepted engineering principles and practices. As with all geotechnical and environmental reports, the opinions expressed here are subject to revisions in light of new information, new governmental regulations or new interpretations of existing regulations, which may be developed in the future, and no warranties are expressed or implied.

The opinions of probable cost presented in this report are based upon our general experience with the remedial technologies indicated. However, it should be understood that the final cost may be subject to variation depending on the actual conditions encountered during remediation.

This report has not been prepared for use by parties other than the Mr. Michael Marr. It may not contain sufficient information for the purposes of other parties or other uses. If any changes are made in the project as described in this report, the conclusions and recommendations contained herein should not be considered valid, unless the changes are reviewed by Eichleay, and the conclusions and recommendations are modified or approved in writing.

Soil deposits may vary in type, strength, permeability, and many other important properties between points of observation and exploration. Additionally, changes can occur in groundwater and soil moisture conditions due to seasonal variations, or for other reasons. Furthermore, the distribution of chemical concentrations in the soil and groundwater can vary spatially and over time. The chemical analysis results presented herein are illustrative of only the sampling locations at the time of sampling. Therefore, it must be recognized that Eichleay does not and cannot have complete knowledge of the subsurface conditions underlying the subject site. The opinions presented are based upon the findings at the points of exploration and upon interpretative data, including interpolation and extrapolation of information obtained at points of observation.

TABLE 1
SUMMARY OF SOIL ANALYSES DATA

Sample No.	TPH-G (mg/kg)	TPH-D (mg/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethyl Benzene (ug/kg)	Total Xylenes (ug/kg)	O&G (mg/kg)
B-1-5	310	3.8	ND	ND	1300	ND	NT
B-1-10	470	NT	ND	ND	1700	1700	NT
B-1-40	ND	NT	ND	ND	ND	ND	NT
B-3-5	490	ND	ND	380	5300	18000	NT
B-3-10	ND	ND	ND	ND	ND	8.7	NT
B-3-30	ND	NT	ND	ND	ND	ND	NT
B-4-15	ND	NT	ND	ND	ND	ND	NT
B-5-15	ND	NT	ND	ND	ND	ND	ND
B-6-5	ND	ND	ND	ND	ND	ND	NT

NOTES

Sample No.	The first two characters refer to the boring number, and the last character is the depth at which the sample was obtained.
TPH-G	Total Petroleum Hydrocarbons as Gasoline
TPH-D	Total Petroleum Hydrocarbons as Diesel
O&G	Oil & Grease
mg/kg	Milligrams per kilograms (parts per million, ppm)
ug/kg	Micrograms per kilograms (part per billion, ppb)
ND	Not detected above laboratory detection limits
NT	Not tested

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TABLE 2

SUMMARY OF GROUNDWATER ANALYSES DATA

Well No.	TPH-G (mg/l)	TPH-D (mg/l)	Benzene (ug/l)	Toluene (ug/l)	Ethyl Benzene (ug/l)	Total Xylenes (ug/l)
MW B-1	0.06	ND	0.5	2.8	1.2	6.0
MW B-3	0.20	ND	2.7	12.0	4.4	23.0
MW B-5	0.38	ND	ND	1.7	1.5	5.1

NOTES

TPH-G Total Petroleum Hydrocarbons as Gasoline
TPH-D Total Petroleum Hydrocarbons as Diesel
mg/l Milligrams per liter (parts per million, ppm)
ug/l Micrograms per liter (parts per billion, ppb)
ND Not detected above laboratory detection limits

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TABLE 3

SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS

Monitoring Well No.	Rim Elevation*	Depth- Ft	G.W. Elevation*
MW-B1	198.19	9.70	188.49
MW-B3	201.41	9.22	192.19
MW-B5	201.39	9.26	192.13

Notes

* City of Oakland Datum. To convert to Mean Sea Level, subtract 3.00 from above elevations.

Measurements were made on 7/11/1995.

For more information see Figure 5.

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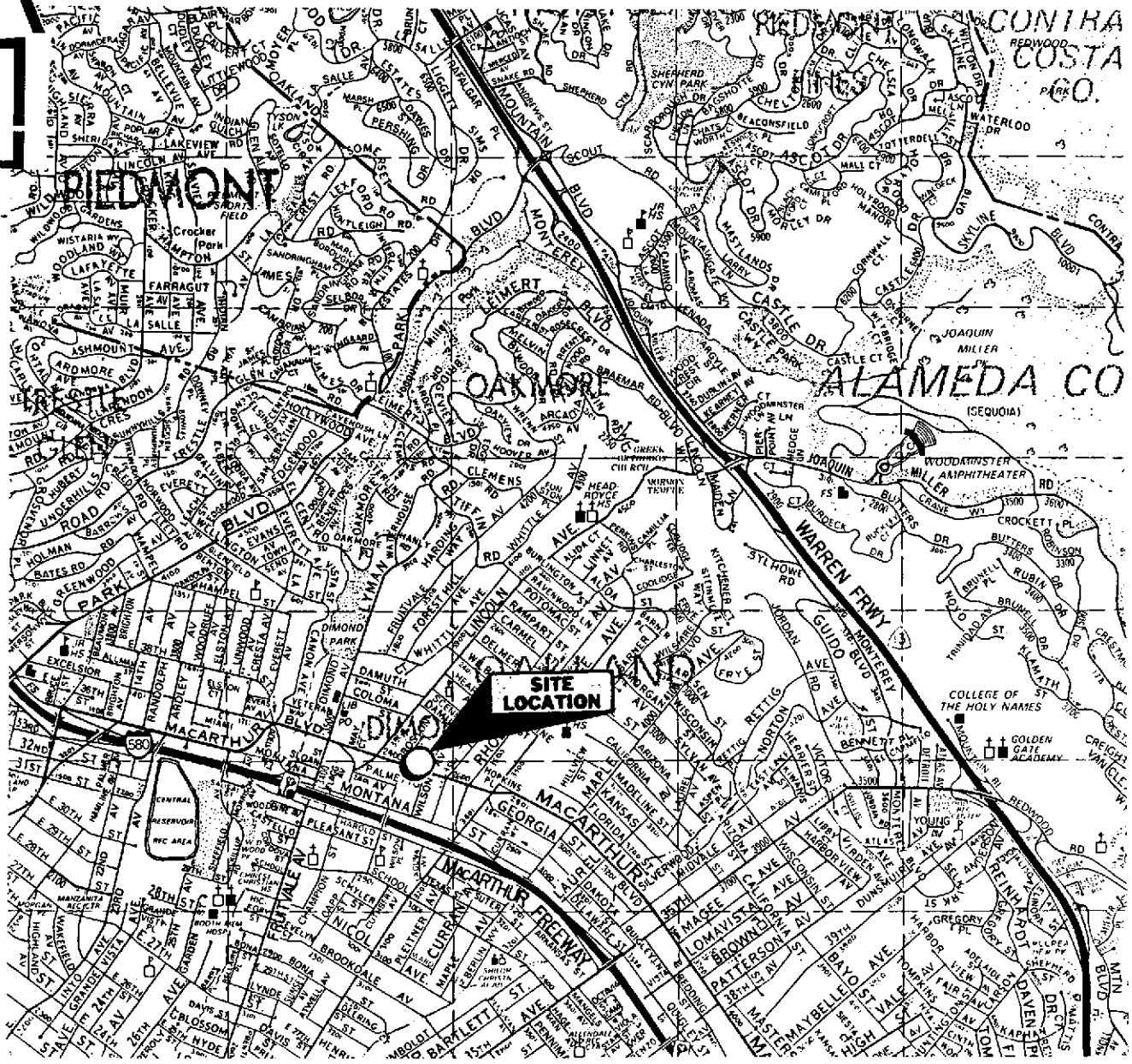


