Weiss Associates DRAFT *Environmental and Geologic Services*

5500 Shellmound Street, Emeryville, CA 94608-2411 *Fax: 510-547-5043 Phone: **510-450-6000***

SH

COMPREHENSIVE SITE EVALUATION AND PROPOSED FUTURE ACTION PLAN

at

Former Chevron Service Station 9-1026
3701 Broadway
Oakland, California

prepared for

Chevron U.S.A. Products Company
P.O. Box 5004
San Ramon, California 94583-0804

Weiss Associates

COMPREHENSIVE SITE EVALUATION AND PROPOSED FUTURE ACTION PLAN

at

Former Chevron Service Station 9-1026
3701 Broadway
Oakland, California

prepared by

Weiss Associates
5500 Shellmound Street
Emeryville, CA 94608

WA Job # 4-0314-014

Janet K. Macdonald
Senior Staff Hydrogeologist

Cynthia N. Okano
Staff Engineer

Weiss Associates work for Chevron U.S.A. Products Company, P.O. Box 5004, San Ramon, California, was conducted under my supervision. To the best of my knowledge, the data contained herein are true and accurate and satisfy the specified scope of work prescribed by the client for this project. The data, findings, recommendations, specifications or professional opinions were prepared solely for the use of Chevron U.S.A. in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied, and are not responsible for the interpretation by others of these data.

James W. Carmody December 20, 1994
Certified Engineering Geologist
No. 1576

CONTENTS

APPENDICES

Appendix A. Figures

Site Location Map - Chevron Service Station #9-1026
Land Use in the Vicinity of Former Chevron SS 9-1026
Potentiometric Surface Map - June 13, 1994
Groundwater Flow Patterns & Observed Gasoline Plume
Tank/Line Removal Diagram - Diagram One
Tank Removal Sampling Locations Diagram - Diagram Two-A
Overexcavation Diagram - Diagram Two-B
1988 Subsurface Soil Investigation - Soil Sample Locations
1988 Subsurface Soil Investigation - TPH as Gasoline in Soils - 10 to 12 Foot Depth
Previous Ground Water Elevation Contour Maps

Appendix B. Tables

1982 Well Monitoring (B-1 through B-7, A, B, C, E and F, March through April 1982)
1988 Additional Well Installation - Concentrations of Hydrocarbon Constituents in Soil and Groundwater Samples from the Vicinity of Former Chevron SS 9-1026, Oakland, California
Tank/Line Removal Sampling - Table of Sampling Locations and Analytical Results
1988 Subsurface Soil Investigation - Laboratory Analyses Summary
Analytical Results for Soil Samples Collected on October 18, 1992
Historical Groundwater Analytical Results and Monitoring Data (B-1 through B-7, EA-1, EA-2, A, B, E, F, 1989 to present)
Separate-Phase Hydrocarbons Bailed (B and B-3, 1993)

Appendix C. Boring Logs

Appendix D. Contingency Plan

SUMMARY

The site at 3701 Broadway in Oakland, California is a former Chevron service station. In 1979, three ground water monitoring wells were installed at the site and, in 1982, nine additional monitoring wells were installed. The station was closed in April 1988, the service station building and tanks were removed and two additional wells were installed to determine the downgradient extent of hydrocarbons in ground water. Separate-phase hydrocarbons (SPH) were observed in the onsite wells located in the vicinity of the former pump islands. The site is currently a used automobile dealership.

Review of subsurface site investigations and historical ground water monitoring data shows that:

- ***A significant source of the hydrocarbons detected in ground water at this site probably originates offsite:*** Elevated hydrocarbon concentrations have consistently been detected in upgradient wells A and B-4, and the concentrations in B-4 have been increasing over time. The hydrocarbons originating upgradient should be addressed by the responsible parties.

- ***The hydrocarbon plume appears to be contained by natural processes and no significant plume migration has occurred:*** No hydrocarbons have been detected in offsite wells E, F and EA-1, located directly downgradient of the former underground tanks and former pump islands, for almost two years. Low-permeability sediments appear to be hindering plume migration.

- ***Hydrocarbons in onsite soil have been remediated to the extent feasible:*** Hydrocarbon-bearing soil was removed from the site when the tanks were removed in 1988. Ground water extraction is not effective in low-permeability sediments.

- Maximum contaminant levels (MCLs) cannot be achieved for the ground water at this site until the upgradient source has been identified and addressed.

Chevron requests that the Alameda County Department of Environmental Health (ACDEH) 1) acknowledge that attainment of drinking water standards at this site is not solely Chevron's responsibility; and 2) define a non-attainment area where reduced monitoring would be conducted for a limited period of time, and a Contingency Plan implemented if hydrocarbon concentrations exceed trigger values.

INTRODUCTION

At the request of Chevron U.S.A. (Chevron), Weiss Associates (WA) has prepared this site evaluation for former Chevron Service Station 9-1026, located at 3701 Broadway, Oakland. The objectives of this evaluation are to: 1) summarize all investigative and remedial actions performed at the site to date; 2) determine whether the site meets the Regional Water Quality Control Board - San Francisco Bay Region (RWQCB) criteria for establishment of a Non-Attainment Area (NAA); and 3) outline a recommended future action plan. The site-specific information presented in this evaluation was compiled from the reports listed in the References section of this report.

SITE HISTORY

SITE SETTING

The site is located on the northwest corner of the intersection of Broadway and MacArthur Boulevard (see Appendix A). The area around the site is predominantly commercial, with some residences on Webster Street. Mosswood Park is located across MacArthur Boulevard to the south and Kaiser-Permanente Hospital is located across Broadway to the east. The parking lot of a small shopping mall abuts the site to the north and east. A motel and residential buildings are located west of the site.

The aboveground structures of the former station, including the pump island foundations, were removed in 1988. Currently, the site is paved and is a used automobile dealership. The surface elevation is approximately 70 ft above mean sea level (msl). The site is 1,120 ft from Glen Echo Creek, which drains into Lake Merritt, approximately 1 mile to the south. San Francisco Bay is approximately 4 miles west of the site.

SITE INVESTIGATIONS

1979 Well Installation: In about 1977, a fuel filter rusted at the eastern pump island resulting in a subsurface release of regular gasoline. About two years later, gasoline odors were detected in Mosswood park across MacArthur Boulevard and in the motel to the west of the station. In 1979, monitoring wells B-5, B-6 and B-7 were installed and no separate-phase hydrocarbons (SPH) were measured. Well locations are shown in Appendix A and all historical elevation and analytic data are compiled in Appendix B.

1982 Well Installation: In 1982, the steel fuel storage tanks were replaced with fiberglass tanks. On March 25, 1982, J.H. Kleinfelder & Associates installed monitoring wells B-1, B-2, B-3 and B-4 to a depth of about 20 ft. Between March 30 and April 26, 1982, all the site wells were inspected for SPH. SPH were observed in all onsite monitoring wells except well B-4, ranging in thickness from a sheen in well B-5 to 5.82 ft in B-3. Boring logs for wells B-1 through B-4 are presented in Appendix C.

On April 23, 1982, I.T. Enviroscience installed monitoring wells A, B, C, E and F to further characterize the gasoline plume. Wells A, B and C were located onsite and wells E and F were located downgradient of the site on MacArthur Boulevard. On April 26, 1982, wells A, E and F contained no SPH. Boring logs for wells A, B, C, E and F are presented in Appendix C.

1984 Hydrocarbons in Lake Merritt: In March 1984, the United States Environmental Protection Agency (EPA) notified several gasoline retailers that fuel was entering Lake Merritt through the Glen Echo Creek storm drain, and that local residents had complained of product odor. No SPH were measured in any of the Chevron wells. Chevron conducted gas chromatography (GC) fingerprinting of samples from the storm drain, from wells and dispensers on the Chevron site and from the Rainbow Carwash located directly north of the Chevron site. The GC results indicated that the hydrocarbon fingerprint of the storm drain sample was dissimilar compared to well or dispenser samples from the Chevron site. On August 3, 1984, Chevron sent the EPA a letter quoting these results and stating that they were not responsible for contamination of the Glen Echo Creek storm drain. The apparent source of the gasoline in the storm drain was a faulty dispenser at the Rainbow Carwash.

1988 Well Installation: On April 11, 1988, EA installed offsite monitoring wells EA-1 and EA-2 to further investigate the extent of hydrocarbons in soil and ground water near the site. No total petroleum hydrocarbons as gasoline (TPH-G) or benzene, toluene, ethylbenzene or xylenes (BTEX) were detected in soil samples collected from 15.5 and 20.5 ft below ground surface (bgs). Ground water from well EA-1 contained no TPH-G or BTEX, and only 0.8 parts per billion (ppb) TPH-G were detected in well EA-2.

1988 Tank/Line Removal and Overexcavation: On April 22, 1988, Chevron demolished the service station building and removed all above-ground and subsurface installations. Blaine Tech Services, Inc. (BTS) removed three fiberglass 10,000-gallon underground storage tanks (USTs) (designated Tanks A, B, and C), one fiberglass 6,000-gallon recovery product UST (Tank D), one fiberglass 1,000-gallon waste oil UST (Tank WO) and the associated product line piping. The former tank locations are shown in Appendix A. BTS observed the condition of the USTs and collected soil samples during removal. No holes were observed in any of the tanks.

Tanks A, B, C and WO shared a common excavation. Following tank removal, standing water was observed in the tank pit at a depth of approximately 14 ft bgs. Approximately 1/8 of an inch of SPH was measured on the water. Approximately 2,800 gallons of liquid were removed from the excavation prior to collecting capillary zone samples. BTS overexcavated to remove all visibly contaminated soil. A confirmatory soil sample was collected at the lateral boundary of the excavation where no contaminated soil was evident. Up to 890 parts per million (ppm) TPH-G, 14,000 ppm total oil and grease (TOG) and 4,300 ppm total petroleum hydrocarbons as diesel (TPH-D) were detected.

Tank D was damaged during removal causing a release of hydrocarbons into the water within the excavation. Approximately 1/4 of an inch of SPH was measured on the water surface. Approximately 700 gallons of liquid were removed from the excavation prior to collecting two soil samples from the capillary zone. No TPH-G or benzene were detected in either of these samples.

1988 Subsurface Soil Investigation: In November 1988, Groundwater Technology, Inc. (GTI) of Concord, California, conducted a subsurface investigation to further characterize the areal extent of

petroleum hydrocarbons beneath the site. GTI collected 23 soil samples from 16 sampling points for laboratory analyses. Attempts to collect samples from depths greater than 12 ft bgs were impeded by wet, stiff clay that was difficult to penetrate. The chemical data indicated that TPH-G concentrations were greater than 100 ppm at 5 to 10 ft bgs in the vicinity of the former pump islands. The gasoline was also highly degraded as indicated by the low benzene, toluene and xylene concentrations detected in the samples.

