PROBLEM ASSESSMENT REPORT

ARCO Service Station
1401 Grand Avenue
San Leandro, California

Aegis Project No. 91-001

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

This report documents the results of the limited subsurface investigation conducted by Aegis Environmental, Inc. (Aegis), located at 1401 Grand Avenue in San Leandro, California (Figure 1). This investigation was in response to a request from the property owner, Mr. Manmohan Chopra.

1.1 Purpose

The purpose of the investigation was to further:

- characterize soil and hydrogeologic conditions beneath the site; and,
- assess the presence and extent of petroleum hydrocarbons, if any, in soil and groundwater beneath the site.

1.2 Scope

The scope of work completed at the site was performed according to the Aegis standard operating procedures included in Appendix A, and included the following activities:

- From September 15 through 18, 1992, five soil borings were drilled on site to approximately 56 feet below surface. The borings were logged, sampled, and completed as 4-inch-diameter groundwater monitoring wells MW-1 through MW-5 at the locations indicated on Figure 2. Wells MW-1 and MW-2 were installed to be used as both groundwater monitoring and vapor extraction wells.
- Based on results of field observations and measurements, thirty-two soil samples were selected and submitted to a state-certified laboratory for analysis of petroleum hydrocarbons.
- Approximately 7 cubic yards of soil cuttings from the borings were placed on and covered by plastic sheeting. Two samples were collected from the stockpiled soil and submitted to a state-certified laboratory for analysis.
- Each monitoring well was developed and purged until a minimum of three wetted-casing volumes were removed. Purgewater was collected and temporarily stored in 55-gallon, Department of Transportation (DOT) barrels pending disposal.
- On September 25, 1992, a survey of the top-of-casing elevation and location of each well was completed by a licensed surveyor.

- On October 7, 1992, a short-term vapor extraction test, consisting of individual testing of wells MW-1 and MW-2, was conducted.

- On October 7, 1992, rising head tests were conducted in MW-1, MW-2, and MW-4 to determine hydrogeologic parameters.

2.0 BACKGROUND

2.1 Site Description

The site is located at 1401 Grand Avenue in San Leandro, California (Figure 1), within a commercial/residential section, and is an active convenience market and service station that retails unleaded gasoline. The current property owner, Mr. Chopra, leased the station between July 1986 and March 1988, purchased the station in March 1988, and operated the site until August 1990. The current lessee is Mr. Jay Anast who has been operating the site since August 1990.

Four underground storage tanks (UST) are located at the locations indicated on Figure 2. Table 1 summarizes the type, capacity, and product stored in each tank.

2.2 Previous Investigation

- On April 24, 1991, a limited subsurface investigation was performed by Aegis ("Soil Boring Results Report," dated June 10, 1991). The investigation included drilling four soil borings to a vertical depth of approximately 40 feet below existing grade at the locations indicated on Figure 2. A total of nine soil samples were analyzed for concentrations of total petroleum hydrocarbons (TPH), as gasoline, and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8260. In addition, soil samples were analyzed for total lead by EPA Method and 7420. The analytical results are summarized in Table 3.

- On June 22, 1992, a limited subsurface investigation was conducted by Aegis ("Initial Subsurface Investigation Results Report," dated June 22, 1992). The investigation included three soil borings (B-5 through B-7) drilled to approximately 49 feet true vertical depth below surface (Figure 2). The borings were drilled at an angle of 26 to 28 degrees from vertical to collect soil samples from beneath the UST. A total of twenty-two soil samples were analyzed for concentrations of TPH, as gasoline, by EPA Method 5030 and BTEX by EPA Method 8240. The analytical results are summarized in Table 3.

2.3 Adjacent Land Uses

The site is located adjacent to Interstate Highway 580. A review of Alameda County and San Francisco Bay Area Regional Water Quality Control Board files was conducted by Aegis personnel. The information indicates no adjacent sites with a history of distributing or storing petroleum products.

2.4 Utility Locations

Norcal Geophysical Consultants, Inc., of Petaluma, California, conducted a ground penetrating radar survey on March 25, 1992, at the site. The survey located the excavation housing the UST and product/vent, water, and electrical lines (Figure 2).

2.5 Generalized Geology and Hydrogeology

The bedrock beneath the site is indicated on the "Geologic Map of California" (1975), as sandstone belonging to the Franciscan Formation (KJf), of Jurassic-Cretaceous age. Within the vicinity of the site, the bedrock unit reportedly varies in thickness from 26 to 35 feet. The soils and alluvial materials underlying the site include clay, silty clay, and sand.

Site drainage is mainly to the southwest. The site's vicinity is part of the San Leandro Creek watershed. The nearest stream, San Leandro Creek, is 0.2-miles to the north. On the basis of soil boring data, the estimated depth to groundwater and direction of flow is approximately 43.5 feet below surface and to the south, respectively.

2.6 Water Well Survey

Table 2 summarizes well search (survey) information gathered by Aegis personnel in February 1992 from the California Department of Water Resources regarding both active and inactive municipal, agricultural, industrial, domestic water, and test wells within 1/2 mile of the site (Figure 3).

3.0 RESULTS

3.1 Soil Boring and Sampling

From September 15 through 18, 1992, soil borings MW-1 through MW-5 were drilled to approximately 56 feet below surface at the locations indicated on Figure 2. The five soil borings were completed as 4-inch-diameter groundwater monitoring wells. The borings were drilled with 10-inch-diameter hollow-stem augers.

During drilling, the subsurface soils and alluvial materials of the unsaturated (vadose) zone were sampled at 5-foot intervals. Logs of the soil borings were generated based on field descriptions, and are included as Appendix B.

Figure 4 shows cross-section locations A-A,' B-B,' and C-C'). Figures 5A, 5B, and 5C are generalized cross sections A-A,' B-B,' and C-C,' respectively. As indicated on the cross sections, soil types vary across the site and consist of silty clay, silt, clayey silt, and sandy silt from the surface to between 30 to 35 feet in depth. Below 30 to 35 feet, layers of sand and sandy silt were encountered in the borings.

Saturated soil horizons were first encountered at 42 feet below surface.

3.2 Analytical Results: Soil

A total of thirty-one soil samples were analyzed by NET Pacific, Inc. (NET), of Santa Rosa, California, for concentrations of TPH, as gasoline, by GC-FID Method 5030/8015; and BTEX by EPA Method 8020. In addition, two soil samples containing TPH were analyzed for total metals cadmium, chromium, lead, and zinc by EPA Methods 6010 and 7421 (lead). In each of the borings for MW-1 through MW-5, a sample from below the air-water interface was collected for analysis of petrophysical properties, including (liquid) permeability and grain-size distribution. Results of the petrophysical testing are included in Appendix D. Sieve analysis indicates aquifer materials consist of clayey gravel, sandy gravel, and clayey sand. **Permeability** of the material ranged from 5.6 x 10^{-5} to 1.1 ft/day (2 x 10^{-8} to 4 x 10^{-4} cm/sec). hydraulic conductivity?

The analytical results for gasoline constituents are summarized in Table 3. The analytical reports and chain of custody form(s) are included in Appendix C. Concentrations of benzene and TPH, as gasoline, appear on the cross sections (A-A,' B-B,' and C-C') and Figures 6 and 7.

Concentrations of TPH, as gasoline, exceeding 10 parts-per-million (ppm) were found only in soil samples collected from boring for MW-2. The highest recorded concentration of TPH, as gasoline, was 39 ppm, found in soil sample MW-2/8 collected at 39 feet below surface.

Concentrations of benzene exceeding 0.1 ppm were found in soil samples collected from the borings for wells MW-2 and MW-4. The highest recorded concentration of benzene was 0.27 ppm, found in soil sample MW-4/6 collected at 29.5 feet below surface.

3.3 Groundwater Monitoring Well Installation, Development, and Surveying

Four-inch-diameter groundwater monitoring wells were installed in borings for MW-1 through MW-5 (Figure 2). Groundwater monitoring well construction details are included on the boring logs in Appendix B. The wells were constructed according to the standards found in California Code of Regulations, Title 23, Sections 2647 and 2648.

Based on water levels observed during the drilling, perforated casing was set in wells MW-3 through MW-5 from approximately 35 to 55 feet below surface. Monitoring wells MW-1 and MW-2 were designed as both groundwater monitoring and vapor extraction wells. Perforated casing was set in MW-1 and MW-2 from approximately 15 to 55 feet below grade. Each of the wells was capped with a locking wellhead cap and secured by a water-tight, traffic-rated wellhead vault. The top-of-casing elevation, above mean sea level, of each well was surveyed relative to a nail in the top of the curb at the southwest corner of Grand and Joaquin by a licensed surveyor.

Approximately three wetted-casing volumes were purged from the wells using a 5-foot stainless steel bailer mounted to the drill rig. Well development water was stored temporarily on site in DOT-approved, 55-gallon drums, pending laboratory analysis of the groundwater samples.

3.4 Groundwater Conditions

On September 29, 1992, measurements of the depths to groundwater in well MW-1 through MW-5 were collected by Aegis personnel. Groundwater levels are summarized in Table 4. All groundwater elevation measurements were made from the referenced wellhead elevations, and measured to the nearest 0.01 foot.

Floating liquid hydrocarbons were found in well MW-3. The thickness of floating liquid hydrocarbons, measured using an interface probe, was 0.02 foot.

Figure 6 is a potentiometric surface map of the shallow water-bearing zone on September 29, 1992. On the basis of the September 29, 1992, measurements, groundwater is estimated to flow to the northwest at an average gradient of approximately 0.02 ft/ft.

Groundwater elevations are corrected for the presence of floating liquid hydrocarbons using the formula: CDTW = DTW -(0.75 x LHT), where CDTW is the corrected depth-to-water, DTW is the measured depth-to-water, 0.75 is the density correction factor for unweathered gasoline, and LHT is the liquid hydrocarbon thickness.

3.5 Groundwater Sampling and Analysis

On September 29 1992, Aegis personnel collected groundwater samples from four of the wells at the site. A sample was not collected from monitoring well MW-3 due to the presence of floating hydrocarbons. The samples were submitted under chain-of-custody to NET. The samples were analyzed for concentrations of TPH, as gasoline, by GC-FID/EPA Methods 5030/8015 and BTEX by EPA Method 8020. The analytical results for gasoline constituents are summarized in Table 5. The analytical reports and chain-of-custody form(s) are included in Appendix E. Concentrations of TPH and benzene reported in Table 5 are also shown on Figure 9.

Concentrations of TPH, as gasoline, exceeding 1 ppm were found in groundwater samples collected from wells MW-1 and MW-2. The highest reported concentrations of TPH, as gasoline, and benzene were found in the water sample collected from well MW-2.

3.6 Drill Cuttings and Monitoring Well Purgewater

All drill cuttings were stored temporarily on site, on and under plastic sheeting, pending laboratory analysis of samples collected from the stockpile. Following receipt of the laboratory results, the drill cuttings will be transported, by a licensed hauler, from the site to an appropriate disposal facility.

Rinsewater and purgewater generated during the drilling and development of the wells was stored temporarily on site in DOT-approved 55-gallon drums, pending laboratory analysis of the boring samples. Following receipt of the laboratory results, the water will be transported from the site to an appropriate disposal facility.

3.7 Rising Head Slug Tests

Rising head slug tests were performed in monitoring wells MW-1, MW-4, and MW-2 on October 7, 1992, to estimate the hydraulic conductivity (K) of the water-bearing horizon in the immediate vicinity of the monitoring wells. Prior to the test, a pressure transducer was placed in the wells and connected to a datalogger to record change in water level over time. The test consisted of dropping a 5-foot-long, 3-inch-diameter PVC pipe ("slug"), capped at both ends and filled with clean sand into the wells. After slug inserting, water levels were allowed to stabilize in the well. The slug was "instantaneously" removed from the well and the resulting changes in water levels were recorded. A software package entitled "Aqtesolv" (Geraghty and Miller, Inc., 1989) was used to analyze the data. "Aqtesolv" consists of a curve drawing and matching program. The data is analyzed by plotting the time verses relative displacement (drawdown) of groundwater on semi-log paper and matching the data with an appropriate type curve. The method of analysis depends on site-specific hydrogeologic conditions, both man-made and natural. The method used to analyze the slug test data at 1401 Grand Avenue was developed by H. Bouwer, H. and R. C. Rice to determine hydraulic conductivity of unconfined aquifers

9.37×10^{-7} to 5.088×10^{-6} ms^{-1} ≈ (silty – clean sand)

with completely or partially penetrating wells (Bouwer, et.al., 1976). The calculated values for K ranged from 0.247 to 1.34 ft/day (1.717×10^{-4} to 9.313×10^{-4} feet per minute). Data and assumptions made in analyzing the data are included in Appendix F.

3.8 Soil Vapor Extraction Test Procedure and Results

A short-term soil vapor extraction test consisting of individual tests of two wells, MW-1 and MW-2, was conducted on October 7, 1992. Monitoring wells MW-3, MW-4, and MW-5 (Figure 2) were used as vacuum influence monitoring points. The purpose of the test was to obtain information related to the soil vapor extraction rates, soil vapor hydrocarbon concentrations, and extent of vacuum influence for design of a soil venting system.

A portable soil venting blower was used to induce vacuum/airflow from the test wells. No fresh air was artificially admitted into the system. As required by the Bay Area Air Quality Management District (BAAQMD), during this test, soil vapors from the test wells (blower exhaust) were routed through an emission control device prior to discharge to the atmosphere. An internal combustion engine fueled by propane was used for emissions control.

Individual tests were performed on groundwater/vapor extraction wells MW-1 and MW-2. The recorded airflow rates from well MW-1 varied from 90.5 to 91.6 cubic feet per minute (cfm) at a vacuum of between 31.5 to 33 inches of water. The average airflow rate from the test well was 3.2 cfm/ft of open well screen at an average vacuum of 32 inches of water. A measurable vacuum (greater than 0.006-inches water) was recorded in observation wells MW-2, MW-3, MW-4, and MW-5 located at distances of 38, 50, 50, and 38 feet from the test well MW-1, respectively.

The recorded airflow rates from the test of MW-2 varied from approximately 48 to 51.2 cfm at a vacuum of between 6 and 7 inches of water. The average airflow rate from the well was 1.9 cfm/ft of open well screen at an average vacuum of 6.7 inches of water. A measurable vacuum (greater than 0.01-inches water) was measured at monitoring wells MW-1, MW-3, and MW-4 located at distances of 38, 52, and 20 feet, respectively, from the test well MW-2. Monitoring well MW-5, located at a distance of 72 feet from the test well, did not record any measurable vacuum during the test of MW-2.

Periodic soil vapor hydrocarbon concentrations from the test wells, measured with a flame ionization detector on site varied from 15,250 to 8,750 ppm by volume. A soil-gas sample was collected at the blower exhaust at the end of each 150-minute test. The air samples were delivered under chain-of-custody to NET and analyzed for concentrations of TPH, as gasoline, by GC-FID/EPA Methods 5030/8015 and BTEX by EPA Method 8020. The analytical reports and chain-of-custody form(s) are included in Appendix G. Test data and analytical laboratory results are summarized on Table 6.

Based on laboratory analytical results, the benzene extraction rate from MW-1 was 1.7 lbs/hour, and the TPH, as gasoline, extraction rate was 8.5 lbs/hour. The extraction rates from MW-2 were: benzene 1.5 lbs/hour; and TPH, as gasoline, 40.4 lbs/hour. Based on the hourly hydrocarbon extraction rates during the test (Table 6) and an airflow rate of 100 cfm, the initial TPH, as gasoline, and benzene extraction rates could be as high as 2,070 and 45 lbs/day, respectively.

Results of the tests indicate soil venting is feasible if pursued as a soil remedial option at the site. A soil venting system could be designed using MW-1 and MW-2 as vapor recovery wells. Specific air discharge requirements must be met when operating any remediation system that emits hydrocarbons to the atmosphere under the jurisdiction of the BAAQMD. The results of the venting test indicate emissions controls would be required.

4.0 SITE ASSESSMENT

4.1 Soil Boring and Sampling

Soil borings B-1 through B-4 were drilled to 40 feet below surface at the locations indicated on Figure 2. Borings B-3 through B-5 were drilled at an angle to a vertical depth of approximately 40 feet to determine soil conditions directly beneath the UST. The borings for MW-1 through MW-5 were drilled to 56 feet below grade to determine the extent of petroleum hydrocarbons soil. The borings for MW-1 through MW-5 were completed as 4-inch-diameter groundwater monitoring wells.

Figure 2 shows cross-section locations A-A' and B-B.' Figures 5A and 5B are generalized cross sections A-A' and B-B'. As shown on the cross sections, soil types vary across the site and consist of silty clay, silt, clayey silt, and sandy silt from the surface to between 30 to 35 feet in depth. Below 30 to 35 feet, layers of sand and sandy silt were encountered in the borings.

Saturated soil horizons were first encountered at 42 feet below surface.

4.2 Distribution of Petroleum Hydrocarbons: Soil

Figures 7 and 8 indicate the isoconcentration contour maps of TPH, as gasoline, in soil at 19 to 21 and 35 to 40 feet below grade, respectively. As shown on the figures, the highest concentrations of petroleum hydrocarbons in soil to date are located below the super-unleaded UST at a depth of 40 feet. As indicated on the figures, a zero line for petroleum hydrocarbons in soil can be inferred around the fuel distribution and storage area on site.

4.3 Distribution of Petroleum Hydrocarbons: Groundwater

Figure 10 indicates the distribution of concentrations TPH, as gasoline, and benzene in the groundwater based on data collected on September 29, 1992. As shown on the figure, the highest concentrations of dissolved petroleum hydrocarbons in water were reported in the water sample from well MW-2. Also, floating liquid hydrocarbons were reported in well MW-3.

5.0 REMEDIAL ACTION ALTERNATIVES

The following sections discuss appropriate soil and groundwater remedial alternatives. Each section provides a general description and technical critique of the respective remediation alternative.

5.1 Soil

In general, soil remediation alternatives are dictated by site size, subsurface conditions, contaminant types, contaminant concentrations, and the volume of contaminated soil. Soil remediation alternatives can be broken into two broad categories; ex-situ and in-situ. Ex-situ soil remediation involves excavation of the soil and the selection of an appropriate treatment and/or disposal option. In-situ remediation options generally include the prevention of the migration of contaminants or destruction/removal of the contaminants while still in the subsurface. Typically, soil treatment options are effective for a limited number of organic compounds. The presence of certain organic compounds (polychlorinated byphenyls, certain pesticides, etc.) and certain inorganic compounds (metals, acids, etc.) above regulated concentrations may limit treatment and disposal options. In some cases where multiple contaminants are involved, treatment is utilized to reduce contaminant concentrations of a select number of compounds in order to increase disposal options.

5.1.1 No Action

This alternative to soil cleanup involves one of the following: 1) the completion of a health risk assessment indicating hydrocarbons in soil do not pose a threat to public health and/or groundwater. A formal health risk assessment prepared by a team of certified industrial hygienists, hydrogeologists, and engineers, discusses site-specific hydrogeologic, contaminant, and site features relating to existing and future biological receptors and groundwater; 2) a negotiated plan to monitor soil and/or groundwater quality without an active remediation system; and 3) completion of a subsurface investigation that indicates hydrocarbons in soil are below required action levels.

All no-action options require horizontal and vertical definition of hydrocarbons in soil and groundwater. When the parameters have been defined, and no significant threat to the public health has been demonstrated, no action at a site may be considered a viable alternative.

5.1.2 Soil Excavation

Excavation of soil involves not only the physical removal, but physical and chemical characterization, disposal, and/or treatment either on or off site. In general, excavation is performed to accomplish at least one of two objectives. The first objective is to remove hydrocarbons from the subsurface. This is feasible when hydrocarbon-bearing soil has been determined to be shallow enough for conventional excavation, site restrictions allow for the excavation, and the vertical and horizontal extent of hydrocarbons has been defined. The second objective for soil excavation is to remove the source of potential impact to groundwater thereby either reducing or eliminating future monitoring and/or remediation requirements. Before excavation is selected as an alternative, the site should be completely characterized and in-situ alternatives of soil remediation explored.

As mentioned above, once excavated, the soil must be treated and/or reclaimed or disposed of at an appropriate facility. Restrictions on disposal of certain types of contaminants may increase the desirability of both on-site and off-site treatment options.

5.1.3 In-Situ Vapor Extraction

In-situ soil vapor extraction utilizes a series of vapor extraction wells to remove volatile organic compounds (VOC) from the soil matrix. A vacuum is applied to the extraction wells, typically by means of a blower, and VOC vapors contained within soil pore spaces are extracted from the subsurface. In-situ vapor extraction can be a time- and cost-effective remedial technology in permeable soil, and if contaminants are volatile at ambient temperatures. Vapor extraction systems have been shown to efficiently remove lighter-chain hydrocarbons from soil. Additionally, vapor extraction systems have been shown to have a positive effect on groundwater quality. If the vapors brought to the surface are of sufficient concentration, treatment of the vapors will be required. Numerous options

are available for treatment of extracted vapors, including thermal destruction, catalytic oxidation, and carbon adsorption. The type of vapor treatment is determined by local air discharge regulations, contaminant types, and concentrations.

5.1.4 Incineration

Incineration of hydrocarbon-bearing soil at the site would require excavation of soil, permitting, and either contracting for a temporary soil incineration unit on site or hauling the soil to an off-site incinerator facility. Typically, these units consist of a combustion chamber and a vapor-treatment system. Soil is introduced into the chamber and heated sufficiently to volatilize and destroy the hydrocarbons present. Fumes generated by the process may be collected and treated by various means. Typically, on-site units treat approximately 500 cubic yards of soil per day to "nondetectable" levels. If the soil is treated on site, it may be feasible to reclaim the material as backfill for the excavation(s). Currently, there are a limited number of units permitted in the western United States that incinerate soil.

5.1.5 Physical Containment

The physical containment of contaminants in soil is accomplished either by the injection of stabilizing agents into the soil matrix or by excavating soil and adding a stabilizing, vitrifying, or encapsulating agent. The success of physical containment methods mainly depends on soil matrix grain size. Soil with a coarse-grained matrix has a relatively high permeability and low attraction between soil particles, thus enhancing the ability of stabilizing agents to completely penetrate the soil. Soil with a fine-grained matrix has a relatively low permeability and higher attraction between soil particles, thus inhibiting the introduction of stabilizing agents and reducing the effectiveness of the stabilizing process. The presence of groundwater in close proximity to a containment area complicates placement of stabilizing agents and the ability of the agents to set up at or below the soil/water interface. Because physical containment does not remove or degrade waste material, long-term monitoring may be required. This alternative is feasible for a wide range of organic and inorganic compounds.

5.2 Groundwater

The following sections discuss groundwater remediation alternatives. The technical approach to groundwater remediation generally falls into two broad categories, ex-situ and in-situ alternatives. An option that is also considered is "no action" and/or monitoring only. Ex-situ groundwater remediation alternatives involve the design, installation, operation, and maintenance of a suitable groundwater extraction and water treatment system. In-situ options include passive approaches to groundwater remediation or injection of various media into the subsurface (soil and/or groundwater) to enhance biodegradation.

5.2.1 No Action

This alternative to groundwater remediation involves a negotiated plan to monitor groundwater quality without an active remediation system. Generally speaking, for this option to be considered, free-phase product must not be present on the groundwater table. For example, it is a matter of policy with the California Regional Water Quality Control Board regarding leaking underground fuel tanks sites that free-phase petroleum product must be removed from the groundwater table in all cases. In any event, contaminants in groundwater must be demonstrated not to pose an immediate and/or long-term threat to the public health.

This option requires definition of the horizontal and vertical extent of hydrocarbons in groundwater via regular sampling of monitoring wells. It must include a complete evaluation of the beneficial uses of the impacted water-bearing zone, as well as the background (regional) quality of the groundwater.

After a complete assessment of the extent of groundwater contamination, the beneficial uses of the water-bearing zone, and background water quality, an in-depth assessment of the potential threat to the public health must be undertaken. In some cases this must be presented in the form of a formal health risk assessment prepared by a certified industrial hygienist. In addition to the issues outlined above, the potential for migration of the groundwater plume must be evaluated. When all of these parameters have been defined, and no significant threat to the public health has been demonstrated, a long-term groundwater monitoring program may be negotiated with the concerned regulatory agencies.

5.2.2 In-Situ Groundwater Remediation Alternatives

As mentioned in Section 5.2, this broad category of groundwater remediation alternatives does not include extraction, treatment, and discharge of treated groundwater. Generally speaking, the technical approach is either to cause or enhance biodegradation and may include injection of various media including, but not limited to, air, nutrients, biocultures, and/or a combination of these elements.

5.2.2.1 In-Situ Vapor Extraction

As with in-situ soil vapor extraction, a groundwater remediation alternative utilizes a series of vapor extraction wells to remove volatile hydrocarbons from the subsurface. A vacuum is applied to the extraction wells, typically by means of a blower, and volatile constituents on and dissolved in groundwater may be effectively removed. In-situ vapor extraction can be a time- and cost-effective remedial technology in permeable soil, and if contaminants are volatile at ambient temperatures. Vapor extraction systems have been shown to efficiently remove lighter-chain petroleum hydrocarbons from groundwater.

5.2.2.2 In-Situ Bioremediation

This groundwater remediation alternative involves the injection of nutrients, an appropriate bioculture, and air (or some combination of these) into the vadose zone, capillary fringe, and affected areas of the groundwater table. An appropriate monitoring program must be implemented concurrently with the treatment process to evaluate its effectiveness, the rate of biodegradation, and ensure the maintenance of optimum conditions for the biomass. Prior to implementing an in-situ bioremediation alternative, key subsurface conditions and characteristics must be ascertained to ensure the adequacy of this treatment alternative. Some of these key elements include:

1) The lateral and vertical heterogeneity and/or homogeneity of the subsurface material and/or soil types as defined by the Unified Soil Classification System.

2) The horizontal and vertical permeabilities of subsurface soil.

3) The types, concentrations, and distribution of hydrocarbons in the vadose and groundwater zone.

4) The biological and chemical oxygen demand of the water-bearing zone and any potential bioculture.

5) The pH of the affected soil mass and groundwater zone.

6) The identification of any naturally occurring microorganisms present in the subsurface which may potentially consume the contaminants in question.

Once these subsurface characteristics and conditions have been adequately evaluated, a determination must be made as to whether in-situ bioremediation is technically feasible. For example, if permeability of soil represents a potential problem in ensuring the effective introduction of nutrients, bioculture, and/or air into the affected areas of the subsurface, then the feasibility of enhancing local permeabilities must be evaluated. In some cases, these difficulties may be overcome by a series of appropriately located trenches. If a preliminary assessment of the subsurface conditions indicates the lack of appropriate microorganisms, then an appropriate artificial bioculture must be specified. If the pH of soil and/or groundwater is untenable for the proposed bioculture, then a plan to alter the pH to appropriate levels must be developed.

After technical problems have been identified and resolved, a preliminary design of a potential treatment system can be accomplished. The preliminary costs of a potential treatment system can be compared to other groundwater treatment alternatives. Finally, nontechnical considerations, such as the length of remediation, can be considered concurrent with technical feasibility and potential project costs.

5.2.2.3 Air Sparging

Air sparging is used in combination with in-situ bioremediation and/or vapor extraction. A similar evaluation of subsurface characteristics and conditions as those to be assessed for in-situ bioremediation and vapor extraction must be undertaken. With air sparging, subsurface conditions must demonstrate permeability in both the saturated and unsaturated subsurface material materials sufficient for vertical and horizontal airflow. Additionally, hetroegenous subsurface conditions may not be suitable for air sparging. An appropriate demonstrated naturally occurring microorganism colony will further enhance the sparging process. The sparging process typically includes installation of a vapor extraction system and air sparging system which includes a number of perimeter points at which air is discharged into groundwater. A portion of the injected air volatilizes hydrocarbons from both aquifer materials and those dissolved in groundwater. The remaining portion of sparged air dissolves in groundwater and enhances naturally occurring organisms.

As with other groundwater remediation alternatives, once technical feasibility has been demonstrated, a preliminary design of a potential system may be undertaken. At that point, preliminary project costs and nontechnical considerations can be reviewed and the desirability of air sparging versus other or in combination with remediation alternatives may be evaluated.

5.2.3 Ex-Situ Groundwater Remediation Alternatives

Ex-situ groundwater remediation alternatives include the design, installation, and operation of a suitable number of groundwater recovery well(s) located so as to enable the capture of the contaminant plume. Following extraction, contaminated groundwater is treated by an appropriate water treatment-technology to achieve target cleanup levels with treated water being discharged by either reinjection, discharge to sanitary sewer, storm sewers, and/or land surface. This treatment alternative is also referred to as "pump-and-treat" and experience has demonstrated this technology alone is not an effective groundwater treatment alternative. Therefore, groundwater extraction and treatment systems are usually installed for the purpose of hydraulic control, to halt migration of a contaminated plume, and are usually used in combination with in-situ technologies to effectively remediate contaminated groundwater.

The selection of an ex-situ groundwater remediation alternative depends on adequate design of the extraction system (recovery wells). Depending on the site, a suitable water treatment system must be designed to be compatible with the flow rate delivered from the extraction system as well as the contaminant type. Before embarking on design of an extraction and treatment system, the feasibility of discharge of treated water to various receptors, National Pollutant Discharge Elimination System (NPDES) permits, etc., must be considered.

All of the aforementioned design parameters, cleanup objectives, and compatible in-situ treatment technologies must be evaluated to develop the most feasible, cost-effective cleanup system for a specific site.

5.2.3.1 Air Stripping

Air stripping involves the removal of organic compounds by increasing the surface area of the processed groundwater and volatilizing organic compounds by mixing the water with blowing air. The most common air-stripping design is counter-current, packed-tower aeration. Other techniques include vacuum stripping, aspiration stripping, steam stripping, cascading, or water fall aeration, diffuser striping, and surface aeration. To remove compounds that are volatile at higher than ambient groundwater temperature, the air stripping system can be designed to preheat the water or is used in conjunction with a secondary treatment or polisher system, such as activated carbon.

Prior to choosing this method of treatment, flow rates, contaminant types and concentrations, groundwater chemistry, permitting requirements, and space and power requirements must be considered.

The air containing organic compounds is typically discharged from the system. The air discharge should be modeled and permitted where required. Similarly, treatment of the air used to strip compounds from the water may be required by the permitting agencies.

5.2.3.2 Bioremediation

Extracted groundwater may also be treated by use of an aboveground bioreactor. Bioreactors utilize natural or specialized bacteria to remove organic contaminants through aerobic and anaerobic consumption and digestion processes. Digested organic compounds are converted to biomass and harmless byproducts such as methane, carbon dioxide, and inorganic salts. The bioreactor design depends on contaminant concentration and type, flow rates, and groundwater chemistry. Groundwater is pumped from the subsurface and enters a container that contains a sludge or film with a high microbe population that is exposed to the liquid. The reactor capacity is large enough to allow both sufficient surface area for the introduction of the microbes into the groundwater and a sufficient residence time for the microbes to metabolize the organic compounds. The water may be pretreated to adjust the pH and temperature, and to remove inorganic materials that may clog the reactor system or harm the microbes.

5.2.3.3 Ultraviolet Degradation

Ultraviolet (UV) degradation involves pumping extracted water through a UV light source. Two methods of destruction of organic compounds utilizing UV light have been developed. The first method utilizes either a natural or introduced hydroxyl radical source and a UV energy source to destroy organic compounds. The UV light source frees hydroxyl radicals, usually from hydrogen peroxide or ozone, which then react with the organic compound to form carbon dioxide and a secondary byproduct. The second method of UV light destruction involves utilizing a plasma type UV light source with a focused wavelength. This focused energy is absorbed by the organic compound, breaking the molecular bonds. This reaction also produces carbon dioxide and a secondary byproduct. Depending on the type of organic compound being destroyed, the secondary byproduct can potentially be hazardous and may need to be disposed of or treated.

Before utilizing this treatment alternative, groundwater chemistry, contaminant type and concentration, and flow rates must be evaluated.

5.2.3.4 Absorption

Organic compounds may be absorbed onto a medium, such as activated carbon, as a treatment alternative. Once the medium becomes saturated with the compound(s) it must be treated or replaced. Because of the inherent costs associated with treatment or replacement of the medium, this alternative is only practical for low flow and contaminant concentrations and is often used as a secondary treatment in conjunction with other systems. When absorption is used as the primary treatment for dissolved organic compounds, groundwater may need to be pre-treated to remove certain inorganic compounds to prevent clogging of the medium.

5.2.3.5 Direct Discharge or Disposal

Direct discharge or disposal can be a viable remediation alternative when discharge chemistry, contaminant types and concentrations, and flow rates qualify for discharge to a sanitary treatment system, recycling facility, or surface water. Factors that need to be considered prior to selecting this alternative include not only those mentioned above, but the availability of a sanitary treatment facility and/or surface water, transportation costs, permitting requirements, characterization requirements, and liability.

Typically, sanitary districts and recycling facilities require complete characterization of the waste stream, regular monitoring, and a fee for discharge to the facility. Direct discharge to a storm sewer system or surface water body is permitted under the NPDES. The NPDES permit system requires ongoing characterization of the waste stream, complete facility description, and a complete description of the surface water system to which the waste stream is discharged.

5.2.3.6 Separation/Filtration

Separation/filtration of sludge, liquid hydrocarbons (free product), and inorganic compounds is utilized to increase treatment and disposal options of extracted groundwater. Separation typically involves the use of a tank or pond to allow either settling of solids or the separation of undissolved organic constituents from groundwater. The byproducts are regularly collected and disposed of appropriately. Methods of filtration include reverse osmosis, ultrafiltration, microfiltration, bipolar separations, and electrolysis. The newer filtration systems are more chemically resistant and versatile. Filtration systems generate waste concentrate that must also be disposed of appropriately.

6.0 CONCEPTUAL SCHEDULE

Actual selection of a viable option for treatment and/or disposal of hydrocarbon-bearing soil at the site, from those outlined above, depends on a number of variables requiring further definition. These variables include:

- determination of the extent of petroleum hydrocarbons in groundwater; and,
- additional groundwater data to confirm the hydraulic gradient and flow direction.

A conceptual schedule of events to help determine the above variables should include: a) refinement of soil and hydrocarbon volume calculations based on analytical results obtained to date; b) additional groundwater sampling, soil sampling and analysis; c) installation of additional monitoring wells (off site) to determine the extent of petroleum hydrocarbons in groundwater; d) the interim selection and installation/performance of a soil remediation alternate to remove the source of petroleum hydrocarbons in groundwater; and e) testing of the UST, vent lines, and product lines for leaks.

Once determination of the above variables is complete, selection of a remediation option will be documented in a final remedial plan to be submitted to the involved regulatory agencies.

The presence of free-phase and dissolved hydrocarbons in groundwater necessitates the need to address groundwater remediation alternatives. Because of the lack of historical data on groundwater gradient, groundwater chemistry, and flow direction, conclusions about the distribution of petroleum hydrocarbons in groundwater at this time would be premature. Therefore, the selection or design of a groundwater remediation system, based on the currently available data, would also be premature. To address groundwater quality beneath the site, the following is proposed:

- Continued groundwater monitoring to assess the effect of interim floating liquid hydrocarbon removal on groundwater quality and to define chemical and hydrogeologic trends with respect to groundwater;

- Formulate a contingency to add a passive floating liquid hydrocarbon recovery system to the well(s) to be determined on the basis of evaluation of data collected during and after soil remediation; and,

- Formulate a contingency to provide gradient control by extraction and treatment of groundwater as indicated by data collected during future monitoring events.