SCALE: 1" = 2200'

REVISIONS		
REV	DESCRIPTION	APPR

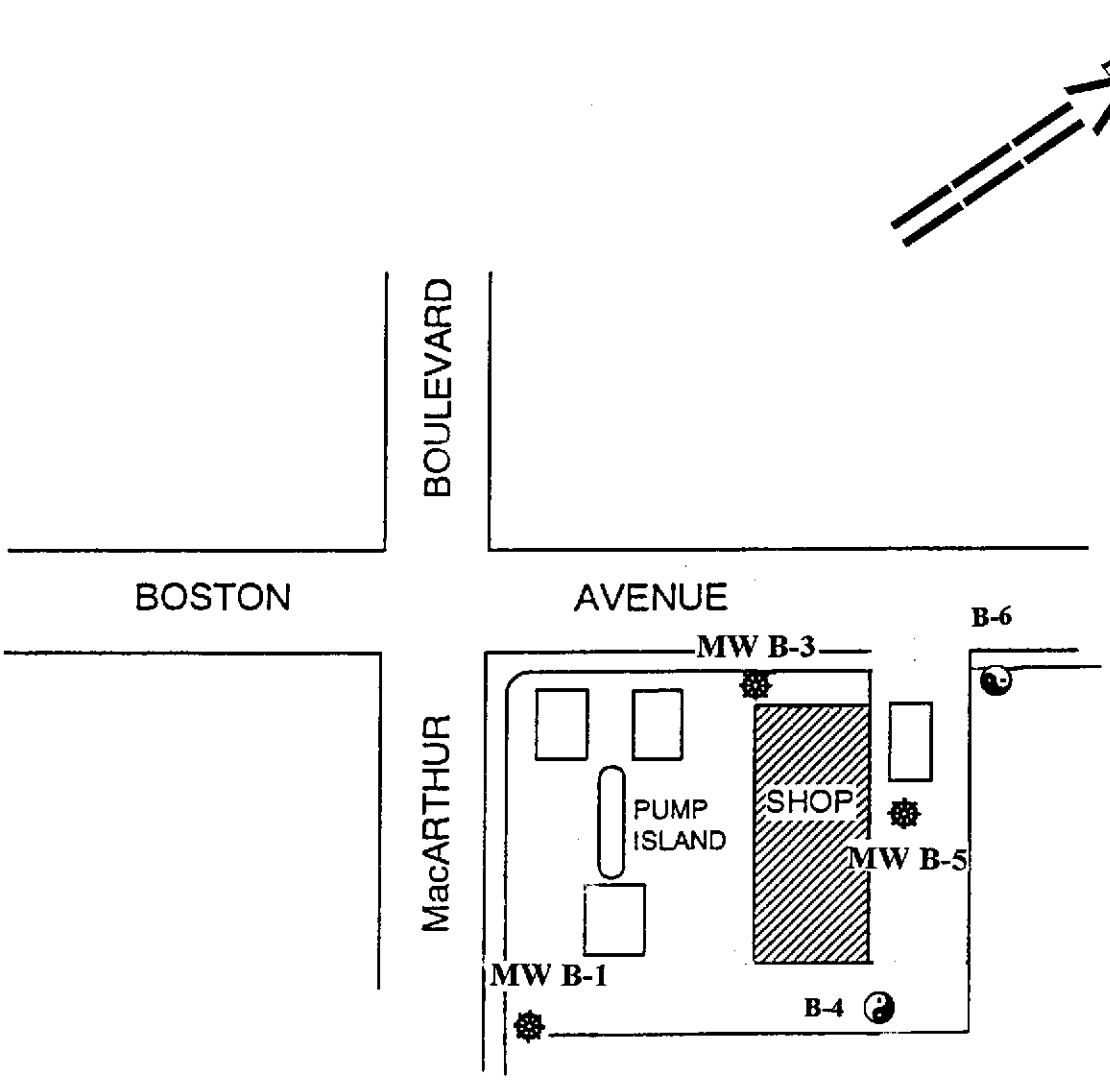
Eichleay ENGINEERS INC of CA

PITTSBURGH
CHICAGO
SAN FRANCISCO

LOCATION MAP

2504 MacArthur Blvd.
Oakland, California

SCALE	DATE SEPT 1995	CONTRACT 4872	
DRAWN BY	DRAWING		REVISION
CHECKED	FIGURE 1		
APPROVED			



NOTE

Soil boring B-2 was not drilled

LEGEND

- Approximate Location of Soil Borings
- Approximate Location of Monitoring Wells
- Approximate Location of Former Tanks