Former USTs at upgradient properties: In a letter to Mr. Brady W. McQueen, General Manager of Val Strough Honda, dated June 11, 1990, Gil Wistar, Hazardous Materials Specialist for the ACDEH, requested technical reports regarding the three former underground fuel tanks at the upgradient properties at 3737 and 3741 Broadway. Mr. Wistar mentioned that ACDEH suspected that hydrocarbons at the Chevron site migrated from 3737/3741 Broadway "because the monitoring wells at 3701 Broadway that are upgradient of the tanks removed from that property (Chevron), but downgradient of the tank area on 3737/3741 Broadway, show significant groundwater contamination".

1991 Well Destruction and Reinstallation: In June 1991, WA oversaw the destruction of wells B-6 and B-7 and the reinstallation of well B at the site. Wells B-6 and B-7, constructed of corrugated steel casing, were destroyed by pressure grouting using Portland Type I, II cement mixed with 3 to 5% bentonite powder by volume. Well B was reconstructed by installing a 4-inch diameter casing within the existing 12-inch diameter, corrugated steel casing.

1992 Well Replacement: In October 1992, GTI supervised the replacement of wells E, F and B-1. The existing casings were extracted and the borings were extended from a depth of about 20 ft to a depth of about 35 ft. Soil samples collected from the drill cuttings were analyzed for TPH-G and BTEX. None of these compounds were detected in any of the samples. Ground water samples were collected from the new wells and analyzed for TPH-G and BTEX. TPH-G and benzene were detected at 280 ppb and 2.7 ppb, respectively, in well E and at 300 ppb and 9.7 ppb, respectively, in well B-1. No TPH-G or BTEX were detected in well F.

Ground Water Monitoring: Since March 1982, ground water samples have been collected from 10 to 12 Chevron wells. Ground water sampling results are compiled in Appendix B. Ground water monitoring data are summarized below.

Upgradient onsite wells:

- **Well A:** Well A, located upgradient of any known or suspected onsite sources, has contained about 10,000 ppb TPH-G, but no SPH, since quarterly monitoring began in May 1989. The hydrocarbons in well A appear to have migrated onsite from an upgradient offsite source.

- **Well B-4:** In April 1982, no SPH were observed in well B-4, located upgradient of the former fuel pump islands. In May 1989, 3,600 ppb TPH-G and 840 ppb benzene were detected in ground water. By June 1994, TPH-G concentrations were 36,000 ppb and benzene concentrations had gradually increased to 13,000 ppb.

The increase in hydrocarbon concentrations on the upgradient side of the Chevron site further indicates that an active hydrocarbon source exists to the north.

Other onsite wells:

- **Well B-3:** TPH-G concentrations in well B-3, located cross-/downgradient of the former fuel pump islands, have been about 100,000 ppb since quarterly monitoring began in May 1989. In April 1982, up to 5.82 ft of SPH was measured. No SPH were measured during the three sampling events conducted since December 1993, (Appendix B).

- **Well B-2:** In April 1982, 0.26 ft of SPH was measured in well B-2, located cross-/downgradient of the former fuel pump islands. Since May 1989, a sheen has only been evident during two quarterly monitoring events. TPH-G concentrations have generally ranged between about 50,000 and 150,000 ppb.

- **Well B-1:** In April 1982, 1.45 ft of SPH was measured in well B-1, located cross-gradient of the former fuel pump islands and downgradient of the former underground tanks. Since May 1989, a sheen has only been evident during one quarterly monitoring event. In May 1989, 16,000 ppb TPH-G and 2,300 ppb benzene were detected in a ground water sample collected from B-1. Since May 1992, TPH-G and benzene concentrations dramatically decreased from 27,000 and 2,800 ppb, respectively to 69 and 10 ppb, respectively in June 1994.

- **Well EA-2:** TPH-G concentrations have been fluctuating in offsite, crossgradient well EA-2 from a high of 760 ppb in May 1989 to less than the detection limit in June 1994. No SPH have ever been detected in this well.

Hydrocarbons in these wells are probably from a combination of the former onsite USTs and the upgradient source to the north.

Offsite wells:

- **Well E:** No TPH-G or benzene have been detected in this well since March 1993. This well is located downgradient of the former onsite USTs.
- **Well F:** TPH-G and benzene have only been detected once (at 64 and 0.4 ppb, respectively) since quarterly sampling began in May 1989. Well F is located downgradient of the former fuel pump islands.
- **Well EA-1:** No TPH-G have ever been detected and benzene has only been detected below 3 ppb since quarterly sampling began in May 1989. Well EA-1 is located downgradient of the former fuel pump islands.

The lack of hydrocarbons in wells E, F and EA-1 indicate that the hydrocarbon plume originating from onsite and possibly from the north has not migrated offsite.

Currently, onsite well B is the only well with occasional SPH. Otherwise, no SPH have been measured in any other wells since December 1993, except for a sheen observed in well B-2 in March 1994.

REMEDIAL ACTIONS

IT Enviroscience observed and monitored SPH in site wells between August 1982 and May 1983. In June 1983, Gettler-Ryan began routine gauging and pumping of all monitoring wells with observed SPH. Over the duration of the program, SPH were regularly pumped from wells identified by Gettler-Ryan as wells 3, 4, 7, 8, 9 and 12. (Based on depth to water and well size recorded on Gettler-Ryan's Daily Monitor Records, it appears that wells 1 through 7 correspond to wells B-1 through B-7 and wells 8 through 12 correspond to wells A, B, C, E and F, respectively.) Over 200 gallons of product/water mixture were removed from the wells during these activities.

Gettler-Ryan's gauging and pumping program ended in October 1987. Since May 1989, measurable SPH have been observed only in wells B and B-3 except for one anomalous record of observation in wells B-1, B-2, E, EA-1 and F during the September 8, 1993 sampling event. No SPH have been observed in wells EA-1 or F since May 1989, and it is probable that the September

1993 observation was due to an error in the field sampling; possibly an algae layer was mistaken for degraded product.

In April 1988, the five USTs and the associated subsurface piping were removed. In addition, all visibly contaminated soil was removed. Approximately 3,500 gallons of standing water were pumped from the excavations. Because all the visibly impacted soil was removed during the tank excavation, no additional onsite remedial activity is warranted until the upgradient source has been identified and removed.

EVALUATION OF NON-ATTAINMENT AREA CRITERIA AND FUTURE ACTION PLAN

The configuration of the hydrocarbon plume and the site hydrogeologic and chemical conditions indicate that the hydrocarbons in ground water beneath this site have originated from at least two sources: the former USTs and fuel pump islands located at the Chevron site, and 2) an upgradient source offsite to the north/northeast. Therefore, because an active source of hydrocarbons may still exist upgradient of the site, ground water remediation at the Chevron site is inappropriate at this time. Chevron's responsibility should be limited to implementation of the future action plan outlined below. In the following section, each of the criteria specified by the RWQCB for establishment of a NAA is considered for the subject site.

DISCUSSION OF NON-ATTAINMENT AREA CRITERIA

Criterion a. The Discharger has demonstrated (e.g., pump test, ground water monitoring, transport modeling) and will verify (e.g., ground water monitoring) that no significant pollution migration will occur due to hydrogeologic or chemical characteristics.

Site Hydrogeology: The sediments beneath the site are primarily silt and clay of low estimated permeability (Appendix C). The ground water flow direction has been consistently to the south-southwest (Appendix A).

Ground Water Flow: Ground water flows to the south-southwest under a gradient of about 0.02 ft/ft. The average depth to ground water is approximately 11 ft to 17 ft bgs.

Plume Locations: The data collected in the vicinity of the Chevron site suggest the hydrocarbon plume is probably the result of at least two separate sources:

- A significant hydrocarbon plume appears to originate north/northeast of the Chevron site, probably from the Val Strough Honda site located at 3737 and 3741 Broadway. Hydrocarbon concentrations in wells upgradient of the former Chevron fuel pump islands are higher and consistently increasing compared to downgradient wells.

- An onsite hydrocarbon source existed in the vicinity of the former onsite fuel pump islands. However, decreasing concentrations in onsite downgradient well B-1 and the lack of hydrocarbons in offsite downgradient wells E, F and EA-1 indicate that this plume is confined to a small area onsite.

Plume Stability: Hydrocarbons have been detected in ground water at this site since at least 1982. Because no hydrocarbons are detected in down- /crossgradient monitoring wells E, F and EA-1, the plume appears to be stable. Low-permeability sediments that underlie the site are probably impeding the plume's migration.

Criterion b. Adequate source removal and/or isolation is undertaken to limit future migration of pollutants to ground water.

Source Removal: The gasoline and waste oil tanks and product piping removed in April 1988 were inspected and reported to be in good condition, and the visibly hydrocarbon-impacted soil in the vicinity of the former tanks and product lines was excavated following tank removal. However, a sample collected at the lateral extent of the excavation indicated that some hydrocarbons remained in the soil. A potentially active source of hydrocarbons originates upgradient and should be addressed by the appropriate responsible party.

Criterion c. Dissolved phase cleanup is not cost-effective due to limited water quality impacts, environmental and human health risks and separate phases have been or are actively being removed.

The extent of hydrocarbons in ground water at this site has been defined by the present well network. Although SPH reportedly reached a thickness of over 5 ft in well B-3 in 1982, by 1989, after several pumping events during which over 200 gallons of product/water mixture were removed, no SPH were measured. As of June 1994, only well B contained SPH at a thickness of 0.23 ft. SPH is bailed as necessary. The site is covered with asphalt, limiting potential contact with the soil and volatilization of hydrocarbons to the air.

Since water quality is impacted not only in the vicinity of the site but upgradient of the site as well, it would not be cost-effective to pursue active remediation at this site based on known upgradient sources of hydrocarbons in the ground water. Implementing remedial measures to address the contamination present in the ground water beneath the site will not address the impacts from the

upgradient sources. Possible remedial actions and their potential effectiveness at this site are discussed below.

Excavation: As discussed above, visibly contaminated soil was excavated in 1988.

SPH Removal: All SPH were removed when evident. Currently, SPH occasionally occur only in well B.

Ground Water and Soil Vapor Extraction: Ground water extraction and treatment combined with soil vapor extraction and treatment is the most common, and one of the most effective, technologies for controlling and remediating hydrocarbons in the subsurface. Ground water/soil vapor extraction is initially very effective at reducing plume mass and concentrations. However, a soil vapor extraction test conducted at this site by WA in 1992 indicated that the site soils were very low permeability, and that these technologies would not be effective or appropriate at this site. Additionally, ground water extraction might encourage further migration of the offsite plume toward the Chevron site.

Air Sparging and In-Situ Biodegradation Enhancement: Air sparging and other ground water oxygenation technologies may theoretically enhance cleanup by encouraging biological degradation of hydrocarbons in both the unsaturated and saturated zones. However, this technique would also be hindered by the low-permeability sediments beneath this site.

Criterion d. An acceptable plan is submitted and implemented for containing and managing the remaining human health, water quality and environmental risks, if any, posed by residual soil and ground water pollution.

The hydrocarbons at the Chevron site are from onsite and upgradient sources. Containing and managing the risks associated with the upgradient plume are not Chevron's responsibility. As part of a cooperative effort, Chevron will maintain a monitoring plan as described below.