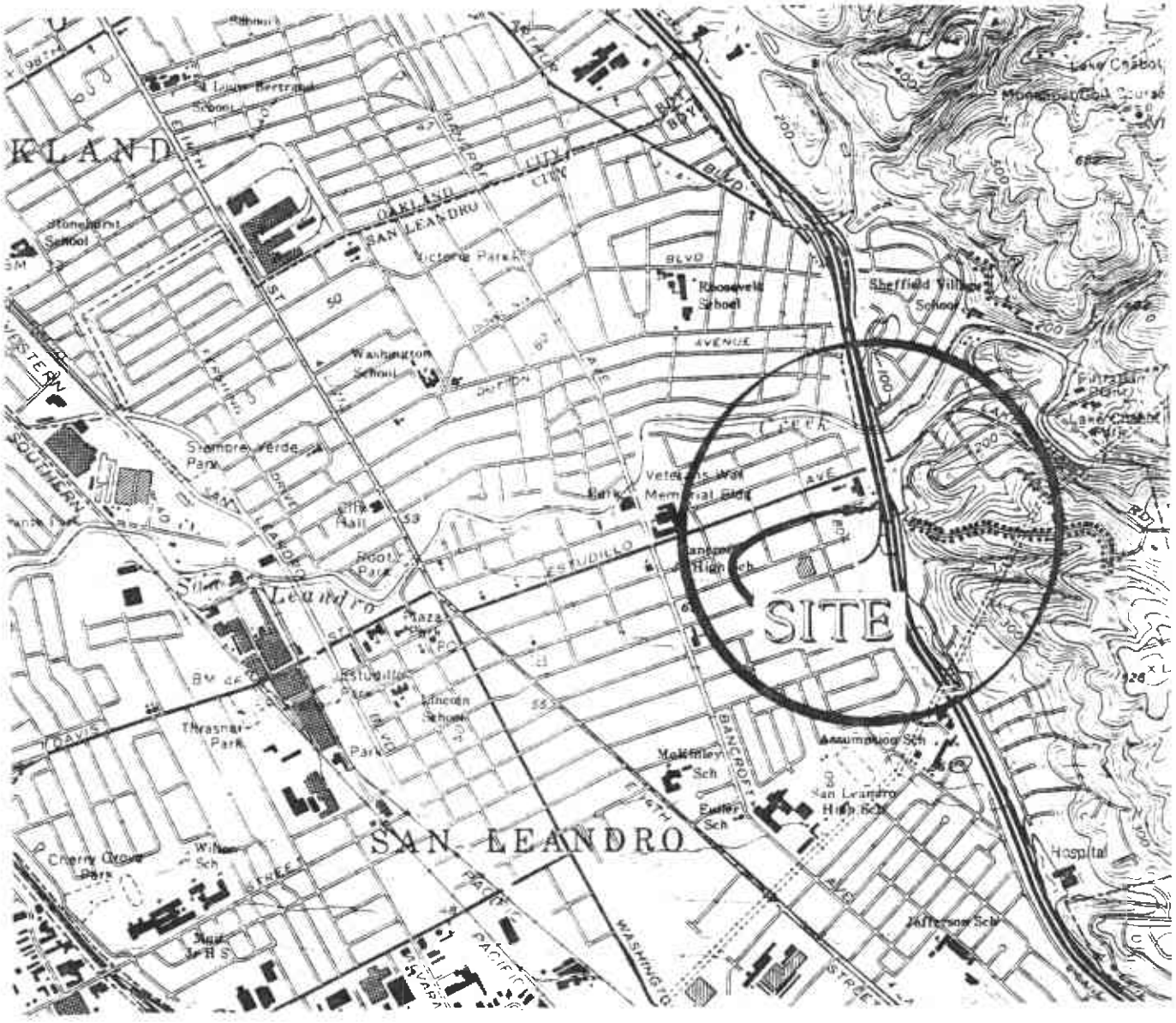
8.0 REFERENCES

Aegis Environmental, Inc., June 1991, "Soil Boring Results Report;" ARCO Service Station 1401 Grand Avenue, San Leandro, California.

Aegis Environmental, Inc., June 1992, "Initial Subsurface Investigation and Results Report," ARCO Service Station 1401 Grand Avenue, San Leandro, California.

Bouwer, H. and R. C. Rice, 1976, "A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells," Water Resources Research, Vol.12, no.3,pp.423-428.

Geraghty and Miller Modeling Ground: Glen M. Duffield and James O. Rumbaugh, October 17, 1989, Aqtesolv, Aquifer Test Solver, Version 1.00.



GENERAL NOTES:

BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
SAN LEANDRO, CALIF.

0 2000 4000
Approximate Scale
1" = 2000'

AEGIS ENVIRONMENTAL, INC.

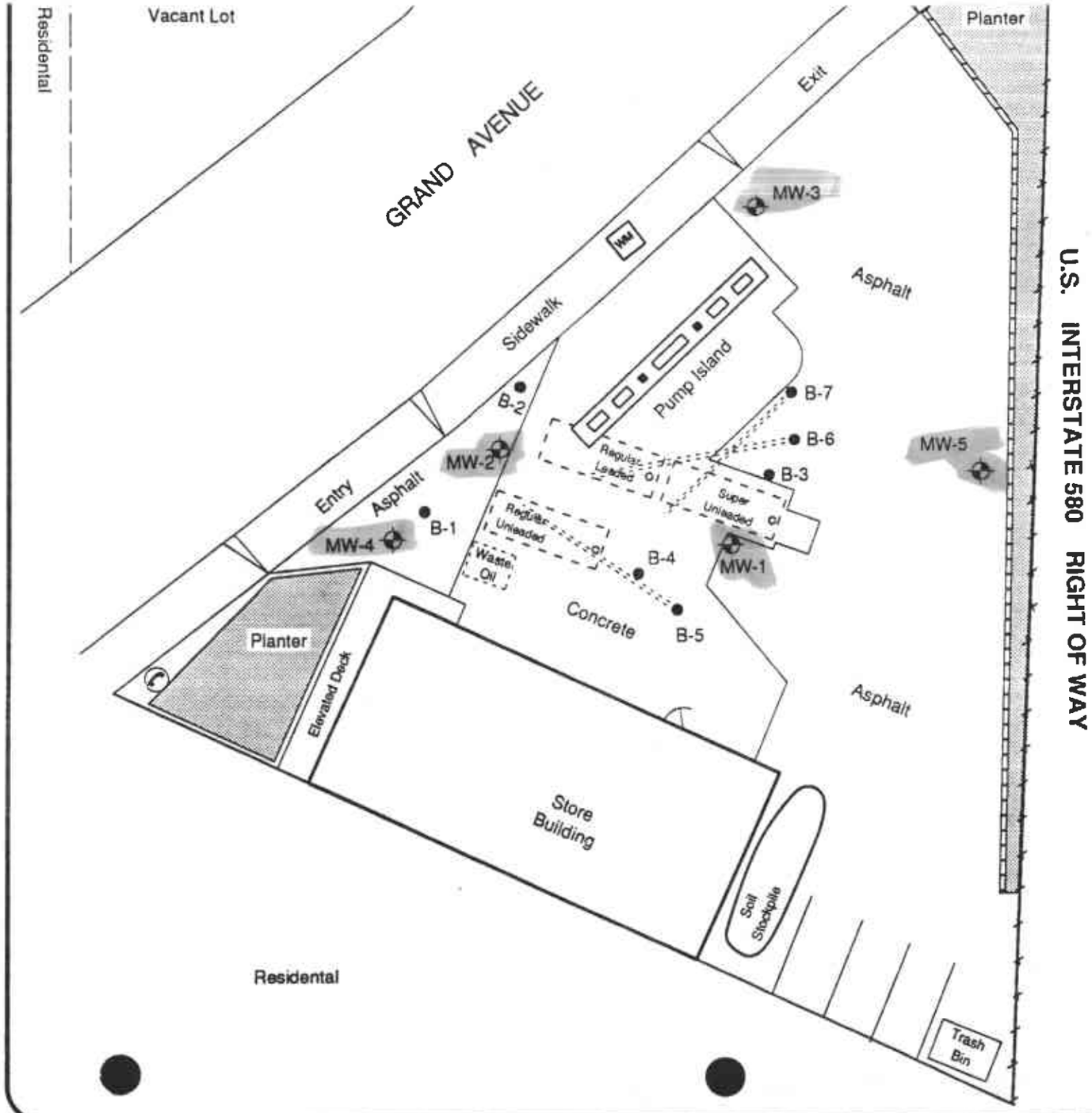
SITE LOCATION MAP

FIGURE 1

BY: Ed Bernard	DATE: June 10, 1992
REVISED BY	DATE
REVIEWED BY	DATE

Haber Oil
1401 Grand Avenue
San Leandro, CA

PROJECT NUMBER
10-91001



Telephone Booth

Fence

Soil Boring Locations

Monitoring Well Locations

Angled Aegis Soil Boring Locations

NOTES

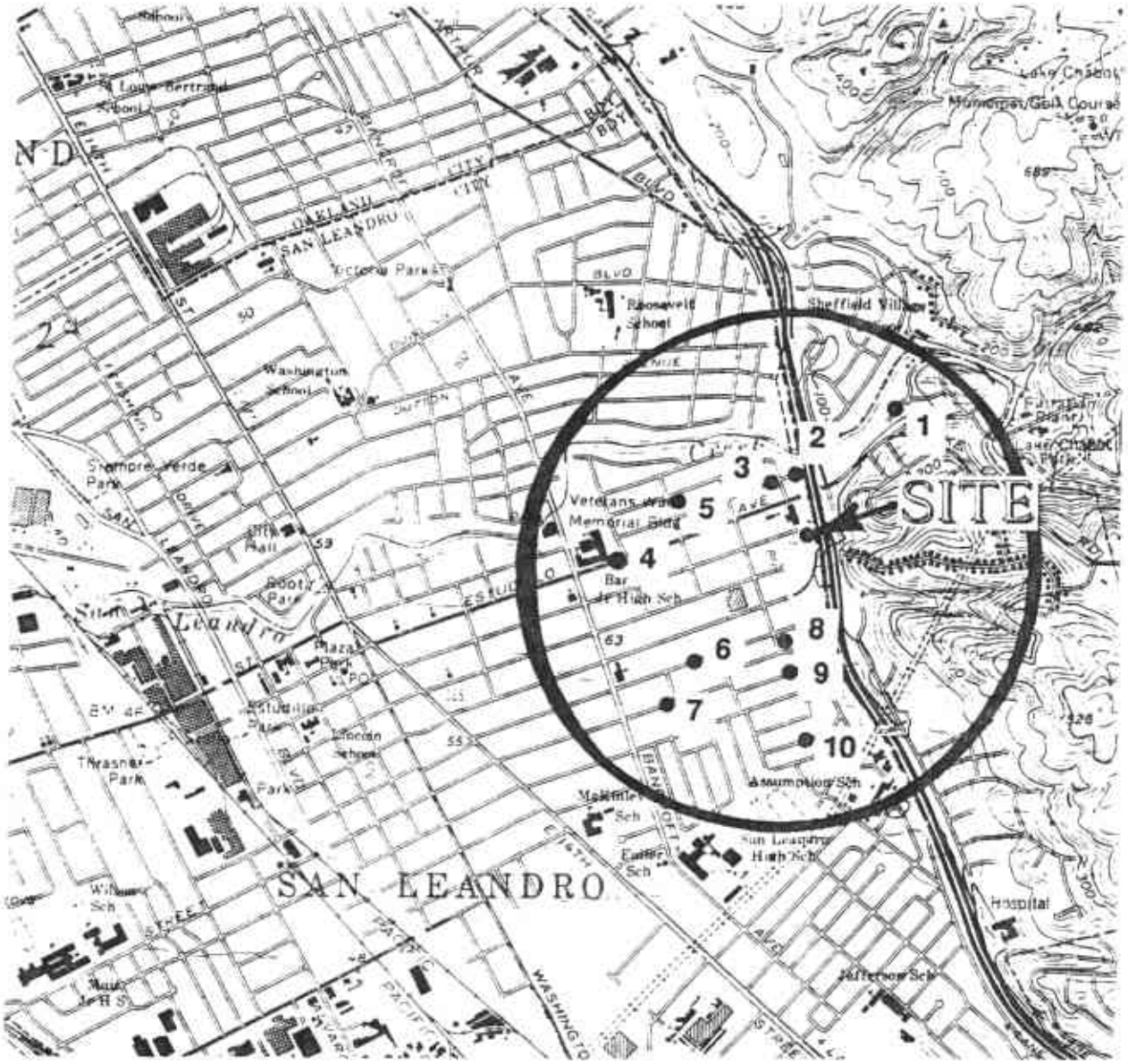
Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0

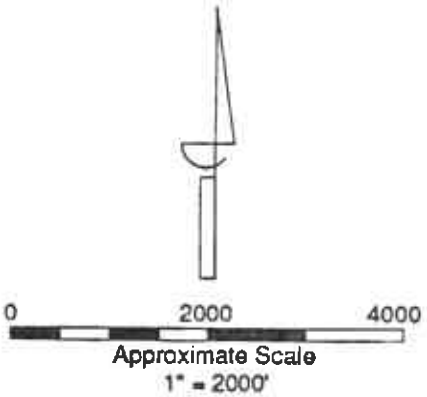
FIG-2

AEGIS ENVIRONMENTAL, INC.		SITE MAP
DRAWN BY: D. Hada	DATE: April 18, 1992	Haber Oil 1401 Grand Avenue San Leandro, CA
REVISED BY: D. Hada	DATE: November 11, 1992	
REVIEWED BY:	DATE: 11/19/92	

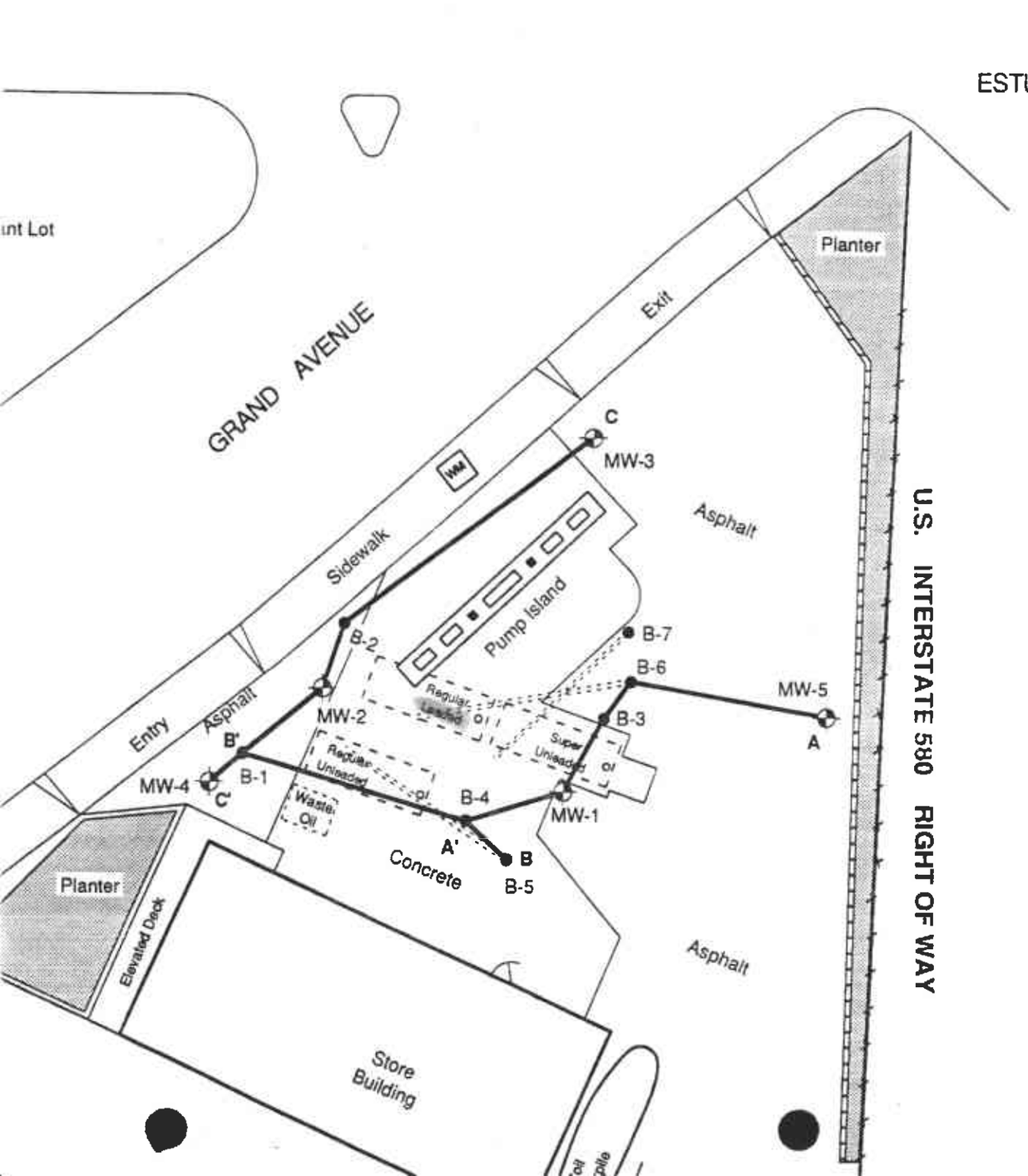


GENERAL NOTES:

BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
SAN LEANDRO, CALIF.



AEGIS ENVIRONMENTAL, INC.		WELL LOCATION MAP	FIGURE 3
DRAWN BY: D. Hada	DATE: November 11, 1992	Haber Oil 1401 Grand Avenue San Leandro, CA	PROJECT NUMBER: 10-91001
REVISED BY:	DATE:		
REVIEWED BY:	DATE:		



LEGEND

- WM — Water Meter (East Bay Municipal Utilitiy District)
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- A' — A — Cross Section Location

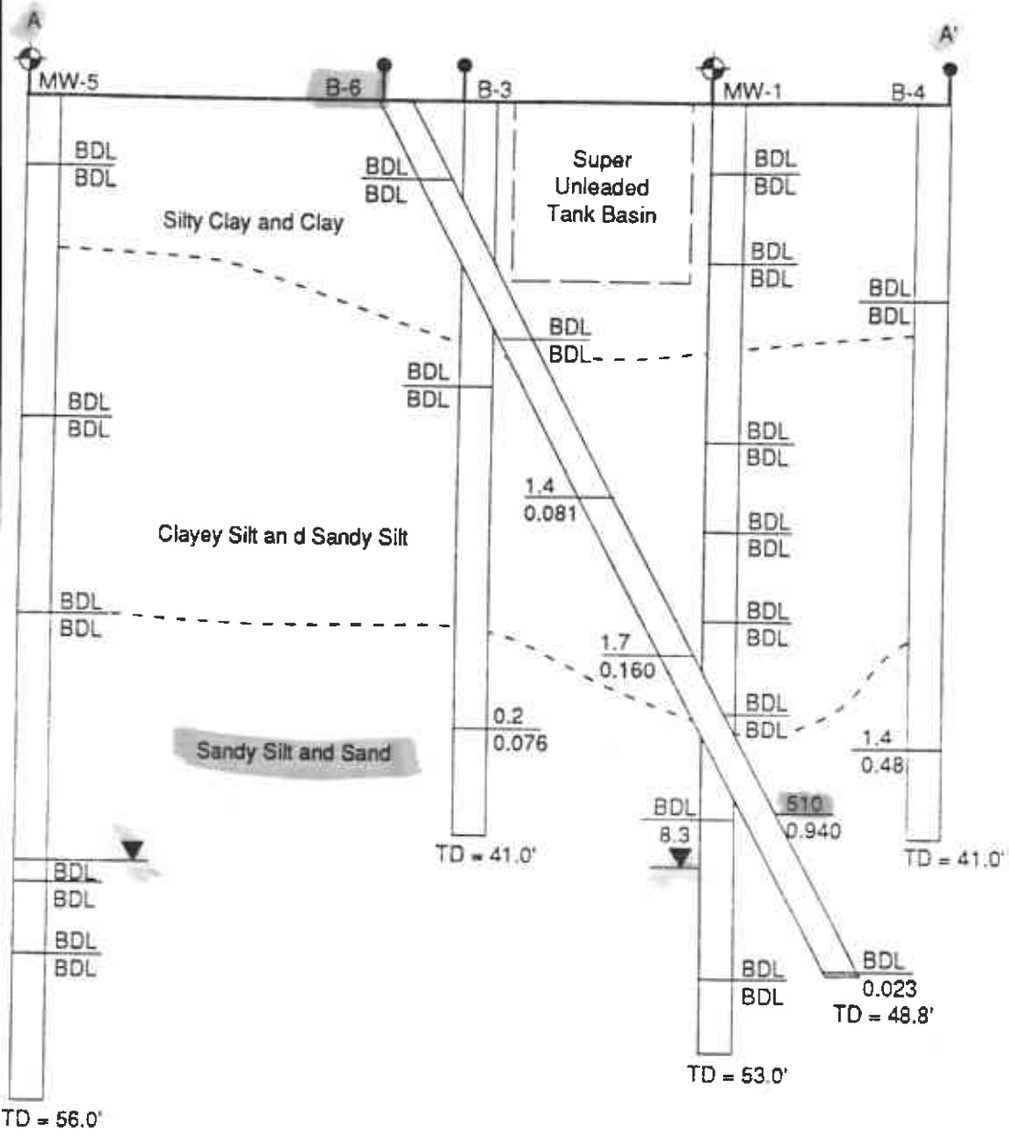
NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

FIG-4

0 20 40
Approximate Scale


A
A'
MW-5
B-6
B-3
MW-1
B-4
Super
Unleaded
Tank Basin
Silty Clay and Clay
Clayey Silt an d Sandy Silt
Sandy Silt and Sand
BDL
1.4
0.081
1.7
0.160
0.2
0.076
1.4
0.48
510
0.940
8.3
0.023
TD = 41.0'
TD = 41.0'
TD = 53.0'
TD = 48.8'
TD = 56.0'

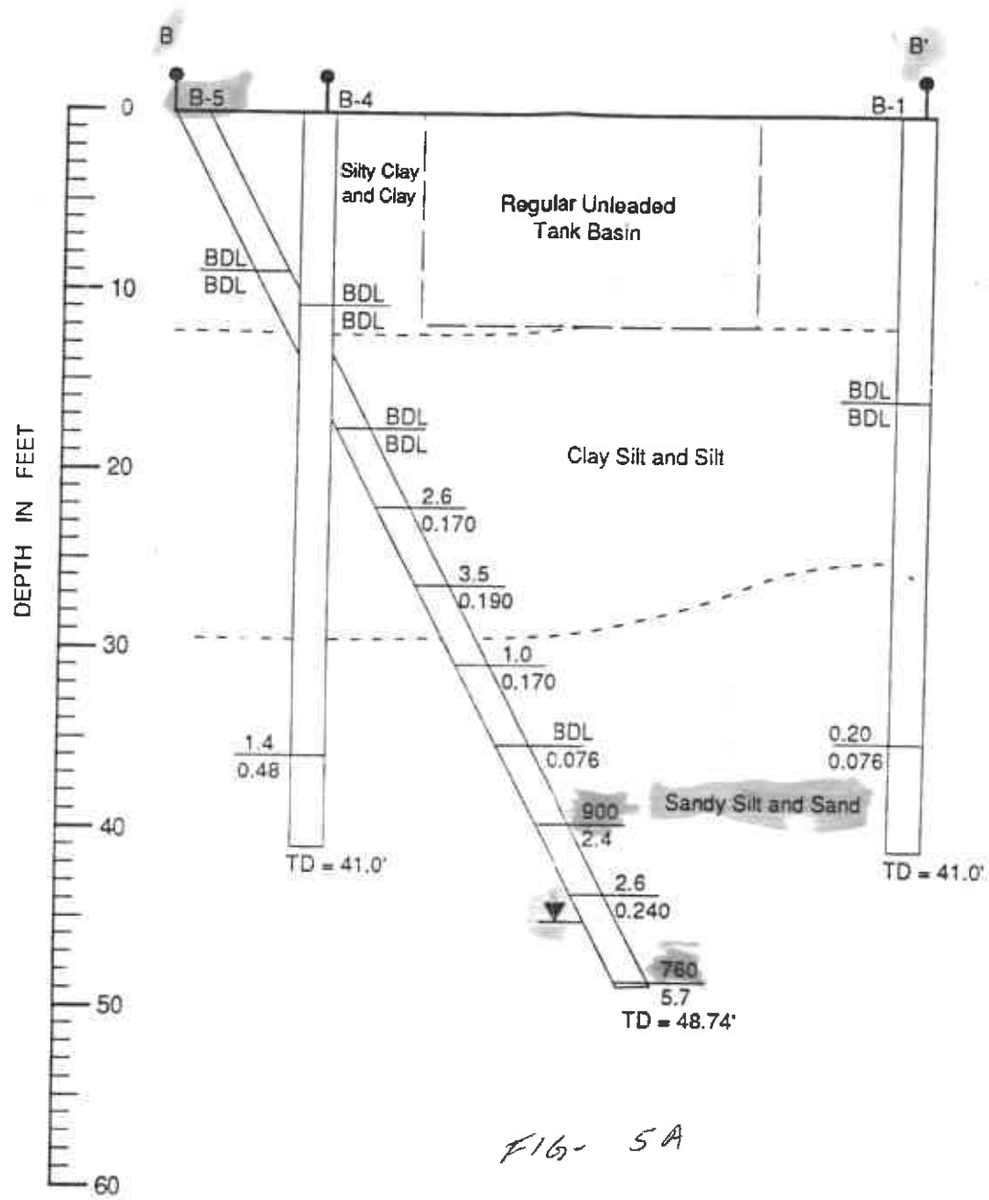

B
B'
B-5
B-4
B-1
Silty Clay
and Clay
Regular Unleaded
Tank Basin
Clay Silt and Silt
Sandy Silt and Sand
DEPTH IN FEET
0
10
20
30
40
50
60
BDL
2.6
0.170
3.5
0.190
1.0
0.170
1.4
0.48
0.20
0.076
900
2.4
2.6
0.240
760
5.7
TD = 41.0'
TD = 41.0'
TD = 48.74'

FIG- 5A

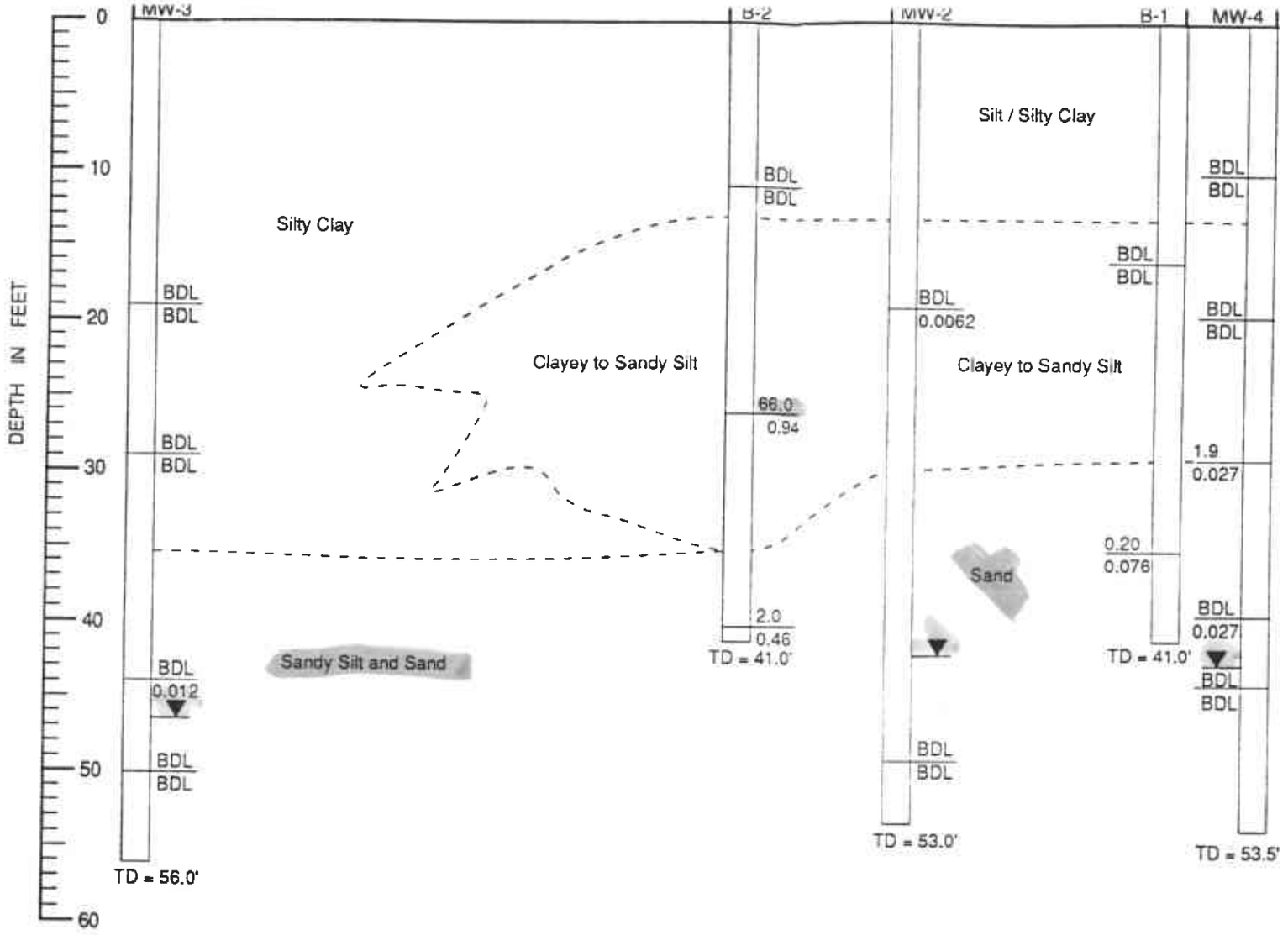
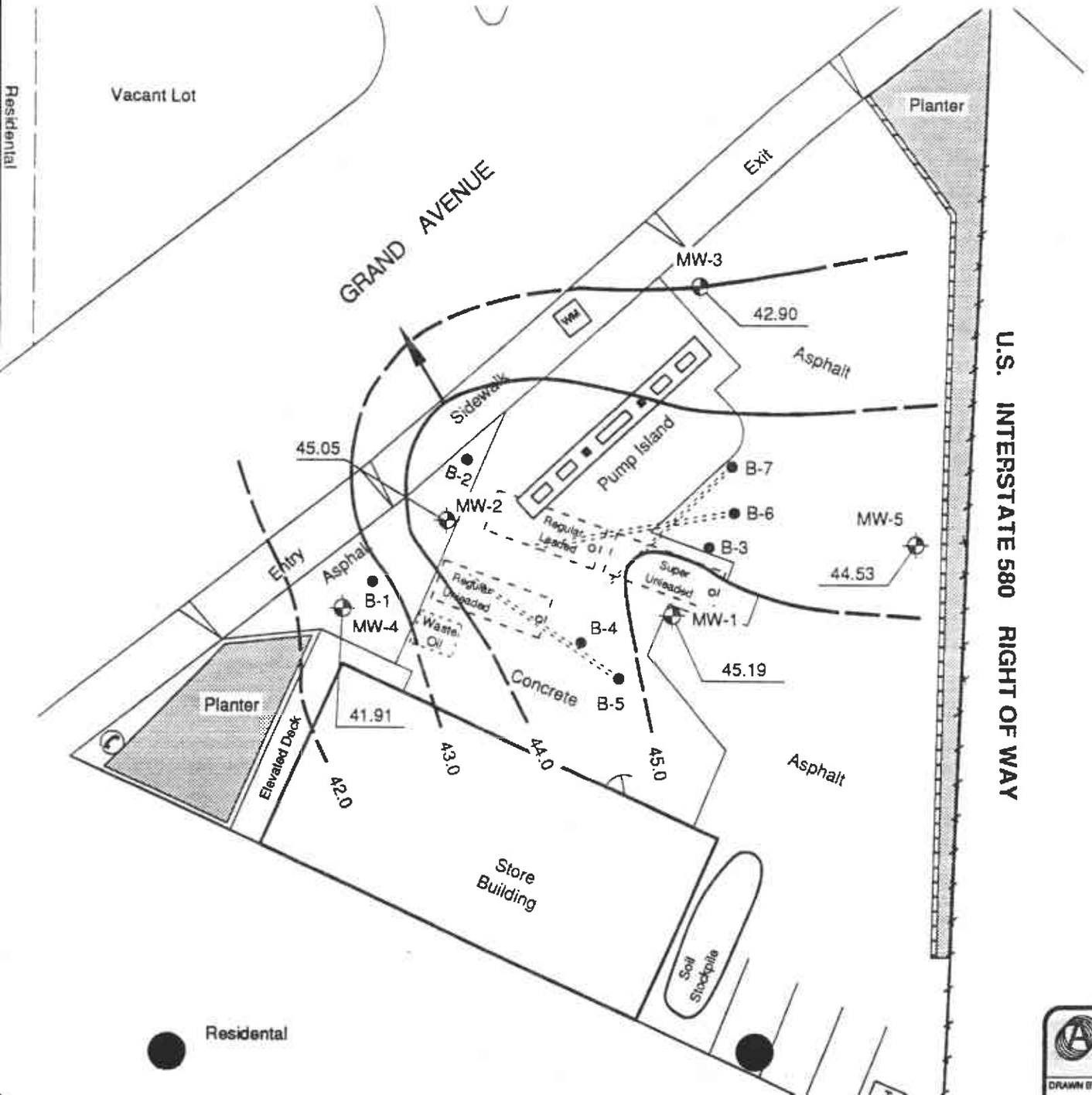


FIG. 5B

TPH-Gasoline, Results in ppm
Benzene, Res[redacted] ppm

SCALE

Horizontal 1"= 10'



LEGEND

- Water Meter (East Bay Municipal Utilitiy District)
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- Potentiometric Surface Contour Line (Dashed Where Inferred)
- 45.19 Groundwater Elevation in Feet
- Estimated Direction of Groundwater Flow

Hydraulic Gradient = 0.02 ft/ft
Contour Interval = 1.0 ft

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

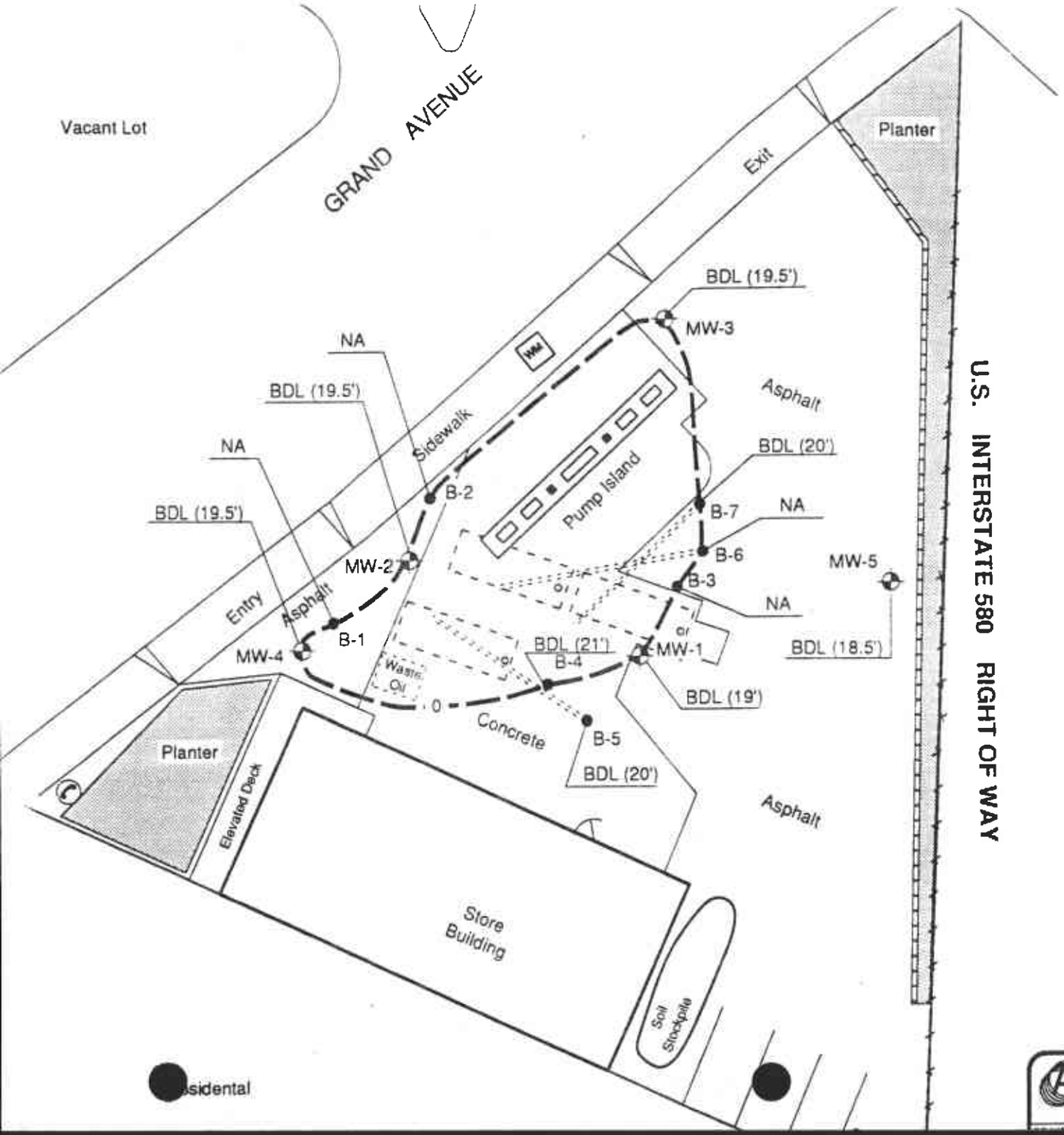
0 20
Approxima
1" =

Fig. 6

AEGIS ENVIRONMENTAL, INC.