Not to Scale

REVISIONS		
REV	DESCRIPTION	APPR

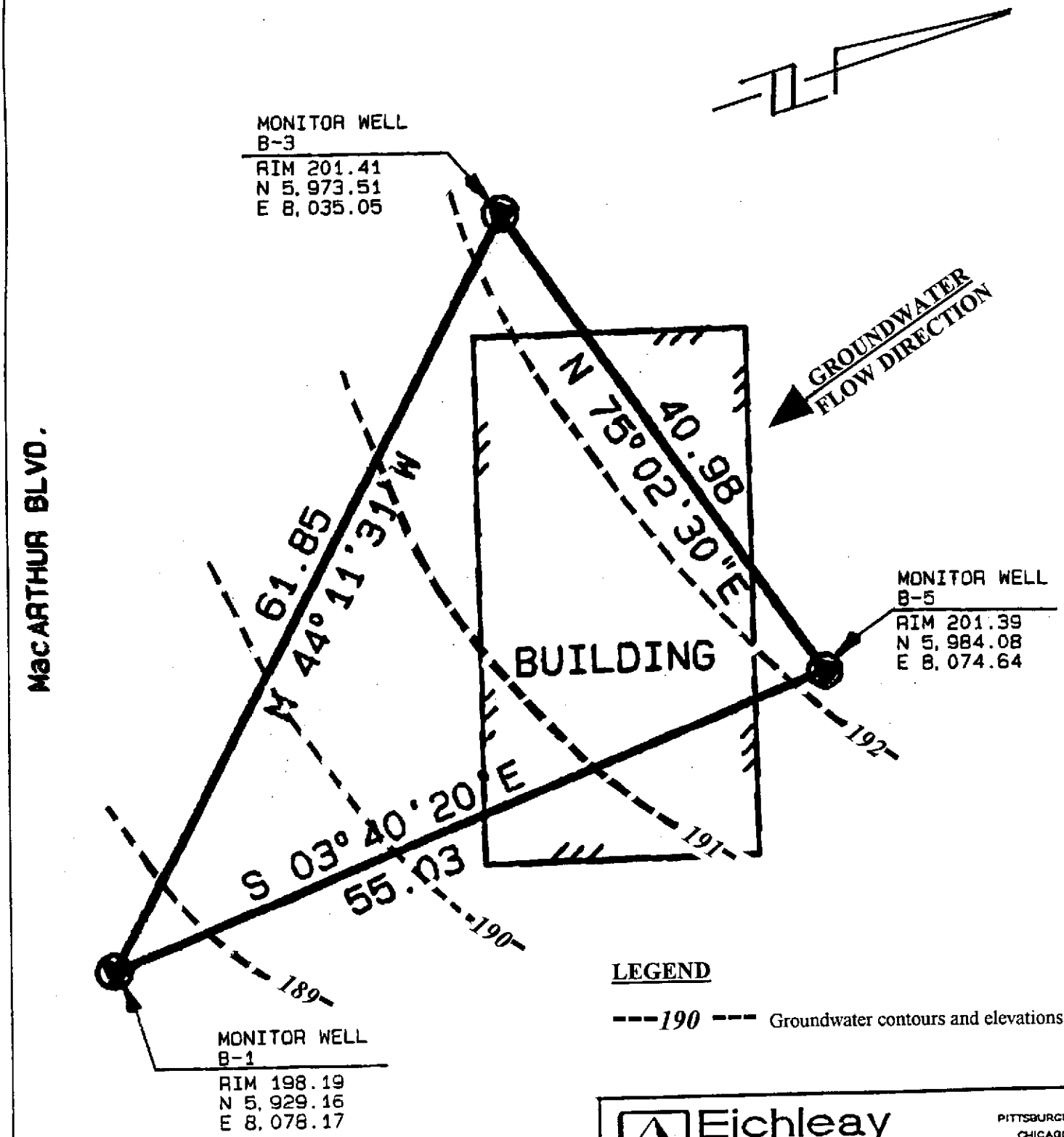
Eichleay ENGINEERS INC of CA

PITTSBURGH
CHICAGO
SAN FRANCISCO

SITE SKETCH

2504 MacArthur Blvd.
Oakland, California

SCALE	DATE SEPT 1995	CONTRACT 4872	
DRAWN BY	DRAWING		REVISION
CHECKED	**FIGURE 2**		
APPROVED			



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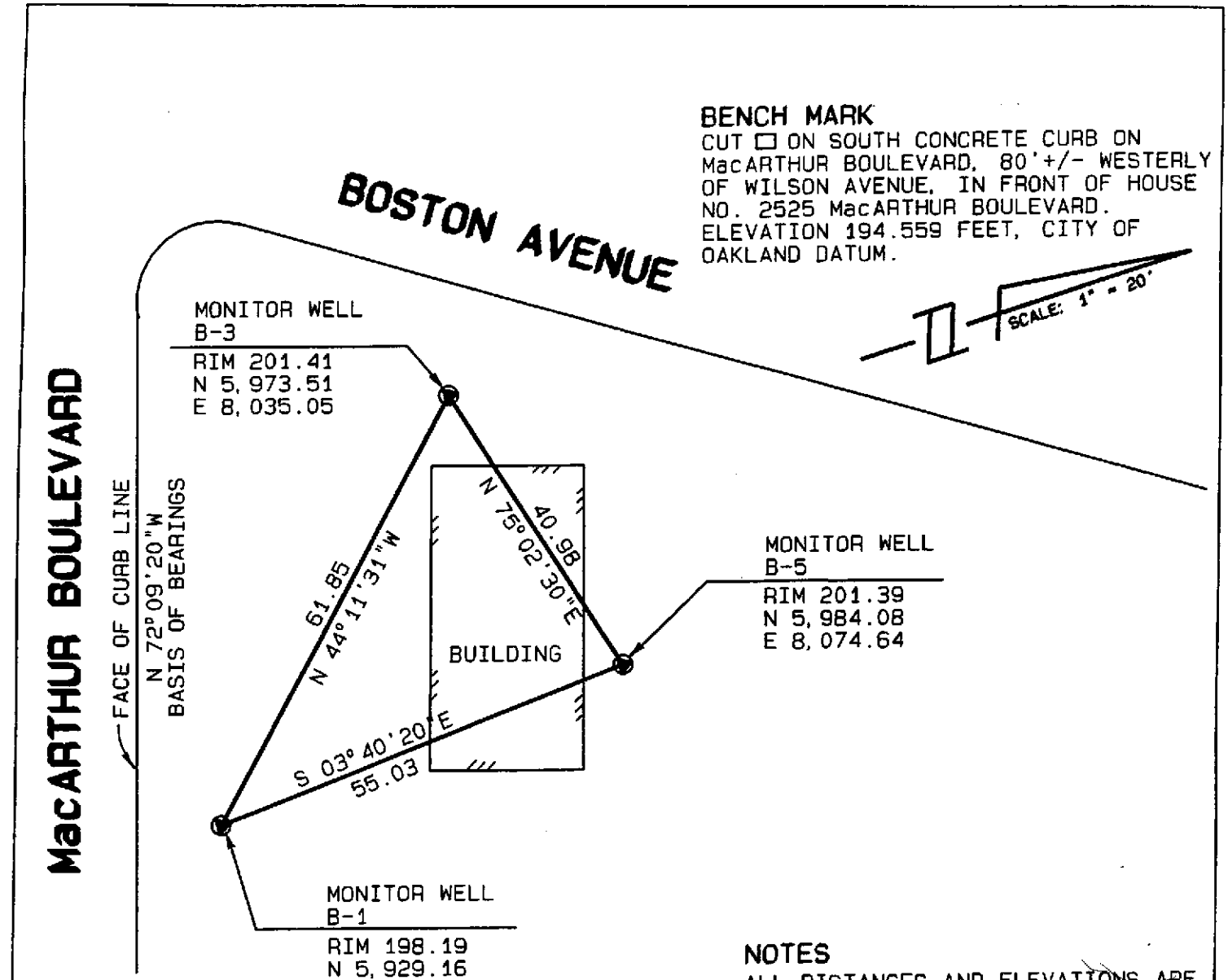
G. W. POTENTIOMETRIC LEVELS

2504 MacArthur Blvd.
Oakland, California

SCALE	DATE SEPT 1995	CONTRACT 4872	
DRAWN BY	DRAWING		REVISION
CHECKED	FIGURE 3		
APPROVED			



20 10 0 20 40

GRAPHIC SCALE (FEET)

BKF JOB NO. 955038-50, FB WC40/63

NOTES

ALL DISTANCES AND ELEVATIONS ARE IN FEET & DECIMALS THEREOF. RIM ELEVATION WAS TAKEN ON THE NORTH EDGE OF THE MONITOR WELL.

DATE OF FIELD SURVEY WAS JULY 11, 1995.

ARBITRARY BASIS OF BEARINGS OF N 72° 09' 20" W, ALONG THE FACE OF CURB LINE OF ADELINE STREET AND WITH ARBITRARY COORDINATE BASE AT MONITOR WELL "B-1", TAKEN AS N 5,929.16 AND E 8,078.17.

Eichleay ENGINEERS INC of CA

PITTSBURGH
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MONITORING WELLS SURVEY DATA
2504 MacArthur Blvd.
Oakland, California

SCALE	DATE SEPT 1995	CONTRACT 4872	
DRAWN BY	DRAWING		REVISION
CHECKED	**FIGURE 4**		
APPROVED			

APPENDIX A

Appendix A
Drilling, Sealing and Sampling Protocol

DRILLING, SEALING, AND SAMPLING PROTOCOL

DRILLING

1. Eichleay Engineers Inc. of California will obtain all necessary permits for the installation of the proposed groundwater monitoring wells.

2. Borings will be drilled using appropriate methods after consideration of site geologic and geotechnical conditions and accepted practice.