FUTURE ACTION PLAN

Continued Ground Water Monitoring: Chevron's portion of the hydrocarbon plume at this site has remained stable during the six years since monitoring was initiated in 1989, and continued monitoring of the wells is unlikely to yield significant additional information. The goal of this future action plan is to 1) confirm that a portion of hydrocarbons detected in ground water at this site are due to offsite sources; 2) assist the ACDEH in identifying these sources; and 3) confirm that Chevron's plume is stable and contained. To achieve these goals, Chevron will:

1) Sample upgradient onsite well B-4, and cross-/downgradient site wells B, B-1, B-2 and B-3 semi-annually in the spring and fall through 1996.

2) Sample cross-gradient well EA-2 and downgradient offsite wells EA-1, E and F annually in the spring through 1996. Wells EA-1, E and F have not contained hydrocarbons for almost two years.

If the data continue to indicate that a significant source is located upgradient of the Chevron site, and the Chevron portion of the plume is stable and contained, we will cease monitoring while the upgradient source is identified and addressed by the responsible parties. Otherwise, the contingency plan described below will be activated.

Table 1. Proposed Monitoring and Sampling Schedule. Chevron Service Station #9-2782

	1995				1996			
Well ID	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
FP → B	G&S		G&S		G&S		G&S	
B-1	G&S		G&S		G&S		G&S	
B-2	G&S		G&S		G&S		G&S	
FP → B-3	G&S		G&S		G&S		G&S	
B-4	G&S		G&S		G&S		G&S	
EA-1	G&S				G&S			
EA-2	G&S				G&S			
E	G&S				G&S			
F	G&S				G&S			

G&S = Gauging and Sampling

Contingency Plan: For each of these sampling points, "baseline" and "trigger" conditions have been defined (Appendix D). Should monitoring indicate that "trigger" concentrations occur in any

well for two consecutive monitoring periods, a Contingency Plan for increased ground water monitoring and evaluating an appropriate course of action will be implemented. Details of the Contingency Plan are presented in Appendix D.

CONCLUSIONS

Site data demonstrate that:

- Ground water has been monitored at the site since 1982.
- Sediments beneath the site consist primarily of low permeability clay and silt.
- Hydrocarbon concentrations detected in upgradient ground water migrating onto the Chevron site are higher than concentrations detected in ground water at the site, and are consistently increasing. This indicates that an additional source may be responsible for additional degradation of the ground water. The former tanks at Val Strough Honda at 3737 and 3741 Broadway may be the source of the offsite plume.
- The lack of hydrocarbons in downgradient wells E and F indicate that the plume is stable.

Based on these findings, Chevron plans continued ground water monitoring through 1996. The proposed monitoring and Contingency Plan will ensure that the risks posed by the residual plume are contained and managed.

Although elevated hydrocarbon concentrations are present in the ground water at the Chevron site, they are probably due to both a former onsite source and an upgradient source. The portion of the plume attributable to Chevron meets the RWQCB criteria for making the point of compliance for cleanup goals the downgradient site boundary while the upgradient contaminant sources are identified and addressed. The proposed monitoring and Contingency Plan will help confirm an offsite origin of the plume.

Chevron proposes that ACDEH and the RWQCB acknowledge that attainment of drinking water standards at this site is not solely Chevron's responsibility, and that a non-attainment area encompassing the residual Chevron plume should be established. Chevron will continue to monitor the site wells through 1996 to further verify the stability of the residual plume.

REFERENCES

Blaine Tech Services, Inc., June 13, 1988, Full Service Station Demolition with Removal of All Above Ground and Subsurface Installations, Chevron Service Station No. 1026, 3701 Broadway, Oakland, California. Sampling Report 88125-C-2.

EA Engineering, Science, and Technology, Inc., June 1988, Report of Investigation, Soil Vapor Contaminant Assessment, Former Chevron SS 9-1026, MacArthur Boulevard and Broadway, Oakland, California; EA Project 10118.21.

EA Engineering, Science, and Technology, Inc., July 1988, Report of Investigation, Former Chevron SS 9-1026, MacArthur Boulevard and Broadway, Oakland, California; EA Project 10118.21.

Gil Wistar, June 11, 1990, Alameda County Department of Environmental Health, letter to Brady W. McQueen, Val Strough Honda; 2 pp.

Groundwater Technology, Inc., December 1988, Subsurface Soil Investigation, 3701 Broadway Avenue, Oakland, California; R203-175-8173A.

Groundwater Technology, Inc., January 19, 1993, Environmental Assessment Report, Chevron Service Station No. 9-1026, 3701 Broadway, Oakland, California.

Groundwater Technology, Inc., July 15, 1994, Groundwater Monitoring and Sampling Activities, Chevron Service Station No. 9-1026, 3701 Broadway, Oakland, California; Project No. 020104090.

IT Enviroscience, April 28, 1982, Progress Report #1, Gasoline Leakage, Chevron Service Station #1026, 3701 Broadway, Oakland, CA.

J.H. Kleinfelder & Associates, April 6, 1982, Groundwater Monitoring Well Installation Report, Candia's Chevron Station, Oakland, California; File B-1192-1.

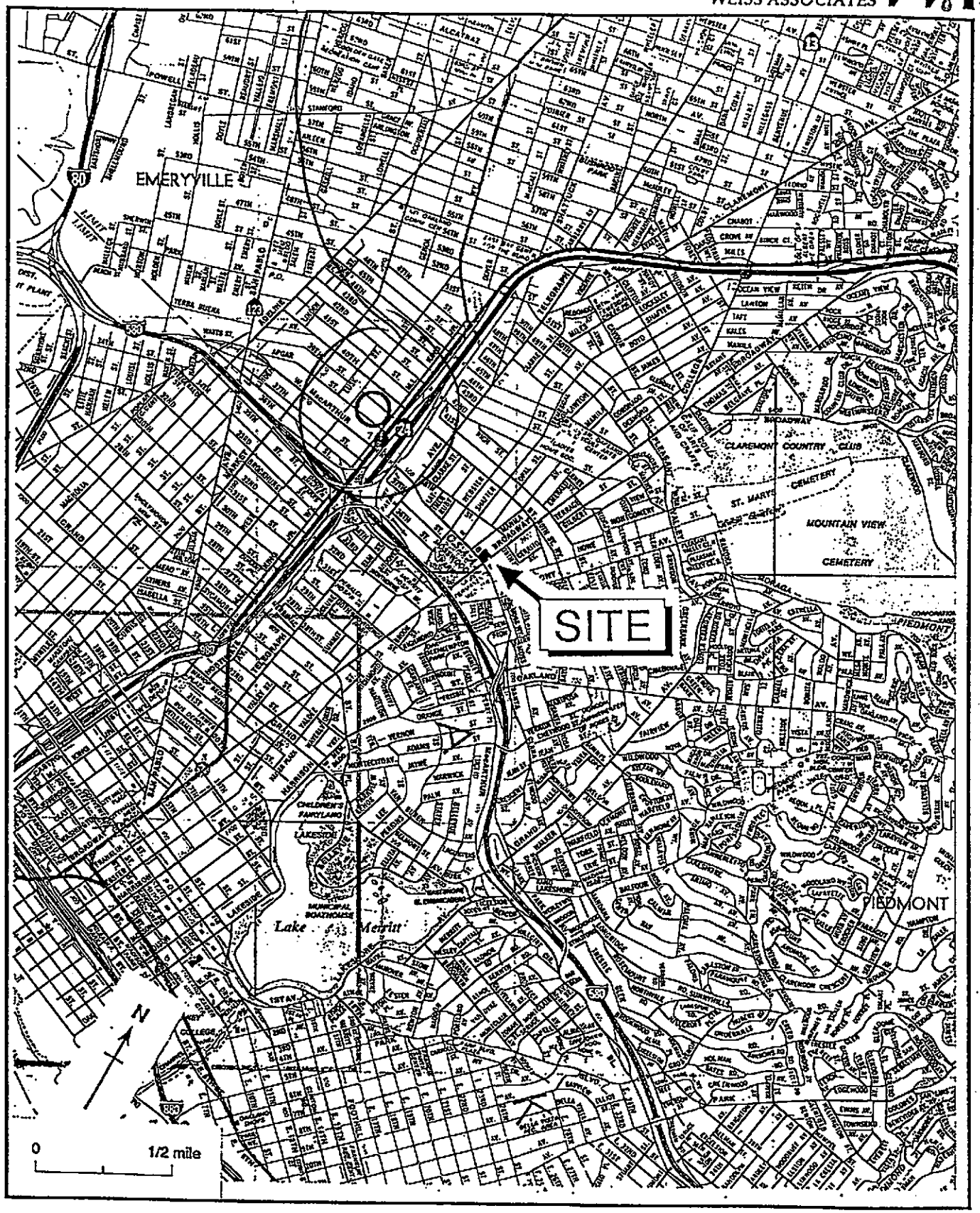
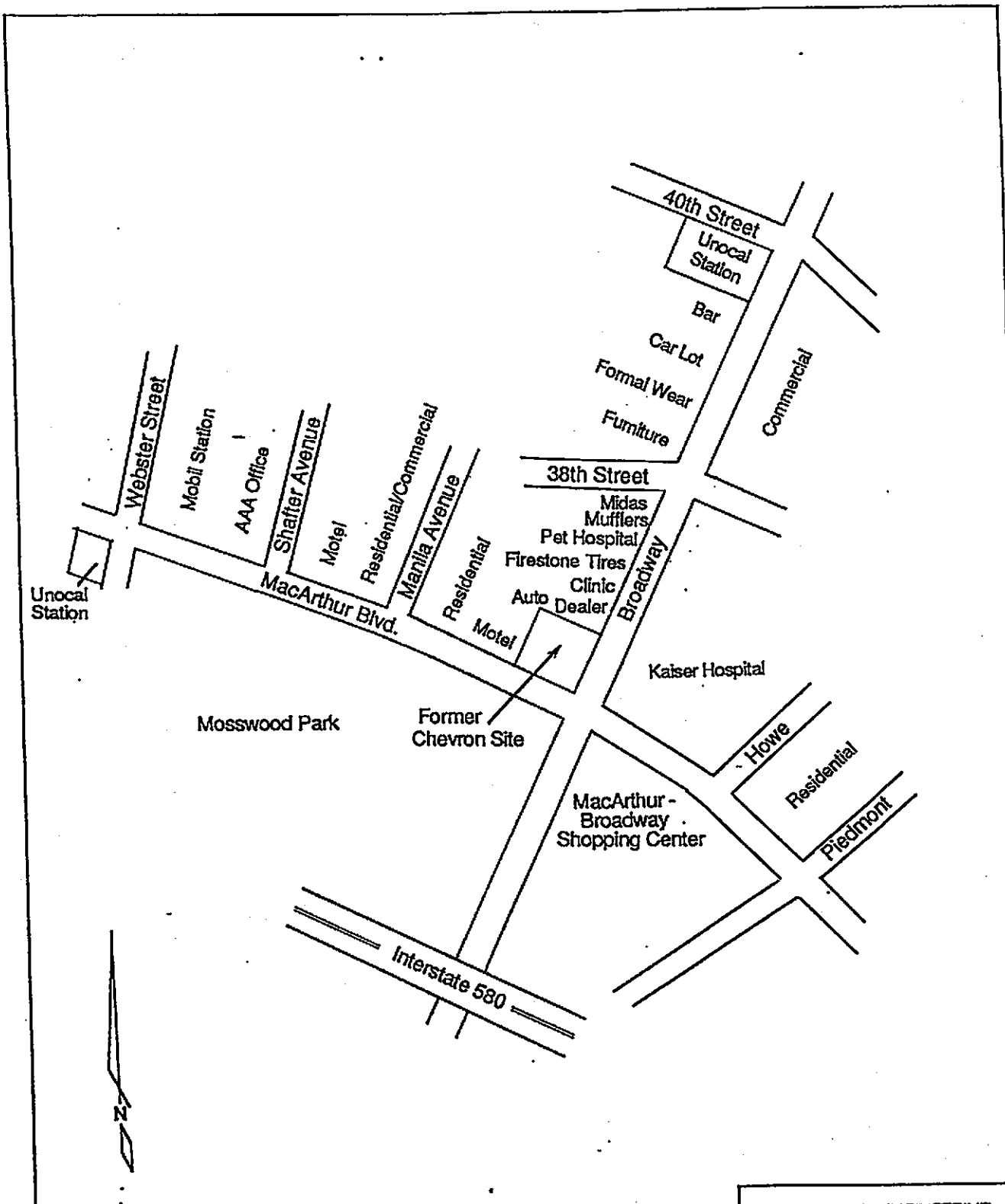