POTENTIOMETRIC SURFACE MAP
September 29, 1992

DRAWN BY: R. Hede
DATE: November 11, 1992



LEGEND

WM	Water Meter (East Bay Municipal Utilitiy District)
	Telephone Booth
	Fence
	Soil Boring Locations
	Monitoring Well Locations
	Angled Aegis Soil Boring Locations
BDL	Concentration of TPH (parts per million)
BDL	Below Detection Limits
NA	Not Analyzed
	Inferred Isoconcentration Contour Line

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

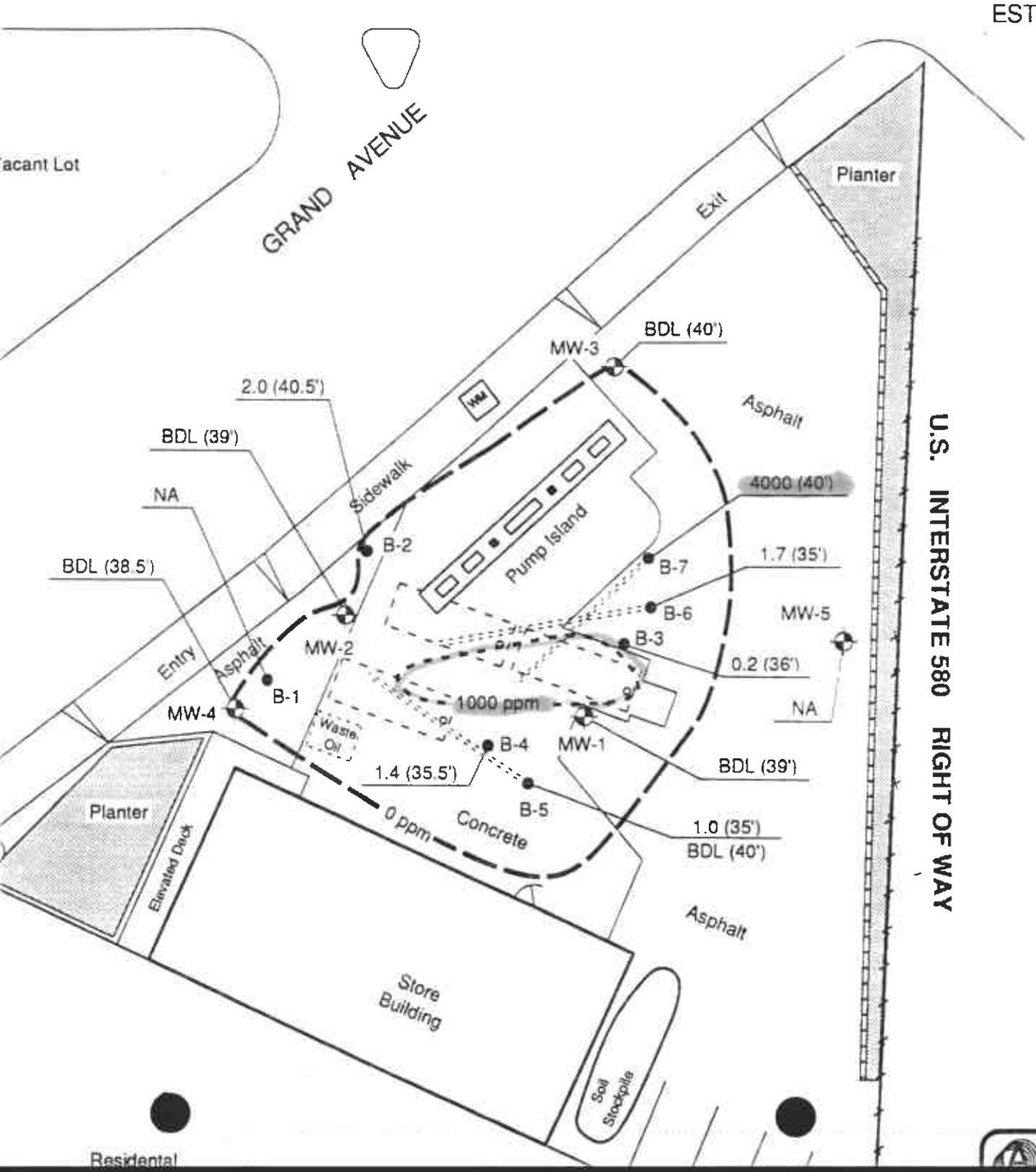
All Locations Are Approximate

0 20
Approximate Sc
1" = 20'

FIG-7

AEGIS ENVIRONMENTAL

ISO CONCENTRATION CONTOUR MAP OF TPH
AS GASOLINE IN SOIL AT 19' - 21' BELOW SURFACE



LEGEND

- Water Meter (East Bay Municipal Utilitiy District)
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- 2.0 (40') — Concentration of TPH (parts per million) with Depth of Sample
- BDL — Below Detection Limits
- NA — Not Analyzed
- Inferred Isoconcentration Contour Line

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

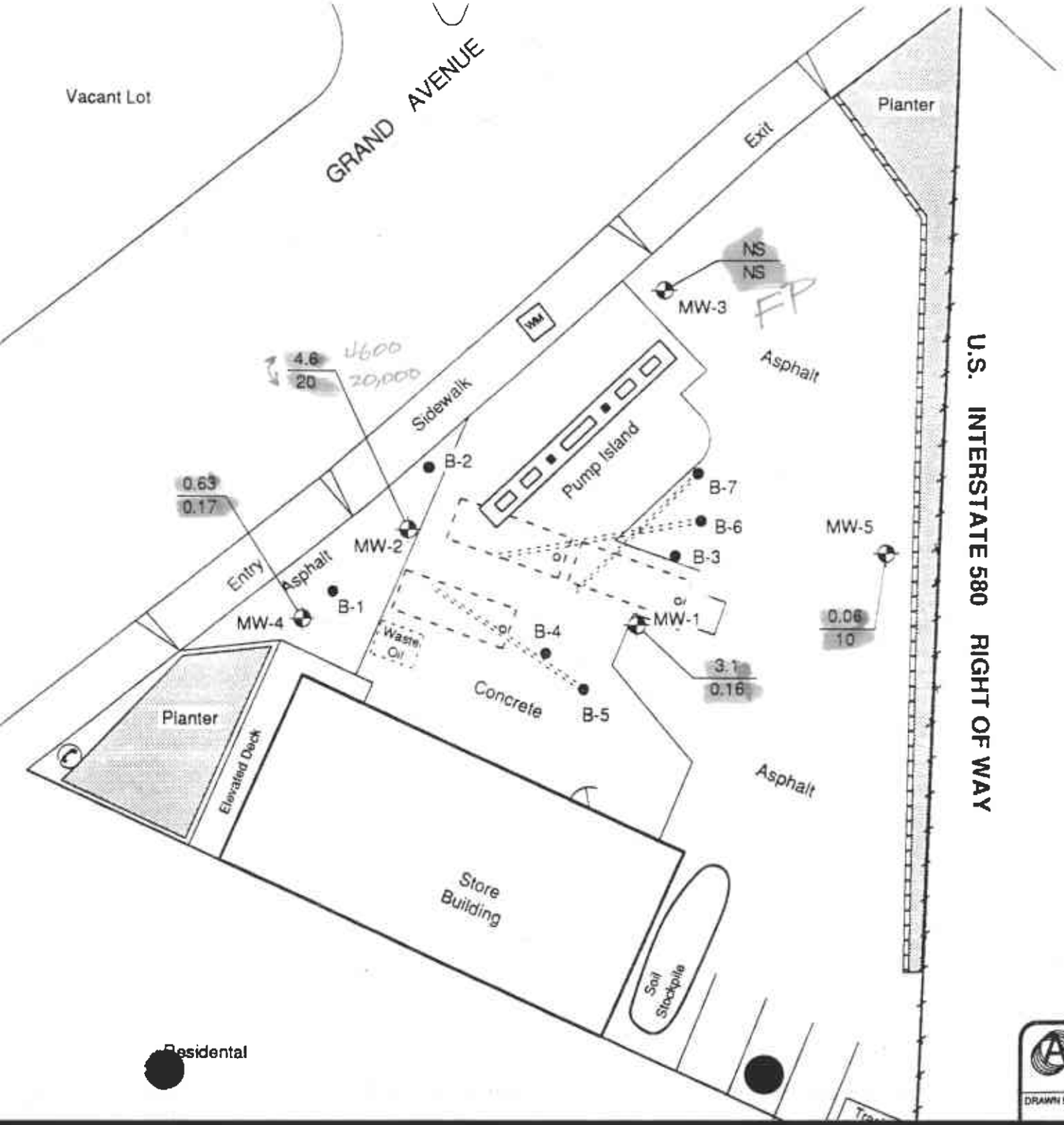
0 20 4

Approximate Scale
1" = 20'

FIG-8

ISO CONCENTRATION CONTOUR MAP OF TPH

FIGU



LEGEND

- WM — Water Meter (East Bay Municipal Utilitiy District)
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- Concentration of TPH (parts per million)
  Concentration of Benzene (parts per million)
- NS — Not Sampled Because Of Floating Liquid Hydrocarbons

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0 20
Approximate Sc
1" = 20'

FIG-9

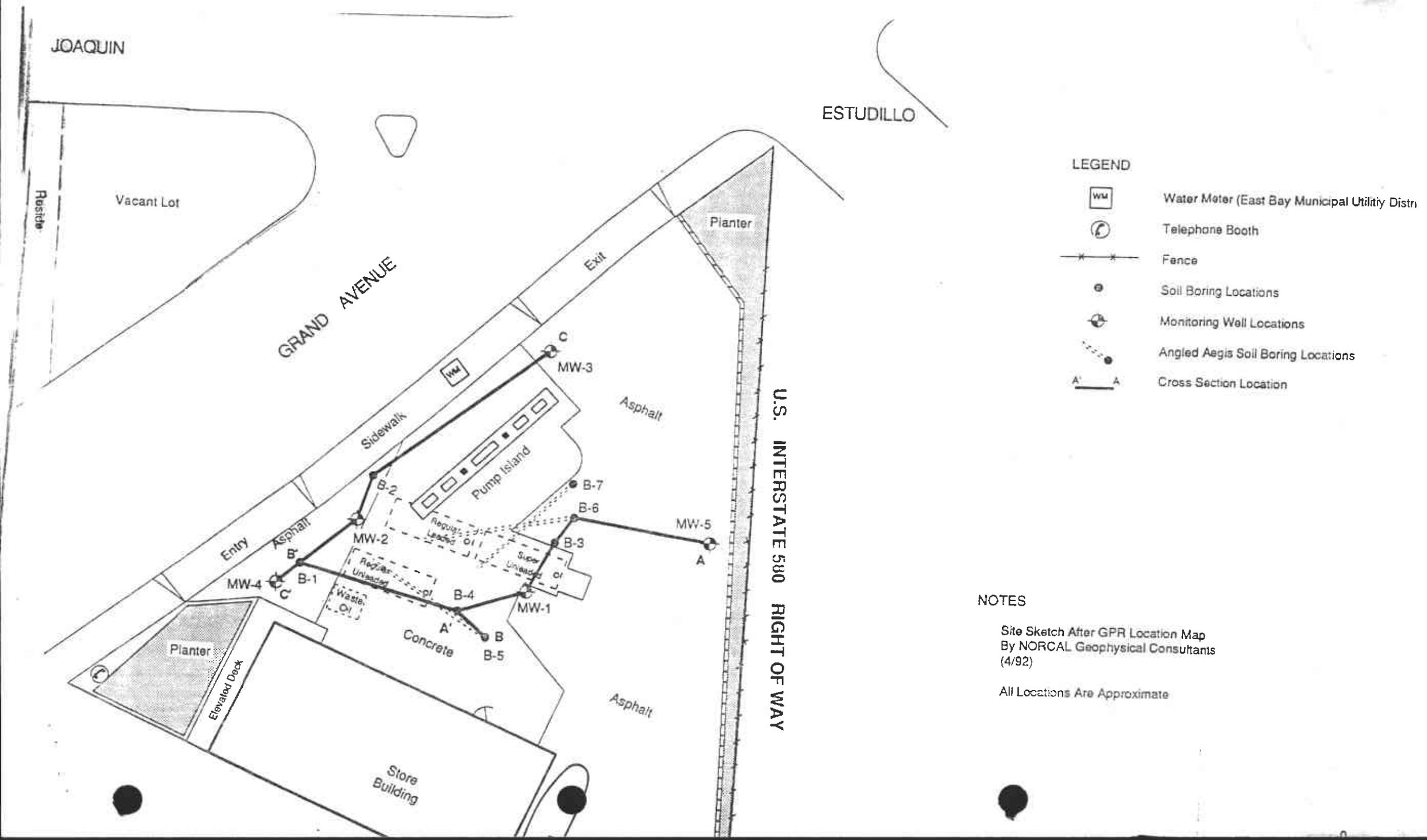
AEGIS ENVIRONMENTAL, INC.

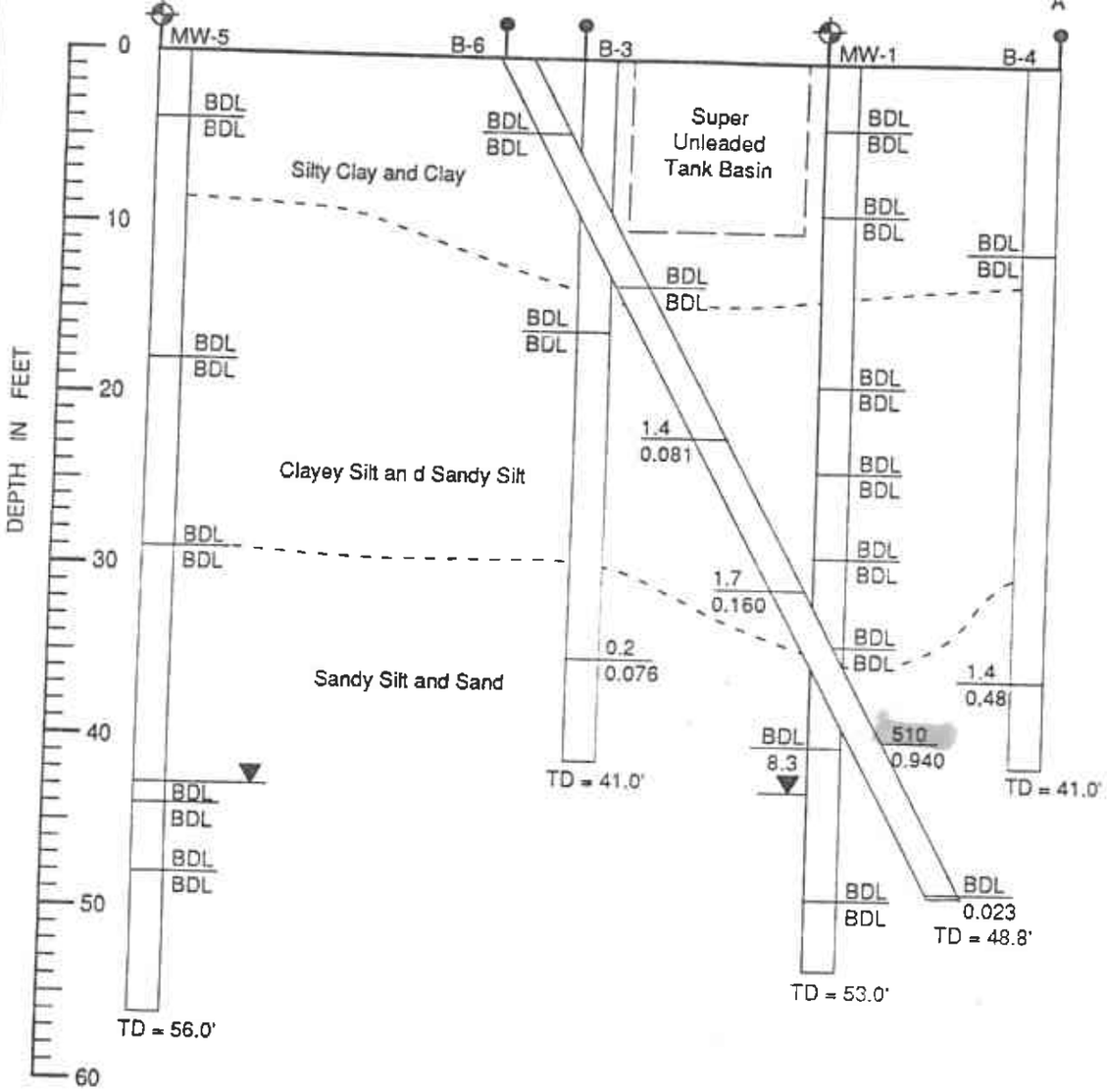
DRAWN BY D. Hada

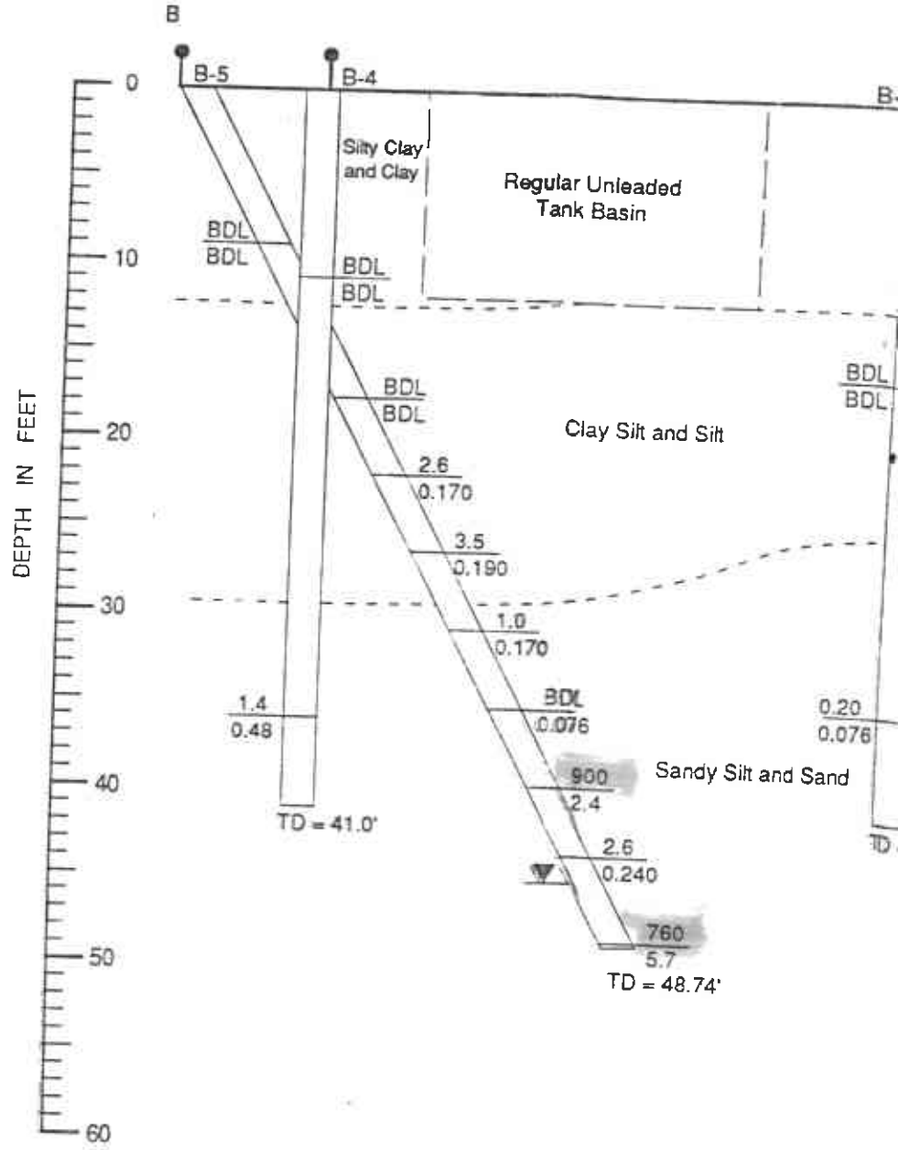
DATE November 11, 1992

DISTRIBUTION MAP OF TPH AND BENZENE IN GROUNDWATER

Haber Oil


JOAQUIN
ESTUDILLO
Vacant Lot
Raisite
GRAND AVENUE
Exit
Planter
Sidewalk
Asphalt
Pump Island
Entry
Asphalt
Regular Unleaded
Super Unleaded
Waste Oil
Concrete
Planter
Elevated Deck
Asphalt
Store Building
U.S. INTERSTATE 580 RIGHT OF WAY
MW-1
MW-2
MW-3
MW-4
MW-5
B-1
B-2
B-3
B-4
B-5
B-6
B-7
A
A'
B
B'
C
C'
LEGEND
Water Meter (East Bay Municipal Utility Distri
Telephone Booth
Fence
Soil Boring Locations
Monitoring Well Locations
Angled Aegis Soil Boring Locations
Cross Section Location
NOTES
Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)
All Locations Are Approximate





LEGEND

1.2 TPH-Gasoline, Results in ppm
BDL Benzene, Results in ppm

SCALE

Horizontal 1"= 10'

FIG- 5A

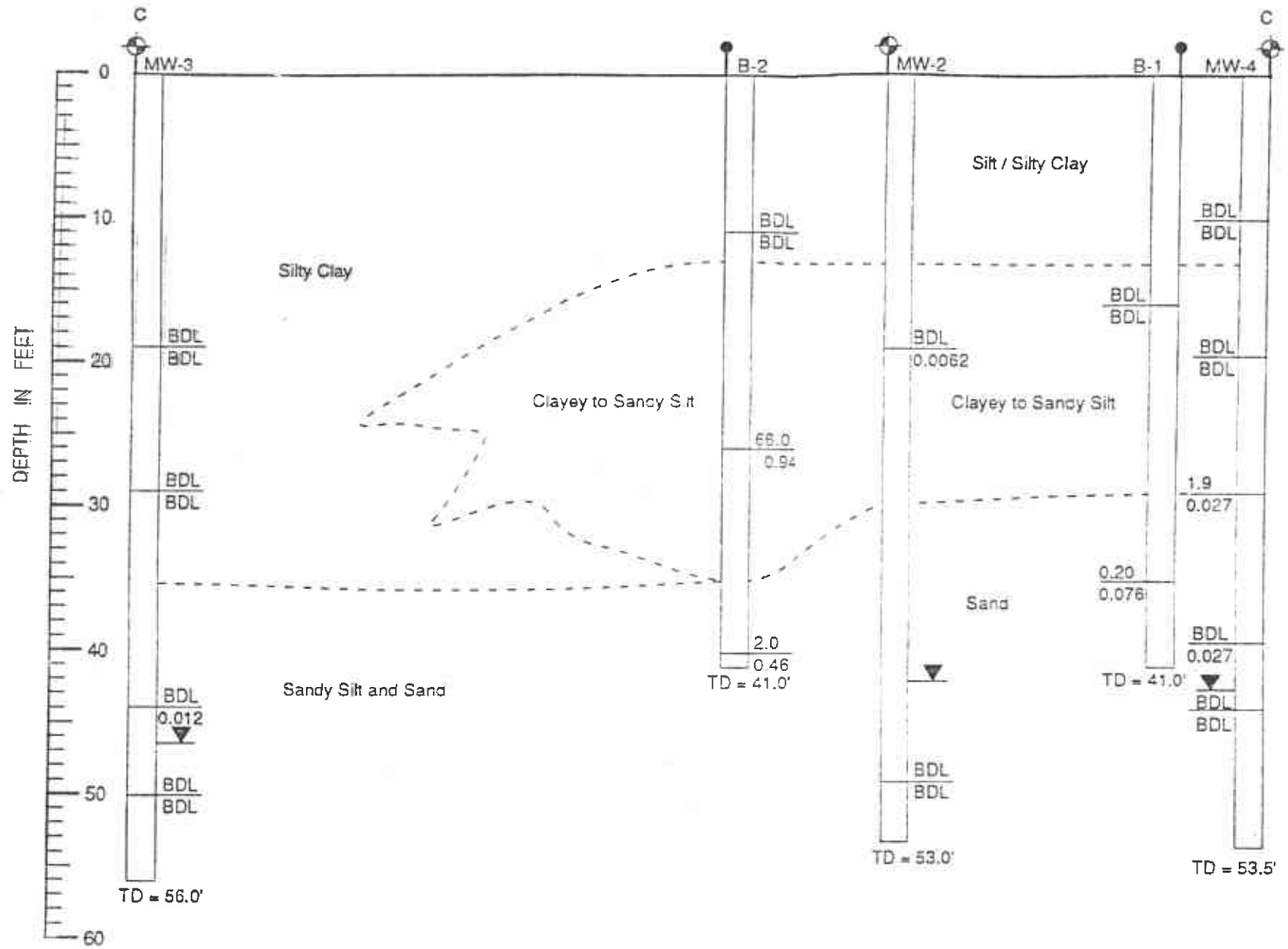
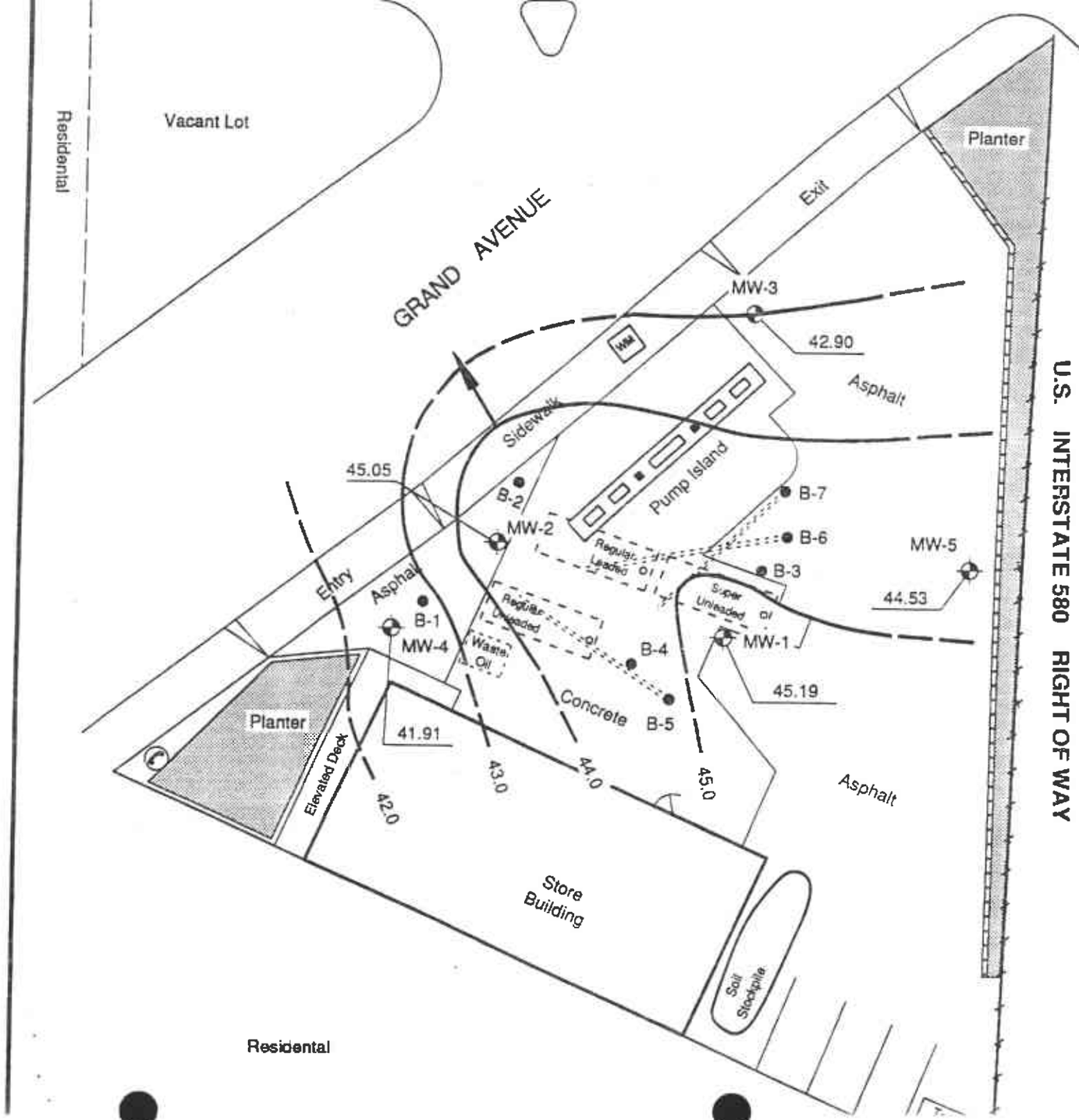


FIG- 5 B

LEGEND



LEGEND

- WM — Water Meter (East Bay Municipal Utilitiy Di
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- Potentiometric Surface Contour Line (Dashed Where Inferred)
- 45.19 — Groundwater Elevation in Feet
- Estimated Direction of Groundwater Flow

Hydraulic Gradient = 0.02 ft/ft
Contour Interval = 1.0 ft

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

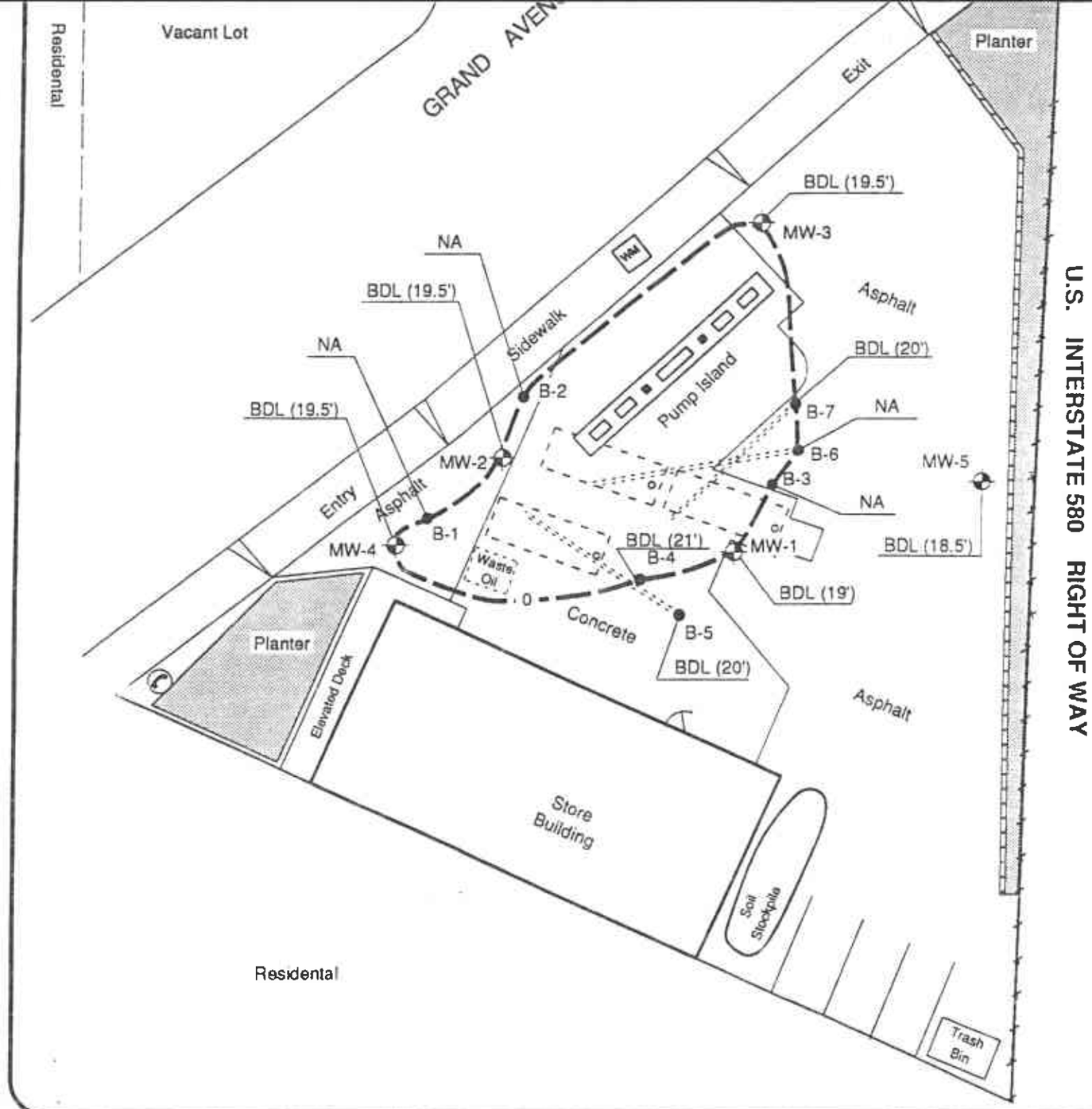
0

FIG-6

AEGIS ENVIRONMENTAL, INC.