3. All augers, drilling rods, and tools used during drilling will be thoroughly steam-cleaned. The augers, drilling rods and tools will be stored before use in a clean area.

4. A method blank of the cleaned rods and/or augers will be taken prior to use and if required by regulatory agencies to detect contamination from any previous drilling site.

5. All borings will be advanced according to guidelines provided by the agency under which the drilling operations are to be conducted.

6. The subsurface stratigraphy and aquifer geometry will be determined using cuttings from the drilling operations and by sampling undisturbed soils using a California Modified or appropriate sampler. Logs will be maintained of all borings with details of materials encountered.

7. Depths of all borings will be determined in the field. Ground water or vadose monitoring wells will be constructed in each boring, as appropriate.

SEALING

8. Bentonite or neat cement seals will be tremied to the bottom of all holes which have penetrated clay layers, to protect the integrity of all lower aquifers.

9. All aquifers encountered will be properly isolated using bentonite or neat cement seals.

10. At no time will slotting or sand packs extend through 5-foot thick or thicker clay layers to connect adjacent aquifers unless previously agreed to by local and state agencies.

11. All wells will be sealed at the surface with at least 5 feet of neat cement. A protective locking device will be installed at the surface over the well casing.

12. All surface seals will be inspected by the appropriate agencies as needed.

13. All well casings will be protected against surface infiltration.

SAMPLING (GENERAL)

14. Any materials supplied by the client will reduce the cost of our work. These may include tap water, 55-gallon drums, and DI water. Arrangements will be made before the start of the project.

15. Chemical sampling procedures and sample storage will be conducted under the direction of our consulting laboratory or a consulting analytical chemist.

16. All equipment used during the sampling process will be thoroughly steam-cleaned prior to its use.

17. All samples will be stored in an ice chest and packed in blue ice or ice in such a manner as to prevent sample immersion in melted ice.

18. All samples will be delivered to the consulting laboratory as soon as possible after collection.

19. All sample containers will be opened only by the consulting laboratory which performs the chemical testing.

SOIL SAMPLES

20. Soil samples will be attempted at 5-foot intervals or more frequently as determined in the field.

21. Sample container cleaning blanks may be taken of the steam-cleaned brass liners for quality control purposes at the rate of one per boring.

22. All soil sampling equipment will be disassembled and thoroughly steam-cleaned prior to each usage.

23. The ends of all soil sample liners will be covered with aluminum foil and an air-tight cap which will be wrapped with aluminized tape and properly labeled. All soil samples will be immediately stored in an ice chest and packed with blue ice or ice in such a manner as to prevent immersion in melted ice.

24. All excess soils will be placed in 55-gallon drums for proper disposal.

25. The center of each soil liner will be extracted at the consulting laboratory for appropriate analysis.

WATER SAMPLES

26. At least 3 to 5 well bore volumes will be purged from each well prior to sampling for volatile organic compounds. Purging will be accomplished using a bladder or centrifugal pump, a Honda jet pump with foot valve, or by hand-bailing with a clean teflon bailer. During evacuation, pH, conductivity, and temperature will be monitored and recorded. All samples will be retrieved with a steam-cleaned teflon bailer. Cleaning blanks of the teflon bailer will be taken between each well to be sampled if the client so desires.

27. Samples will not be taken until the pH, conductivity, and temperature measurements have stabilized during well purging.

28. All sampling equipment, including gloves and tape measures will be properly decontaminated between each well.

29. All samples will be placed in the appropriate cleaned containers provided by the project laboratory. The type of container necessary is contingent upon the analysis needed.

SAMPLE RECORDS AND CUSTODY

30. Records will be maintained for all samples collected by Elchleay Engineers Inc. of California.

31. A positive chain-of-custody record will be maintained by Eichleay Engineers Inc. of California for future reference.

32. All records will be maintained under strict confidence by Eichleay Engineers Inc. of California and will be released only by written authorization of the client.

APPENDIX B

BORING LOCATION	See site sketch	DRILL DATE	6/20/95	GROUND EL.
DEPTH/ELEV. WATER	34'	DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 41.5'
DRILL RIG	B-61	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
		0					Advanced boring with 6 5/8" O.D. hollow-stem augers (HA). Samples obtained by driving (DR) a 2" I.D. California split-spoon sampler (CS) using 140# hammer falling 30".
	0.0 - 0.4 Asphalt pavement and subbase						
	0.4 - 41.5 Silty CLAY; dark brown - gray; slightly moist; plastic; moderately soft	2				HA	Strong odor of hydrocarbon
		4					
	5.0 Reddish brown; damp; stiff; few yellow rock pieces, some mottling		5.0 B-1 5	2 5 7	90%	DR	PID: 875 ppm
		6					
CL			6.5				
		8				HA	Odor of hydrocarbon in soil cuttings
		10	10.0 B-1 10	3 6 35	100%	DR	PID: 180 ppm
			11.5				
		12					
		14				HA	
			15.0				
		16	B-1 15	5 8 14	100%	DR	PID: 25 ppm
			16.5				
		18				HA	
		20					

Eichleay Engineers Inc. of California	Marr & Associates 2504 MacArthur Boulevard Oakland, California	EXPLORATION BORING LOG Project No. 4872 Sheet No. 1 of 3	BORING NO. B-1

BORING LOCATION	See site sketch	DRILL DATE	6/20/95	GROUND EL.
DEPTH/ELEV. WATER	34'	DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 41.5'
DRILL RIG	B-61	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
	20.0	20	20.0				
	Light brown; some sand and gravel; damp		B-1 20	7 10 24	100%	DR	PID: 11 ppm
		22	21.5				
	25.0					HA	
	Sand 5-10%	24					
			25.0				
		26	B-1 25	11 14 28	100%	DR	PID: 19 ppm
			26.5				
CL		28				HA	
	Slightly moist	30	30.0				
			B-1 30	4 7 20	100%	DR	PID: 12 ppm
			31.5				
		32				HA	Water @ 34.0'
		34					
			35.0				
		36	B-1 35	6 11 29	100%	DR	
			36.5				
		38				HA	
		40					

Eichleay Engineers Inc. of California	Marr & Associates 2504 MacArthur Boulevard Oakland, California	EXPLORATION BORING LOG Project No. 4872	Sheet No. 2 of 3	BORING NO. B-1

BORING LOCATION	See site sketch	DRILL DATE	6/20/95	GROUND EL.
DEPTH/ELEV. WATER	34'	DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 41.5'
DRILL RIG	B-61	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
		40	40.0				
			B-1 40	6 6 18	100%	DR	
	B.B. @ 41.5		41.5				
		42					

Well Construction
0.0 - 31.0
Solid 2" I.D. Sch. 40 pvc.

31.0 - 41.0
Slotted (0.010) 2" I.D. Sch. 40 pvc with end cap.

Sand and Seal
0.0 - 2.0
Surface Seal and Christy Box.

2.0 - 28.0
Grout

28.0 - 29.0
Bentonite

29.0 -41.5
#3 Sand

31-40
Slotted
Sand

DISCLAIMER

Data on this log are an approximation of the geologic and subsurface conditions because the information was obtained from indirect, discontinuous, and possibly disturbed sampling necessitated by use of small diameter holes. This log indicates conditions in this hole only on the date indicated and may not necessarily represent conditions at other locations and on other dates. Any water levels shown are subject to verification.

This hole was logged in such a way as to provide data primarily for investigative purposes and not necessarily for the purpose of specific contractors.