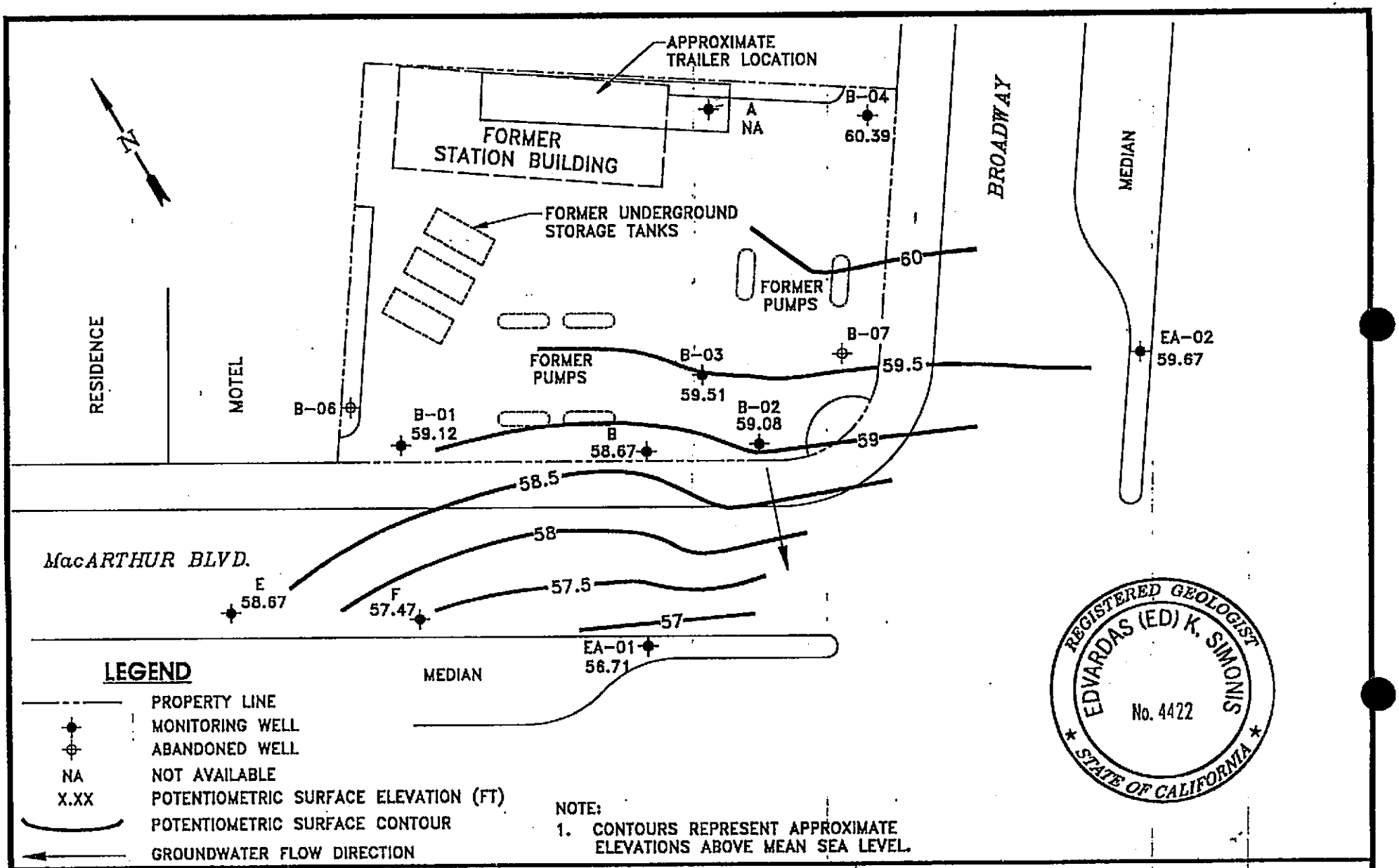
Figure 1. Site Location Map -Former Chevron Service Station #91026, 3701 Broadway, Oakland, California



EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
41A Lafayette Circle
Lafayette, CA. 94549

Figure 2. Land use in the vicinity of former Chevron SS 9-1026, Oakland, California.

Drawn	Date
Reviewed	Date



GROUNDWATER TECHNOLOGY

0 FEET 50
SCALE

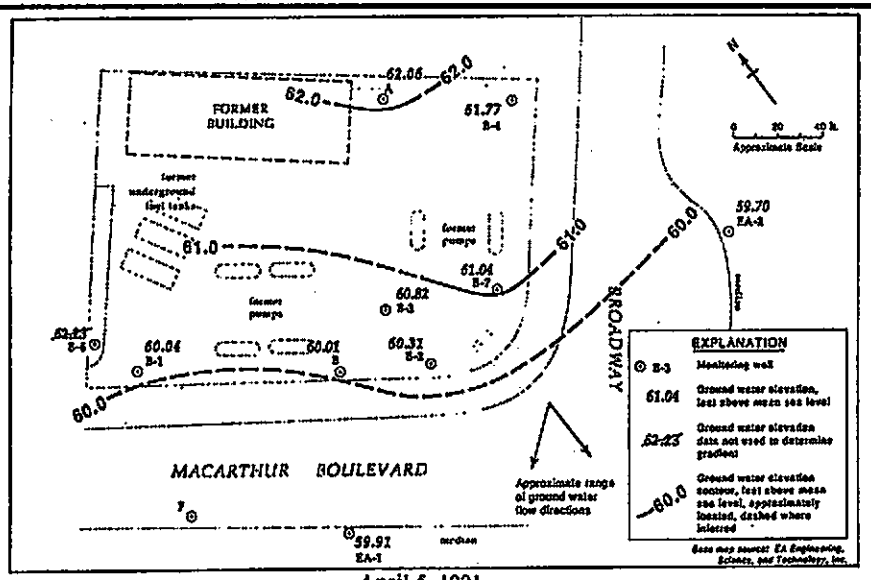
CLIENT: CHEVRON U.S.A. PRODUCTS CO.
SERVICE STATION No. 9-1026

LOCATION: 3701 BROADWAY
OAKLAND, CALIFORNIA

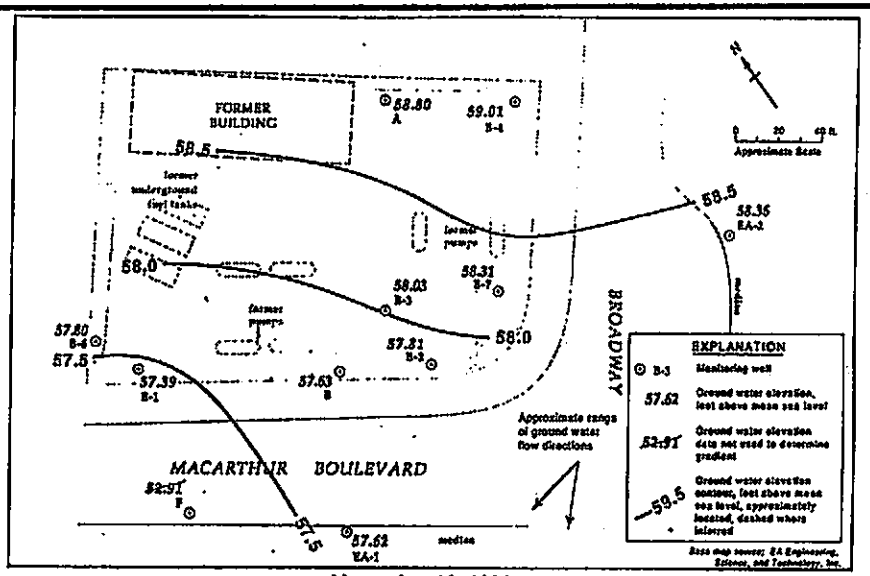
POTENTIOMETRIC SURFACE MAP (6/13/94)