DRAWN BY:

POTENTIOMETRIC SURFACE M
September 29, 1992



- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- BDL — Concentration of TPH (parts per million)
- BDL — Below Detection Limits
- NA — Not Analyzed
- Inferred Isoconcentration Contour Line

NOTES

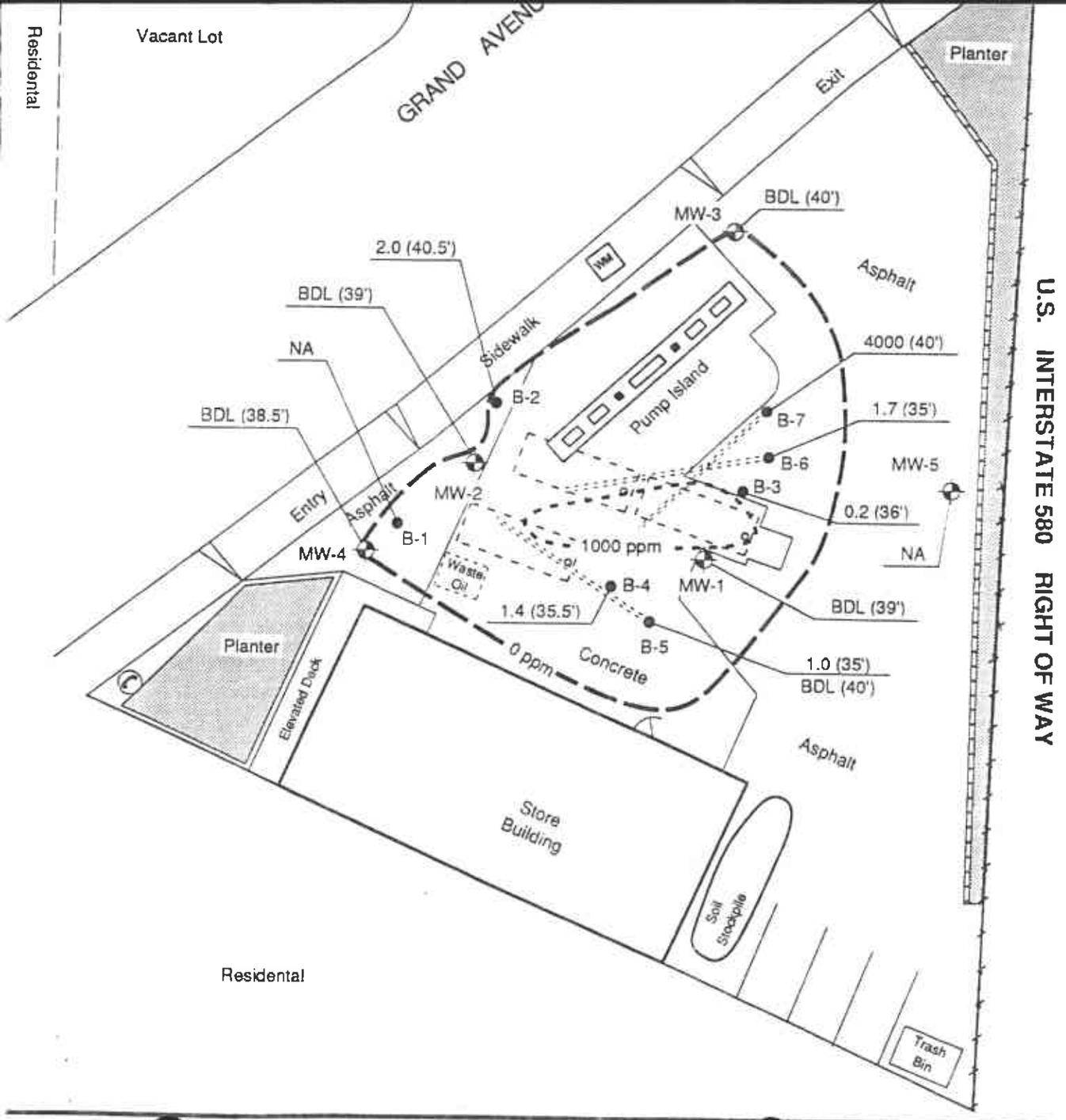
Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0
Appr

FIG- 7

AEGIS ENVIRONMENTAL, INC.		ISO CONCENTRATION CONTOUR MAP OF AS GASOLINE IN SOIL AT 19' - 21' BELOW GR
DRAWN BY: D. Hada	DATE: November 11, 1992	
REVISED BY: Ed Bernard	DATE: December 15, 1992	Haber Oil 1401 Grand Avenue San Leandro, CA
REVIEWED BY: R. Kraft	DATE: 12/15/92	



WM Water Meter (East Bay Municipal Utilitiy District)

Telephone Booth

Fence

Soil Boring Locations

Monitoring Well Locations

Angled Aegis Soil Boring Locations

2.0 (40') Concentration of TPH (parts per million) with Depth of Sample

BDL Below Detection Limits

NA Not Analyzed

Inferred Isoconcentration Contour Line

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0 20
Approxima
1"=2

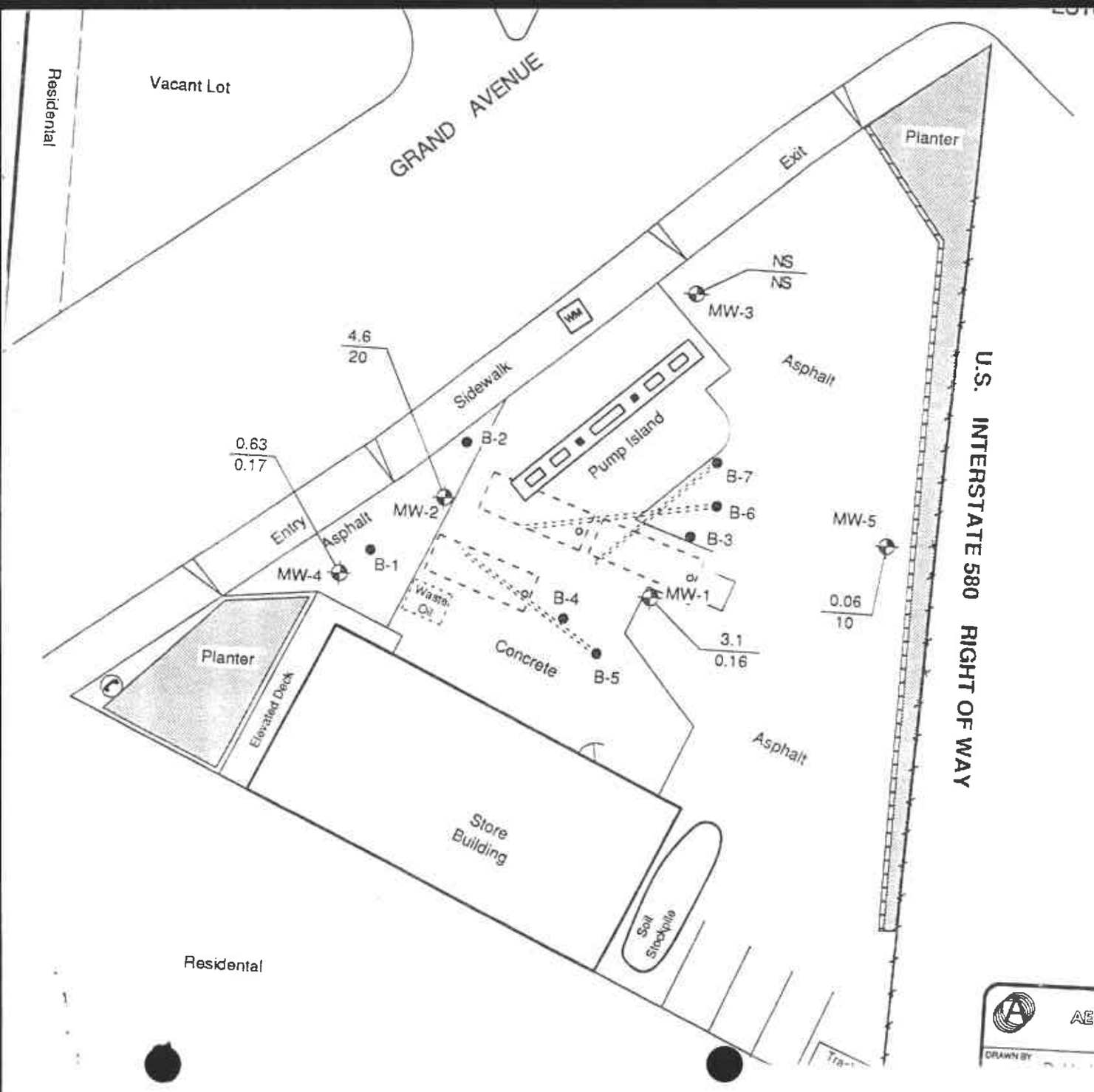
FIG-8

AEGIS ENVIRONMENTAL, INC.

ISOCONCENTRATION CONTOUR MAP OF TPH AS GASOLINE IN SOIL AT 35' - 40' BELOW SURFACE

DRAWN BY	D. Hada	DATE November 11, 1992
REVISED BY	Ed Bernard	DATE December 15, 1992
REVIEWED BY	R. Duff	DATE 12/15/92

Haber Oil
1481 Grand Avenue
San Leandro, CA



LEGEND

- WM — Water Meter (East Bay Municipal Utility District)
- Telephone Booth
- Fence
- Soil Boring Locations
- Monitoring Well Locations
- Angled Aegis Soil Boring Locations
- 3.1 / 0.16 — Concentration of TPH (parts per million) / Concentration of Benzene (parts per million)
- NS — Not Sampled Because Of Floating Liquid Hydrocarb

NOTES

Site Sketch After GPR Location Map
By NORCAL Geophysical Consultants
(4/92)

All Locations Are Approximate

0 20
Approximate Scale
1" = 20'

FIG-9

AEGIS ENVIRONMENTAL, INC.

DRAWN BY DATE

DISTRIBUTION MAP OF TPH AND BENZENE IN GROUNDWATER

TABLE 1

UNDERGROUND STORAGE TANK INVENTORY

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA

Tank	Product	Capacity (Gallons)	Construction	Status
1	Regular leaded	7,500	Single-walled steel	Active
2	Super unleaded	6,000	Single-walled steel	Active
3	Regular unleaded	7,500	Single-walled steel	Active
4	Waste-oil	550	Single-walled steel	Inactive

TABLE 3

ANALYTICAL RESULTS: SOIL

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(All results in parts-per-million)

Sample ID	Date Collected	Sample Depth (Feet)	Total Petroleum Hydrocarbons	Aromatic Volatile Organics				Total Lead
			Gasoline	Benzene	Toluene	Ethyl-benzene	Total Xylenes	
B-1-3	04/24/91	16.0	<	<	<	<	<	ND
B-1-7	04/24/91	25.5	0.2	0.076	0.003	0.004	0.015	ND
B-2-2	04/24/91	11.0	<	<	<	<	<	ND
B-2-5	04/24/91	25.5	66	0.94	3.8	1.3	8.7	3
B-2-8	04/24/91	40.5	2.0	0.46	0.30	0.049	0.24	ND
B-3-3	04/24/91	16.0	<	<	<	<	<	ND
B-3-7	04/24/91	36.0	0.2	0.022	0.004	0.004	0.033	ND
B-4-4	04/24/91	21.0	<	<	<	<	<	ND
B-4-7	04/24/91	35.5	1.4	0.48	0.003	0.021	0.007	ND
SS-1A, 1B, 1C, 1D	04/14/92	1.0	0.7	0.002	<	<	0.005	0.06[1]
B5 at 10 feet	04/14/92	10	<	<	<	<	<	—
B5 at 20 feet	04/14/92	20	<	<	<	<	<	—
B5 at 25 feet	04/14/92	25	2.6	0.17	<	0.075	0.059	—
B5 at 30 feet	04/14/92	30	3.5	0.19	0.0037	0.099	0.12	—
B5 at 35 feet	04/14/92	35	1.0	0.17	0.067	0.021	0.067	—
B5 at 40 feet	04/14/92	40	<	0.076	0.040	0.0046	0.018	—
B5 at 45 feet	04/14/92	45	900	2.4	18	8.9	53	<<0.2[1]
B5 at 50 feet	04/14/92	50	2.6	0.24	0.32	0.039	0.17	—
B5 at 55 feet	04/14/92	55	760	5.7	24	10	53	<<0.2[2]

NOTES:
< = Below Practical Quantitation Reporting Limits per "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" (August 10, 1990). (PQL for BTEX = 0.005 ppm, TPH, as gasoline and diesel = 1.0 ppm.)
<< = Below the indicated detection limit as labeled in the analytical laboratory results reports.
ND = Not detected.
— = Not analyzed.
1 = Total lead.
2 = Soluble lead (California Waste Extraction Test).
Analytical methods are listed in the attached laboratory reports.

TABLE 3 (CONTINUED)

ANALYTICAL RESULTS: SOIL

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(All results in parts-per-million)

Sample ID	Date Collected	Sample Depth (Feet)	Total Petroleum Hydrocarbons	Aromatic Volatile Organics				Total Lead
			Gasoline	Benzene	Toluene	Ethyl-benzene	Total Xylenes	
B6 at 5 feet	04/14/92	5	<	<	0.006	<	0.0078	—
B6 at 15 feet	04/14/92	15	<	<	<	<	<	—
B6 at 25 feet	04/14/92	25	1.4	0.081	0.0024	0.0055	0.0087	—
B6 at 35 feet	04/14/92	35	1.7	0.16	0.022	0.0065	0.020	—
B6 at 45 feet	04/14/92	45	510	0.94	0.47	2.2	8.6	—
B6 at 55 feet	04/14/92	55	<	0.023	0.0083	0.0084	0.029	—
B7 at 10 feet	04/14/92	10	<	<	<	<	<	—
B7 at 20 feet	04/14/92	20	<	0.14	<	<	<	—
B7 at 30 feet	04/14/92	30	<	0.091	0.0051	0.0078	<	—
B7 at 40 feet	04/14/92	40	4,000	11	3	25	140	—
B7 at 50 feet	04/14/92	50	<	0.016	<	<	<	—
SS-1	04/14/92	Soil	620	<	2.8	3	16	0.044[2]
SS-2	04/14/92	Stockpile	100	<	<	0.15	0.9	0.061[2]

NOTES: < = Below Practical Quantitation Reporting Limits per "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" (August 10, 1990). (PQL for BTEX = 0.005 ppm, TPH, as gasoline and diesel = 1.0 ppm.)

--- = Not analyzed.

2 = Soluble lead (California Waste Extraction Test).

Analytical methods are listed in the attached laboratory reports.

TABLE (CONTINUED)

ANALYTICAL RESULTS: SOIL

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(All results in parts-per-million)

Sample ID	Date Collected	Sample Depth (Feet)	Total Petroleum Hydrocarbons	Aromatic Volatile Organics			
			Gasoline	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-1/1	09/15/92	4	<<	<<	<<	<<	<<
MW-1/2	09/15/92	9	<<	<<	0.0029	<<	0.0068
MW-1/3	09/15/92	14.5	<<	<<	<<	<<	0.0028
MW-1/4	09/15/92	19	<<	<<	<<	<<	<<
MW-1/5	09/15/92	24.5	<<	<<	<<	<<	<<
MW-1/6	09/15/92	29.5	<<	<<	<<	<<	0.003
MW-1/7	09/15/92	33.5	<<	<<	<<	<<	0.0025
MW-1/8	09/15/92	39	<<	0.0083	<<	<<	<<
MW-1/9	09/15/92	44	<<	0.026	<<	<<	<<
MW-1/10	09/15/92	49.5	<<	<<	<<	<<	<<
MW-1/11	09/15/92	53	<<	<<	<<	<<	<<

NOTE: << = Below the indicated detection limit labeled in the analytical laboratory results reports.

TABLE 3 (CONTINUED)

ANALYTICAL RESULTS: SOIL

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(All results in parts-per-million)

Sample ID	Date Collected	Sample Depth (Feet)	Total Petroleum Hydrocarbons	Aromatic Volatile Organics				Total Lead	Cadmium	Chromium	Zinc
			Gasoline	Benzene	Toluene	Ethyl-benzene	Total Xylenes				
MW-2/4	09/15/92	19.5	<<	0.0062	<<	<<	<<	—	—	—	—
MW-2/6	09/15/92	29.5	11	0.160	0.550	0.180	1.7	4.3	<<	4.5	50
MW-2/8	09/15/92	39	<<	0.078				—	—	—	—
MW-2/10	09/15/92	49.5	<<	0.078	0.058	0.0054	0.021	—	—	—	—
MW-3/4	09/18/92	19.5	<<	<<	<<	<<	<<	—	—	—	—
MW-3/6	09/19/92	29	<<	<<	<<	<<	<<	—	—	—	—
MW-3/8	09/18/93	40	<<	<<	<<	<<	<<	—	—	—	—
MW-3/9	09/18/92	44.5	<<	0.012	<<	<<	<<	—	—	—	—
MW-3/10	09/18/92	50	<<	<<	<<	<<	<<	—	—	—	—
MW-4/2	09/18/92	9.5	<<	<<	<<	<<	<<	—	—	—	—
MW-4/3	09/18/92	14.5	<<	<<	<<	<<	<<	—	—	—	—
MW-4/4	09/18/92	19.5	<<	<<	0.0028	<<	0.0035	—	—	—	—
MW-4/6	09/18/92	29.5	1.9	0.27	0.210	0.044	0.370	4.4	2.9	24	33
MW-4/8	09/18/92	38.5	<<	0.027	<<	<<	0.0078	—	—	—	—
MW-4/9	09/18/92	44	<<	<<	<<	<<	0.0025	—	—	—	—
MW-5/1	09/17/92	4.5	<<	<<	<<	<<	0.0028	—	—	—	—
MW-5/3	09/17/92	18.5	<<	<<	<<	<<	<<	—	—	—	—
MW-5/5	09/17/92	29	<<	<<	<<	<<	<<	—	—	—	—
MW-5/8	09/17/92	44.5	<<	<<	<<	<<	<<	—	—	—	—
MW-5/9	09/17/92	48.5	<<	<<	<<	<<	<<	—	—	—	—
Northside	09/18/92	Stockpile	<<	<<	<<	<<	0.0032	—	—	—	—
Southside	09/18/92	Stockpile	0.77	0.0047	0.0068	0.0047	0.039	5.3	3.8	55	40

NOTES: << = Below the indicated detection limit labeled in the analytical laboratory results reports.
— = Not analyzed.

TABLE 4

LIQUID LEVEL DATA

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(Measurements in feet)

Monitoring Well	Date	Reference Elevation (top of casing)[1]	Depth to Groundwater[1]	Depth to Product[1]	Groundwater Elevation[2]	Product Thickness	Well Depth
MW-1	09/29/92	87.96	42.77	---	45.19		52.25
MW-2	09/29/92	86.60	41.55	---	45.05		52.82
MW-3	09/29/92	87.50	44.60	44.58	42.90*	0.02	53
MW-4	09/29/92	86.20	44.29	---	41.91		53.34
MW-5	09/29/92	89.06	44.53	---	44.53		55.05

NOTES:
[1] = Measurement and reference elevation taken from notch/mark on top north side of well casing.
[2] = Elevation referenced to (mean sea level or arbitrary benchmark).
* = Corrected groundwater elevation - CDTW = DTW - (SP.G x LHT).
CDTW = Corrected depth to water.
DTW = Measured depth to water.
SP.G. = Specific gravity: unweathered gasoline = 0.75, diesel = 0.80.
LHT = Measured liquid hydrocarbon thickness.
Well Depth = Measurement from top of casing to bottom of well.

TABLE 5

ANALYTICAL RESULTS: GROUNDWATER

ARCO SERVICE STATION
1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA
(All results in parts-per-million)

Monitoring Well	Date Collected	Total Petroleum Hydrocarbons	Aromatic Volatile Organics			
		Gasoline	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-1	09/29/92	3.1	0.16	<	<	0.006
MW-2	09/29/92	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MW-3	09/29/92	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MW-4	09/29/92	0.63	0.17	0.06	0.0073	0.65
MW-5	09/29/92	0.06	10	0.0071	<	0.0069

NOTES: FLH = Floating liquid hydrocarbons/not sampled.
< = Below Practical Quantitation Reporting Limits per "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" (August 10, 1990). (PQL for BTEX = 0.0005 ppm, TPH, as gasoline and diesel = 0.05 ppm.)

TABLE 6

VAPOR EXTRACTION PILOT TEST DATA AND SUMMARY
OCTOBER 7, 1992

1401 GRAND AVENUE, SAN LEANDRO, CALIFORNIA

TEST 1: WELL MW-2
DURATION OF TEST : 2.5 HOURS

DATE	TIME	INFLUENT VACUUM	WELL TEMP.	WELL AIRFLOW	CONCENTRATION (PPMV) TPH FID	TPH LAB	BENZENE LAB	EXTRACTION RATES TPH FID	TPH LAB	BENZENE LAB	VACUUM MEASUREMENTS(IN.H20) MW-2	MW-3	MW-4	MW-5	COMMENTS
											DISTANCE FROM MW-1				
		(IN.H20)	(DEG.F)	(CFM)				(LB/HR)	(LB/HR)	(LB/HR)	38 ft	50 ft	50 ft	38 ft	
10/7/92	12:30 PM	-6	72	48	15250			9.7							
	1:00 PM							0							Start test.
	1:30 PM	-7	73	51.2	10000			6.8			-0.1	-0.05	-0.25	0	
	1:45 PM	-6.75	73	51.2	10000			6.8							
	2:00 PM	-7	73	51.2	10000			6.8			-0.09	-0.06	-0.23	0	
	2:15 PM	-6.75	73	50.7	10000			6.7							
	2:30 PM	-6.75	73	50.7	9250			6.2			-0.1	-0.07	-0.25	0	
	2:45 PM	-6.75	73	50.7	9250			6.2							
	3:00 PM	-6.75	73	50.7	9250	60000	2500	6.2	40.4	1.5	-0.11	-0.08	-0.25	0	Collected soil gas sample
															End of Test

TEST 2 : WELL MW-1
DURATION OF TEST: 2 HOURS

DATE	TIME	INFLUENT VACUUM	WELL TEMP.	WELL AIRFLOW	CONCENTRATION (PPMV) TPH FID	TPH LAB	BENZENE LAB	EXTRACTION RATES TPH FID	TPH LAB	BENZENE LAB	VACUUM MEASUREMENTS(IN.H20) MW-2	MW-3	MW-4	MW-5	COMMENTS
											DISTANCE FROM MW-1				
		(IN.H20)	(DEG.F)	(CFM)				(LB/HR)	(LB/HR)	(LB/HR)	38 ft	50 ft	50 ft	38 ft	
10/7/92	3:15 PM	-31.5	79	91.6	11500			13.8							
	3:30 PM	-31.5	81	90.5	10000			11.8							Start test.
	3:45 PM	-32	80	90.5	9500			11.3			-0.08	-0.08	-0.02	-0.14	
	4:00 PM	-31.5	80	91.6	9250			11.1							
	4:15 PM	-32	79	91.6	9000			10.8			-0.09	-0.08	-0.02	-0.17	
	4:30 PM	-32.25	73	63	8750			10.5							
	4:45 PM	-32.5	74	63	8750			10.5			-0.09	-0.07	-0.01	-0.17	
	5:00 PM	-32.5	77	67	8750			10.5							
	5:15 PM	-33	76	91.6	8750	65000	1600	10.6	78.5	1.7	-0.09	-0.07	-0.02	-0.2	
	5:30 PM										-0.09	-0.07	-0.01	-0.17	Collected soil gas sample
															End test.

Notes:
Airflow approximated from anemometer measurements.
Extraction rate = Airflow X Concentration of constituent
Molecular weight of gasoline assumed as 86 lb/lb mole.
Molecular weight of benzene assumed as 78.12 lb/lb mole.
CONSTRUCTION: 4 IN.DIA., TOTAL DEPTH - 53 FT. SCREENED INTERVEL: 38 FT (15 TO 53 FT BELOW GRADE)

APPENDIX A

STANDARD OPERATING PROCEDURES

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SOIL BORING SAMPLING
SOP-1

During drilling, soil samples for chemical analysis are collected in thin-walled brass tubes, of varying diameters and lengths (e.g., 4 or 6 inches long by 2 inches outside diameter). Three or four of the selected tubes, plus a spacer tube, are set in an 18-inch long split-barrel sampler of the appropriate inside-diameter.

Where possible, the split-barrel sampler is driven its entire length either hydraulically or using a 140-pound drop hammer. The sampler is extracted from the borehole and the brass tubes, containing the soil samples, are removed. Upon removal from the sampler, the selected brass tubes are either immediately trimmed and capped with aluminum foil or "Teflon" sheets and plastic caps or the samples are extruded from the tubes and sealed within other appropriate cleaned sample containers (e.g., glass jar). The samples are then hermetically sealed, labeled, and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. These procedures minimize the potential for cross-contamination and volatilization of volatile organic compounds (VOC) prior to chemical analysis.

One soil sample collected at each sampling interval is analyzed in the field using either a portable photoionization detector (PID), flame ionization detector, organic vapor analyzer, catalytic gas detector, or an explosimeter. The purpose of this field analysis is to qualitatively determine the presence or absence of hydrocarbons, and the samples to be analyzed at the laboratory. The soil sample is sealed in either a brass tube, glass jar, or plastic bag to allow for some volatilization of VOC. The PID is then used to measure the concentrations of hydrocarbons within the containers's headspace. The data is recorded on both field notes and the boring logs at the depth corresponding to the sampling point.

Other soil samples are collected to document the soil and/or stratigraphic profile beneath the project site, and estimate the relative permeability of the subsurface materials. All drilling and sampling equipment are either steam cleaned or washed in solution and doubly rinsed in deionized water prior to use at each site and between boreholes to minimize the potential for cross-contamination.

In the event the soil samples cannot be submitted to the analytical laboratory on the same day they are collected (e.g., due to weekends or holidays), the samples are temporarily stored until the first opportunity for submittal either on ice in a cooler, such as when in the field, or in a refrigerator at Aegis' office.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SOIL EXCAVATION AND SAMPLING
SOP-2

Excavation and subsequent soil sampling is performed under the direction of a registered geologist or civil engineer. To reduce the potential for cross-contamination, all excavation equipment is either steam cleaned or washed prior to use and between excavations. Soil samples for chemical analysis are collected in cleaned, thin-walled brass tubes of varying diameters and lengths (e.g., 6 inches long by 2 inches outside diameter) or other appropriate cleaned sample container. If used, one tube may be set in a 2-inch inside diameter, hand-driven sampler. To reduce the potential for cross-contamination between samples, the sampler is washed in a solution and doubly rinsed between each sampling event.

Upon recovery, a portion of the soil sample is sealed for later screening with either a portable photoionization detector, flame ionization detector, or an explosimeter. Another portion of the sample is used for description of the excavated materials. A third portion of the sample is hermetically sealed, labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. These procedures minimize the potential for cross-contamination and volatilization of volatile organic compounds prior to chemical analysis.

In the event the soil samples cannot be submitted to the analytical laboratory on the same day they are collected (e.g., due to weekends or holidays), the samples are temporarily stored until the first opportunity for submittal either on ice in a cooler, such as when in the field, or in a refrigerator at Aegis' office.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SOIL CLASSIFICATION
SOP-3

Soil samples are classified according to the Unified Soil Classification System. Representative portions of the samples may be submitted under strict chain-of-custody to an analytical laboratory for further examination and verification of the in-field classification, and analysis of soil mechanical and/or petrophysical properties. The soil types are indicated on logs of either excavations or borings together with depths corresponding to the sampling points, and other pertinent information.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: SAMPLE IDENTIFICATION AND CHAIN-OF-CUSTODY PROCEDURES
SOP-4

Sample identification and chain-of-custody procedures ensure sample integrity, and document sample possession from the time of collection to its ultimate disposal. Each sample container submitted for analysis is labeled to identify the job number, date, time of sample collection, a sample number unique to the sample, any in-field measurements made, sampling methodology, name(s) of on-site personnel and any other pertinent field observations also recorded on the field excavation or boring log.

Chain-of-custody forms are used to record possession of the sample from time of collection to its arrival at the laboratory. During shipment, the person with custody of the samples will relinquish them to the next person by signing the chain-of-custody form(s) and noting the date and time. The sample-control officer at the laboratory will verify sample integrity, correct preservation, confirm collection in the proper container(s), and ensure adequate volume for analysis.

If these conditions are met, the samples will be assigned unique laboratory log numbers for identification throughout analysis and reporting. The log numbers will be recorded on the chain-of-custody forms and in the legally-required log book maintained in the laboratory. The sample description, date received, client's name, and any other relevant information will also be recorded.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURES
RE: LABORATORY ANALYTICAL QUALITY ASSURANCE AND CONTROL
SOP-5

In addition to routine instrument calibration, replicates, spikes, blanks, spiked blanks, and certified reference materials are routinely analyzed at method-specific frequencies to monitor precision and bias. Additional components of the laboratory Quality Assurance/Quality Control program include:

1. Participation in state and federal laboratory accreditation/certification programs;

2. Participation in both U.S. EPA Performance Evaluation studies (WS and WP studies) and inter-laboratory performance evaluation programs;

3. Standard operating procedures describing routine and periodic instrument maintenance;

4. "Out-of-Control"/Corrective Action documentation procedures; and,

5. Multi-level review of raw data and client reports.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURE
RE: HOLLOW-STEM AUGER MONITORING WELL INSTALLATION AND DEVELOPMENT
SOP-6

Boreholes for monitoring wells are drilled using a truck-mounted, hollow-stem auger drill rig. The borehole diameter will be a minimum of 4 inches larger than the outside diameter of the casing when installing well screen. The hollow-stem auger provides minimal interruption of drilling while permitting soil sampling at desired intervals. Soil samples are collected by either hammering or hydraulically pushing a conventional split-barrel sampler containing pre-cleaned 2-inch-diameter brass tubes. A geologist or engineer from Aegis Environmental, Inc., continuously logs each borehole during drilling and constantly checks drill cuttings for indications of both the first recognizable occurrence of groundwater and volatile hydrocarbons using either a portable photoionization detector, flame ionization detector, or an explosimeter. The sampler is rinsed between samples and either steam cleaned or washed with all other drilling equipment between borings to minimize the potential for cross-contamination.

Monitoring wells are cased with threaded, factory-perforated and blank Schedule 40 PVC. The perforated interval consists of slotted casing, generally with 0.020-inch wide by 1.5-inch long slots, with 42 slots per foot. A PVC cap may be secured to the bottom of the casing with stainless steel screws; no solvents or cements are used. Centering devices may be fastened to the casing to ensure even distribution of filter material and grout within the borehole annulus. The well casing is thoroughly washed and/or steam cleaned, or may be purchased as pre-cleaned, prior to installation.

After setting the casing inside the hollow-stem auger, sand or gravel filter material is poured into the annular space to fill from boring bottom to generally 1 foot above the perforated interval. A 1- to 2-foot thick bentonite plug is set above this filter material to prevent grout from infiltrating into the filter pack. Either neat cement, containing about 5 percent bentonite, or sand-cement grout is then tremmied into the annular space from the top of the bentonite plug to near surface. A traffic-rated vault is installed around each wellhead for wells located in parking lots or driveways, while steel "stovepipes" are usually set over wellheads in landscaped areas.

After installation, the wells are thoroughly developed to remove residual drilling materials from the wellbore, and to improve well performance by removing fine material from the filter pack that may pass into the well. Well development techniques used may include pumping, surging, bailing, swabbing, jetting, flushing, and air-lifting. All development water is collected either in drums or tanks for temporary storage, and properly disposed of depending on laboratory analytical results. To minimize the potential for cross-contamination between wells, all development equipment are either steam cleaned or properly washed prior to use.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURE
RE: GROUNDWATER PURGING AND SAMPLING
SOP-7

Prior to water sampling, each well is purged by evacuating a minimum of three wetted well-casing volumes of groundwater. When required, purging will continue until either the discharge water temperature, conductivity, or pH stabilize, a maximum of ten well-bore volumes of groundwater have been recovered, or the well is bailed dry. When practical, the groundwater sample should be collected when the water level in the well recovers to at least 80 percent of its static level.

The sampling equipment consists of either a "Teflon" bailer, PVC bailer, or stainless steel bladder pump with a "Teflon" bladder. If the sampling system is dedicated to the well, then the bailer is usually "Teflon," but the bladder pump is PVC with a polypropylene bladder. In general and depending on the intended laboratory analysis, 40-milliliter glass, volatile organic analysis (VOA) vials, with "Teflon" septa, are used as sample containers.

The groundwater sample is decanted into each VOA vial in such a manner that there is no meniscus at the top of the vial. A cap is quickly secured to the top of the vial. The vial is then inverted and gently tapped to see if air bubbles are present. If none are present, the vial is labeled and refrigerated for delivery, under strict chain-of-custody, to the analytical laboratory. Label information should include a unique sample identification number, job identification number, date, time, type of analysis requested, and the sampler's name.

For quality control purposes, a duplicate water sample is collected from each well. This sample is put on hold at the laboratory. When required, a trip blank is prepared at the laboratory and placed in the transport cooler. It is labeled similar to the well samples, remains in the cooler during transport, and is analyzed by the laboratory along with the groundwater samples. In addition, a field blank may be prepared in the field when sampling equipment is not dedicated. The field blank is prepared after a pump or bailer has been either steam cleaned or properly washed, prior to use in the next well, and is analyzed along with the other samples. The field blank analysis demonstrates the effectiveness of the in-field cleaning procedures to prevent cross-contamination.

To minimize the potential for cross-contamination between wells, all well development and water sampling equipment not dedicated to a well is either steam cleaned or properly washed between use. As a second precautionary measure, wells are sampled in order of least to highest concentrations as established by available previous analytical data.

In the event the water samples cannot be submitted to the analytical laboratory on the same day they are collected (e.g., due to weekends or holidays), the samples are temporarily stored until the first opportunity for submittal either on ice in a cooler, such as when in the field, or in a refrigerator at Aegis' office.

AEGIS ENVIRONMENTAL, INC.
STANDARD OPERATING PROCEDURE
RE: MEASURING LIQUID LEVELS USING WATER LEVEL OR INTERFACE PROBE
SOP-12

Field equipment used for liquid-level gauging typically includes the measuring probe (water-level or interface), light filter(s), and product bailer(s). The field kit also includes cleaning supplies (buckets, TSP, spray bottles, and deionized water) to be used in cleaning the equipment between wells.

Prior to measurement, the probe tip is lowered into the well until it touches bottom. Using the previously established top-of-casing or top-of-box (i.e., wellhead vault) point, the probe cord (or halyard) is marked and a measuring tape (graduated in hundredths of a foot) is used to determine the distance between the probe end and the marking on the cord. This measurement is then recorded on the liquid-level data sheet as the "depth to water" (DTW).

When necessary in using the interface probe to measure liquid levels, the probe is first electrically grounded to either the metal stove pipe or another metal object nearby. When no ground is available, reproducible measurements can be obtained by clipping the ground lead to the handle of the interface probe case. After grounding the probe, the top of the well casing is fitted with a light filter to insure that sunlight does not interfere with the operation of the probe's optical mechanism.

The probe tip is then lowered into the well and submerged in the groundwater. An oscillating (beeping) tone indicates the probe is in water. The probe is slowly raised until either the oscillating tone ceases or becomes a steady tone. In either case, this is the depth-to-water indicator and the DTW measurement is made accordingly. The steady tone indicates floating hydrocarbons. In this case, the probe is slowly raised until the steady tone ceases. This is the depth-to-product (DTP) indicator and the DTP measurement is made accordingly.

The process of lowering and raising the probe must be repeated several times to ensure accurate measurements. The DTW and DTP measurements are recorded on the liquid-level data sheet. When floating product is indicated by the probe's response, a product bailer is lowered partially through the product-water interface to confirm the product on the water surface, and as further indication of product thickness, particularly in cases where the product layer is quite thin. This measurement is recorded on the data sheet as "product thickness."

In order to avoid cross-contamination of wells during the liquid-level measurement process, wells are measured in the order of "clean" to "dirty" (where such information is available). In addition, all measurement equipment is cleaned with TSP solution and thoroughly rinsed with deionized water before use, between measurements in respective wells, and at the completion of the day's use.

APPENDIX B

SOIL BORING LOGS AND MONITORING WELL CONSTRUCTION DETAILS

8857

Phone (916) [illegible]2110
FAX (916) [illegible]7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to: CUSTODY SEAL Environmental
891 Riverside, Suite G
Roseville, CA 9567[illegible]
@ 7-24

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET, Santa Rosa, California
Project Manager B. Gacker

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Seals intact

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
48.5 feet below grade	MW-5	Sample # 9	9/17/92	brass/soil	1	Refer to Comments *
54 feet below grade	MW-5	# 10	↓	↓	1	↓
						TPH ND Nonetec. pr MK to LD 10/6

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Jodi Cantoff 7:00		9-21	1:45	
		A. Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: ice/courier

Received for Lab by: (signature) Date/Time: Comments: Analyze for: TPH-gasoline by GC/FID Method 5030; BTEX by EPA Method 8020. If TPH is not detected, the sample collected at or near air water interface will be tested for total Metals. * 5 day turn around.

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

Phone (916) [redacted]2110
FAX (916) [redacted]-7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to: AEGIS Environmental
801 Riverside, Suite G
Roseville, CA 95678

CUSTODY SEALED @ seals intact A.C.

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET, Santa Rosa, California
Project Manager B. Garber

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required	
4.5 Feet below grade	MW-5	Sample #1	09/17/92	brass/soil	1	Refer to Comments	*
9.5 feet below grade	MW-5	#2					mk
18.5 feet below grade	MW-5	#3				Refer to Comments	*
24.5 feet below grade	MW-5	#4					mk
29 feet below grade	MW-5	#5				Refer to Comments	*
34.5 feet below grade	MW-5	#6					mk
39.5 feet below grade	MW-5	#7					mk
44.5 feet below grade	MW-5	#8				Refer to Comments	*

Sampler(s) (signature) Michael Kitko

TPH ND, None to be per MK to LD 10/6/92

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Jodi Carroll 7:00		9-21	1:45	
		Lope	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: ice/courier

Received for Lab by: (signature) Date/Time: Comments: Analyze for: TPH-gasoline by GC/FID Method 5030; BTEX by EPA Method 8020. If TPH is not detected, the sample collected at or near the air-water interface will be tested for total metals. *5-day turn around.

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

8854

Phone (916) [redacted] 2110
FAX (916) [redacted] 7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to:
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678

CUSTODY SEALED

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET, Santa Rosa, California
Project Manager B. Gerber

For Shell Projects Only
WIC: seals intact
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
9.5 feet below grade	MW-4	Sample # 2	09/18/92	brass/soil	1	Refer to Comments *
19.5 feet below grade	MW-4	#4			1	run Cd, Co, Pb, Zn per MK told 10/6/92
29.5 feet below grade	MW-4	#6			1	〃
38.5 mk 39 feet below grade	MW-4	#8			1	
44 feet below grade	MW-4	#9			1	
14.5'	MW-4	#3	9/18/92	〃	〃	* added per B. Gerber ins to sue Long 9/22/92

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Julie Cantrell		9-21	1:45	
	7:20	A. Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: ice/courier

Received for Lab by: (signature) Date/Time: Comments: Analyzed for: TPH-gasoline by GC\FID method 5030; BTEX by EPA Method 8020. Soil sample with highest TPH concentration analyzed for total priority pollutant metals cadium, chromium, lead and zinc by EPA Methods 6010 and 7421 (Lead). ~~If TPH is not detected~~ MK

Receiving Laboratory: Please return original form after signing for receipt of samples.