This stratification lines or depth intervals represent the approximate boundaries between material types, and the transitions may be gradual.

Soil classifications shown on logs are field classifications based on the Unified Soil Classification System.

BORING LOCATION	See site sketch	DRILL DATE	6/26/95		GROUND EL.
DEPTH/ELEV. WATER	34'	DRILL CONTRACTOR	Gregg Drilling		TOTAL DEPT 35.0'
DRILL RIG	Rhino	BORING DIA.	8"		LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
	0.0 - 0.3 Asphalt and subbase	0					Advanced boring with 6 5/8" O.D. hollow-stem augers (HA). Samples obtained by pushing (P) a 2" I.D. California split spoon sampler.
	0.3 - 10.0 Silty CLAY, dark gray; slightly moist; soft; plastic						
CL		2				HA	The boring is located about 2 feet from an old fill-pipe.
			3.5				Strong odor of Hydrocarbon
		4	B-3 5		90%	P	PID: 210 ppm
	4.0 Brown; ± 30% sand and steam-rounded gravel to 3/4"; damp; stiff		5.0				
		6					
		8					
	8.5 Rock fragments to 1.5"		8.5				Slight odor of Hydrocarbon
			B-3 10		100%	P	PID: 28 ppm
?	10.0 - 18.0 Silty CLAY; light brown with yellow, rust and gray mottlings; damp; stiff; ± 15% sand and gravel; low plasticity; more silt	10	10.0				
CL-ML		12					
			13.5				
		14	B-3 15		100%	P	PID: 12 ppm
			15.0				
		16					
?		18					
			18.5				
CL	Moderate plasticity; ± 5% sand and gravel; moist to damp; multi-color Mottlings.		B-3 20		100%	P	PID: 8 ppm
		20					
			20.0				

Eichleay Engineers Inc. of California	Marr & Associates 2504 MacArthur Boulevard Oakland, California	EXPLORATION BORING LOG Project No. 4872 Sheet No. 1 of 2	BORING NO. B-3

25.35

BORING LOCATION	See site sketch	DRILL DATE	6/26/95	GROUND EL.	
DEPTH/ELEV. WATER	34'	DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT	35.0'
DRILL RIG	Rhino	BORING DIA.	8"	LOGGED BY	F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
		20					
	Silty CLAY; brown; damp; plastic; ± 5% sand	22				HA	
			23.5				
		24	B-3 25		100%	P	
			25.0				
CL		26				HA	
		28					
			28.5				
			B-3 30		100%	P	
		30					
			30.0				
		32				HA	
	± 33.0						
	Moist	V	33.5				
?	34.0	34	B-3 35		100%	P	G.W. @ 34.0, water rose to 30.5 in 30 minutes
ML	Clayey SILT; brown; 30-40% sand; wet; loose						
	B.B. @ 35.0	36					Well Construction 0.0 - 25.0 Solid 2" I.D. Sch. 40 pvc 25.0 - 35.0 Slotted (0.010) 2" I.D. Sch. 40 pvc with end cap Sand and Seal 0.0 - 2.0 Surface seal & christy Box 2.0 - 22.0 Grout 22.0 - 23.0 Bentonite 23.0 - 35.0 Sand
		38					
		40					

DISCLAIMER

Data on this log are an approximation of the geologic and subsurface conditions because the information was obtained from indirect, discontinuous, and possibly disturbed sampling necessitated by use of small diameter holes. This log indicates conditions in this hole only on the date indicated and may not necessarily represent conditions at other locations and on other dates. Any water levels shown are subject to verification.

This hole was logged in such a way as to provide data primarily for investigative purposes and not necessarily for the purpose of specific contractors.

This stratification lines or depth intervals represent the approximate boundaries between material types, and the transitions may be gradual.

Soil classifications shown on logs are field classifications based on the Unified Soil Classification System.

Eichleay Engineers Inc. of California	**Marr & Associates** **2504 MacArthur Boulevard** **Oakland, California**	EXPLORATION BORING LOG Project No. 4872 Sheet No. 2 of 2	BORING NO. B-3

BORING LOCATION	See site sketch	DRILL DATE	6/20/95	GROUND EL.
DEPTH/ELEV. WATER	Dry	DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 16.5'
DRILL RIG	B-61	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
	0.0 - 0.3 Asphalt and Subbase	0					Advanced boring with 6 5/8" O.D. hollow-stem augers (HA). Samples obtained by driving (DR) a 2" I.D. California split-spoon sampler (CS) using 140# hammer falling 30".
	0.3 - 16.5 Silty CLAY; brown; slightly damp; plastic; soft	2				HA	
		4					
			5.0				
		6	B-4 5	2 3 4		DR	PID: 2 ppm
	Some gray and black mottlings		6.5				
CL		8				HA	
		10	10.0				
			B-4 10	2 4 9		DR	PID: 1 ppm
	5-10% fine sand; damp to dry; rust, gray and green mottlings; stiff		11.5				
		12					
		14				HA	
			15.0				
		16	B-4 15	3 8 23		DR	PID: 2 ppm
			16.5				
	B.B. @ 16.5	18					
		20					

DISCLAIMER

Data on this log are an approximation of the geologic and subsurface conditions because the information was obtained from indirect, discontinuous, and possibly disturbed sampling necessitated by use of small diameter holes. This log indicates conditions in this hole only on the date indicated and may not necessarily represent conditions at other locations and on other dates. Any water levels shown are subject to verification.

This hole was logged in such a way as to provide data primarily for investigative purposes and not necessarily for the purpose of specific contractors.

This stratification lines or depth intervals represent the approximate boundaries between material types, and the transitions may be gradual.

Soil classifications shown on logs are field classifications based on the Unified Soil Classification System.

Eichleay Engineers Inc. of California	Marr & Associates 2504 MacArthur Boulevard Oakland, California	EXPLORATION BORING LOG Project No. 4872 Sheet No. 1 of 1	BORING NO. B-4

BORING LOCATION	See site sketch	DRILL DATE	6/21/95, 6/26/95	GROUND EL.
DEPTH/ELEV. WATER		DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 30.0'
DRILL RIG	Rhino	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
	0.0 - 0.3 Asphalt and Subbase	0					Advanced boring with 6 5/8" O.D. hollow-stem augers (HA). Samples obtained by pushing (P) a 2" I.D. California split spoon sampler.
	0.3 - 30.0 Silty CLAY; brown; soft; plastic; slightly moist; some rust mottlings	2					
			3.5				
		4	B-5 5		100%	P	PID: 28 ppm
			5.0				
CL		6				HA	
	8.0 Light brown; ± 10% sand; reddish brown and gray mottlings; damp; stiff	8	8.5				
			b-5 10		100%	P	PID: 10 ppm
		10	10.0				
		12				HA	
			13.5				
		14	B-5 15		100%	P	PID: 6 ppm
	15.0 15% sand with some silt		15.0				
		16				HA	
		18					
	18.5 Interbedded thin sand layers; light brown and rust mottlings; moist		18.5				
			B-5 20			P	Rig broke down - boring dry - 6/21/95
		20	20.0				

BORING LOCATION	See site sketch	DRILL DATE	6/21/95, 6/26/95	GROUND EL.
DEPTH/ELEV. WATER		DRILL CONTRACTOR	Gregg Drilling	TOTAL DEPT 30.0'
DRILL RIG	Rhino	BORING DIA.	8"	LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
		20					Resumed drilling on 6/26/95; Water in boring @ 10.0'
		22				HA	
			23.5				
CL		24	B-5 25		0%	P	Sample lost- could not be retrieved
			25.0				
		26				HA	
	Light brown; plastic; ± 15% sand; wet	28					
			28.5				
			B-5 30		100%	P	PID: 2 ppm
		30					
			30.0				
	B.B. @ 30.0	32					

Well Construction
0.0 - 15.0
Solid 2" I.D. Sch. 40 pvc
15.0 - 25.0
Slotted (0.010) 2" I.D. Sch. 40 pvc with end cap

Sand and Seal
0.0 - 2.0
Surface seal & Christy Box
2.0 - 12.0
Grout
13.0 - 13.0
Bentonite
13.0 - 30.0
Sand

15.25

DISCLAIMER

Data on this log are an approximation of the geologic and subsurface conditions because the information was obtained from indirect, discontinuous, and possibly disturbed sampling necessitated by use of small diameter holes. This log indicates conditions in this hole only on the date indicated and may not necessarily represent conditions at other locations and on other dates. Any water levels shown are subject to verification.