FILE:	PROJECT NO.:	PM:	PE/RG:	FIGURE:
4090PSM, (1:50)	02010-4090			1

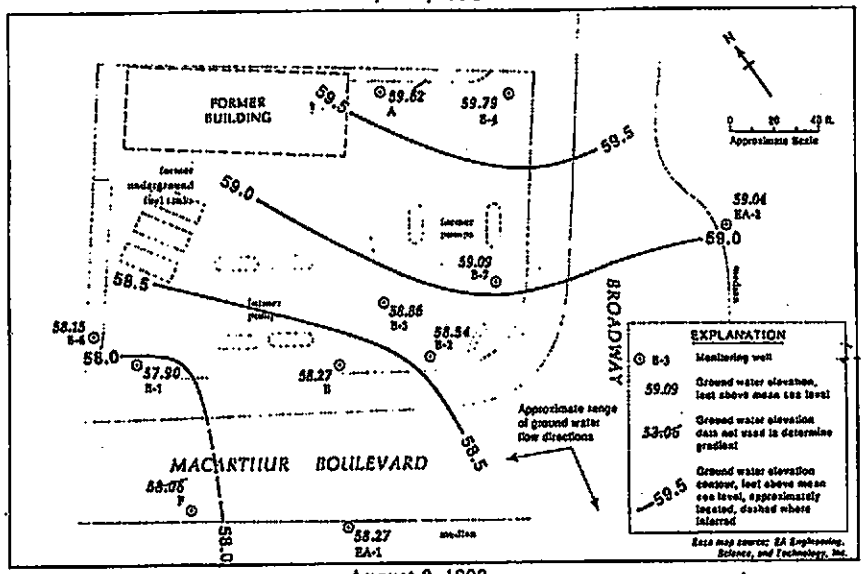
REV.:	DES.:	DET.:	DATE:
	SS	SS	6/20/94



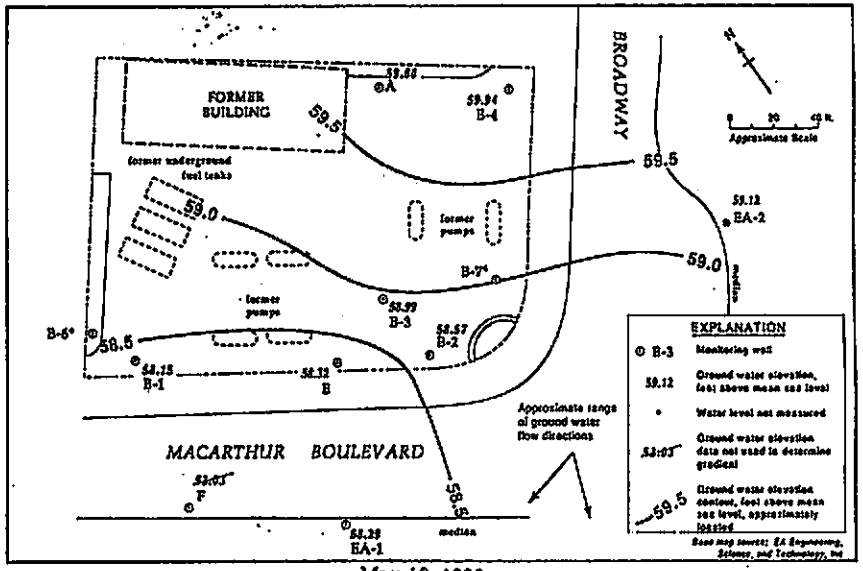
April 5, 1991



November 13, 1990



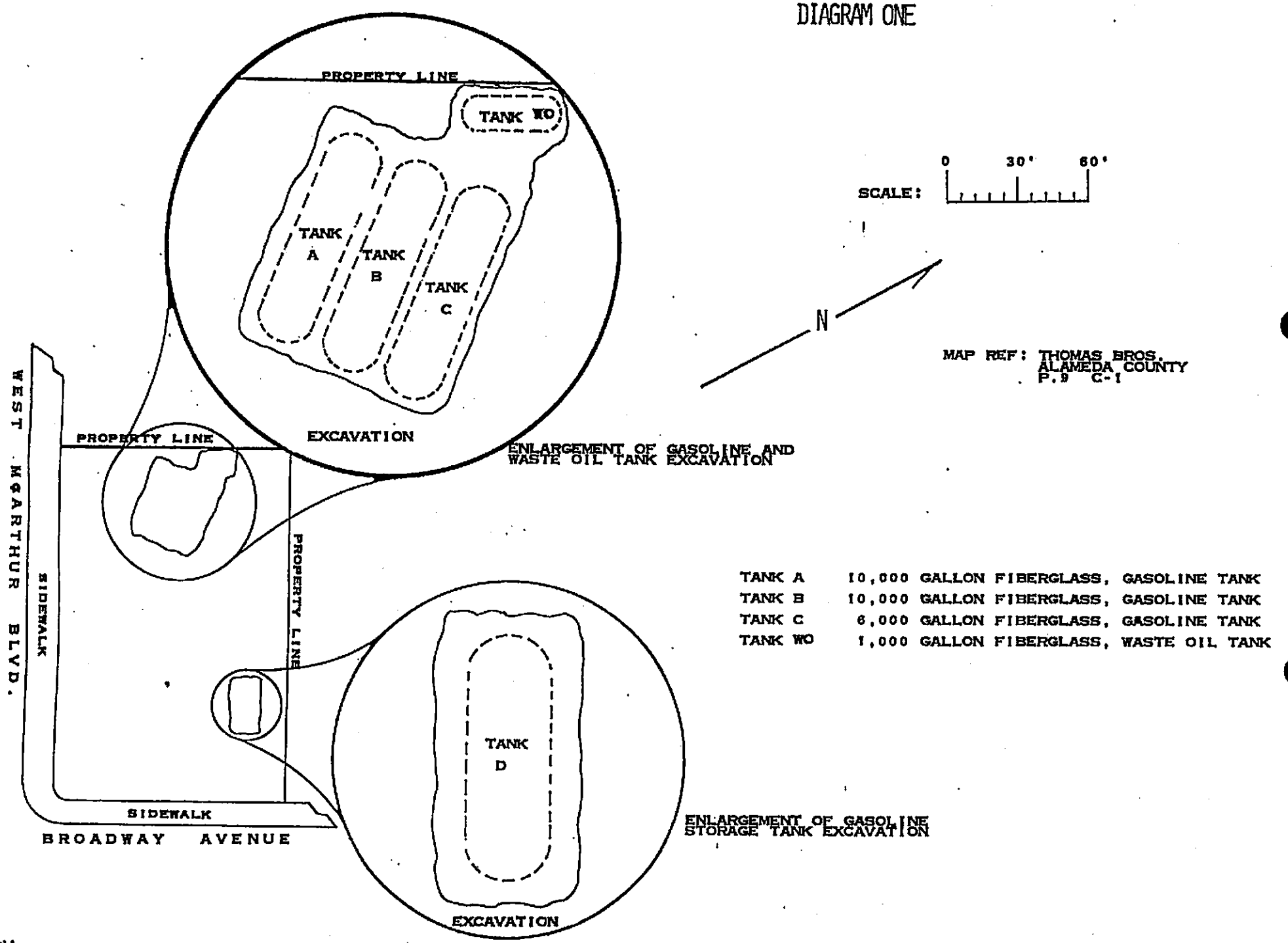
August 9, 1990



May 10, 1990

Figure 3. Previous Ground Water Elevation Contour Maps - Former Chevron Service Station #9-1026, 3701 Broadway, Oakland, California

DIAGRAM ONE

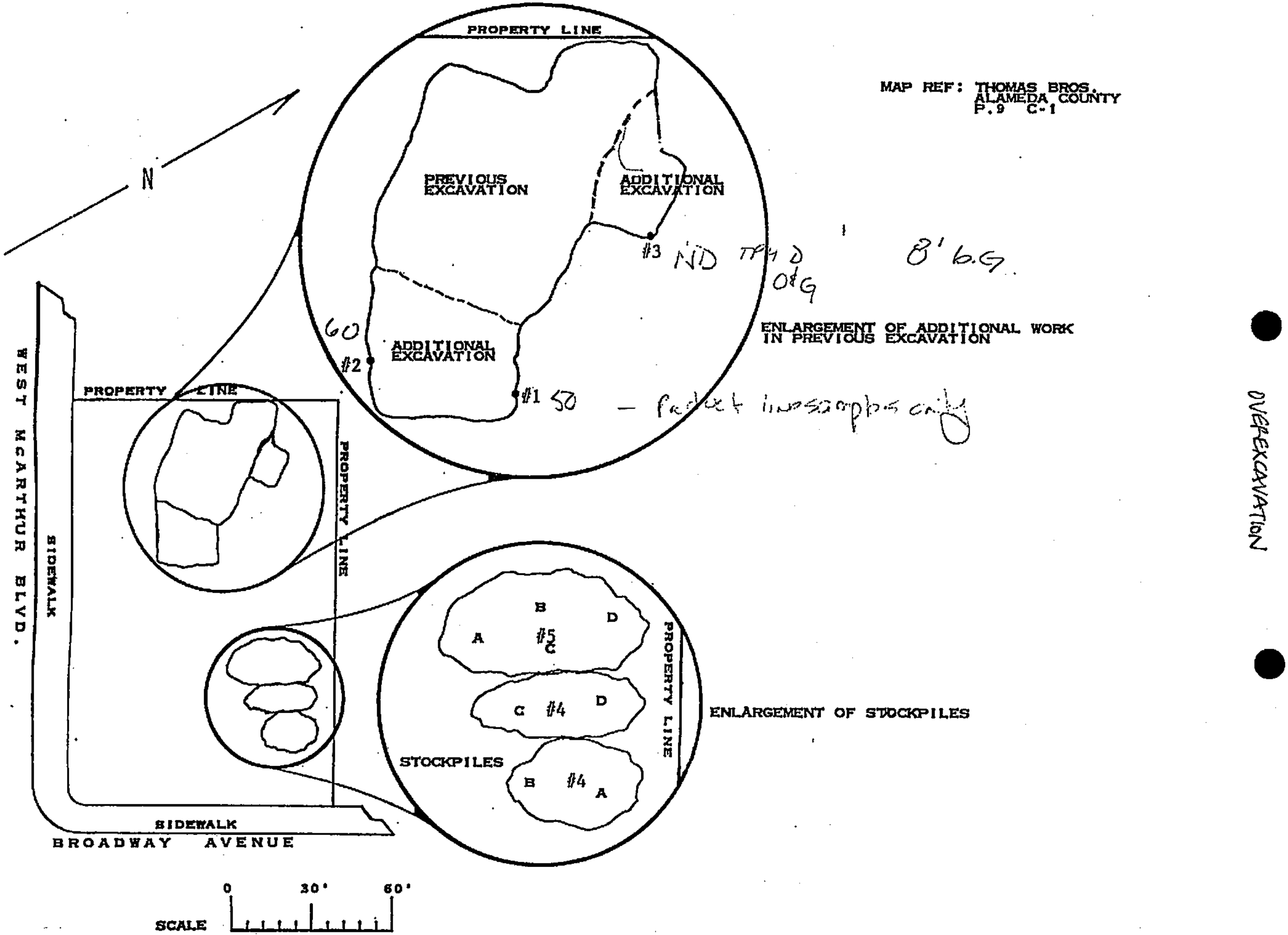


TANK A	10,000	GALLON FIBERGLASS, GASOLINE TANK
TANK B	10,000	GALLON FIBERGLASS, GASOLINE TANK
TANK C	6,000	GALLON FIBERGLASS, GASOLINE TANK
TANK WO	1,000	GALLON FIBERGLASS, WASTE OIL TANK