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* 5 day turn around.

8857

Phone (916) [redacted] 2110
FAX (916) [redacted] 7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to:
AEGIS Environmental Consultants, Inc.
501 Riverside Avenue
Roseville, CA 95678

CUSTODY SEALED 9/22 TJS

For Shell Projects Only Seals intact A.L.

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET, Santa Rosa, California
Project Manager B. Gerber

WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
~~20~~ 19.5 feet below grade	MW-3	Sample # 4	9/18/92	brass/soil	1	Refer to Comments
~~30~~ 29 feet below grade	MW-3	# 6			1	
44.5 feet below grade	MW-3	# 9			1	
50 feet below grade	MW-3	# 10			1	
40 feet	MW-3	# 8	9/16/92	"	"	* added per B. Gerbers instructions to Suelon 9/22/92
						TPH - NJ NO metals per MK to LD 09/6/92

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Jody Canall 7:00		9-21	1:45	
		A. Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: ice / courier

Received for Lab by: (signature) _____ Date/Time: _____ Comments: Analyze for: TPH as gasoline by GC/FI, Method 5030; BTEX by EPA Method 8020. Soil sample with highest TPH concentration analyze for total priority pollutant metals Cadium, chromium, lead and zinc by EPA Methods 6010 and 7421 (lead)

* 5 day turn around

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

8357

Phone (916) [redacted] 2110
FAX (916) [redacted] 7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

CUSTODY SEAL
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678
Seals intact

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET in Santa Rosa, California
Project Manager B. Garber

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
19.5 Feet below grade	MW-2	Sample # 4	09/15/92	brass/soil	1	Refer to comments *
29.5 feet below grade	MW-2	# 6	09/15/92		1	* Highest TPHg ppm, Cd, Cr, Pb, Zn, Ni
~~39 feet below grade~~	MW-2	# 8	09/15/92		1	no sample received - S. Lo client notified - B. garber 9/22/92
49.5 feet below grade	MW-2	# 10	09/15/92	↓	1	↓

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Rick Carroll 7:00		9-21	1:40	
		A. Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: UPS/courier

Received for Lab by: (signature) Date/Time: Comments: Analyze for: TPH as gasoline by GC/FID Method 5030; BTEX by EPA Method 8020. Soil sample with highest TPH concentration analyze for total priority pollutant metals cadmium, chromium, lead and zinc by EPA Methods 6010 and 7421 (lead).

* 5 day-turn around

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

Phone (916 '2 2110
FAX (916[redacted]6-7830

AEGIS Environmen[redacted] Consultants, Inc.
Sample Identification/Field Chain of Custody Record

Send results to:
CUSTODY SEALED [redacted]
801 Rivers[redacted] Suite C
Roseville, CA 95678
@ 7:00
seals intact A.L.

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET - Santa Rosa, California
Project Manager: B. Garber

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
44 feet in depth	Monitoring Well - MW-1	sample #9	09/15/92	brass/soil	1	Refer to Comments *
49.5 feet in depth	" " " - MW-2	#10	09/15/92	brass/soil	1	
53 feet in depth	" " " - MW-2	#11	09/15/92	brass/soil	1	
						TPH-ND No metals per MK to LD 10/1

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Jodi Carroll	[signature]	9-21	1:45	
	[signature] 7:00	A. Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: ice/courier

Received for Lab by: (signature) Date/Time: Comments: Analyze for: TPH as gasoline by GC/FID Method 5030; BTEX by EPA Method 8020. Soil sample with highest TPH concentrations analyze for total priority pollutant metal Cadium, chromium, lead and zinc by EPA Methods 6010 and 7421 (lead).

* 5-day Turn around.

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

Phone (916) [illegible] 2110
FAX (916) [illegible] 7830

8851

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send re[illegible]
CUSTODY SEALED [illegible]
8[illegible] Riverside, Suite C
@ 7[illegible] Roseville, CA 95[illegible]
Seals intact A.L.

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET - Santa Rosa, California
Project Manager B. Barber

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
4 feet in depth	Monitoring Well MW-1	Sample #1	September 15, 1992	brass/soil	1	Refer to Comments *
9 feet in depth	MW-1	#2			1	
14.5 feet in depth	MW-1	#3			1	All TPH incl
19 feet in depth	MW-1	#4			1	NO metals
24.5 feet in depth	MW-1	#5			1	Pb, Mk. tol
29.5 feet in depth	MW-1	#6			1	benz
33.5 feet in depth	MW-1	#7			1	
39 feet in depth	MW-1	#8			1	

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	Jodie Carroll		9/21	1:45	
	7:07	A Lepre	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: 09/18/92 Shipment Method: Ice/courier

Received for Lab by: (signature) Date/Time: Comments: Analyze for: TPH as gasoline by GC/FID Method 5030; BTEX by EPA Method 8020. Soil sample with highest TPH concentration analyze for total priority pollutant metals cadmium, chromium, lead and zinc by EPA Methods 6010 and 7421 (lead). * 5-day turn around. * 9/22/92

Receiving Laboratory: Please return original form after signing for receipt of samples

White/Original Yellow/Lab Copy Pink/File Copy

gas/BTXE data available 9/28
metals due on 10/1/92 per
[illegible] to Ron [illegible]

8357

Phone (916) [redacted]2110
FAX (916) [redacted]7830

AEGIS Environment[redacted]Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to: CUSTODY SEALED
[redacted] Arrival
801 Riverside Ave C
@ 7:00 Roseville, CA 95678
seals intact A.L

Site Address: 1401 Grand Avenue, San Leandro, California
AEGIS Project #: 91-001
Shipped By: M. Kitko
Shipped To: NET, Santa Rosa, California
Project Manager B. Gaber

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
North Side	Soil Stockpile	North side soil stockpile	09/18/92	Brass/soil	1	Refer to Comments *
South side	Soil Stockpile	South side soil stockpile	09/18/92	Brass/soil	1	↓ run Cd, Cr, Pb, Zn per MK tel 10/6/92

Sampler(s) (signature) Michael Kitko

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
	[signature] 7:00	[signature]	9-21	1:45	
		A Lopez	9/22/92	0800	

Sealed for shipment by: (signature) Michael Kitko Date/Time: Shipment Method: Ice Courier
Received for Lab by: (signature) Date/Time: Comments: * 5 days turnaround

Analyze for: TPH as gasoline by GC/FID Method 5030; BTEX by EPA Method 8020; The soil sample with the highest TPH concentrations analyze for Total Priority Metals Cadium, Chromium, lead and zinc by EPA Meth[illegible]

Receiving Laboratory: Please return original form after signing for receipt of samples.
White/Original Yellow/Lab Copy Pink/File Copy

782 2110
(6) 786-7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

Send results to:
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678

Site Address: 1401 GRAND AVE SAN LEANDRO CA
AEGIS Project #: 91-001
Shipped By: AEGIS
Shipped To: NET
Project Manager: [illegible]

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
MW-1	1401 GRAND AVE	MW 1	9-29-92	WATER	7	TPH GAS BTEX
2	↓	2	↓	↓	↓	↓
4	↓	4	↓	↓	↓	↓
5	↓	5	↓	↓	↓	↓

Sampler(s) (signature) [signature] [illegible]

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time	Comments
MW 1 2 4 5	[signature] 10/1/92	[signature]	10/1/92 1500	
MW 1 2 4 5	[signature]	[signature]	10/1/92 1515	

Sealed for shipment by: (signature) [signature] Date/Time: 9/30 1400 Shipment Method:
Received for Lab by: (signature) Date/Time: Comments:

Receiving Laboratory: Please return original form after signing for receipt of samples.

Phone (916) 782 2110
FAX (916) 786-7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

9072

Send results to:
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678

Site Address: 1401 GRAND AVE. SAN LEANDRO CA
AEGIS Project #: 91-001
Shipped By: AEGIS
Shipped To: NET
Project Manager BRIAN GMAEN

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
MW-1	1401 GRAND AVE	MW-1	9-29-92	WATER	2	TPH Gas BTEX
2		2				
4		4				
5		5				

Sampler(s) (signature) BRIAN GMAEN

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
MW's 1,2,4,5	5:00 10/1/92		10/1/92	1500	
MW's 1,2,4,5		Fed Ex ABH 160220124	10/1/92	1545	

Sealed for shipment by: (signature) Date/Time: 10/1/92 5:00 Shipment Method:
Received for Lab by: (signature) Date/Time: 10/2/92 10:00 Comments:

Receiving Laboratory: Please return original form after signing for receipt of samples.

White-Original Yellow-1st Copy Pink-2nd Copy

NET Pacific, Inc

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
*	:	Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
ICVS	:	Initial Calibration Verification Standard (External Standard).
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND		Not detected; the analyte concentration is less than the applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

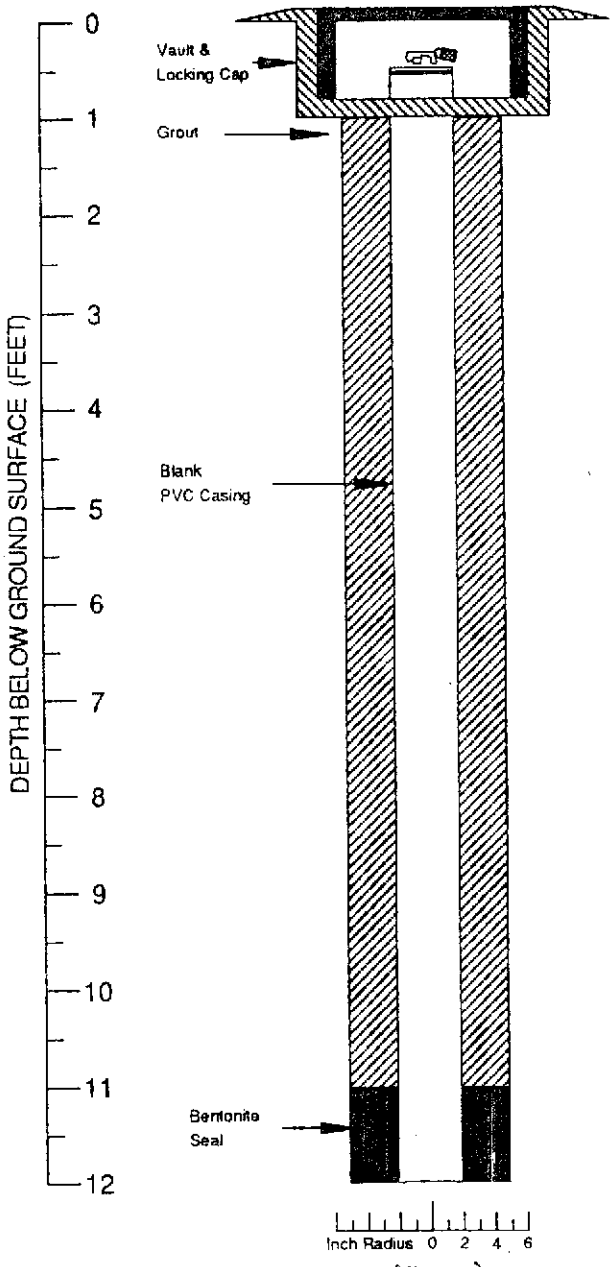
Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, Rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, Rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986., Rev. 1, December 1987.

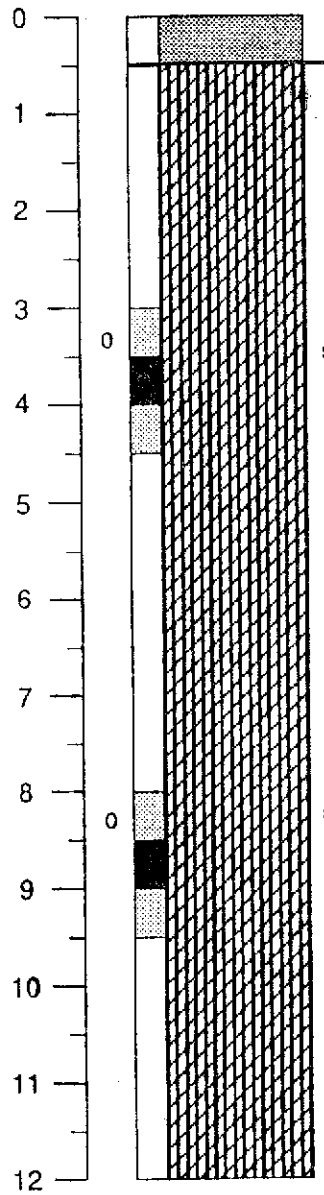
SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray , damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 15, 1992 09:20 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 15, 1992 13:50 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

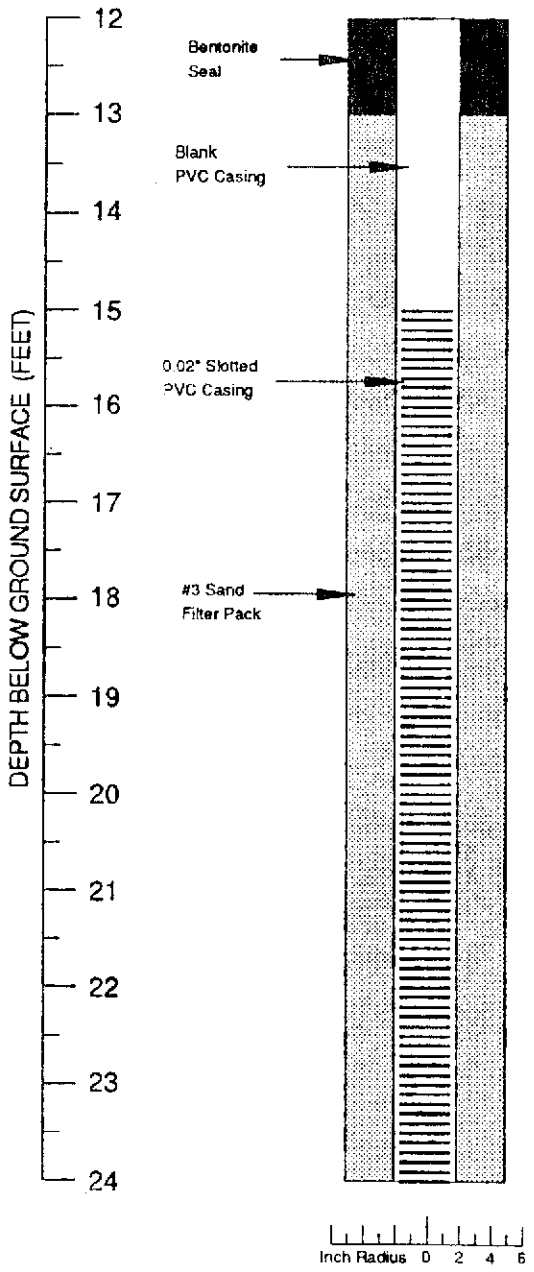
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

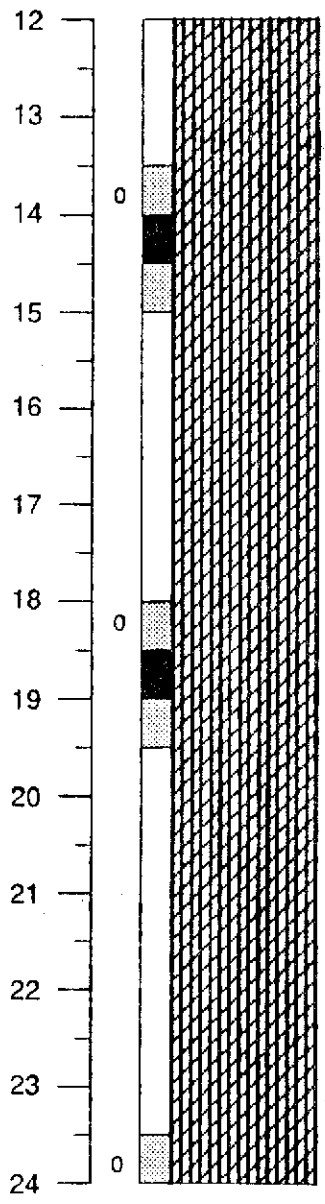
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

CLAYEY SILT (ML); dark yellowish brown damp, slightly plastic, soft, no odor

same, sample collected, no odor

same, sample collected, no odor

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

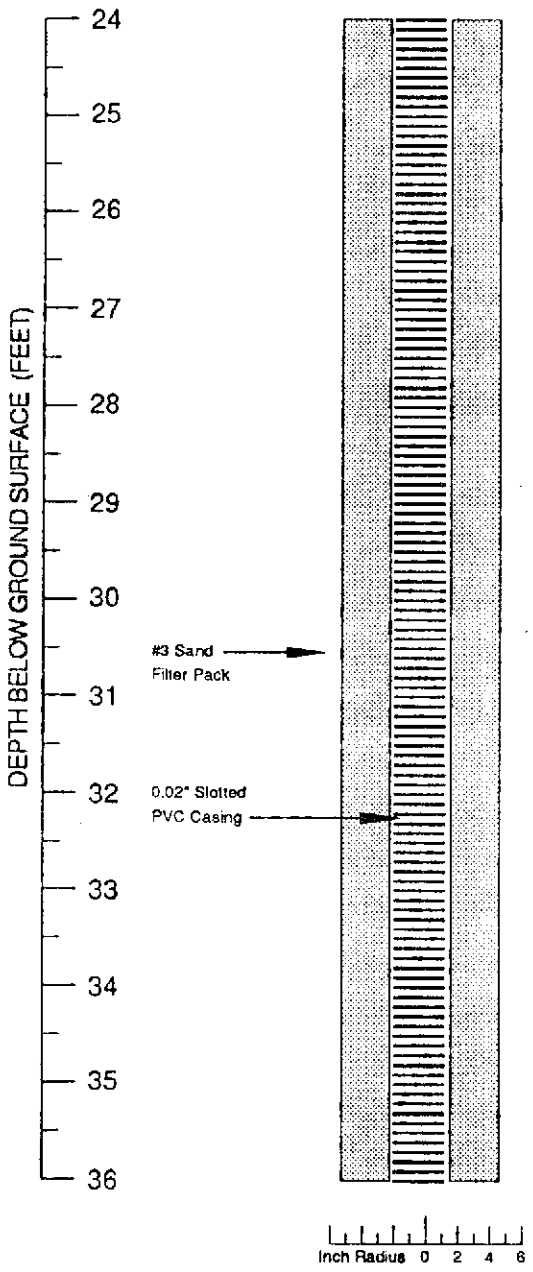
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

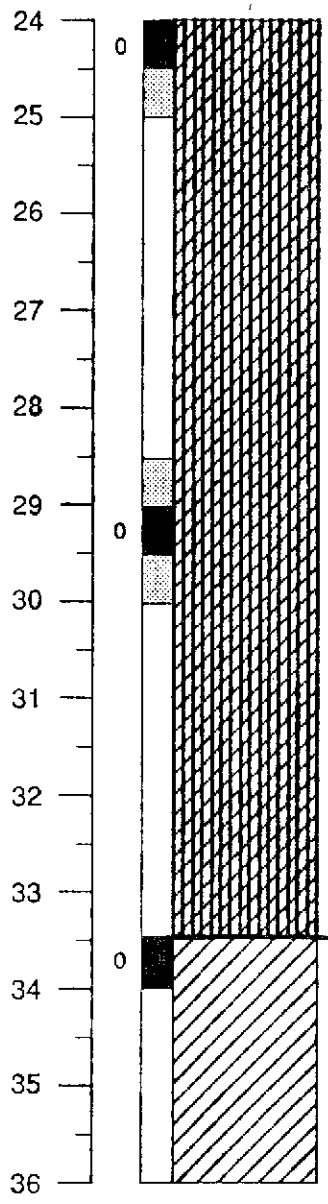
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBE
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

SAND (SM); greenish gray, dry to damp, poorly graded, fine to medium grained, no hydrocarbon odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

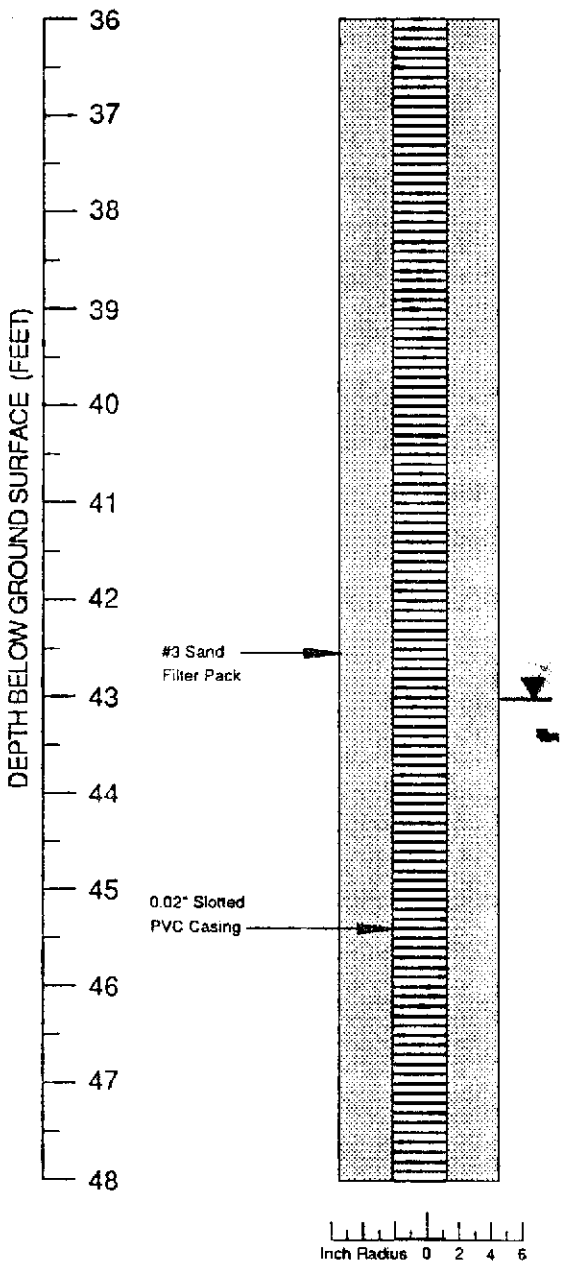
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

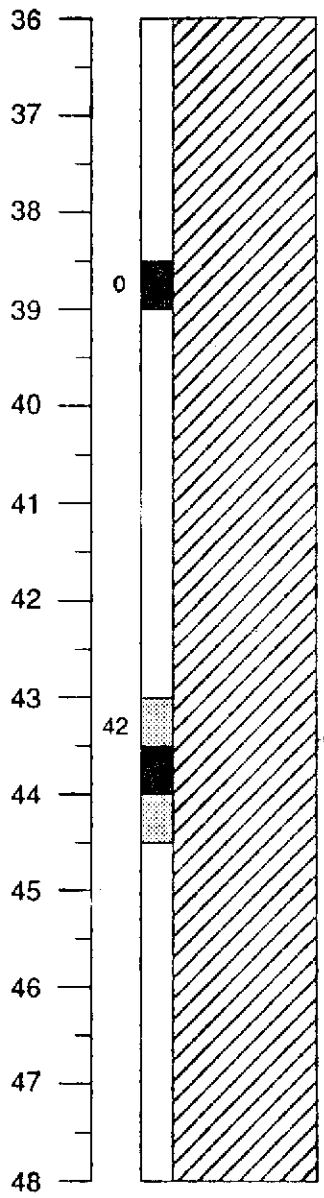
Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, [redacted]

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

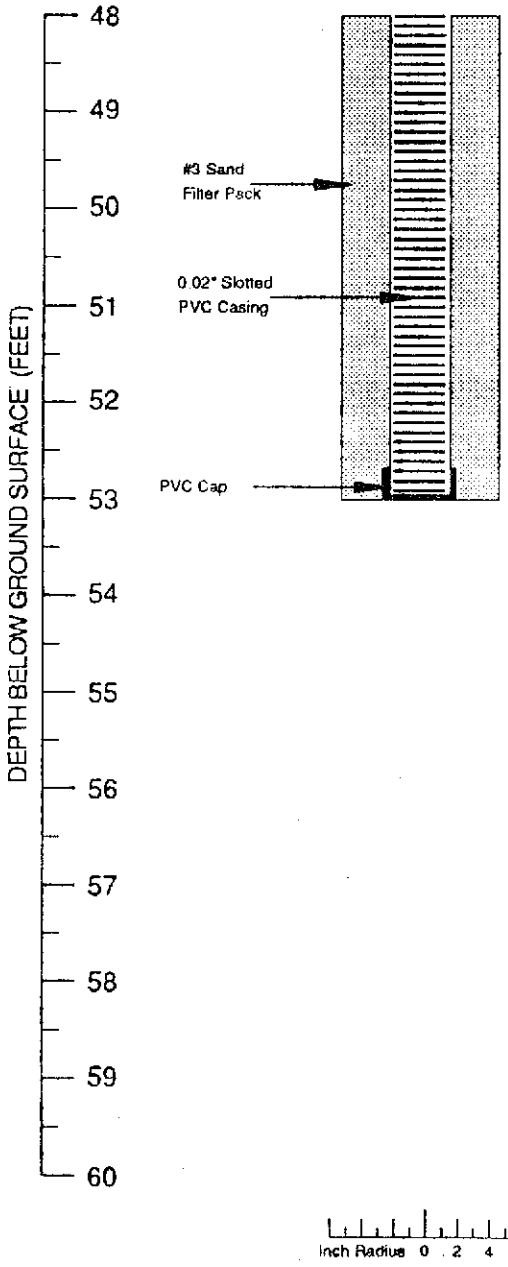
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

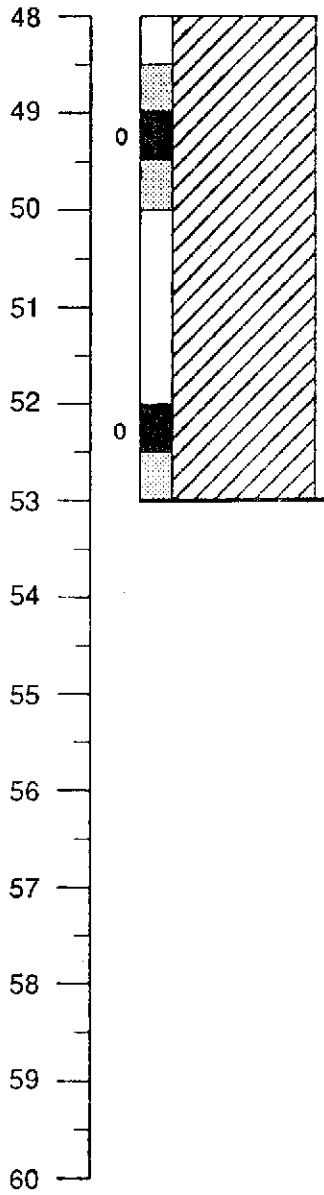
Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

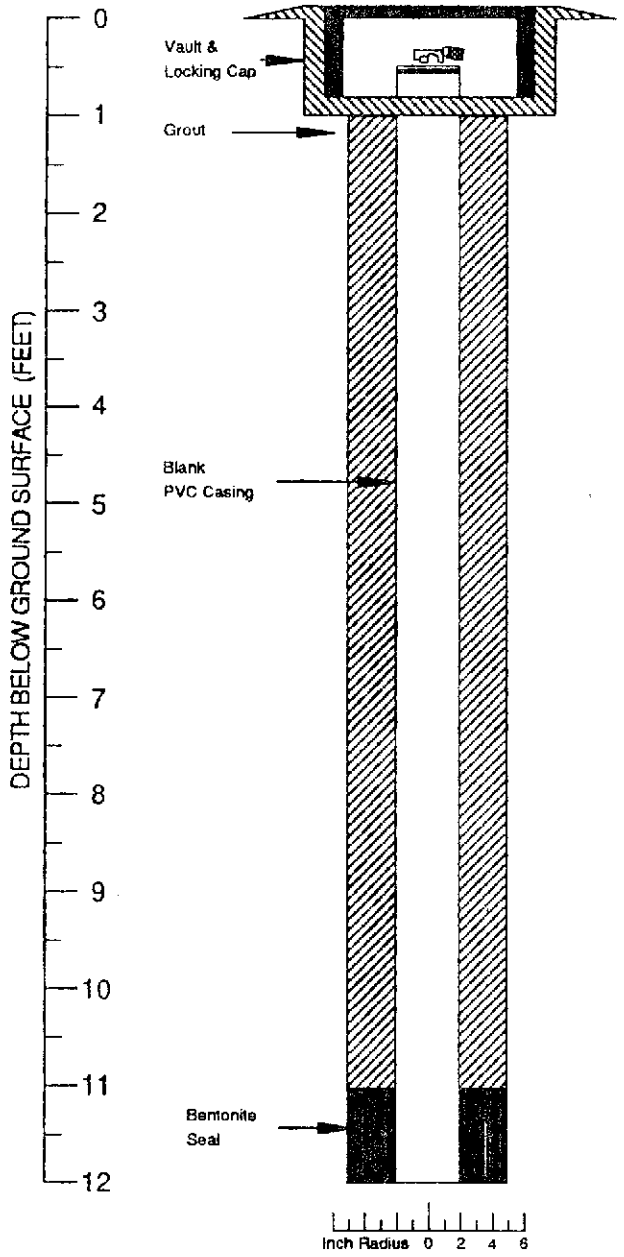
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

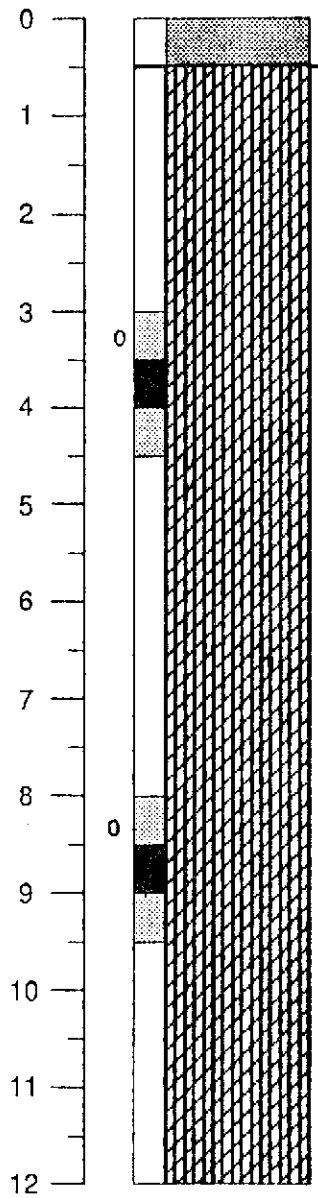
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-1	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-1

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko	Drilling Company: B & F Drilling Co.	Well Head Completion: Sept. 15, 1992 12:50 hrs
Project Mgr: Brian Garber	Drilling Method: 10" Hollow Stem Auger	Type of Sampler: Modified Calif. Split Spoon
Date Drilled: Sept. 15, 1992 09:20 hrs	Driller: Bob Gansberg & Chris Fiscus	TD (Total Depth): 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

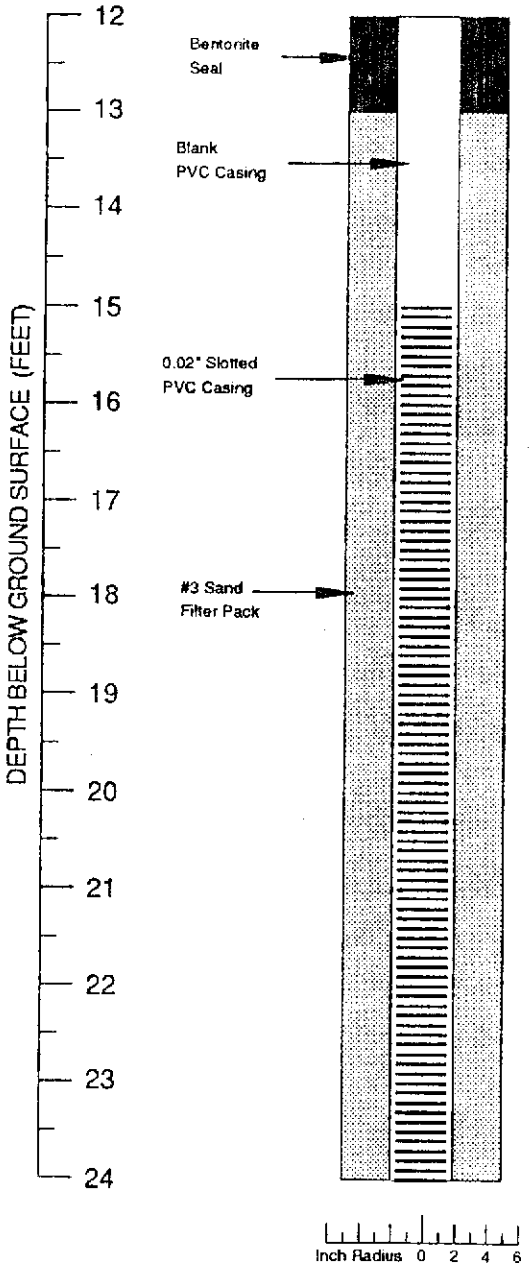
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

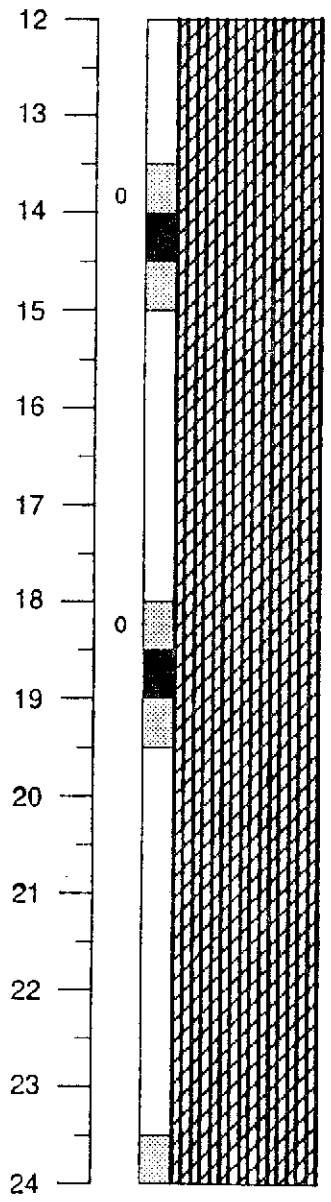
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

CLAYEY SILT (ML); light olive gray, damp, slightly plastic, soft, no odor.

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

Water level during drilling	
Water level in completed well	
Location of recovered drill sample	
Location of sample sealed for chemical analysis	
Sieve sample	
Grab Sample	

Contacts:

——	Solid where certain
· · · ·	Dotted where approximate
– –	Dashed where uncertain
//////	Hachured where gradational
est K	Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
NR	No Recovery

AEGIS ENVIRONMENTAL, INC.