This hole was logged in such a way as to provide data primarily for investigative purposes and not necessarily for the purpose of specific contractors.

This stratification lines or depth intervals represent the approximate boundaries between material types, and the transitions may be gradual.

Soil classifications shown on logs are field classifications based on the Unified Soil Classification System.

BORING LOCATION	See site sketch	DRILL DATE	6/26/95		GROUND EL.
DEPTH/ELEV. WATER	Dry	DRILL CONTRACTOR	Gregg Drilling		TOTAL DEPT 20.0'
DRILL RIG	Rhino	BORING DIA.	8"		LOGGED BY F.S.

Soil Class	Description	Depth	Sample No.	PR/PRD	Rec.	Mode	Remarks
	0.0 - 1.5 Topsoil and roots	0					Advanced boring with 6 5/8" O.D. hollow-stem augers (HA). Samples obtained by pushing (P) a 2" I.D. California split spoon sampler.
	1.5 - 20.0 Silty CLAY; brown; 25% sand and gravel; damp to dry; stiff; slightly plastic	2				HA	
CL			3.5				
		4	B-6 5		100%	P	PID: 12 ppm
			5.0				
	6.0 10% sand and gravel; slightly damp; some gray and rust mottlings; rock fragments to 1/2"	6				HA	
		8	8.5				
			B-6 10		100%	P	PID: 8 ppm
		10	10.0				
		12				HA	
			13.5				
		14	B-6 15		100%	P	PID: 2 ppm
?	Clayey SILT; light brown; gray and rust mottlings; dense; slightly damp; 35 - 40% sand and stream-rounded gravel to ± 1"		15.0				
ML		16				HA	
		18	18.5				
			B-6 20		100%	P	
		20					

DISCLAIMER

Data on this log are an approximation of the geologic and subsurface conditions because the information was obtained from indirect, discontinuous, and possibly disturbed sampling necessitated by use of small diameter holes. This log indicates conditions in this hole only on the date indicated and may not necessarily represent conditions at other locations and on other dates. Any water levels shown are subject to verification.

This hole was logged in such a way as to provide data primarily for investigative purposes and not necessarily for the purpose of specific contractors.

This stratification lines or depth intervals represent the approximate boundaries between material types, and the transitions may be gradual.

Soil classifications shown on logs are field classifications based on the Unified Soil Classification System.

B.B @ 20.0

Eichleay Engineers Inc. of California	Marr & Associates 2504 MacArthur Boulevard Oakland, California	EXPLORATION BORING LOG Project No. 4872 Sheet No. 1 of 1	BORING NO. B-6

APPENDIX C

Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road, Concord, California 94520 • 510-689-7000 • FAX 510-689-7006

SITE SAFETY EVALUATION FORM

A. SITE DESCRIPTION

Project Name and No. Subsurface Investigation 4872 Date 6/1/95

Location Corner of Boston Ave. & MacArthur Blvd. Project Manager Fred Serafin

Site Condition Old gas station — Presently auto repair

Scope of Work Drilling, installation of monitoring wells, sampling

B. PERSONNEL AND PERSONAL PROTECTIVE EQUIPMENT

Name	Firm	Job Description	Level of Protection	Monitoring Equipment	PPE
Fred Serafin	Eichleay	Project Manager	D	PID	*
Drillers	Gregg Drilling	Drilling	D	"	*
* Hard hat, safety shoes, eye protection, hearing protection,					

Decontamination Procedures 1) Soap and water between sampling
2) Equipment steam cleaned

C. EMERGENCY CONTACTS

All sites working with hazardous waste require a portable telephone.

Nearest public telephone (within 2 to 5 minutes of site) 30 sec. other side of the street

Mileage from site to nearest public telephone 200 yds.

If over 5 miles, name of person working on-site trained in CPR/First Aid: —

	NAME	ADDRESS	TEL.NO
Site Contact:	Eric Fok	2504 MacArthur	531-5573
Fire Department:			911
Police Department:			911
Poison Control Center:			911
Eichleay Contact:	Fred Serafin	1390 Willow Pass Rd., Conc.	689-7000
Nearest Hospital: (Attach map)	Merrit Peralta	350 Hawthorne	655-4000

D. HAZARDOUS IDENTIFICATION LIST

see attached

HAZARDS IDENTIFICATION

Chemical Name	PEL/TLV	IDLH	Unit	LEL (%)	Highest Concentration (PPM)			Symptoms of Acute Exposure	Instrument Response Factors		
					Air	Water	Soil		PID	FID	Other
Benzene	0.1 ppm	Carc.		1.30							
Toluene	50 ppm	2000		1.30							
Ethylbenzene	100 ppm	1000		1.00							
Xylenes	100 ppm	1000		1.10							

OTHER POTENTIAL HAZARDS

Radioactive Materials ____
Pathogens ____
Cold ____
Oxygen Deficiency ____
Poisonous Animals ____
Heat ____
Underground Utilities ____
Aboveground Utiliites ____
Other ____

APPENDIX D

CHROMALAB, INC.

Environmental Services (SDB)

June 28, 1995 *Submission #:* 9506298

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: GRACE AUTO/MARR *Project#:* 4872
Received: June 21, 1995

re: 5 samples for Gasoline and BTEX analysis.

Matrix: SOIL
Sampled: June 20, 1995 *Run:* 7333-J *Analyzed:* June 26, 1995
Method: EPA 5030/8015M/8020

Spl #	CLIENT SMPL ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
93309	B-1-5	310	N.D.	N.D.	1300	N.D.
	Note: GAS DET.LIMIT=200mg/Kg,BTEX DET.LIMIT=1000ug/Kg					
93310	B-1-10	470	N.D.	N.D.	1700	1700
	Note: GAS DET.LIMIT=20mg/Kg,BTEX DET.LIMIT=100ug/Kg					
93316	B-1-40	N.D.	N.D.	N.D.	N.D.	N.D.
93319	B-4-15	N.D.	N.D.	N.D.	N.D.	N.D.
93322	B-5-15	N.D.	N.D.	N.D.	N.D.	N.D.
	Reporting Limits	1.0	5.0	5.0	5.0	5.0
	Blank Result	N.D.	N.D.	N.D.	N.D.	N.D.
	Blank Spike Result (%)	104	104	105	104	107

Jack Kelly
Chemist

Ali Kharrazi
Organic Manager

CHROMALAB, INC.