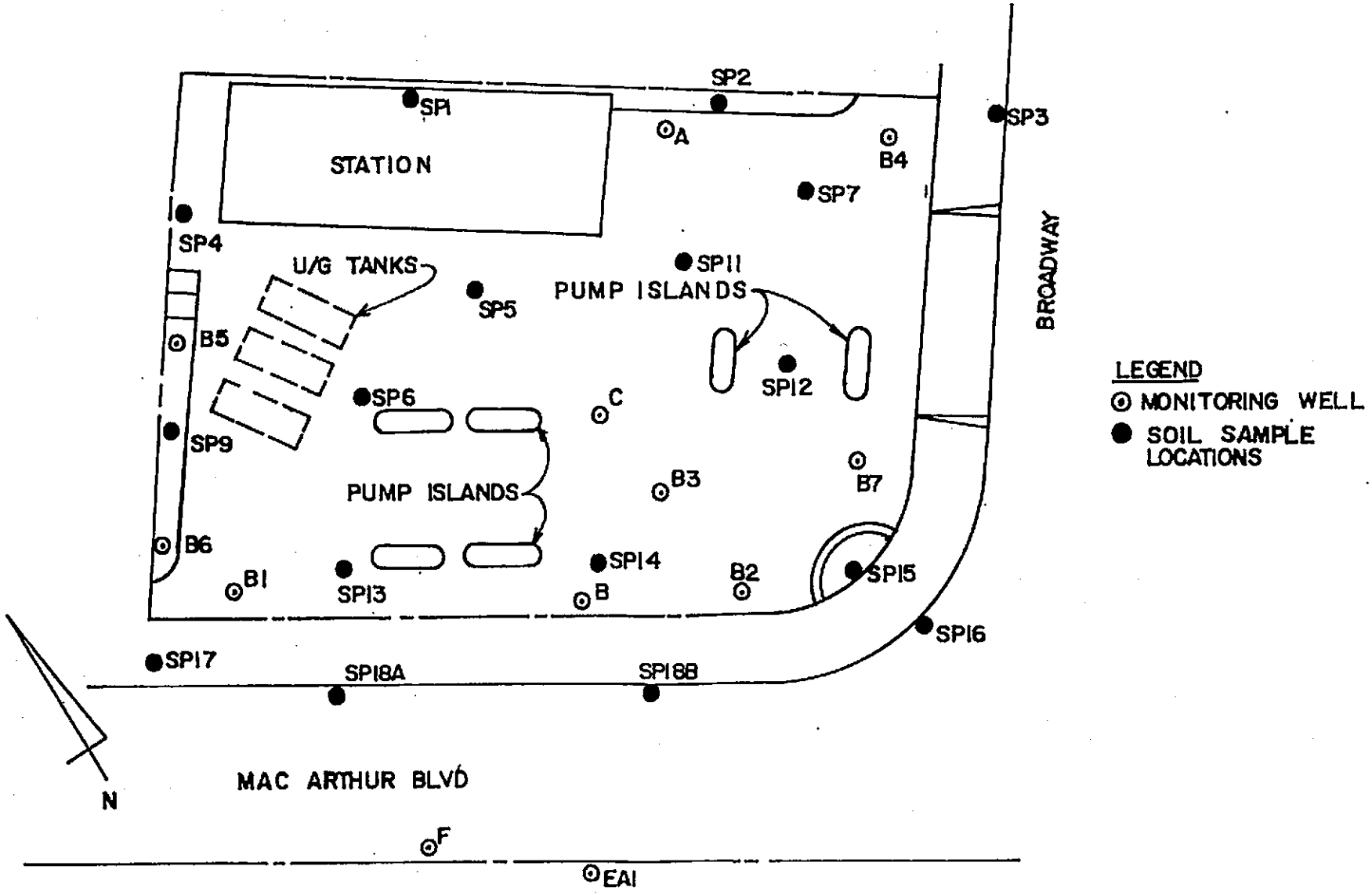
TANK/LINE REMOVAL

OW
LAINE TECH, JUNE 13, 1988

DIAGRAM TWO-B



BLAINE TECH, JUNE 13, 1988



1988 SUBSURFACE SOIL INVESTIGATION

CHEVRON USA, INC.
3701 BROADWAY AVE.
OAKLAND, CALIFORNIA

Figure 1 - Soil Sample Locations

NOT TO SCALE

GROUNDWATER TECHNOLOGY, INC.

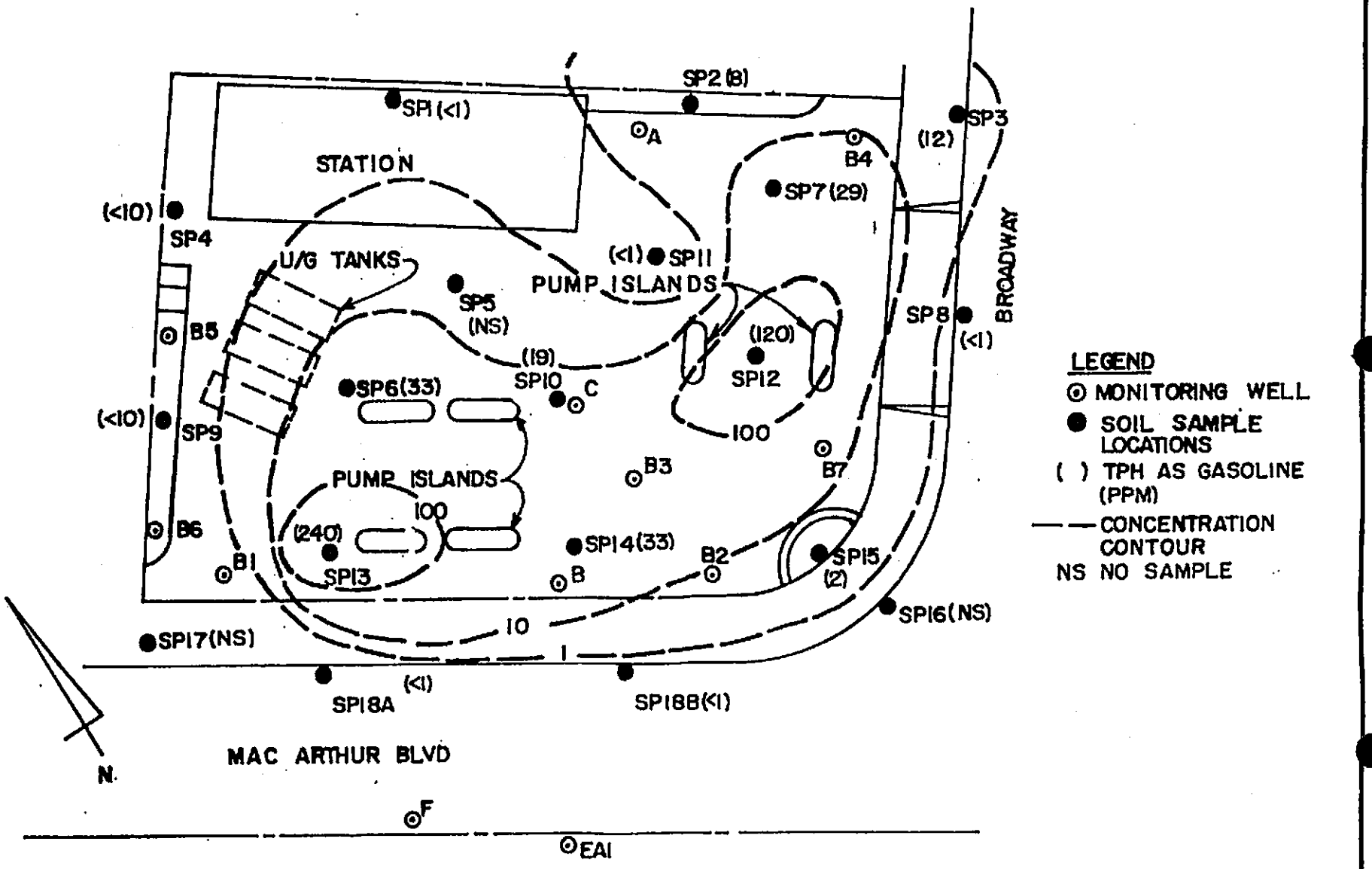


Figure 3 - TPH as Gasoline in Soils-10 to 12 Foot Depth

CHEVRON USA, INC.
3701 BROADWAY AVE.
OAKLAND, CALIFORNIA

NOT TO SCALE

GROUNDWATER TECHNOLOGY, INC.

1982 WELL MONITORING
CB-1 THRU B-7, A, B, C, E AND F 1026

TABLE 1

Well #	Date	Water Depth	Gas Layer Thickness
B- 1	3/30/82	61.25'	0.25'
1	4/ 8/82	61.75'	1.45'
1	4/13/82	62.00'	0.73'
1	4/23/82	63.16'	0.38'
1	4/26/82	61.66'	1.45'
B- 2	3/30/82	63.77'	No gas
2	4/ 8/82	65.09'	0.05'
2	4/13/82	65.09'	0.01'
2	4/23/82	63.95'	0.26'
2	4/26/82	63.31'	0.26'
B- 3	3/30/82	60.50'	3.90'
3	4/ 8/82	60.10'	5.82'
3	4/13/82	60.92'	5.20'
3	4/23/82	60.57'	4.01'
3	4/26/82	60.16'	4.74'
B- 4	3/30/82	64.77'	No gas
4	4/ 8/82	65.66'	No gas
4	4/13/82	65.82'	No gas
4	4/23/82	64.92'	No gas
4	4/26/82	64.83'	No gas
B- 5	3/30/82	62.58'	0.01'
5	4/ 8/82	63.61'	0.01'
5	4/13/82	63.70'	Gas sheen
5	4/23/82	62.88'	Gas sheen
5	4/26/82	62.67'	Gas sheen
B- 6	3/30/82	62.14'	0.08'
6	4/ 8/82	63.57'	0.08'
6	4/13/82	63.73'	0.02'
6	4/23/82	62.34'	0.04'
6	4/26/82	62.25'	0.07'
B- 7	3/30/82	62.80'	0.33'
7	4/ 8/82	63.94'	0.40'
7	4/13/82	64.05'	0.40'
7	4/23/82	63.47'	0.48'
7	4/26/82	63.31'	0.45'
A	4/23/82		No gas
A	4/26/82		Unable to measure
B	4/23/82		0.68'
B	4/26/82		2.32'
C	4/23/82		0.06'
C	4/26/82		0.34'
E	4/23/82		No gas
E	4/26/82		No gas
F	4/23/82		No gas
F	4/26/82		No gas

J. H. KLEINFELDER & ASSOCIATES APRIL 6 1982

1988 ADDITIONAL WELL INSTALLATION

TABLE 3 CONCENTRATIONS OF HYDROCARBON CONSTITUENTS IN SOIL AND GROUND-WATER SAMPLES FROM THE VICINITY OF FORMER CHEVRON SS 9-1026 OAKLAND, CALIFORNIA

Soil Samples (mg/kg)

Well No.	Date	Depth (feet)	Benzene	Toluene	Ethyl-Benzene	Xylenes	Total Petroleum Hydrocarbons
EA1	04/11/88	15.5	<0.5	<0.5		<0.5	<10
EA1	04/11/88	20.5	<0.5	<0.5		<0.5	<10
EA2	04/11/88	15.5	<0.5	<0.5		<0.5	<10
EA2	04/11/88	20.5	<0.5	<0.5		<0.5	<10

Ground-Water Samples(mg/L)