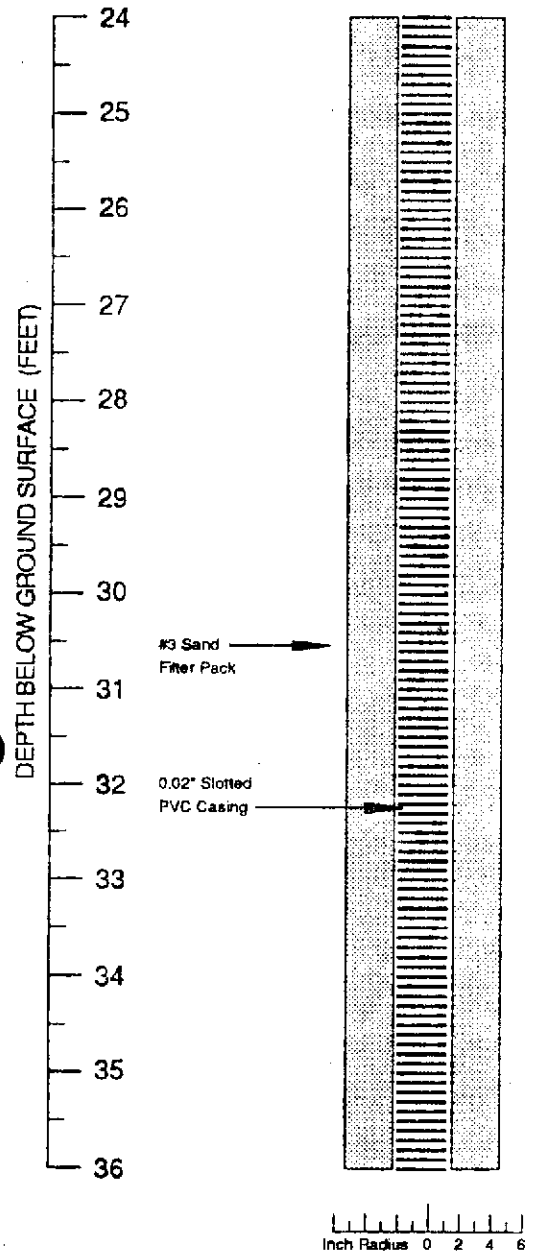
Well Log MW-2

JOB NUMBER 10-91001

Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

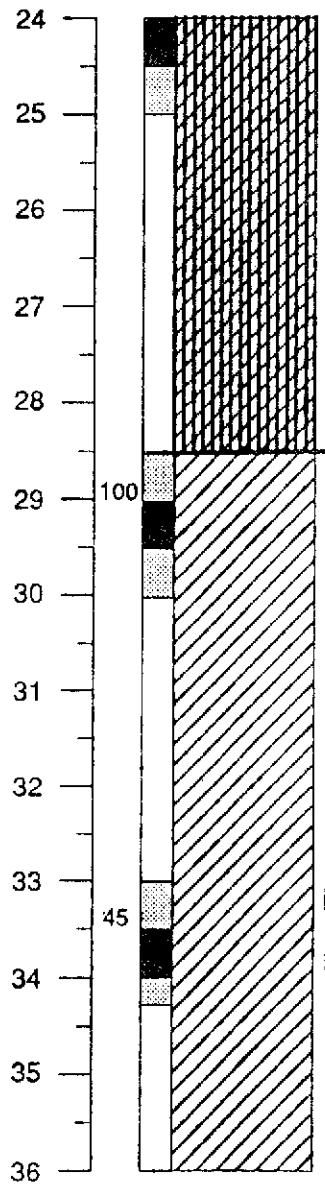
WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

SAND (SM); greenish gray, damp, moderately graded, medium to coarse grained with gravel, strong hydrocarbon odor.

SAND (SM), dry to damp, poorly graded, fine to medium grained, moderate hydrocarbon odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

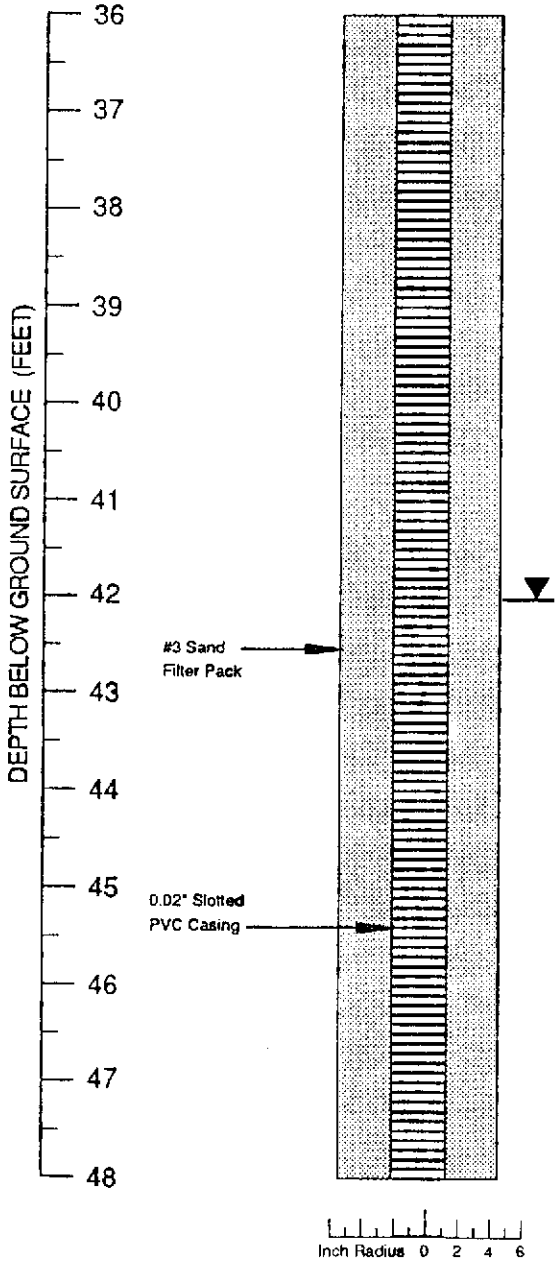
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

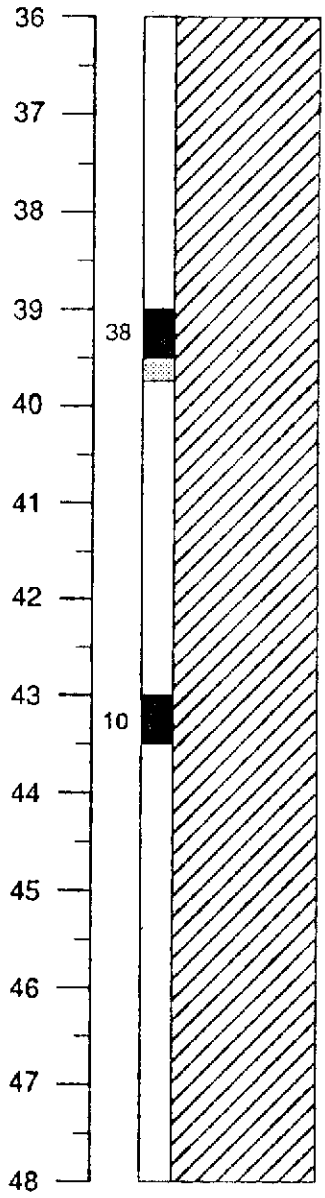
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, weak odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

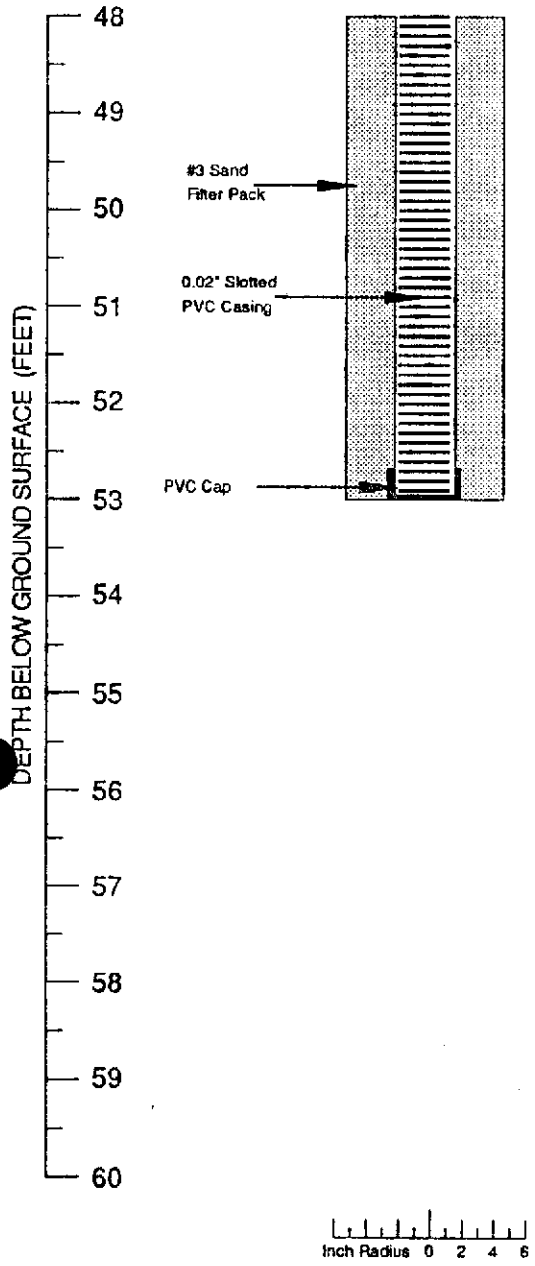
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AECIS ENVIRONMENTAL, INC.

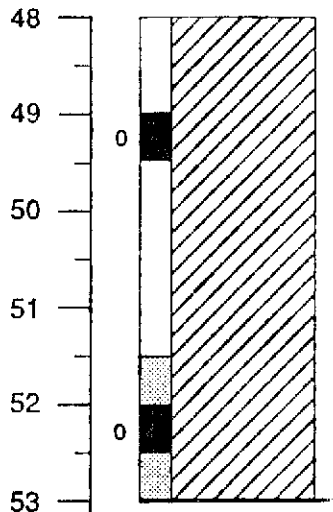
Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

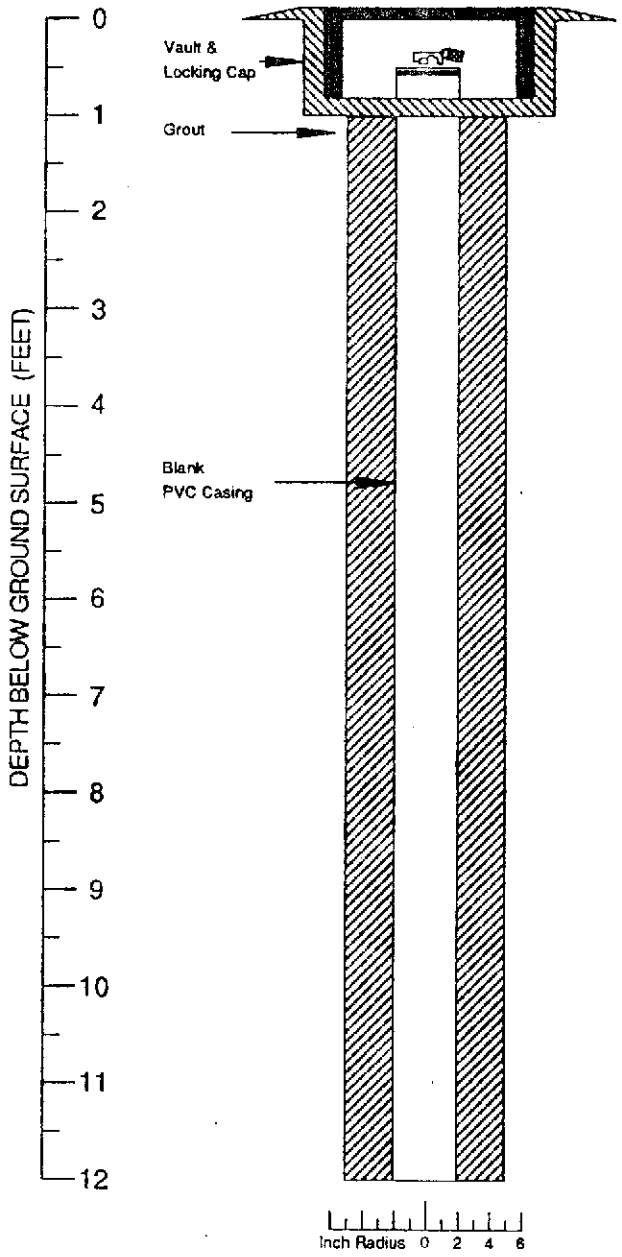
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

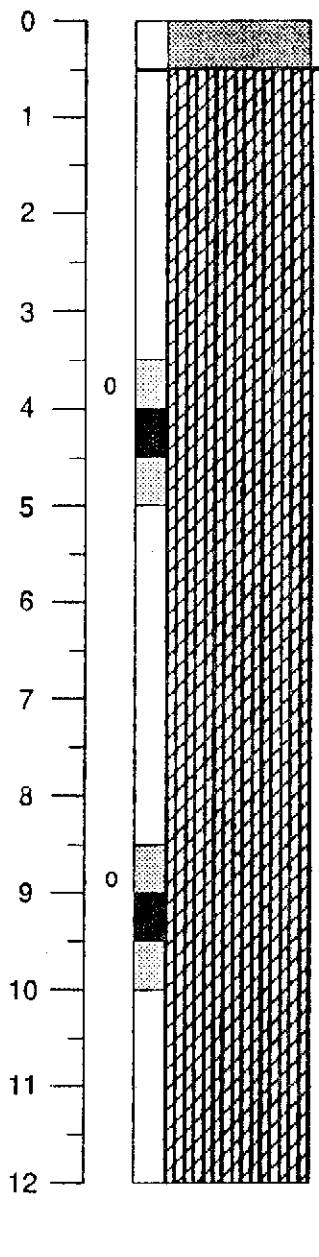
Well Log	JOB NUMBER
MW-2	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-2

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft no, odor.

same, sample collected, no odor.

SILTY CLAY (ML); dusky yellowish brov damp, low plasticity, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 16, 1992 12:55 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 16, 1992 16:45 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 56.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

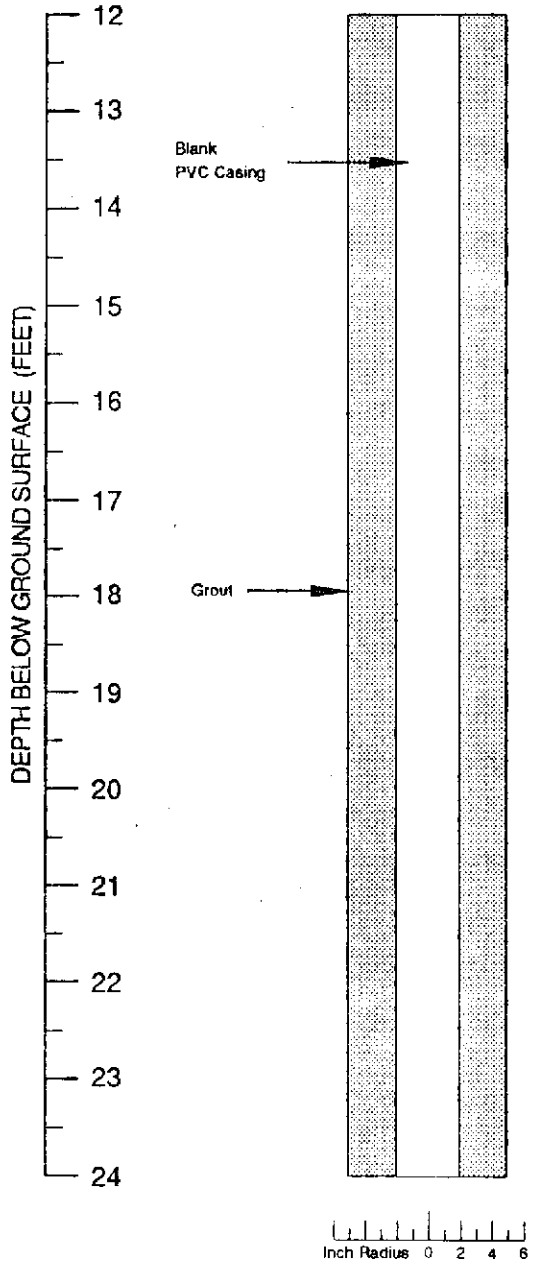
Well Log MW-3

JOB NUMI 10-9100

Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

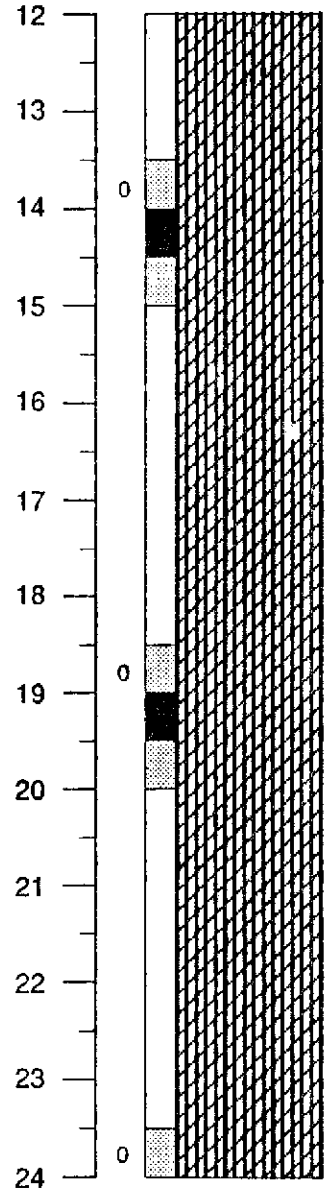
WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, no odor.

same, dark yellowish brown, no odor.

same, sample collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

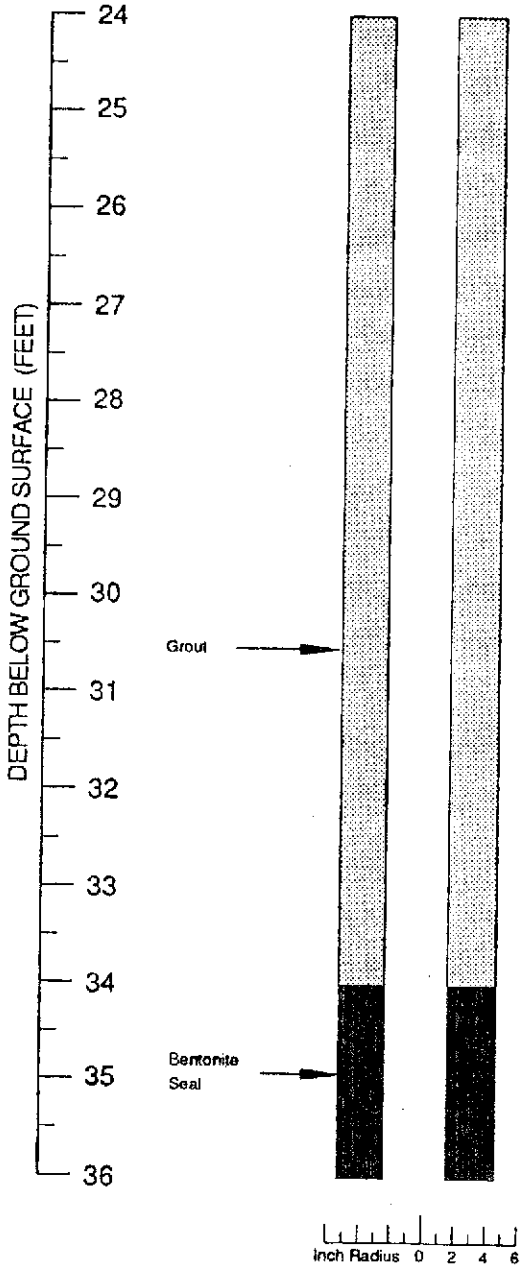
Well Log **MW-3**

JOB NUMBI 10-91001

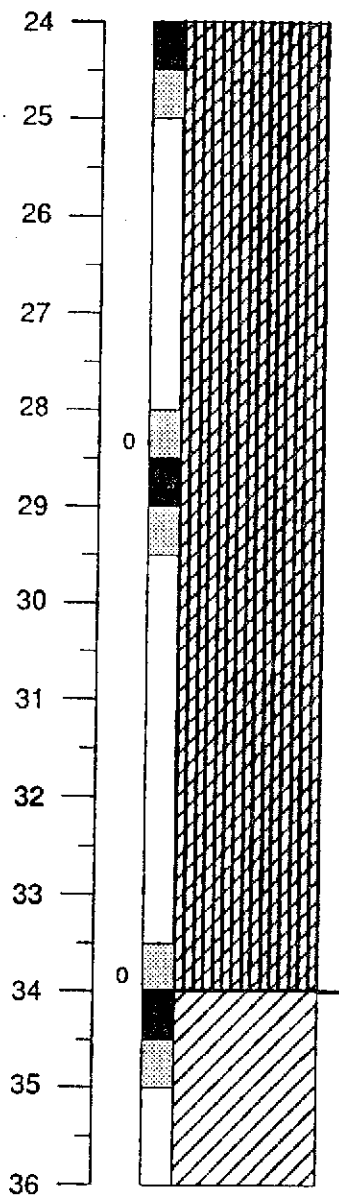
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

SAND (SM); greenish gray, damp, moderately graded, find to medium grained.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

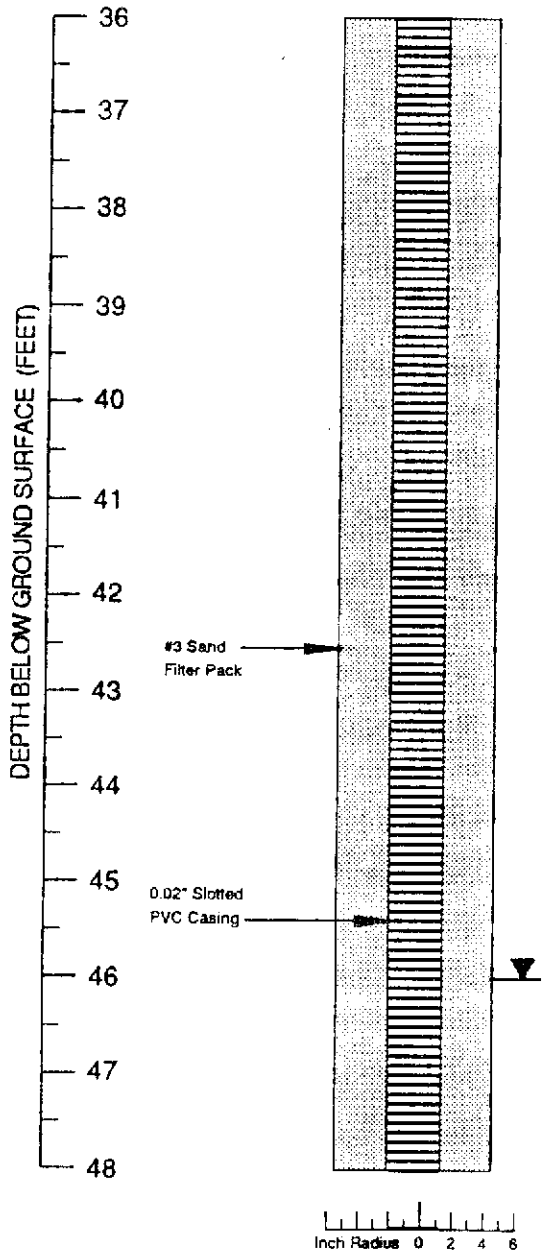
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

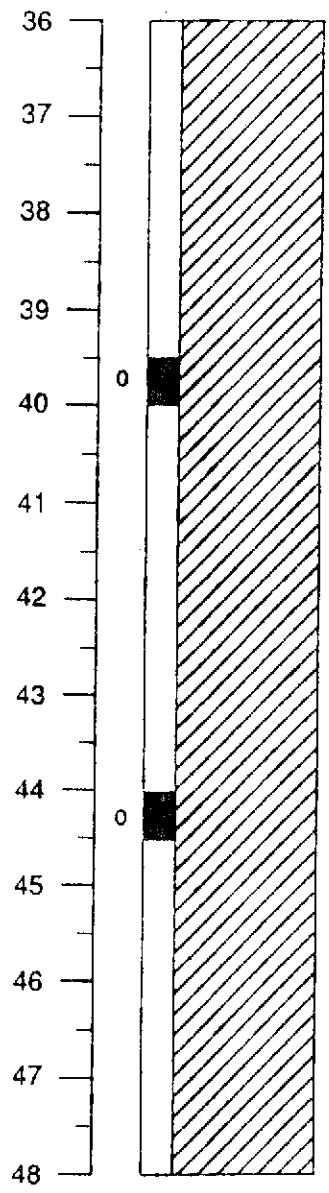
Well Log	JOB NUMBEI
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

Water level during drilling	
Water level in completed well	
Location of recovered drill sample	
Location of sample sealed for chemical analysis	
Sieve sample	
Grab Sample	

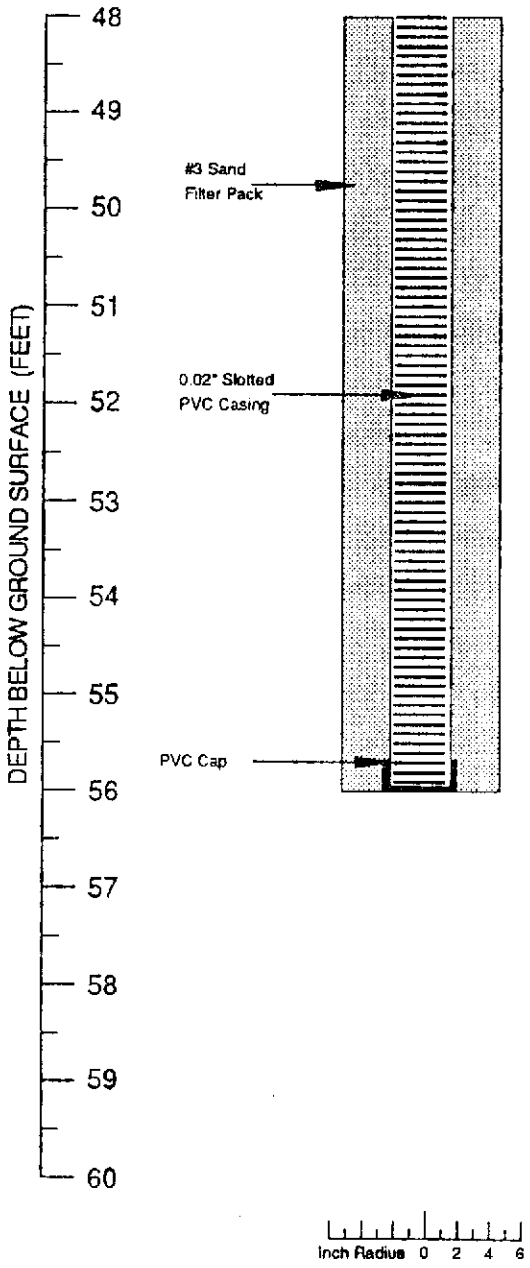
Contacts:

——	Solid where certain
· · · ·	Dotted where approximate
– –	Dashed where uncertain
//////	Hachured where gradational
est K	Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
NR	No Recovery

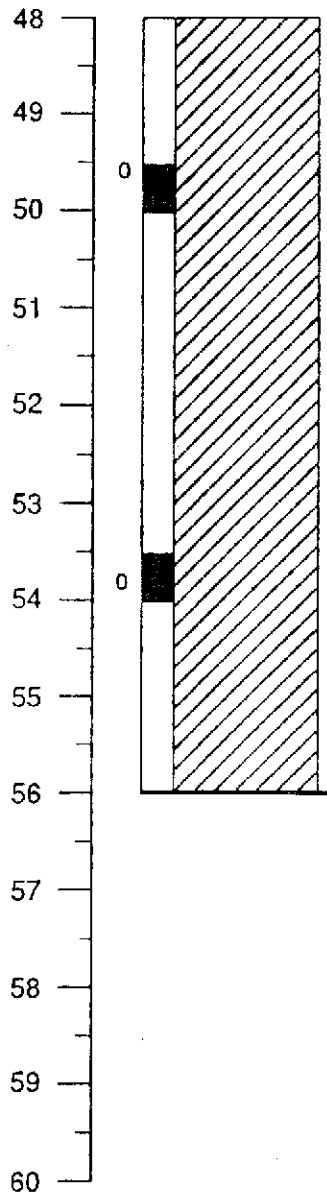
AEGIS ENVIRONMENTAL, INC.

Well Log **MW-3**	JOB NUMBER 10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL **MW-3**

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 56.0 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

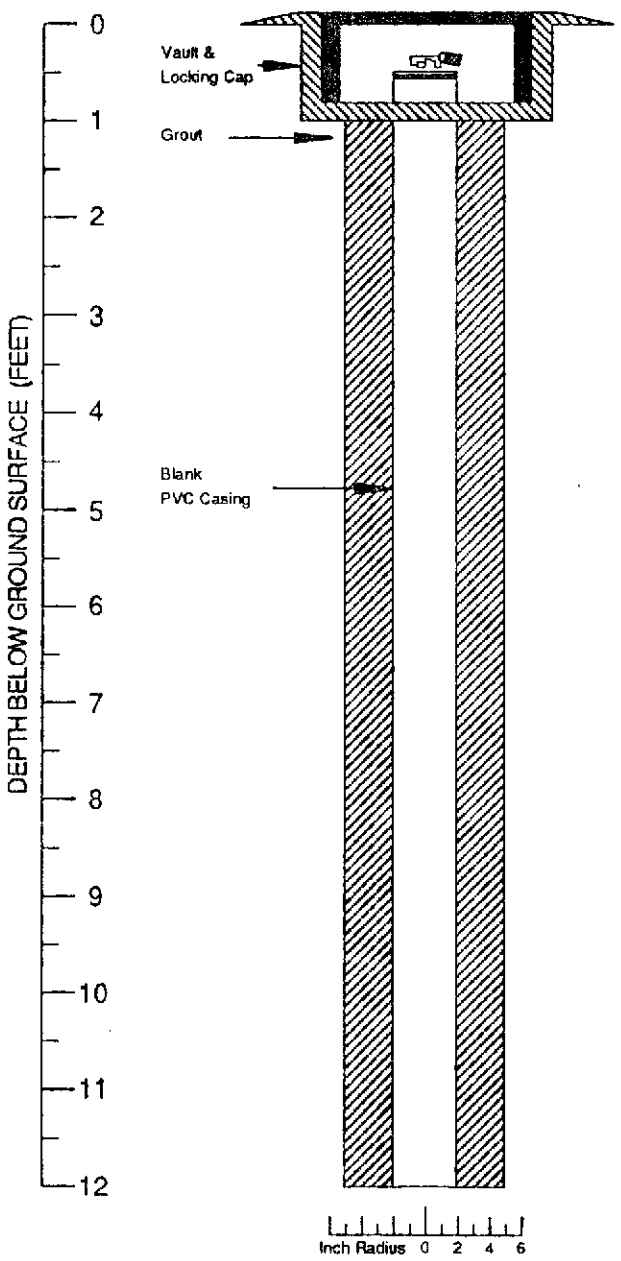
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

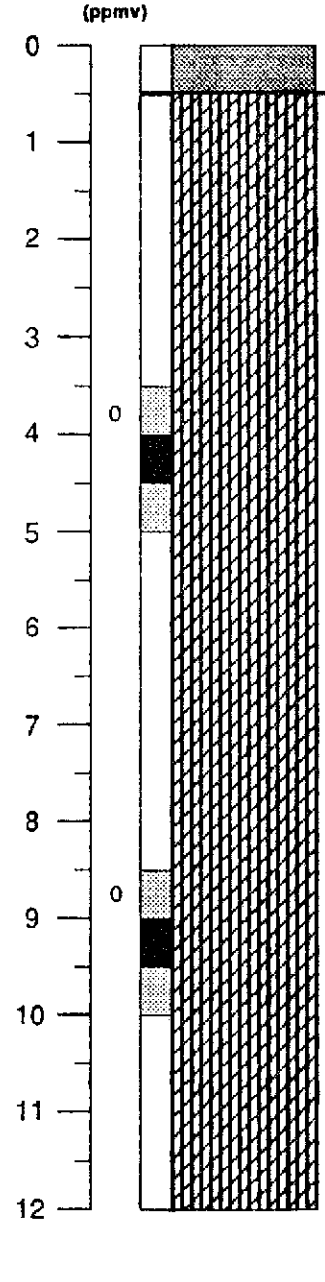
Well Log	JOB NUMBER
MW-3	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-3

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

asphalt

SILTY CLAY (ML); olive gray, damp, slightly plastic, soft, no odor.

SILT (ML); moderate yellowish brown, damp, soft, no odor.

same, sample collected, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 18, 1992 10:00 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 18, 1992 14:15 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 53.5 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

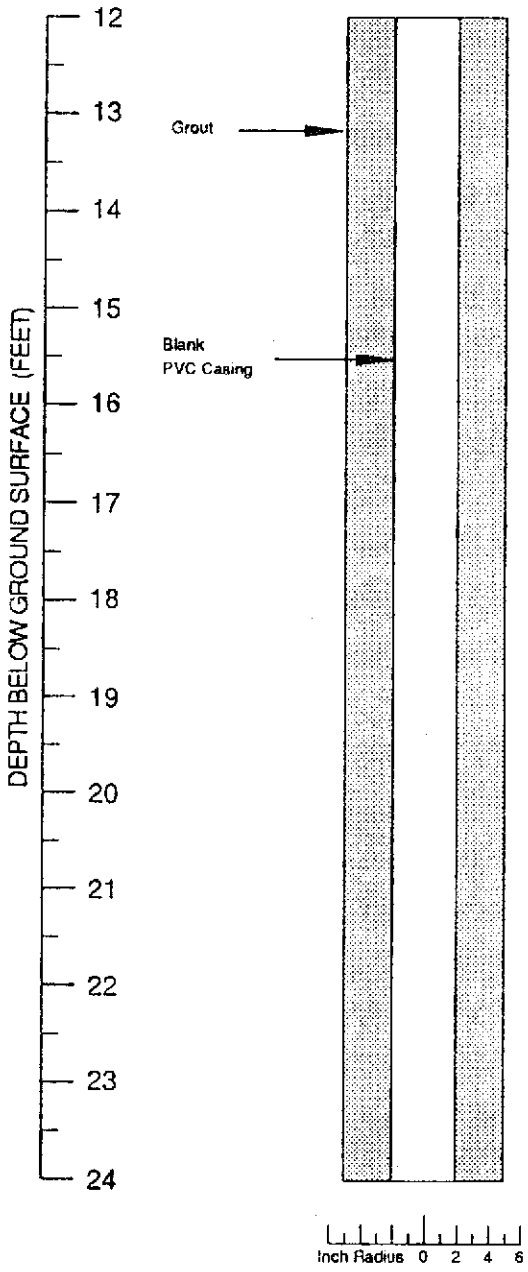
Well Log **MW-4** *

JOB NUMBER 10-91001

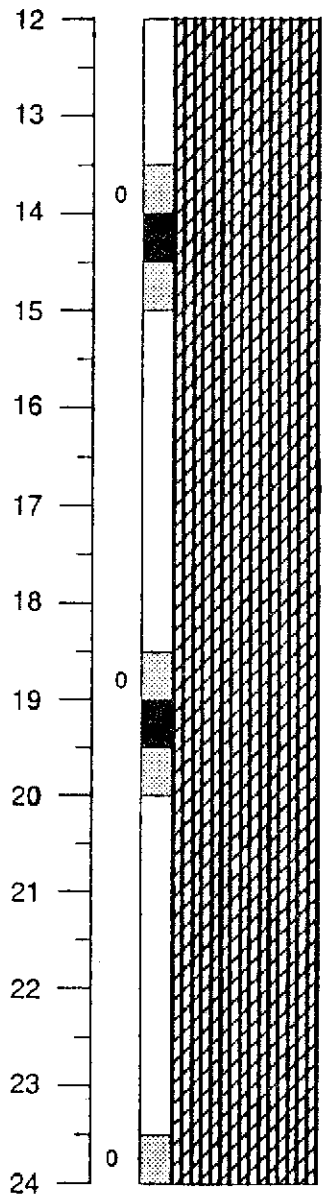
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same,sample collected, no odor.

same,sample collected, no odor.

same,sample collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

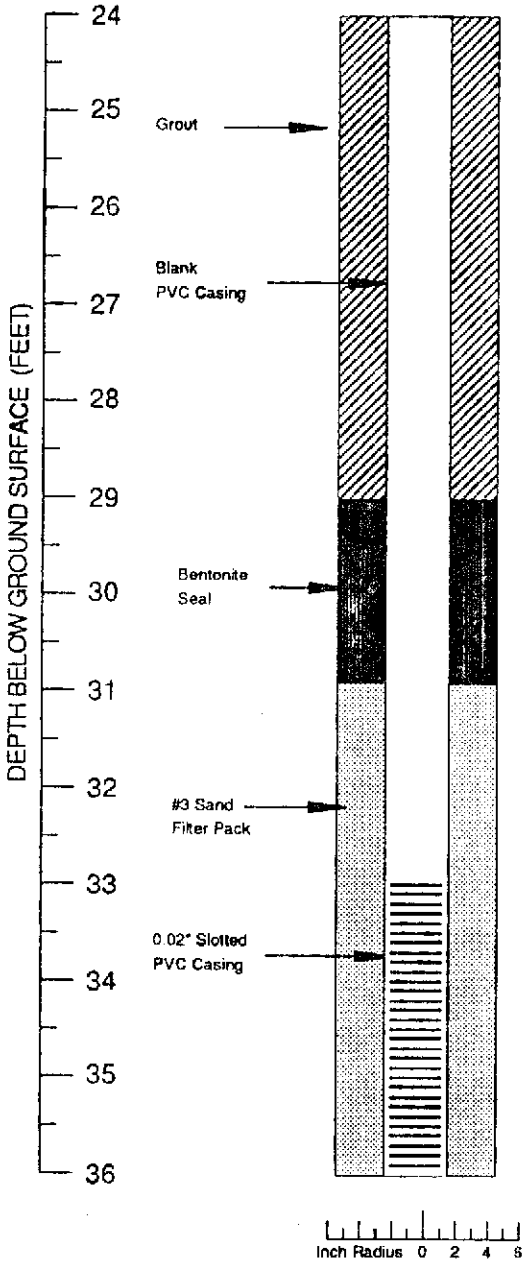
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

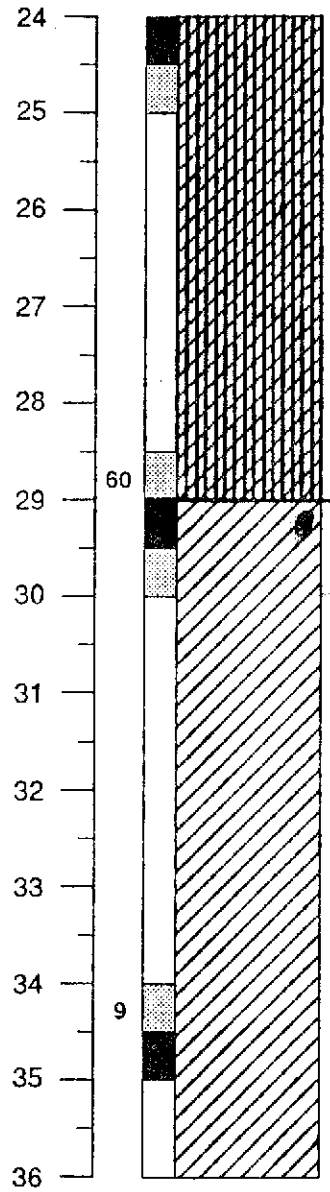
Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

SILTY SAND (SM); light olive gray, moist, poorly graded, fine-grained with strong hydrocarbon odor.