Environmental Services (SDB)

June 28, 1995 *Submission #:* 9506298

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: GRACE AUTO/MARR *Project#:* 4872
Received: June 21, 1995

re: 1 sample for Diesel analysis.

Matrix: SOIL *Extracted:* June 22, 1995
Sampled: June 20, 1995 *Run:* 7370-D *Analyzed:* June 23, 1905
Method: EPA 3550/8015M

Spl # CLIENT SMPL ID	DIESEL (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
93309 B-1-5	3.8	1.0	N.D.	104

Dennis Mayugba
Chemist

Ali Kharrazi
Organic Manager

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

June 27, 1995 *Submission #:* 9506298

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: GRACE AUTO/MARR *Project#:* 4872
Received: June 21, 1995

re: 1 sample for Oil and Grease analysis.

Matrix: SOIL *Extracted:* June 26, 1995
Sampled: June 20, 1995 *Run:* 7332-C *Analyzed:* June 26, 1995
Method: STANDARD METHODS 5520 E&F

Spl # CLIENT SMPL ID	OIL & GREASE (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
93322 B-5-15	N.D.	50	N.D.	88

Carolyn House
Extractions Supervisor

Ali Kharrazi
Organic Manager

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

June 29, 1995 Submission #: 9506298

EICHLEAY ENGINEERS INC. OF CA
Suite 600, 1390 Willow Pass Road
Concord, CA 94520

Attn: Fred Serafin

RE: Analysis for project GRACE AUTO/MARR, number 4872.

REPORTING INFORMATION

Samples were received cold and in good condition on June 21, 1995. They were refrigerated upon receipt and analyzed as described in the attached report. ChromaLab followed EPA or equivalent methods for all testing reported.

Deviation from standard conditions was found in the following:

Over the weekend of June 24-25, one of ChromaLab's sample storage refrigerators failed. The temperature inside the cooler rose above the upper temperature control limit. The tests affected are listed below.

Please call us if you have questions regarding them.

SAMPLES SUBMITTED IN THIS REPORT

Client Sample ID	Matrix	Date collected	Sample #
B-5-15	SOIL	June 20, 1995	93322

Tests affected by refrigerator failure are: SAMPLE B-5-15 FOR OIL & GREASE.

Jill Thomas
Quality Assurance Manager

Eric Tam
Laboratory Director

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

July 4, 1995 *Submission #:* 9506390

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: GRACE AUTO/MARR *Project#:* 4872
Received: June 27, 1995

re: 4 samples for Gasoline and BTEX analysis.
Method: EPA 5030/8015M/8020

Sampled: June 26, 1995 *Matrix:* SOIL
Run: 7455-B *Analyzed:* July 1, 1995

Spl #	Client Sample ID	Gasoline (mg/Kg)	Benzene (ug/Kg)	Toluene (ug/Kg)	Ethyl Benzene (ug/Kg)	Total Xylenes (ug/Kg)
94109	B-3-5	490	N.D.	380	5300	18000
	Note: Detection limit: btex=200 ug/kg & gasoline=40mg/kg					
94110	B-3-10	N.D.	N.D.	N.D.	N.D.	8.7
94111	B-6-5	N.D.	N.D.	N.D.	N.D.	N.D.
94112	B-3-30	N.D.	N.D.	N.D.	N.D.	N.D.
Reporting Limits		1.0	5.0	5.0	5.0	5.0
Blank Result		N.D.	N.D.	N.D.	N.D.	N.D.
Blank Spike Result (%)		99	108	108	111	111

Billy Thach
Chemist

Ali Kharrazi
Organic Manager

07/05 510 889 7008

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

N:DOS280 BILLY 07:25:33

CHROMALAB, INC.

Environmental Services (SDB)

July 5, 1995 *Submission #:* 9506390

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: GRACE AUTO/MARR *Project#:* 4872
Received: June 27, 1995

re: 3 samples for Diesel analysis.
Method: EPA 3550/8015M

Sampled: June 26, 1995 *Matrix:* SOIL *Extracted:* June 30, 1995
Run: 7448-D *Analyzed:* July 2, 1995

Spl # Client Sample ID	DIESEL (mg/Kg)	REPORTING LIMIT (mg/Kg)	BLANK RESULT (mg/Kg)	BLANK SPIKE RESULT (%)
94109 B-3-5	N.D.	1.0	N.D.	95
94110 B-3-10	N.D.	1.0	N.D.	95
94111 B-6-5	N.D.	1.0	N.D.	95

Dennis Mayugba
Chemist

Ali Kharrazi
Organic Manager

CHROMALAB, INC.

Environmental Services (SDB)

July 11, 1995 *Submission #:* 9507055

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: MARR ASSO. *Project#:* 4872
Received: July 7, 1995

re: 3 samples for Gasoline and BTEX analysis.
Method: EPA 5030/8015M/602/8020

Sampled: July 7, 1995 *Matrix:* WATER
Run: 7576-J *Analyzed:* July 11, 1995

Spl # Client Sample ID	Gasoline (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)
95149 B-1	0.06	0.5	2.8	1.2	6.0
95150 B-3	0.20	2.7	12	4.4	23
95151 B-5	0.38	N.D.	1.7	1.5	5.1
Reporting Limits	0.05	0.5	0.5	0.5	0.5
Blank Result	N.D.	N.D.	N.D.	N.D.	N.D.
Blank Spike Result (%)	101	98	100	100	99

Jack Kelly
Chemist

Ali Kharrazi
Organic Manager

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

July 13, 1995 *Submission #:* 9507055

EICHLEAY ENGINEERS INC. OF CA

Atten: Fred Serafin

Project: MARR ASSO. *Project#:* 4872
Received: July 7, 1995

re: 3 samples for Diesel analysis.
Method: EPA 3510/8015M

Sampled: July 7, 1995 *Matrix:* WATER *Extracted:* July 11, 1995
Run: 7616-D *Analyzed:* July 11, 1995

Spl #	Client Sample ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE RESULT (%)
95149	B-1	N.D.	50	N.D.	84
95150	B-3	N.D.	50	N.D.	84
95151	B-5	N.D.	50	N.D.	84

Dennis Mayugba
Chemist

Ali Kharrazi
Organic Manager

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHAIN OF CUSTODY FORM

Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road,
Concord, California 94520
• 510-689-7000 • FAX 510-689-7006

Project: Grace Auto/MARR
Job Number: 4872
Project Manager: Fred Serafin
Date: 6/21/1995

Laboratory: Chromalab
Turnaround Time: Normal
Results To: Fred Serafin
Samplers: FS

UBM #: 9506298 REP: PM
CLIENT: EICHLEAY
DATE: 06/28/95
SDF #:22558

ITEM NO.	SAMPLE NUMBER	DATE AND TIME SAMPLED		MATRIX	# CONTAINERS & PRESERVATIVES						ANALYSIS REQUESTED							
		Date	Time		UNPRESERVED	H_2SO_4	HNO_3	HCl			TPH-G w/ BTEX	TPH-D						COMMENTS
1	B-1-5	6/20/95	8:05	Soil	✓					✓	✓	✓						
2	B-1-10	"	8:15	"	✓					✓	✓							
3	B-1-15	"	8:25	"	✓													Hold
4	B-1-20	"	8:35	"	✓													"
5	B-1-25	"	8:50	"	✓													"
6	B-1-30	"	9:10	"	✓													"
7	B-1-35	"	9:25	"	✓													"
8	B-1-40	"	9:50	"	✓					✓	✓							
9	B-4-5	"	10:50	"	✓													Hold
10	B-4-10	"	10:58	"	✓													"
11	B-4-15	"	11:20	"	✓					✓	✓							
12																		