Well No.	Date	Benzene	Toluene	Ethyl-Benzene	Xylenes	Total Petroleum Hydrocarbons
A	02/09/88	0.690	0.066	0.750	0.820	5.6
B4	02/09/88	9.10	0.110	0.470	0.340	110.0
B7	02/09/88	5.30	25.0	6.80	35.0	180.0
B3	02/09/88	5.60	9.00	1.80	13.0	57.0
B2	02/09/88	29.0	6.50	2.00	8.40	130.0
B5	02/09/88	0.860	0.490	0.020	7.40	12.0
B6	02/09/88	0.037	0.054	0.010	0.240	5.20
C	02/09/88	7.30	16.0	1.90	16.0	110.0
B1	02/10/88	2.00	0.730	0.470	2.40	87.0
F	02/10/88	0.0005	0.004	<0.001	0.002	<0.05
EA1	05/03/88	<0.0005	<0.0005	<0.0005	<0.001	<0.1
EA2	05/02/88	<0.0005	<0.0005	<0.0005	<0.001	0.8

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC, JUNE 1988.

c37/91026

TANK/LINE REMOVAL SAMPLING

TABLE OF SAMPLING LOCATIONS AND ANALYTICAL RESULTS

I.D. GIVEN THIS SAMPLE AREA	SAMPLE DEPTH IN FT. BELOW GRADE	SAMPLING LOCATION DICTATED BY	TYPE & METHOD FOR THE SAMPLE OBTAINED	SAMPLE MATRIX	DATE SAMPLED	BTS CHAIN OF CUSTODY I.D.	BTS SAMPLE I.D.	NAME OF DOHS RMTL LABORATORY	LABORATORY SAMPLE I.D.	ANALYTICAL RESULTS IN PARTS PER MILLION -- PPM TPH AS GAS	BEN-ZENE	TOL-UENE	XY-LENES	ETHYL BEN-ZENE
AP	14.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#3	ANAMETRIX	8804118-03	890	3.3	9.5	110	8.9
Aop	14.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#2	ANAMETRIX	8804118-02	88	ND	0.3	12	1.2
Bop	14.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#1	ANAMETRIX	8804118-01	260	1.6	12	16	4.4
CP	14.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#5	ANAMETRIX	8804118-05	34	0.4	ND	0.2	ND
Cop	14.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#4	ANAMETRIX	8804118-04	480	0.8	1.4	19	8.3
DP	12.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#8	ANAMETRIX	8804118-08	ND	ND	ND	ND	ND
Dop	12.5	STANDARD	CAPILLAR	SOIL	4/22/88	88113-M-1	#7	ANAMETRIX	8804118-07	ND	ND	ND	ND	ND
PRODUCT LINES														
#1	4.0	HANDRIVE	INTERFACE	SOIL	5/4/88	88125-C-2	#1	ANAMETRIX	8805026-01	50	0.7	0.5	3.1	0.6
#2	4.0	HANDRIVE	INTERFACE	SOIL	5/4/88	88125-C-2	#2	ANAMETRIX	8805026-02	50	1.0	0.8	8.1	9.8

TABLE OF SAMPLING LOCATIONS AND ANALYTICAL RESULTS

I.D. GIVEN THIS SAMPLE AREA	SAMPLE DEPTH IN FT. BELOW GRADE	SAMPLING LOCATION DICTATED BY	TYPE & METHOD FOR THE SAMPLE OBTAINED	SAMPLE MATRIX	DATE SAMPLED	BTS CHAIN OF CUSTODY I.D.	BTS SAMPLE I.D.	NAME OF DOHS RHTL LABORATORY	LABORATORY SAMPLE I.D.	ANALYTICAL RESULTS (PARTS PER BILLION) PPB TPH-DIESEL	PPB TOTAL OIL & GREASE	PPB EPA 8240 COMPOUNDS
WoH	10.0	STANDARD	INTERFACE	SOIL	4/22/88	88113-H-1	#6	ANAMETRIX	8804118-06	4300	14,000	SEE LAB REPORT
ADDITIONAL EXCAVATION AREA												
#3	8.0	ELECTIVE	CONFIRM	SOIL	5/4/88	88125-C-2	#3	ANAMETRIX	8805026-03	ND	ND	SEE LAB REPORT
STOCK	1.0	SURVEY	BAAQMD MODIFD	SOIL	5/4/88	88125-C-2	#4A-D	ANAMETRIX	8805026-04	--	2,600	--
	1.0	SURVEY	BAAQMD MODIFD	SOIL	5/4/88	88125-C-2	#5A-D	ANAMETRIX	8805026-05	--	870	--

PLAINE TECH, JUNE 13, 1988.

TABLE 2

LABORATORY ANALYSES SUMMARY
parts per million (ppm)

Sample	Depth in (feet)	TPH-as-gasoline (ppm)	BTEX in (ppm)	TPH as-diesel (ppm)	TPH as-waste oil (ppm)	MOISTURE CONTENT (%)
SP1A	11	ND	NDa	-	-	-
SP2A	12	8	ND	-	-	-
SP3A	12	12	ND	-	-	-
SP4A	10	ND	ND	ND	ND	-
SP6A	5	9	ND	-	-	11
SP6B	10	33	ND	-	-	15
SP7A	5	9	ND	-	-	13
SP7B	10	29	1	-	-	13
SP8A	12	ND	ND	-	-	-
SP9A	10	ND	ND	ND	ND	-
SP10A	5	ND	ND	-	-	21
SP10B	10	19	ND	-	-	21
SP11A	5	9	ND	-	-	-
SP11B	10	ND	ND	-	-	-
SP12A	5	270	18	-	-	-
SP12B	10	120	15	-	-	-
SP13A	5	16	ND	-	-	-
SP13B	10	240	22	-	-	-
SP14A	5	3	ND	-	-	21
SP14B	10	33	1	-	-	21
SP15A	12	2	ND	-	-	31
SP18A	12	ND	ND	-	-	18
SP18B	12	ND	ND	-	-	-

a = below detection limits

GROUNDWATER TECHNOLOGY, INC, DECEMBER 1988.

1988 SUBSURFACE SOIL INVESTIGATION

TABLE 1
ANALYTICAL RESULTS FOR SOIL SAMPLES
COLLECTED ON OCTOBER 18, 1992
(Concentrations in parts per million)

DATE	SAMPLE ID	SAMPLE DEPTH (feet)	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPH-AS-GASOLINE
10/08/92	B1-25	25	<0.5	<0.5	<0.5	<0.5	<1
	B1-30	30	<0.5	<0.5	<0.5	<0.5	<1
	B1-35	35	<0.5	<0.5	<0.5	<0.5	<1

TPH = Total petroleum hydrocarbons

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
A	05/09/89	11,000	260	<2	94	230	13.92	0.00	61.36
	08/09/89	12,000	370	<1.5	100	240	15.62	0.00	59.66
75.28	11/09/89	16,000	690	10	180	350	15.95	0.00	59.33
	02/08/90	14,000	600	7	120	270	14.73	0.00	60.55
	05/10/90	16,000	840	4.8	140	340	15.48	0.00	59.80
	08/09/90	17,000	510	40.0	170	280	15.66	0.00	59.62
	11/13/90	9,000	570	3.1	86	170	16.48	0.00	58.80
	03/27/91	8,000	660	<5	110	250	---	---	---
	04/05/91	---	---	---	---	---	13.22	0.00	62.06
	06/19/91	8,900	740	<3	120	280	15.37	0.00	59.91
	08/21/91	6,800	620	23	85	200	15.99	0.00	59.29
	11/08/91	4,000	640	<5	77	160	16.15	0.00	59.13
	02/13/92	8,000	860	<5	120	390	14.58	0.00	60.70
	05/01/92	13,000	870	19	220	780	14.26	0.00	61.02
75.29	11/18/92	12,000	1,500	83	360	530	16.38	0.00	58.91
	03/19/93	14,000	820	6.1	180	420	12.16	0.00	63.13
	06/10/93	9,000	700	13	170	310	14.25	0.00	61.04
	09/08/93	---	---	---	---	---	---	---	---
	12/21/93	---	---	---	---	---	---	---	---
	03/09/94	9,600	860	21	200	390	13.34	0.00	61.95
	06/13/94	---	---	---	---	---	---	---	---
B	05/09/89	---	---	---	---	---	13.97	0.20	59.58
	08/09/89	---	---	---	---	---	15.69	0.20	57.86
73.39	11/09/89	---	---	---	---	---	15.29	0.08	58.16
	02/08/90	---	---	---	---	---	14.46	0.00	58.93
	05/10/90	---	---	---	---	---	15.07	0.00	58.32
	08/09/90	---	---	---	---	---	15.12	0.00	58.27
	11/13/90	---	---	---	---	---	15.76	0.00	57.63
	04/05/91	---	---	---	---	---	13.38	0.00	60.01
	06/19/91	26,000	7,100	370	430	1,000	15.14	0.00	58.25
	08/21/91	16,000	4,900	270	390	640	15.58	0.00	57.81
	11/08/91	11,000	2,400	48	280	160	15.71	0.00	57.68
	02/13/92	6,800	2,400	60	220	140	14.66	0.00	58.73
	05/01/92	16,000	6,000	180	370	460	14.50	Sheen	58.89
	11/18/92	28,000	2,200	150	920	4,300	15.60	0.00	57.79
	03/19/93	---	---	---	---	---	13.29	0.03	60.12
	06/10/93	---	---	---	---	---	14.30	0.03	59.11
	09/08/93	---	---	---	---	---	15.33	0.24	58.25
	12/21/93	---	---	---	---	---	14.73	0.12	58.76
	03/09/94	---	---	---	---	---	14.07	0.04	59.35
	06/13/94	---	---	---	---	---	14.90	0.23	58.67