SAND (SM); greenish gray, damp, moderately graded, medium to coarse-grained, no odor.

Explanation

Water level during drilling

Water level in completed well

Location of recovered drill sample

Location of sample sealed for chemical analysis

Sieve sample

Grab Sample

Contacts:

Solid where certain

Dotted where approximate

Dashed where uncertain

Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary

NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

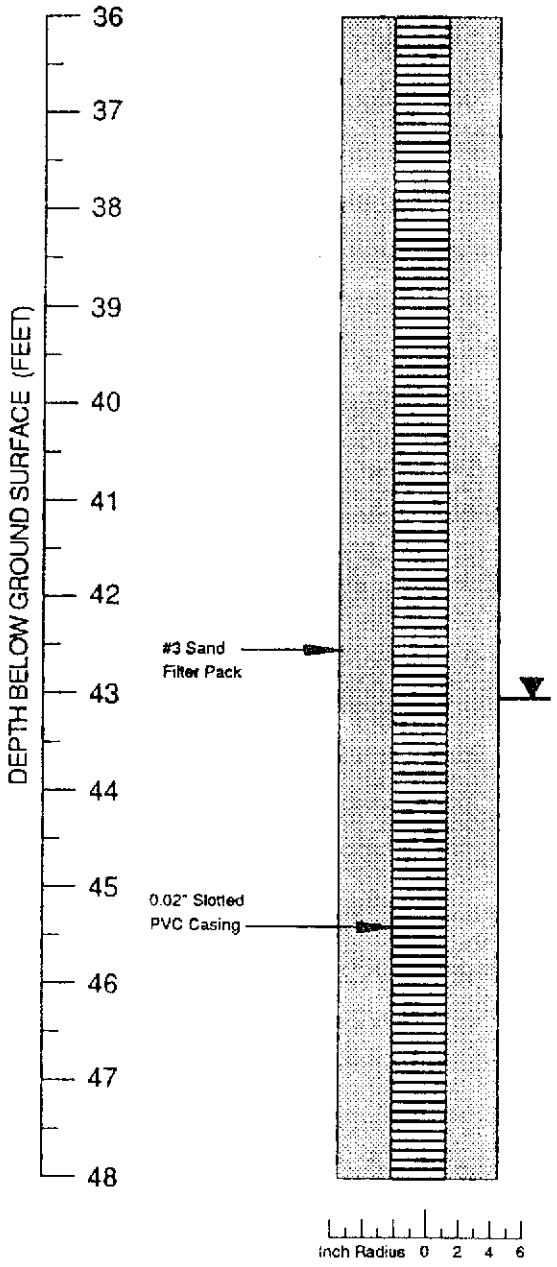
Well Log MW-4

JOB NUMBER 10-91001

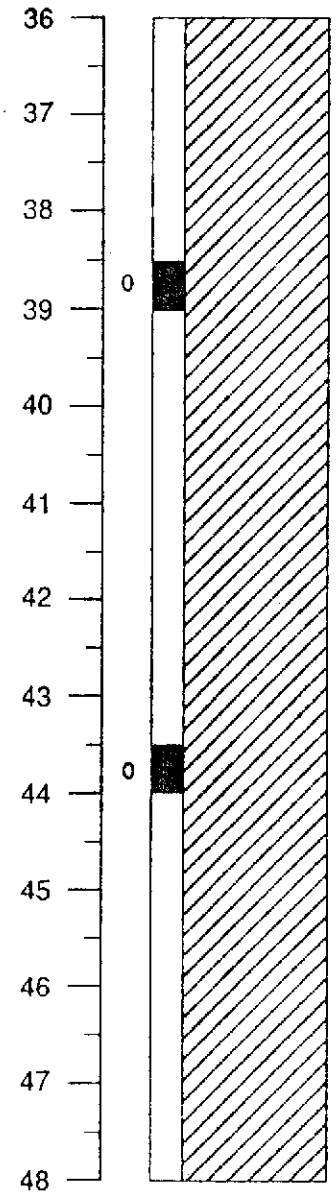
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

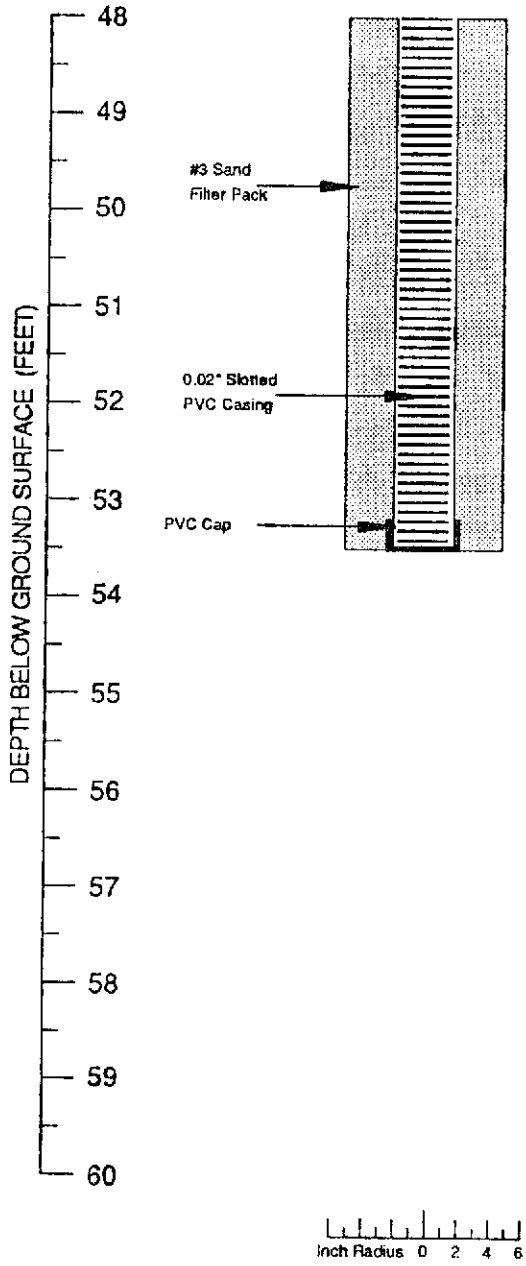
Contacts:

- ——— Solid where certain
- · · · · Dotted where approximate
- – – Dashed where uncertain
- ///// Hachured where gradational
- est K Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR No Recovery

AEGIS ENVIRONMENTAL, INC.

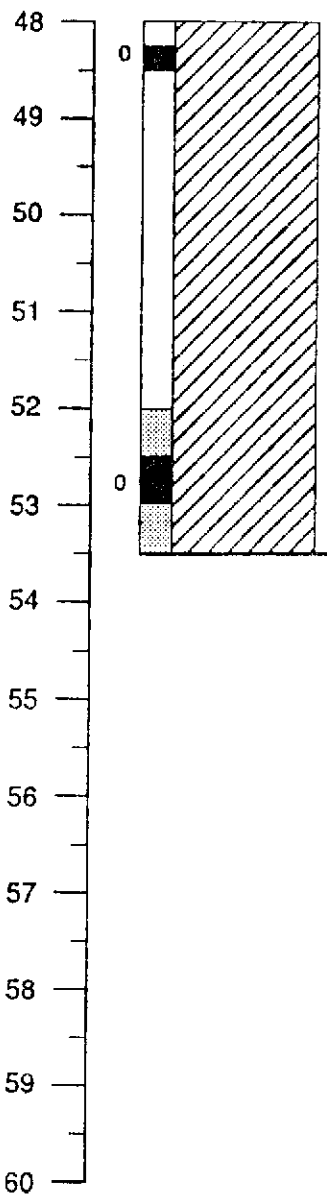
Well Log	JOB NUMBER
MW-4	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 53.5 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

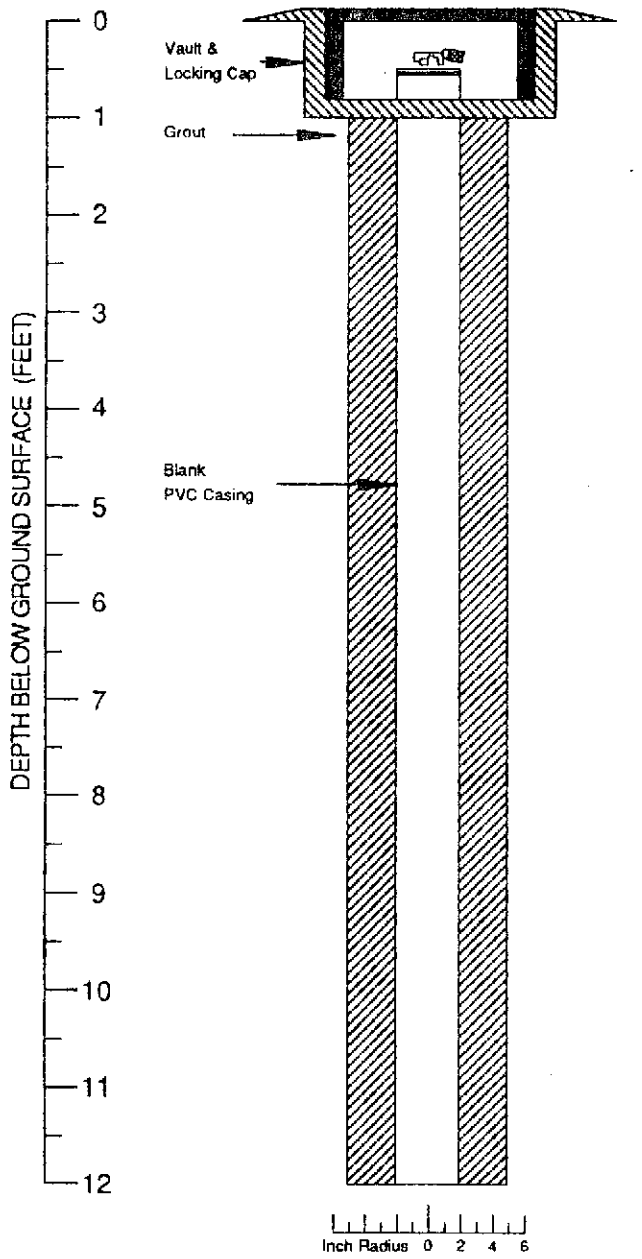
Well Log MW-4

JOB NUMBER 10-91001

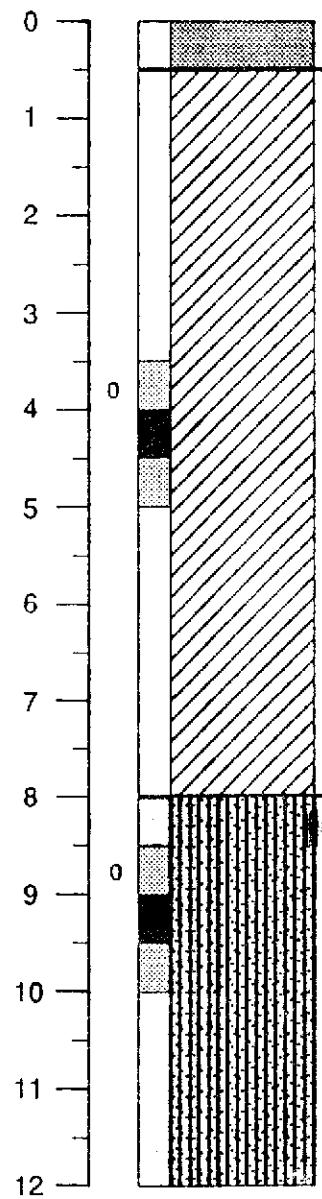
Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

WELL MW-4

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

asphalt

CLAY (CL); dusky yellowish brown, damp, slightly plastic, soft, no odor.

same, sample collected, no odor.

SANDY SILT (ML), dusky yellowish brown, (10 YR 2/2), damp, moderately, no odor.

Logged by: Mike Kitko
Project Mgr: Brian Garber
Date Drilled: Sept. 17, 1992 07:30 hrs

Drilling Company: B & F Drilling Co.
Drilling Method: 10" Hollow Stem Auger
Driller: Bob Gansberg & Chris Fiscus

Well Head Completion: Sept. 17, 199[illegible] 12:03 hrs
Type of Sampler: Modified Calif. Split Spoon
TD (Total Depth): 56.0 Feet

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

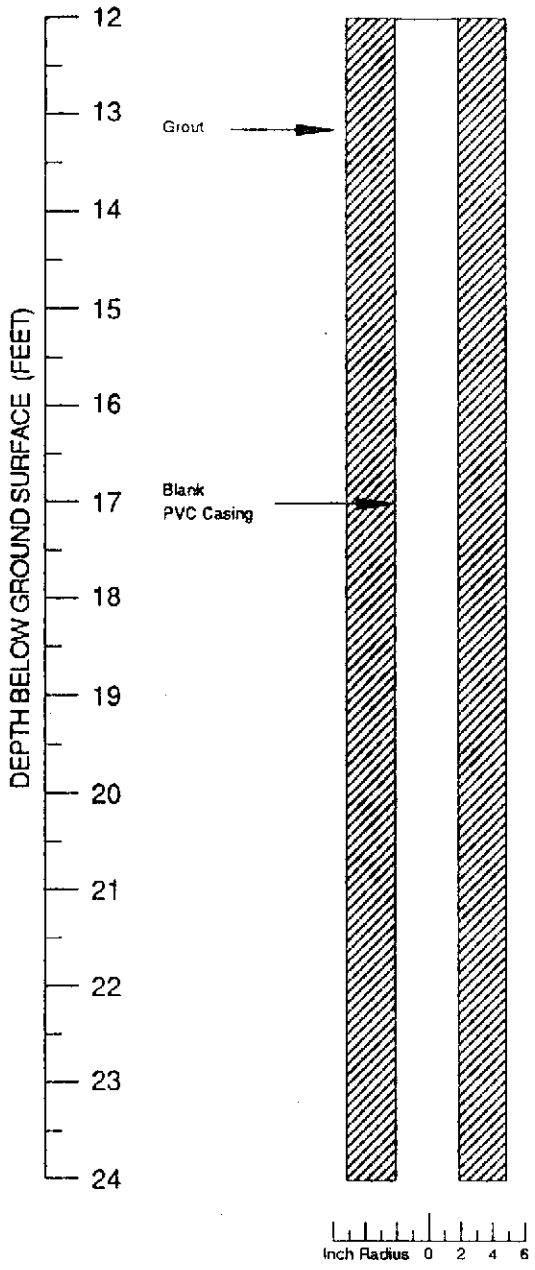
Well Log [redacted]

JOB NUMBER 10-91001

Haber Oil Company
1401 Grand Avenue
San Leandro, Calif.

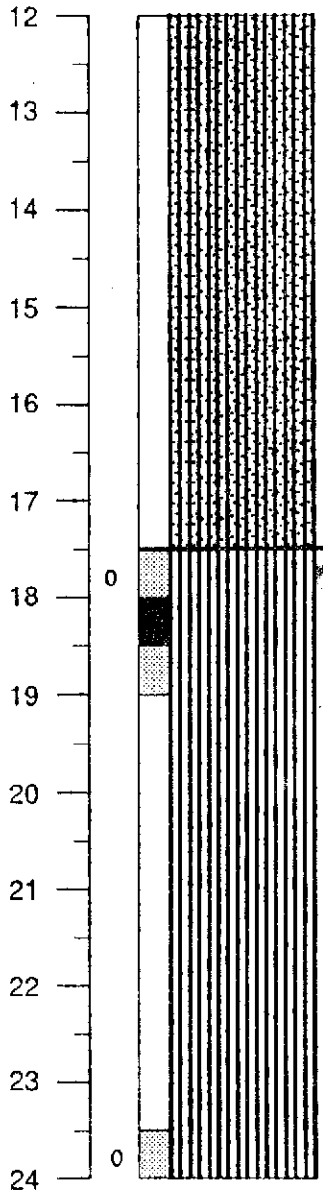
WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

gravel, rock (cobble) encountered.

no sample collected - refusal.

SILT (ML); moderate yellowish brown, damp, soft, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

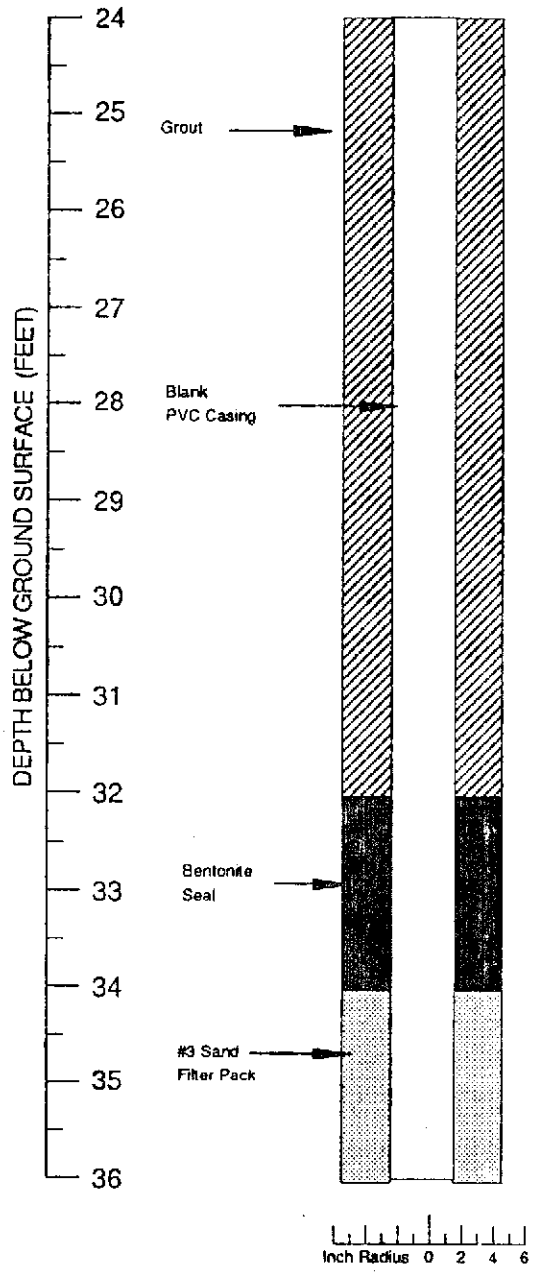
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

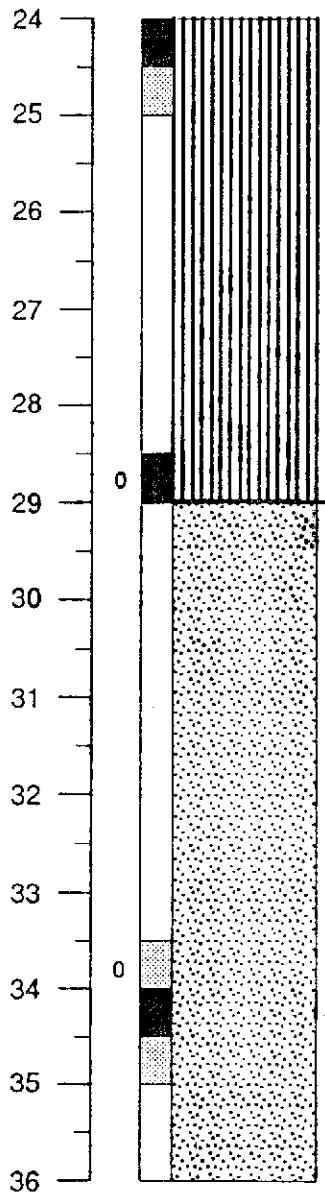
Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

SAND ($M); weathered, moderate yellowish brown, damp, poorly graded medium to coarse grained with gravel, no odor.

SAND ($M); greenish gray, damp, moderately graded medium to coarse grained, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

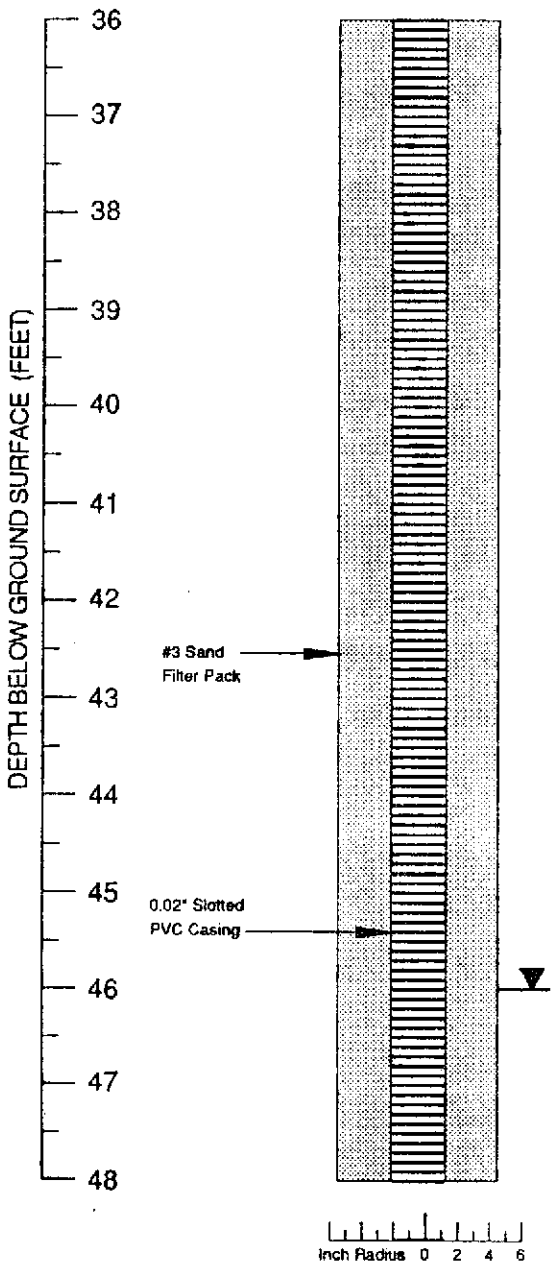
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

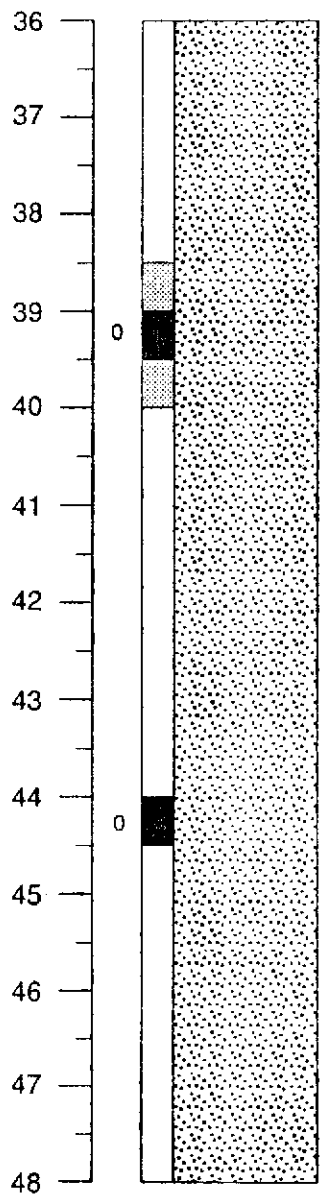
AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG



DESCRIPTION

same, sampled collected, no odor.

same, sampled collected, no odor.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

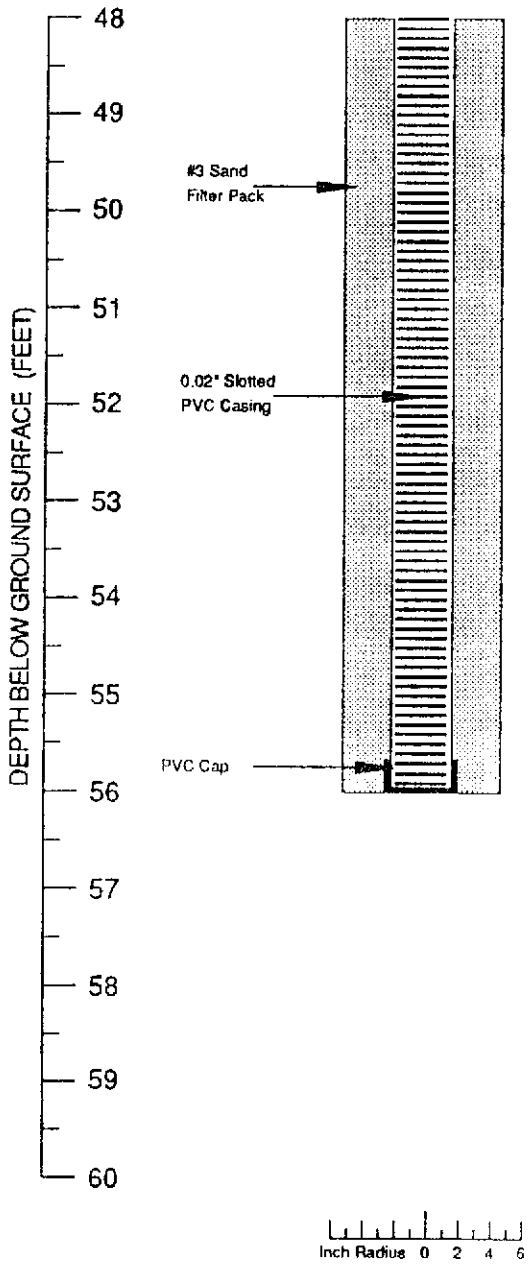
Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

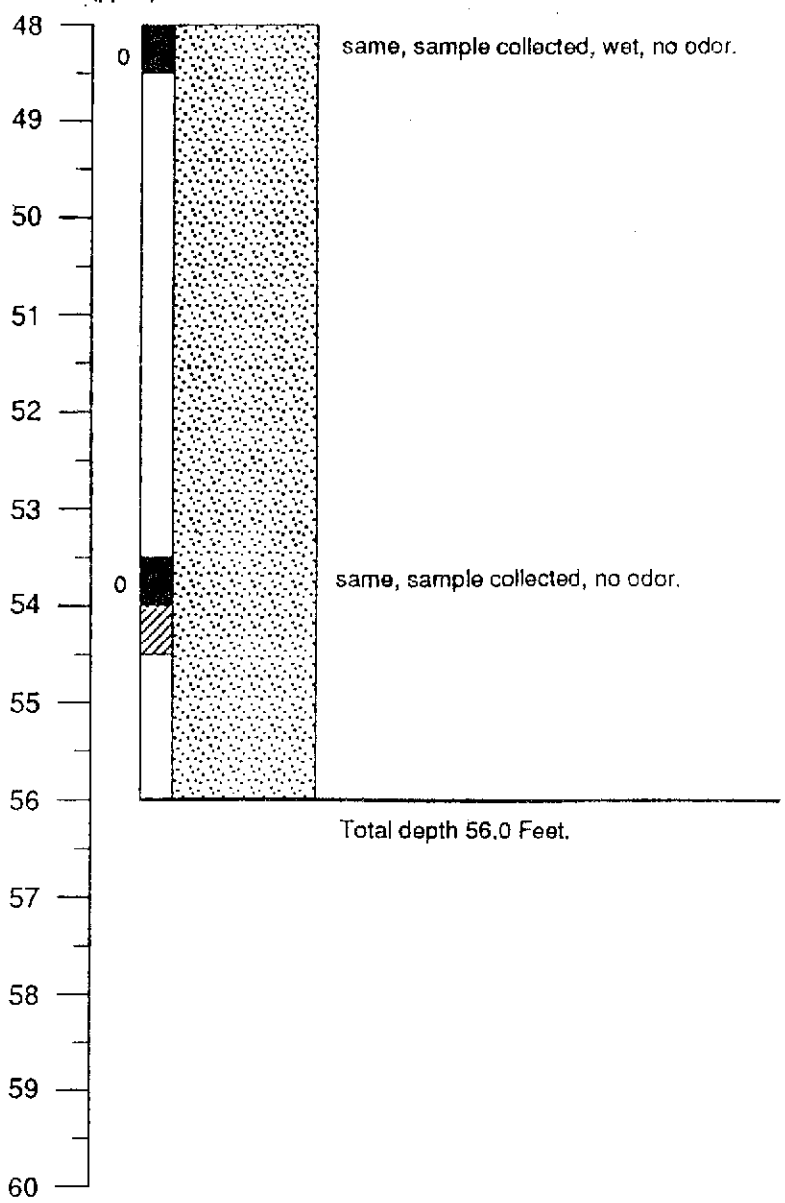
Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

BORING/WELL CONSTRUCTION DETAIL



GRAPHIC LOG

PID (ppmv)



DESCRIPTION

same, sample collected, wet, no odor.

same, sample collected, no odor.

Total depth 56.0 Feet.

Explanation

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab Sample

Contacts:

- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K= primary, 2K= secondary
- NR — No Recovery

AEGIS ENVIRONMENTAL, INC.

Well Log	JOB NUMBER
MW-5	10-91001
Haber Oil Company 1401 Grand Avenue San Leandro, Calif.	WELL MW-5

APPENDIX C

LABORATORY ANALYTICAL REPORTS: SOIL

App. C-1

91CC1

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

RECEIVED
OCT - 9 1992
Ans'd. C.F. 86

Brian Garber
Aegis Environmental Inc.
1050 Melody Lane, Ste 160
Roseville, CA 95678

Date: 10/06/1992
NET Client Acct No: 65400
NET Pacific Job No: 92.48407
Received: 09/22/1992

Client Reference Information

1401 Grand Ave San Leandro CA/91-001

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-1 No. 1 4' 09/15/1992	MW-1 No. 2 9' 09/15/1992	
Parameter	Method	Reporting Limit	137798	137799	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-24-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-24-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	2.9	ug/Kg
Xylenes (Total)	8020	2.5	ND	6.8	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		84	107	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-1 No. 3 14.5' 09/15/1992 137800	 MW-1 No. 4 19' 09/15/1992 137801	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-24-92	09-24-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-24-92	09-24-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	2.8	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		84	92	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-1 No. 5 24.5' 09/15/1992 137802	 MW-1 No. 6 29.5' 09/15/1992 137803	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-24-92	09-27-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-24-92	09-27-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	3.0	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		89	84	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-1 No. 7 33.5' 09/15/1992	MW-1 No. 8 39' 09/15/1992	
Parameter	Method	Reporting Limit	137804	137805	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-27-92	09-27-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-27-92	09-27-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	8.3	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	2.5	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		91	97	% Rec.

Client No: 65400 Date: 10/06/1992
Client Name: Aegis Environmental Inc.
NET Job No: 92.48407 Page: 6

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-1 No. 9 44' 09/15/1992	MW-1 No. 10 49.5' 09/15/1992	
Parameter	Method	Reporting Limit	137806	137807	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-27-92	09-28-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-27-92	09-28-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	26	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		97	90	% Rec.

Client No: 65400
Client Name: Aegis Environmental Inc.
NET Job No: 92.48407

Date: 10/06/1992

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-1 No. 11 53' 09/15/1992 137808	 MW-2 No. 4 19.5' 09/15/1992 137809	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-27-92	09-27-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-27-92	09-27-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	6.2	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		102	86	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-2 No. 6 29.5' 09/15/1992 137810	Units
PRIORITY POLLUTANTS (Solid)				
Antimony (ICP)	EPA 6010	10	ND	mg/Kg
Arsenic (GFAA)	EPA 7060	0.5	3.8	mg/Kg
Beryllium (ICP)	EPA 6010	2.0	ND	mg/Kg
Cadmium (ICP)	EPA 6010	2.0	ND	mg/Kg
Chromium (ICP)	EPA 6010	2.0	45	mg/Kg
Copper (ICP)	EPA 6010	2.0	38	mg/Kg
Lead (GFAA)	EPA 7421	0.2	4.3	mg/Kg
Mercury (CVAA)	EPA 7471	0.1	0.1	mg/Kg
Nickel (ICP)	EPA 6010	5.0	49	mg/Kg
Selenium (GFAA)	EPA 7740	0.5	ND	mg/Kg
Silver (ICP)	EPA 6010	2.0	ND	mg/Kg
Thallium (ICP)	EPA 6010	20	ND	mg/Kg
Zinc (ICP)	EPA 6010	2.0	50	mg/Kg
TPH (Gas/BTXE,Solid)				
METHOD 5030 (GC,FID)			--	
DATE ANALYZED			09-25-92	
DILUTION FACTOR*			10	
as Gasoline	5030	1	11	mg/Kg
METHOD 8020 (GC,Solid)			--	
DATE ANALYZED			09-25-92	
DILUTION FACTOR*			10	
Benzene	8020	2.5	160	ug/Kg
Ethylbenzene	8020	2.5	180	ug/Kg
Toluene	8020	2.5	550	ug/Kg
Xylenes (Total)	8020	2.5	1,700	ug/Kg
SURROGATE RESULTS			--	
Bromofluorobenzene	5030		93	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-2 No. 10 49.5' 09/15/1992 137811	Units
TPH (Gas/BTXE,Solid)				
METHOD 5030 (GC,FID)			--	
DATE ANALYZED			09-25-92	
DILUTION FACTOR*			1	
as Gasoline	5030	1	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	
DATE ANALYZED			09-25-92	
DILUTION FACTOR*			1	
Benzene	8020	2.5	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ug/Kg
Toluene	8020	2.5	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ug/Kg
SURROGATE RESULTS			--	
Bromofluorobenzene	5030		90	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-3 No. 4 19.5' 09/18/1992	MW-3 No. 6 29' 09/18/1992	
Parameter	Method	Reporting Limit	137812	137813	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		85	75	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-3 No. 9 44.5' 09/18/1992 137814	 MW-3 No. 10 50' 09/18/1992 137815	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-27-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-27-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	12	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		88	88	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-3 No. 8 40' 09/16/1992 137816	 MW-4 No. 2 9.5' 09/18/1992 137817	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		93	78	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-4 No. 4 19.5' 09/18/1992 137818	 MW-4 No. 6 29.5' 09/18/1992 137819	Unit
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	1.9	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	270	ug/Kg
Ethylbenzene	8020	2.5	ND	44	ug/Kg
Toluene	8020	2.5	2.8	210	ug/Kg
Xylenes (Total)	8020	2.5	3.5	370	ug/Kg
SURROGATE RESULTS					
Bromofluorobenzene	5030		--	--	
			86	85	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-4 No. 8 38.5' 09/18/1992	MW-4 No. 9 44' 09/18/1992	
Parameter	Method	Reporting Limit	137820	137821	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-28-92	09-28-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-28-92	09-28-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	27	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	7.8	2.5	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	8020		89	87	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

			Descriptor, Lab No. and Results		
			MW-4 No. 3 14.5' 09/18/1992	MW-5 No. 1 4.5' 09/17/1992	
Parameter	Method	Reporting Limit	137822	137823	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-28-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-28-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	2.8	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		78	90	% Rec.