MISCELLANEOUS

Number of Coolers	Type of Coolant
1	ICE

COMMENTS:

Page 1 of 2

CHAIN OF CUSTODY RECORD

Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
F. A. Lunati, Eichleay	
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Dispatched by: (signature & affiliation) Date/Time	Received for lab by: Date/Time

Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road,
Concord, California 94520
• 510-689-7000 • FAX 510-689-7006

CHAIN OF CUSTODY FORM

Project: Grace Auto/MARR
Job Number: 4872
Project Manager: Fred Serafin
Date: 6/21/1995

Laboratory: Chromalab
Turnaround Time: Normal
Results To: Fred Serafin
Samplers: FS

ITEM NO.	SAMPLE NUMBER	DATE AND TIME SAMPLED: Date	DATE AND TIME SAMPLED: Time	MATRIX	# CONTAINERS & PRESERVATIVES: UNPRESERVED	H_2SO_4	HNO_3	HCl			ANALYSIS REQUESTED / TYPE OF CONTAINER: TPH-G w/BTEX	Oil & Grease						COMMENTS
1	B-5-5'			Soil	✓													Hold
2	B-5-10			"	"							✓						"
3	B-5-15			"	"						✓							
4	B-5-20			"	"													Hold
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

MISCELLANEOUS

Number of Coolers	Type of Coolant
1	

COMMENTS:

Page 2 of 2

CHAIN OF CUSTODY RECORD

Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
F. L. [illegible], Eichleay	[illegible]
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Relinquished by: (signature & affiliation)	Received by: (signature & affiliation) Date/Time
Dispatched by: (signature & affiliation) Date/Time	Received for lab by: Date/Time

Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road,
Concord, California 94520
• 510-689-7000 • FAX 510-689-7006

Project: Grace Ruto / MARR
Job Number: 4872
Project Manager: Fred Serafin
Date: 6/26/1995

CHAIN OF CUSTODY FORM

Laboratory: Chromalab
Turnaround Time: Normal
Results To: Fred Serafin
Samplers: FS

ITEM NO.	SAMPLE NUMBER	DATE AND TIME SAMPLED		MATRIX	# CONTAINERS & PRESERVATIVES						ANALYSIS REQUESTED / TYPE OF CONTAINER							COMMENTS
		Date	Time		UNPRESERVED	H_2SO_4	HNO_3	HCl			TPH-G w/BTEX	TPH-D						
1	B-3-5	6/26/95	9:30	Soil	✓					1	✓	✓						
2	B-3-10		9:35							1	✓	✓						
3	B-3-15		9:45															Hold
4	B-3-20		9:55															Hold
5	B-3-25		10:15															Hold
6	B-3-30		10:30							1	✓							
7	B-3-35		11:00															Hold
8	B-6-5		8:25								✓	✓						
9	B-6-10		8:30															Hold
10	B-6-15		8:40															Hold
11	B-6-20	↓	8:55	↓	↓													Hold
12																		

URM #: 9506390 REP: PM
CLIENT: EICHLEAY
DE: 07/05/95
EF #: 27675

MISCELLANEOUS

Number of Coolers	Type of Coolant
1	Ice / Blue Ice

COMMENTS:

Page 1 of 1

CHAIN OF CUSTODY RECORD

Relinquished by: (signature & affiliation)	Date/Time	Received by: (signature & affiliation)	Date/Time
[signature]		[signature]	6-27-95 1935
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	
Dispatched by: (signature & affiliation)	Date/Time	Received for lab by:	Date/Time

Eichleay Engineers Inc.
of California

Suite 600, 1390 Willow Pass Road,
Concord, California 94520
• 510-689-7000 • FAX 510-689-7006

Project: MARK ASSO.
Job Number: 4872
Project Manager: Fred Serafin
Date: 7/7/1995

CHAIN OF CUSTODY FORM

Laboratory: Chromalab
Turnaround Time: 5 days
Results To: Fred Serafin
Samplers: KL/ES

SUBM #: 9507055 REP: PM
CLIENT: EICHLEAY
DUE: 07/14/95
REF #:22811

ITEM NO.	SAMPLE NUMBER	DATE AND TIME SAMPLED		MATRIX	# CONTAINERS & PRESERVATIVES						ANALYSIS REQUESTED / TYPE OF CONTAINER							
		Date	Time		UNPRESERVED	H_2SO_4	HNO_3	HCl			TPH-G/BTEX	TPH-D						COMMENTS
1	B-1	7/7/95	P.M.	H_2O	1			2			✓	✓						
2	B-3	"	"	"	1			2			✓	✓						
3	B-5	"	"	"	1			2			✓	✓						
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

MISCELLANEOUS

Number of Coolers	Type of Coolant
1	ICE

COMMENTS:
Low or ND TPH on field screen
devise.

Page 1 of 1

CHAIN OF CUSTODY RECORD

Relinquished by: (signature & affiliation)	Date/Time	Received by: (signature & affiliation)	Date/Time
F. A. [illegible]	7/7/95 14:15		
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	Date/Time
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	Date/Time
Relinquished by: (signature & affiliation)		Received by: (signature & affiliation)	Date/Time
Dispatched by: (signature & affiliation)	Date/Time	Received for lab by: Chris Romley	7/7/95 14:55

APPENDIX E

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94588-5127 ♦ PHONE (510) 484-2600 FAX (510) 462-3914

May 22, 1995

Eichleay Engineers
1390 Willow Pass Road, Suite 600
Concord, CA 94520

Gentlemen:

Enclosed is drilling permit 95314 for a monitoring well construction project at 2504 MacArthur Boulevard in Oakland for Marr Associates.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number. Please submit the original of your completion report. We will forward your submittal to the California Department of Water Resources.

If you have any questions, please contact **Wyman Hong** at extension 235 or me at extension 233.

Very truly yours,

Craig A. Mayfield

Craig A. Mayfield
Water Resources Engineer III

WH:djf
enc.

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 2504 MacArthur Blvd.
Oakland, CA 94602

CLIENT
Name Marr Associates
Address 27737 Fallen Leaf Ct. Voice (510) 482-1536
City Hayward, CA Zip 94542

APPLICANT
Name Eichleay Engineers Inc. of California
1390 Willow Pass Rd. Fax (510) 689-7006
Address Suite 600 Voice (510) 689-7000
City Concord, CA Zip 94520

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	✓
Monitoring	✓	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger ✓
Cable ___ Other ___

DRILLER'S LICENSE NO. 485165 (GREGG DRILLING)

WELL PROJECTS
Drill Hole Diameter ±8 in. Maximum
Casing Diameter 2 in. Depth 30 ft.
Surface Seal Depth ±10 ft. Number 3

GEOTECHNICAL PROJECTS
Number of Borings 3 Maximum
Hole Diameter 8 in. Depth 30 ft.

ESTIMATED STARTING DATE June 5, 1995
ESTIMATED COMPLETION DATE June 6, 1995

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE F. A. Serafin Date 5/17/95
Fred Serafin
Eichleay Engineers

FOR OFFICE USE

PERMIT NUMBER 95314
LOCATION NUMBER

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well Projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

(C.) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 19 May 95
Wyman Hong

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