Client No: 65400 Date: 10/06/1992
Client Name: Aegis Environmental Inc.
NET Job No: 92.48407 Page: 16

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-5 No. 3 18.5' 09/17/1992 137824	 MW-5 No. 5 29' 09/17/1992 137825	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-28-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-28-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		87	83	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-5 No. 8 44.5' 09/17/1992 137826	 MW-5 No. 9 48.5' 09/17/1992 137827	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-25-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	ND	ug/Kg
Ethylbenzene	8020	2.5	ND	ND	ug/Kg
Toluene	8020	2.5	ND	ND	ug/Kg
Xylenes (Total)	8020	2.5	ND	ND	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		86	88	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results North Side S oil Stockpil 09/18/1992 137828	 South Side S oil Stockpil 09/18/1992 137829	Units
TPH (Gas/BTXE,Solid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			09-28-92	09-25-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	1	ND	0.77	mg/Kg
METHOD 8020 (GC,Solid)			--	--	
DATE ANALYZED			09-28-92	09-25-92	
DILUTION FACTOR*			1	1	
Benzene	8020	2.5	ND	4.7	ug/Kg
Ethylbenzene	8020	2.5	ND	4.7	ug/Kg
Toluene	8020	2.5	ND	6.8	ug/Kg
Xylenes (Total)	8020	2.5	3.2	39	ug/Kg
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		84	79	% Rec.

Ref: 1401 Grand Ave San Leandro CA/91-001

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	1	mg/Kg	113	ND	91	87	4.0
Benzene	2.5	ug/Kg	104	ND	87	84	3.6
Toluene	2.5	ug/Kg	104	ND	91	87	4.4
Gasoline	1	mg/Kg	111	ND	87	92	6.3
Benzene	2.5	ug/Kg	96	ND	86	87	1.0
Toluene	2.5	ug/Kg	94	ND	99	99	<1
Gasoline	1	mg/Kg	100	ND	84	80	4.9
Benzene	2.5	ug/Kg	108	ND	101	98	2.8
Toluene	2.5	ug/Kg	130	ND	107	105	1.6
Gasoline	1	mg/Kg	99	ND	97	107	10
Benzene	2.5	ug/Kg	96	ND	92	95	2.9
Toluene	2.5	ug/Kg	112	ND	97	99	3.0
Antimony	10	mg/Kg	106	ND	98	98	<1
Arsenic	0.5	mg/Kg	100	ND	94	92	2.1
Barium	2	mg/Kg	102	ND	102	96	4.0
Beryllium	2	mg/Kg	102	ND	97	97	<1
Cadmium	2	mg/Kg	105	ND	97	97	<1
Chromium	2	mg/Kg	103	ND	100	100	<1
Cobalt	5	mg/Kg	104	ND	96	96	<1
Copper	2	mg/Kg	101	ND	96	90	3.9
Lead	20	mg/Kg	99	ND	102	101	<1
Mercury	0.1	mg/Kg	106	ND	106	103	3.3
Molybdenum	5	mg/Kg	101	ND	91	90	1.1
Nickel	5	mg/Kg	106	ND	98	95	1.9
Selenium	0.5	mg/Kg	95	ND	89	86	2.8
Silver	2	mg/Kg	101	ND	93	94	1.0
Thallium	20	mg/Kg	90	ND	87	87	<1
Vanadium	5	mg/Kg	100	ND	97	92	4.0
Zinc	2	mg/Kg	103	ND	110	91	10

Ref: 1401 Grand Ave., San Leandro, Project No: 91-001

SAMPLE DESCRIPTION: MW-2 Sample 8
Date Taken: 09/15/1992
Time Taken:
LAB Job No: (-138175)

Parameter	Method	Reporting Limit	Results	Units
TPH (Gas/BTXE,Solid)				
METHOD 5030 (GC,FID)			--	
DATE ANALYZED			09-29-92	
DILUTION FACTOR*			1	
as Gasoline	5030	1	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	
DATE ANALYZED			09-29-92	
DILUTION FACTOR*			1	
Benzene	8020	2.5	78	ug/Kg
Ethylbenzene	8020	2.5	5.4	ug/Kg
Toluene	8020	2.5	58	ug/Kg
Xylenes (Total)	8020	2.5	21	ug/Kg
SURROGATE RESULTS			--	
Bromofluorobenzene	5030		89	% Rec.

Ref: 1401 Grand Ave., San Leandro, Project No: 91-001

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	1.0	mg/Kg	N/A	ND	97	93	4.0
Benzene	2.5	ug/Kg	104	ND	103	100	3.0
Toluene	2.5	ug/Kg	116	ND	99	98	1.0

COMMENT: Blank Results were ND on other analytes tested.

NET Pacific, Inc

Client No: 65400
Client Name: Aegis Environmental Inc.
NET Job No: 92.48658

Date: 10/17/1992
Page: 2

Ref: 1401 Grand Ave. San Leandro CA/91-001

				Descriptor, Lab No. and Results		
				MW-4 No.6 29.5' Below grade 09/18/1992	South Side Soil Stockpile 09/18/1992	
Parameter		Method	Reporting Limit	139681	139682	Units
Cadmium	(ICP)	EPA 6010	2.0	2.9	3.8	mg/Kg
Chromium	(ICP)	EPA 6010	2.0	24	55	mg/Kg
Lead	(GFAA)	EPA 7421	0.2	4.4	5.3	mg/Kg
Zinc	(ICP)	EPA 6010	2.0	33	40	mg/Kg

Ref: 1401 Grand Ave. San Leandro CA/91-001

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Cadmium	2.0	mg/Kg	106	ND	92	88	3.9
Chromium	2.0	mg/Kg	104	ND	92	91	1.0
Lead	0.2	mg/Kg	101	ND	125	92	4.1
Zinc	2.0	mg/Kg	105	ND	92	90	1.2

NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

RECEIVED
OCT 22 1992
AEGIS DK/CF
91-001

Brian Garber
Aegis Environmental Inc.
1050 Melody Lane, Ste 160
Roseville, CA 95678

Date: 10/17/1992
NET Client Acct No: 65400
NET Pacific Job No: 92.48658
Received: 10/06/1992

Client Reference Information

1401 Grand Ave. San Leandro CA/91-001

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

Ref: 1401 Grand Ave., San Leandro, Project No: 91-001

SAMPLE DESCRIPTION: MW-2 Sample 8
Date Taken: 09/15/1992
Time Taken:
LAB Job No: (-138175)

Parameter	Method	Reporting Limit	Results	Units
TPH (Gas/BTXE,Solid)				
METHOD 5030 (GC,FID)			--	
DATE ANALYZED			09-29-92	
DILUTION FACTOR*			1	
as Gasoline	5030	1	ND	mg/Kg
METHOD 8020 (GC,Solid)			--	
DATE ANALYZED			09-29-92	
DILUTION FACTOR*			1	
Benzene	8020	2.5	78	ug/Kg
Ethylbenzene	8020	2.5	5.4	ug/Kg
Toluene	8020	2.5	58	ug/Kg
Xylenes (Total)	8020	2.5	21	ug/Kg
SURROGATE RESULTS			--	
Bromofluorobenzene	5030		89	% Rec.

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
*	:	Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
ICVS	:	Initial Calibration Verification Standard (External Standard).
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.

NATIONAL
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NET Pacific, Inc.
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Santa Rosa, CA 95401
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Brian Garber
Aegis Environmental Inc.
1050 Melody Lane, Ste 160
Roseville, CA 95678

Date: 10/12/1992
NET Client Acct. No: 65400
NET Pacific Job No: 92.48441
Received: 09/24/1992

Client Reference Information

1401 Grand Ave., San Leandro, Project No: 91-001

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

Enclosure(s)

APPENDIX D

GEOTECHNICAL LABORATORY RESULTS REPORT

APP'D

RECEIVED
DEC 16 1992
Ans'd. 91-001
CF/DIS

VECTOR
ENGINEERING, INC.

November 13, 1992
Job No. 89040.29

Mr. Mike Kitko
Aegis Environmental
1050 Melody Lane Suite 160
Roseville, CA 95678

RE: Laboratory Test Results, Project #91-001

Dear Mr. Kitko,

As requested, we have performed the laboratory testing services on the samples you submitted. The testing standards utilized and the results of these procedures are presented below and/or attached.

It has been a pleasure being of service to you on this project. Should you have any questions or need further assistance, please do not hesitate to call this office.

Respectfully Submitted,
VECTOR ENGINEERING, INC.

Richard A. Holloway

Richard A. Holloway
Laboratory Manager

RAH:pr

DAILIES\89040.0

12438 Loma Rica Dr., Suite C • Grass Valley, CA 95945 • (916) 272-2448 Fax: (916) 272-8533
CARSON CITY, NV • EL DORADO HILLS, CA

Project: AEGIS #91-001
Project No.: 893040.29

SIEVE ANALYSIS/CAL TRANS NO. 202

Sample No.: MW 4 @ 53.0'

Sieve Size	% Passing
3/4"	100
1/2"	97.4
3/8"	97.0
#4	90.3
#8	79.0
#16	67.3
#30	56.8
#50	47.8
#100	40.5
#200	34.9

Sample No.: MW 5 @ 54.0'

Sieve Size	% Passing
1"	100
3/4"	93.5
1/2"	87.5
3/8"	84.5
#4	73.0
#8	60.9
#16	49.0
#30	36.8
#50	25.3
#100	17.0
#200	12.7

Project: AEGIS #91-001
Project No.: 893040.29

SIEVE ANALYSIS/CAL TRANS NO. 202

Sample No.: MW 2 @ 52.0'

Sieve Size	% Passing
3/4"	100
1/2"	100
3/8"	99.1
#4	92.0
#8	80.5
#16	64.0
#30	49.7
#50	39.9
#100	33.9
#200	30.3

Sample No.: MW 3 @ 54.0'

Sieve Size	% Passing
3/4"	100
1/2"	96.4
3/8"	95.7
#4	91.7
#8	84.8
#16	66.9
#30	54.1
#50	45.0
#100	37.9
#200	32.7

Project: Aegis #91-001
Project: 893040.29

LABORATORY TEST SUMMARY
Flexible Wall Permeability/ASTM D-5084

TEST NO.	DESCRIPTION	% MOIST./ DRY DENSITY (pcf)	SAMPLE DIA./HT. (cm)	CHAMBER PRESS. (psi)	INLET PRESS. (psi)	OUTLET PRESS. (psi)	TEMP. °c	PERMEABILITY: K (cm/sec)
MW2-52' Sample #11	Tan clayey Gravel*	24.6/100.2	4.90/7.40	70	62	60	20°	$4x10^{-4}$
MW3-54' Sample #11	Tan sandy clay Gravel*	21.2/108.9	4.90/6.20	70	62	60	20°	$2x10^{-4}$
MW4-53' Sample #10	Tan clayey Sand	21.3/112.4	4.90/7.80	70	63	60	20°	$6x10^{-7}$
MW5-54' Sample #10	Tan clayey Sand w/Gravel	23.2/99.0	4.90/8.00	70	63	60	20°	$2x10^{-8}$

Note: Permeant Liquid; De-Aired Water
* Sample may have been disturbed during shipping.

VECTOR ENGINEERINR INC.
12438 Loma Rica Dr.,Suite C
Grass Valley, CA 95945
(916) 272 - 2448

APPENDIX E

LABORATORY ANALYTICAL REPORTS: WATER

GROUND

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

RECEIVED
OCT 2 3 1992
Ans'd. CF/SE DIS
91-001

Brian Garber
Aegis Environmental Inc.
1050 Melody Lane, Ste 160
Roseville, CA 95678

Date: 10/21/1992
NET Client Acct No: 65400
NET Pacific Job No: 92.48608
Received: 10/02/1992

Client Reference Information

1401 Grand Ave., San Leandro, Project No. 91-001

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

NET Pacific, Inc

Client No: 65400 Date: 10/21/1992
Client Name: Aegis Environmental Inc.
NET Job No: 92.48608 Page: 2

Ref: 1401 Grand Ave., San Leandro, Project No. 91-001

			Descriptor, Lab No. and Results		
			MW-1	MW-2	
			09/29/1992	09/29/1992	
Parameter	Method	Reporting Limit	139417	139418	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			10-09-92	10-09-92	
DILUTION FACTOR*			10	100	
as Gasoline	5030	0.05	3.1	20	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			10-09-92	10-09-92	
DILUTION FACTOR*			10	100	
Benzene	8020	0.5	160	4,600	ug/L
Ethylbenzene	8020	0.5	ND	260	ug/L
Toluene	8020	0.5	ND	3,800	ug/L
Xylenes (Total)	8020	0.5	6.0	3,300	ug/L
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		88	94	% Rec.

NET Pacific, Inc

Client No: 65400 Date: 10/21/1992
Client Name: Aegis Environmental Inc.
NET Job No: 92.48608 Page: 3

Ref: 1401 Grand Ave., San Leandro, Project No. 91-001

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-4 09/29/1992 139419	MW-5 09/29/1992 139420	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			10-08-92	10-08-92	
DILUTION FACTOR*			1	1	
as Gasoline	5030	0.05	0.63	0.06	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			10-08-92	10-08-92	
DILUTION FACTOR*			1	1	
Benzene	8020	0.5	170	10	ug/L
Ethylbenzene	8020	0.5	7.3	ND	ug/L
Toluene	8020	0.5	60	7.1	ug/L
Xylenes (Total)	8020	0.5	65	6.9	ug/L
SURROGATE RESULTS			--	--	
Bromofluorobenzene	5030		94	90	% Rec.

NET Pacific, Inc

Client No: 65400 Date: 10/21/1992
Client Name: Aegis Environmental Inc.
NET Job No: 92.48608 Page: 4

Ref: 1401 Grand Ave., San Leandro, Project No. 91-001

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	0.05	mg/L	99	ND	83	99	18
Benzene	0.5	ug/L	103	ND	99	140	34
Toluene	0.5	ug/L	119	ND	92	100	7.9
Gasoline	0.05	mg/L	98	ND	67	91	30
Benzene	0.5	ug/L	94	ND	69	96	33
Toluene	0.5	ug/L	107	ND	79	97	20

COMMENT: Blank Results were ND on other analytes tested.

APPENDIX G

LABORATORY ANALYTICAL REPORTS: AIR

Ref: 1401 Grand Ave., San Leandro, Project: 91001

			Descriptor, Lab No. and Results		
			MW1	MW2	
			10/07/1992	10/07/1992	
Parameter	Method	Reporting Limit	139930	139931	Units
TPH (Gas/BTXE)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			10-09-92	10-09-92	
DILUTION FACTOR*			100	100	
as Gasoline	5030	5	65,000	60,000	ppmv
METHOD 8020 (GC)			--	--	
DATE ANALYZED			10-09-92	10-09-92	
DILUTION FACTOR*			100	100	
Benzene	8020	100	1,600,000	2,500,000	ppbv
Ethylbenzene	8020	100	380,000	480,000	ppbv
Toluene	8020	100	300,000	2,200,000	ppbv
Xylenes (Total)	8020	100	660,000	1,800,000	ppbv

APPENDIX F

RISING HEAD SLUG TEST DATA AND ANALYSIS

Rising/Falling Head Slug Testing

Procedure

In rising/falling head slug testing the static groundwater elevation of an aquifer, at the location of a well, is either increased or decreased "instantaneously" by introducing or removing a known volume into a well. The total change in the elevation is recorded, and the recovery of groundwater to the static level is recorded at pre-determined time intervals. The equipment used in the test consisted a 5-foot-long, 3-inch-diameter PVC pipe, sealed at both ends and filled with clean sand. Prior to dropping the slug into the well, a pressure transducer was placed in the well and connected to a datalogger which recorded the changes in water level over time. Prior to the slug test, all equipment was cleaned either with steam or a tri-sodium phosphate solution to prevent the introduction of contaminants into the groundwater.

Data Analysis

Assumptions and site-specific conditions used in the analysis of this data include the following:

- Fully penetrating wells;
- Saturated thickness is equal to the wettedescreen length;
- Well casing diameter is 4 inches;
- Well diameter is 12 inches;
- Water table (unconfined) aquifer;
- Static height of water in the well is equal to the wetted-screen length; and,
- The top elevation of the screened interval in the well is higher than the static and raised groundwater elevation.

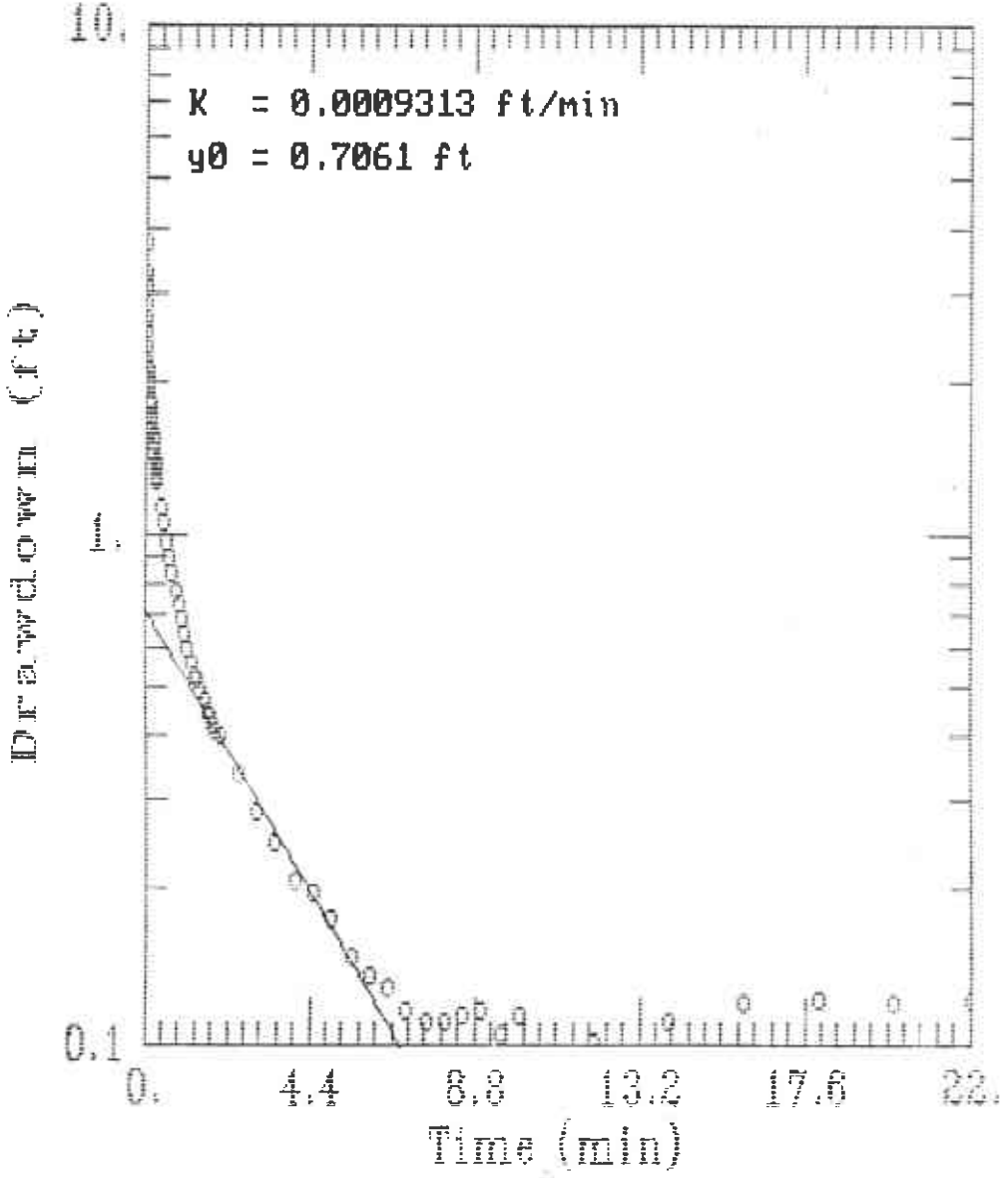
The above assumptions are based on soil boring and monitoring well logs, groundwater elevation data, and field data. Because of the site conditions and monitoring well construction, only the data collected during the falling-head testing was analyzed. The method used to analyze the data was the Bouwer and Rice slug test method for unconfined aquifers (Bouwer, et.al., 1976). To facilitate the analysis of the collected field data, a curve-matching computer program entitled "Aqtesolv" (Geraghty and Miller, 1989) was used.

List of Results and Data

The following data and the graphical representation of the solutions are included as part of this appendix:

- For each well, the time and drawdown data as recorded by the datalogger are included.
- The graphical solutions are in the form of time-verses-drawdown graphs for each of the wells. Included on the graphs is a listing of the "y-intercept" and the hydraulic conductivity.

1401 Grand Ave. MW-1 Rising Head



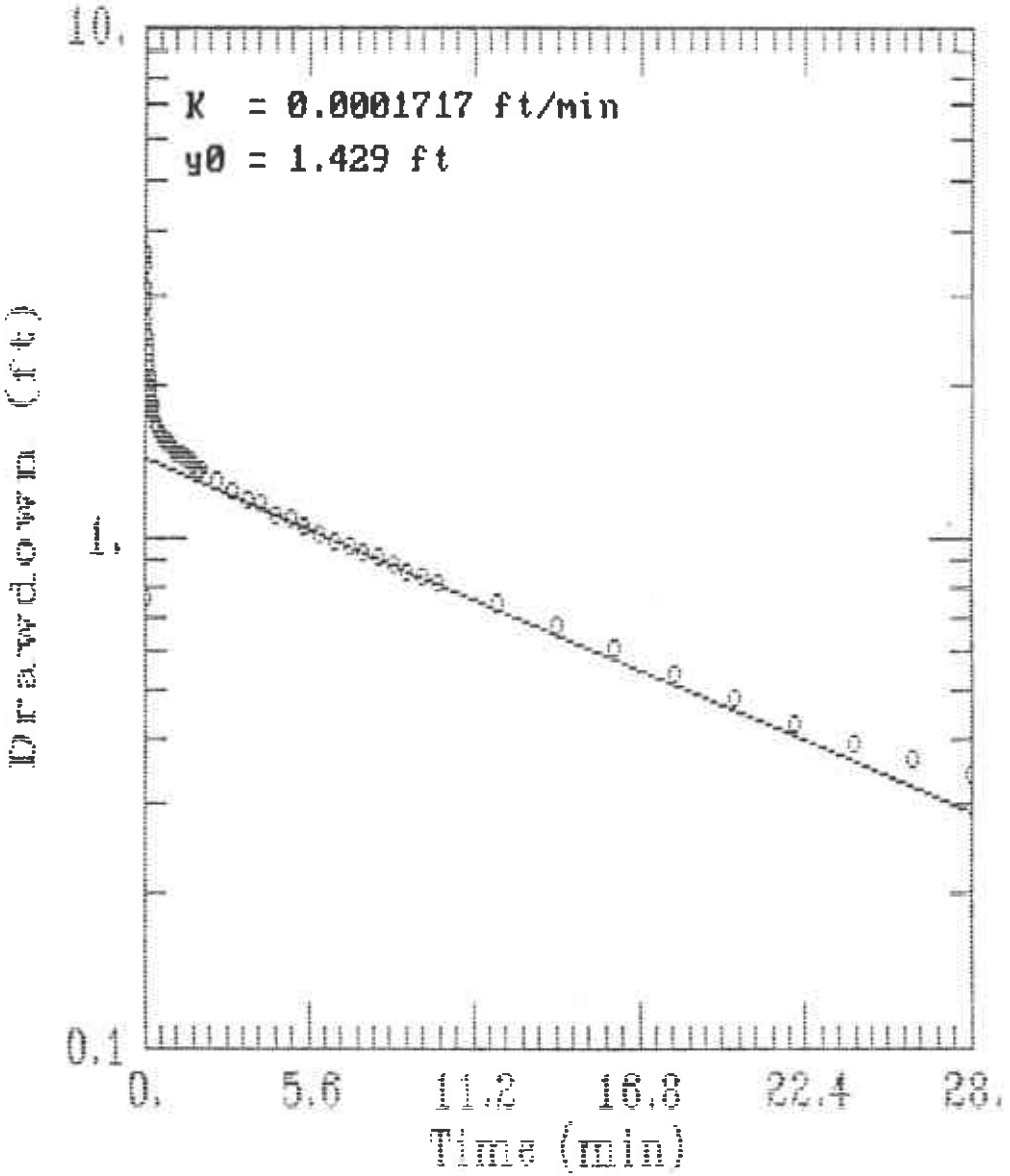
Rising Head Test Data
Haber Oil
1401 Grand Ave., San Leandro, CA

Well MW-1

Time	Drawdown	Weight
0.0000	1.839	1
0.0033	3.235	1
0.0066	3.741	1
0.0100	1.717	1
0.0133	2.164	1
0.0166	3.058	1
0.0200	2.047	1
0.0233	2.819	1
0.0266	2.630	1
0.0300	2.507	1
0.0333	2.498	1
0.0500	2.350	1
0.0666	2.199	1
0.0833	2.101	1
0.1000	2.010	1
0.1166	1.928	1
0.1333	1.846	1
0.1500	1.789	1
0.1666	1.723	1
0.1833	1.666	1
0.2000	1.610	1
0.2166	1.559	1
0.2333	1.512	1
0.2500	1.471	1
0.2666	1.417	1
0.2833	1.383	1
0.3000	1.345	1
0.3166	1.310	1
0.3333	1.279	1
0.4166	1.137	1
0.5000	1.052	1
0.5833	0.976	1
0.6666	0.898	1
0.7500	0.841	1
0.8333	0.778	1
0.9166	0.740	1
1.0000	0.690	1
1.0833	0.642	1
1.1666	0.595	1
1.2500	0.560	1
1.3333	0.532	1
1.4166	0.516	1
1.5000	0.494	1
1.5833	0.469	1

1.6666	0.447	1
1.7500	0.438	1
1.8333	0.422	1
1.9166	0.412	1
2.0000	0.400	1
2.5000	0.340	1
3.0000	0.283	1
3.5000	0.248	1
4.0000	0.208	1
4.5000	0.198	1
5.0000	0.176	1
5.5000	0.148	1
6.0000	0.135	1
6.5000	0.129	1
7.0000	0.116	1
7.5000	0.110	1
8.0000	0.110	1
8.5000	0.113	1
9.0000	0.116	1
9.5000	0.104	1
10.0000	0.113	1
12.0000	0.100	1
14.0000	0.110	1
16.0000	0.119	1
18.0000	0.122	1
20.0000	0.119	1
22.0000	0.122	1

1401 Grand Ave. MW-2 Rising Head



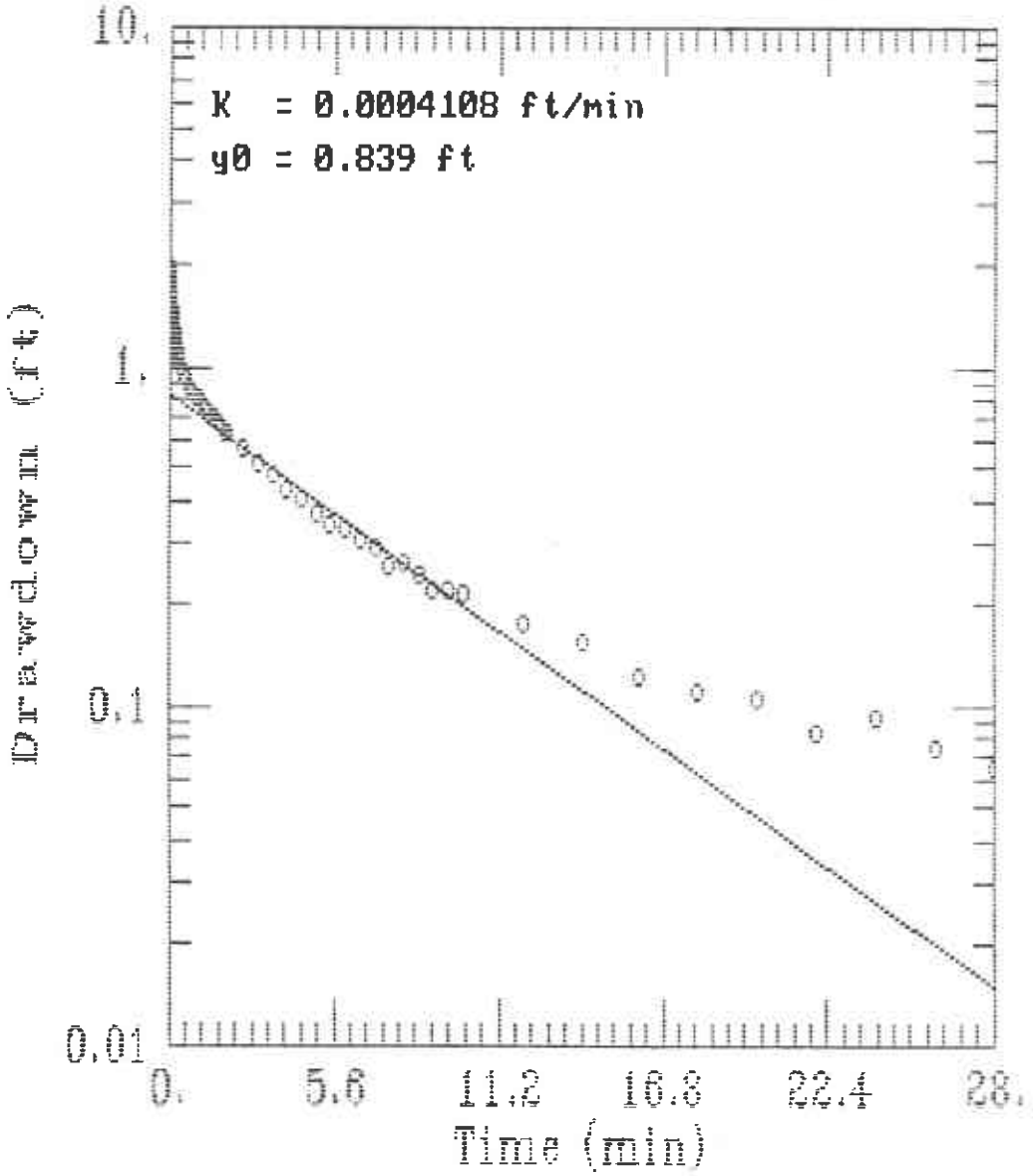
Rising Head Test Data
Haber Oil
1401 Grand Ave., San Leandro, CA

Well MW-2

Time	Drawdown	Weight
0.0000	0.901	1
0.0033	1.969	1
0.0066	2.517	1
0.0100	2.854	1
0.0133	3.103	1
0.0166	3.434	1
0.0200	3.062	1
0.0233	2.870	1
0.0266	3.582	1
0.0300	0.762	1
0.0333	2.911	1
0.0500	2.870	1
0.0666	2.627	1
0.0833	2.549	1
0.1000	2.451	1
0.1166	2.369	1
0.1333	2.290	1
0.1500	2.234	1
0.1666	2.155	1
0.1833	2.086	1
0.2000	2.032	1
0.2166	1.963	1
0.2333	1.919	1
0.2500	1.887	1
0.2666	1.837	1
0.2833	1.802	1
0.3000	1.777	1
0.3166	1.774	1
0.3333	1.739	1
0.4166	1.676	1
0.5000	1.638	1
0.5833	1.597	1
0.6666	1.563	1
0.7500	1.541	1
0.8333	1.534	1
0.9166	1.515	1
1.0000	1.496	1
1.0833	1.471	1
1.1666	1.465	1
1.2500	1.455	1
1.3333	1.440	1
1.4166	1.430	1
1.5000	1.421	1
1.5833	1.405	1
1.6666	1.383	1

1.7500	1.374	1
1.8333	1.374	1
1.9166	1.352	1
2.0000	1.358	1
2.5000	1.292	1
3.0000	1.238	1
3.5000	1.197	1
4.0000	1.172	1
4.5000	1.122	1
5.0000	1.087	1
5.5000	1.055	1
6.0000	1.018	1
6.5000	0.992	1
7.0000	0.961	1
7.5000	0.939	1
8.0000	0.914	1
8.5000	0.891	1
9.0000	0.863	1
9.5000	0.841	1
10.0000	0.819	1
12.0000	0.743	1
14.0000	0.671	1
16.0000	0.605	1
18.0000	0.539	1
20.0000	0.485	1
22.0000	0.434	1
24.0000	0.397	1
26.0000	0.368	1
28.0000	0.343	1

1401 Grand Ave. MW-4 Rising Head



Rising Head Test Data
Haber Oil
1401 Grand Ave., San Leandro, CA

Well MW-4

Time	Drawdown	Weight
0.0000	1.960	1
0.0033	1.932	1
0.0066	1.906	1
0.0100	1.894	1
0.0133	1.869	1
0.0166	1.847	1
0.0200	1.837	1
0.0233	1.806	1
0.0266	1.790	1
0.0300	1.771	1
0.0333	1.762	1
0.0500	1.667	1
0.0666	1.579	1
0.0833	1.513	1
0.1000	1.459	1
0.1166	1.405	1
0.1333	1.349	1
0.1500	1.298	1
0.1666	1.273	1
0.1833	1.245	1
0.2000	1.207	1
0.2166	1.175	1
0.2333	1.160	1
0.2500	1.138	1
0.2666	1.112	1
0.2833	1.093	1
0.3000	1.074	1
0.3166	1.059	1
0.3333	1.043	1
0.4166	0.986	1
0.5000	0.945	1
0.5833	0.914	1
0.6666	0.882	1
0.7500	0.857	1
0.8333	0.838	1
0.9166	0.816	1
1.0000	0.803	1
1.0833	0.778	1
1.1666	0.762	1
1.2500	0.740	1
1.3333	0.734	1
1.4166	0.715	1
1.5000	0.706	1
1.5833	0.687	1
1.6666	0.680	1
1.7500	0.658	1

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

RECEIVED
OCT 2 3 1992
Ans'd. 91-CCY
DIS/CF

Mike Kitko
Aegis Environmental Inc.
1050 Melody Lane, Ste 160
Roseville, CA 95678

Date: 10/27/1992
NET Client Acct No: 65400
NET Pacific Job No: 92.48710
Received: 10/08/1992

Client Reference Information

1401 Grand Ave., San Leandro, Project: 91001

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

Phone (916) [redacted] 2110
FAX (916) [redacted] 7830

AEGIS Environmental Consultants, Inc.

Sample Identification/Field Chain of Custody Record

1150

Send results to:
Aegis Environmental
801 Riverside, Suite C
Roseville, CA 95678

Site Address: 1401 GRAND AVE SAN RAFAEL, CA.
AEGIS Project #: 91001
Shipped By: AEGIS
Shipped To: NET
Project Manager MIKE KITKA

For Shell Projects Only
WIC:
AFE:
CT/DL:
Shell Engineer:
Hazardous Materials Suspected? (yes/no)

Sampling Point	Location	Field ID#	Date	Sample Type	No. of Containers	Analysis Required
MW1	1401 GRAND AVE SAN RAFAEL CA	MW1	10/7/92	AIR	1	TPH/BTEX
MW2	↓	MW2	↓	↓	1	↓

Sampler(s) (signature) TRACE DAVIS Trace Davis

Field ID	Relinquished By (signature)	Received By (signature)	Date/Time		Comments
MW1, MW2	Trace Davis		10/8/92	[illegible]	

Sealed for shipment by: (signature) _____ Date/Time: _____ Shipment Method: HAND DELIVER

Received for Lab by: (signature) [signature] Date/Time 10-8-92/10:40 Comments: STANDARD TAT

AIR SAMPLES

Receiving Laboratory: Please return original form after signing for receipt of samples.

White/Original Yellow/Lab Copy Pink/File Copy

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
*	:	Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
ICVS	:	Initial Calibration Verification Standard (External Standard).
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 (Value 1 - Value 2)/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.