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
B-1	05/09/89	16,000	2,300	260	81	740	12.58	0.00	59.19
	08/09/89	12,000	2,600	340	100	870	14.09	0.00	57.68
71.77	11/09/89	17,000	340	140	110	760	14.06	0.00	57.71
	02/08/90	5,500	70	19	17	150	12.65	0.00	59.12
	05/10/90	18,000	770	110	73	600	13.62	0.00	58.15
	08/09/90	82,000	750	66	95	980	13.87	0.00	57.90
	11/13/90	43,000	1,300	120	74	760	14.38	0.00	57.39
	03/27/91	18,000	580	92	94	770	---	---	---
	04/05/91	---	---	---	---	---	11.73	0.00	60.04
	06/19/91	21,000	910	56	96	810	13.56	0.00	58.21
	08/21/91	50,000	2,400	610	300	1,800	13.90	0.00	57.87
	11/08/91	540,000	3,600	1,500	1,900	5,900	14.05	0.00	57.72
	02/13/92	20,000	500	100	150	920	12.68	0.00	59.09
	05/01/92	27,000	2,800	200	310	1,900	12.92	Sheen	58.85
72.30	11/18/92	300	9.7	3.4	2.3	21	14.30	0.00	58.00
	03/19/93	130	23	0.9	<0.5	5.6	12.28	0.00	60.02
	06/10/93	170	21	1.1	0.8	6.6	13.04	0.00	59.26
	09/08/93	---	---	---	---	---	13.88	0.05	58.46
	12/21/93	<50	6.7	0.5	<0.5	1.2	13.53	0.00	58.77
	03/09/94	1,300	520	8.8	2.4	53	12.65	0.00	59.65
	06/13/94	69	10	0.9	<0.5	2.3	13.18	0.00	59.12
B-2	05/09/89	170,000	30,000	8,400	2,300	12,000	14.58	0.00	59.93
	08/09/89	60,000	29,000	8,700	2,400	12,000	16.06	0.00	58.45
74.51	11/09/89	110,000	32,000	5,500	2,800	12,000	16.95	0.00	57.56
	02/08/90	67,000	28,000	5,900	2,300	11,000	15.56	0.00	58.95
	05/10/90	69,000	24,000	4,800	2,000	11,000	15.94	0.00	58.57
	08/09/90	100,000	33,000	4,000	2,100	12,000	15.97	0.00	58.54
	11/13/90	110,000	33,000	4,300	2,900	13,000	16.70	0.00	57.81
	03/27/91	160,000	26,000	3,200	2,600	15,000	---	---	---
	04/05/91	---	---	---	---	---	14.20	0.00	60.31
	06/19/91	100,000	22,000	2,500	2,000	11,000	15.83	0.00	58.68
	08/21/91	80,000	28,000	2,800	2,400	12,000	16.31	0.00	58.20
	11/08/91	94,000	29,000	1,900	2,200	11,000	16.60	0.00	57.91
	02/13/92	280,000	34,000	2,500	4,600	23,000	15.93	0.00	58.58
	05/01/92	29,000	1,700	300	1,100	4,300	14.94	Sheen	59.57
74.52	11/18/92	26,000	11,000	170	870	950	16.71	0.00	57.81
	03/19/93	110,000	28,000	1,200	2,200	12,000	14.06	0.00	60.46
	06/10/93	140,000	15,000	930	1,900	8,800	14.88	0.00	59.64
	09/08/93	---	---	---	---	---	16.03	0.04	58.52
	12/21/93	980,000	21,000	30,000	9,100	71,000	15.61	0.00	58.91
	03/09/94	110,000	23,000	920	1,300	7,800	14.53	Sheen	59.99
	06/13/94	100,000	22,000	970	1,400	11,000	15.44	0.00	59.08

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
B-3	05/09/89	70,000	12,000	9,500	400	8,900	14.02	0.00	60.01
	08/09/89	---	---	---	---	---	15.38	0.00	58.74
74.12	11/09/89	---	---	---	---	---	15.55	0.05	58.61
	02/08/90	---	---	---	---	---	14.68	<0.01	59.44
	05/10/90	---	---	---	---	---	15.15	0.02	58.99
	08/09/90	---	---	---	---	---	15.27	<0.01	58.85
	11/13/90	---	---	---	---	---	16.04	0.06	58.13
	04/05/91	---	---	---	---	---	13.30	<0.01	60.82
	06/19/91	260,000	20,000	9,000	2,200	16,000	15.16	0.00	58.96
	08/21/91	70,000	28,000	11,000	1,800	11,000	15.61	0.00	58.51
	11/08/91	150,000	29,000	9,700	2,200	13,000	15.77	0.00	58.35
	02/13/92	100,000	27,000	9,906	2,000	11,000	14.88	0.00	59.24
	05/01/92	---	---	---	---	---	14.20	0.01	59.93
74.13	11/18/92	---	---	---	---	---	15.68	0.03	58.47
	03/19/93	---	---	---	---	---	13.75	1.08	61.24
	06/10/93	---	---	---	---	---	14.79	0.87	60.04
	09/08/93	---	---	---	---	---	15.38	0.08	58.81
	12/21/93	1,100,000	18,000	29,000	8,900	59,000	14.74	0.00	59.39
	03/09/94	130,000	11,000	20,000	1,700	15,000	13.53	0.00	60.60
	06/13/94	120,000	9,000	12,000	2,300	19,000	14.62	0.00	59.51
B-4	05/09/89	3,600	840	34	120	200	14.93	0.00	61.50
	08/09/89	<500	4,200	130	370	260	16.65	0.00	59.78
76.43	11/09/89	5,000	4,200	83	400	250	---	---	---
	02/08/90	14,000	6,000	70	530	300	16.99	0.00	59.44
	05/10/90	12,000	5,400	130	460	320	16.05	0.00	60.38
	08/09/90	16,000	7,400	120	530	350	16.49	0.00	59.94
	11/13/90	21,000	7,000	100	550	320	16.64	0.00	59.79
	03/27/91	17,000	8,500	120	500	300	17.42	0.00	59.01
	04/05/91	14,000	7,700	75	610	210	14.66	0.00	61.77
	06/19/91	16,000	7,800	110	550	340	16.48	0.00	59.95
	08/21/91	18,000	11,000	110	450	340	17.00	0.00	59.43
	11/08/91	18,000	6,800	98	500	620	17.38	0.00	59.05
	02/13/92	15,000	9,100	86	570	350	16.42	0.00	60.01
	05/01/92	36,000	16,000	180	990	690	15.50	0.00	60.93
	03/19/93	26,000	15,000	150	900	790	14.11	0.00	62.32
	06/10/93	35,000	14,000	180	940	590	15.44	0.00	60.99
	09/08/93	34,000	15,000	170	1,100	870	16.65	0.00	59.78
	12/21/93	30,000	12,000	74	610	340	16.45	0.00	59.98
	03/09/94	37,000	15,000	140	1,000	580	14.88	0.00	61.55
	06/13/94	36,000	13,000	150	700	250	16.04	0.00	60.39
B-6	05/09/89	26,000	120	110	250	1,300	12.11	0.00	60.55
	08/09/89	19,000	470	150	440	1,400	14.72	0.00	57.94
72.66	11/09/89	13,000	70	36	36	440	13.85	0.00	58.81
	02/08/90	2,900	16	5	10	58	7.73	0.00	64.93
	05/10/90	---	---	---	---	---	---	---	---
	08/09/90	14,000	55	3	130	500	14.51	0.00	58.15
	11/13/90	---	---	---	---	---	14.86	0.00	57.80
	04/05/91	---	---	---	---	---	10.43	0.00	62.23
	06/19/91	Abandoned	---						

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
B-7	05/09/89	210,000	13,000	19,000	2,000	20,000	14.73	0.00	60.67
	08/09/89	672,000	8,700	17,000	2,700	30,000	16.36	0.00	59.04
75.40	11/09/89	150,000	7,000	12,000	1,800	16,000	16.64	0.00	58.76
	02/08/90	41,000	2,500	6,900	1,100	11,000	15.69	0.00	59.71
	05/10/90	---	---	---	---	---	---	---	---
	08/09/90	50,000	1,100	3,900	640	7,200	16.31	0.00	59.09
	11/13/90	---	---	---	---	---	17.09	0.00	58.31
	04/05/91	---	---	---	---	---	14.36	0.00	61.04
	06/19/91	Abandoned							
E	11/18/92	280	2.7	2.4	3.0	12	12.20	0.00	57.87
70.07	03/19/93	<50	<0.5	<0.5	<0.5	<1.5	9.97	0.00	60.10
	06/10/93	<50	<0.5	<0.5	<0.5	<1.5	10.98	0.00	59.09
	09/08/93	---	---	---	---	---	11.80	0.03	58.29
	12/21/93	<50	<0.5	<0.5	<0.5	<0.5	11.25	0.00	58.82
	03/09/94	<50	<0.5	0.7	<0.5	0.7	10.67	0.00	59.40
	06/13/94	<50	<0.5	<0.5	<0.5	<0.7	11.40	0.00	58.67
EA-1	05/09/89	<500	<0.5	<0.5	<0.5	<0.5	14.56	0.00	59.38
	08/09/89	<500	<0.5	<0.5	<0.5	<0.5	16.09	0.00	57.85
73.94	11/09/89	<500	<0.5	<0.5	<0.5	<0.5	15.84	0.00	58.10
	02/08/90	<50	<0.3	<0.3<	<0.3	<0.6	15.05	0.00	58.89
	05/10/90	<50	1	0.3	<0.3	<0.6	15.65	0.00	58.29
	08/09/90	<50	<0.3	<0.3	<0.3	<0.6	15.67	0.00	58.27
	11/13/90	<50	<0.4	<0.3<	<0.3	<0.4	16.32	0.00	57.62
	03/27/91	<50	0.7	0.5	<0.5	<0.5	---	---	---
	04/05/91	---	---	---	---	---	14.03	0.00	59.91
	06/19/91	<50	<0.5	<0.5	<0.5	<0.5	15.56	0.00	58.38
	08/21/91	<50	<0.4	<0.3	<0.3	<0.4	15.99	0.00	57.95
	11/08/91	<50	<0.5	<0.5	<0.5	<0.5	16.13	0.00	57.81
	02/13/92	<50	<0.5	<0.5	<0.5	<0.5	15.10	0.00	58.84
	05/01/92	<50	2.7	<0.5	<0.5	<0.5	18.80	0.00	55.14
71.85	11/18/92	<10	<0.3	<0.3	<0.3	<0.5	15.97	0.00	55.88
	03/19/93	<50	<0.5	<0.5	<0.5	<1.5	13.66	0.00	58.19
	06/10/93	<50	<0.5	<0.5	<0.5	<1.5	14.71	0.00	57.14
	09/08/93	---	---	---	---	---	15.58	0.08	56.33
	12/21/93	<50	<0.5	<0.5	<0.5	<0.5	15.02	0.00	56.83
	03/09/94	<50	<0.5	1.0	<0.5	<0.5	14.38	0.00	57.47
	06/13/94	<50	<0.5	<0.5	<0.5	<0.5	15.14	0.00	56.71

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
EA-2	05/09/89	760	<0.5	<0.5	1.1	<0.5	15.95	0.00	59.29
	08/09/89	<500	<0.5	<0.5	<0.5	<0.5	17.45	0.00	57.79
75.24	11/09/89	<500	<0.5	1	<0.5	<0.5	17.41	0.00	57.83
	02/08/90	190	<0.3	<0.3	<0.3	<0.6	16.57	0.00	58.67
	05/10/90	<50	<0.3	<0.3	<0.3	<0.6	17.12	0.00	58.12
	08/09/90	120	<0.3	<0.3	<0.3	<0.6	17.20	0.00	58.04
	11/13/90	160	<0.4	1.0	<0.3	<0.4	17.88	0.00	57.36
	03/27/91	110	<0.5	<0.5	<0.5	<0.5	---	---	---
	04/05/91	---	---	---	---	---	15.54	0.00	59.70
	06/19/91	<50	<0.5	<0.5	<0.5	<0.5	17.07	0.00	58.17
	08/21/91	70	0.8	1.4	<0.3	<0.4	17.46	0.00	57.78
	11/08/91	<50	<0.5	0.7	<0.5	<0.5	17.58	0.00	57.66
	02/13/92	<50	<0.5	<0.5	<0.5	<0.5	16.69	0.00	58.55
	05/01/92	340	<0.5	2.6	0.7	<0.5	16.16	0.00	59.08
76.24	11/18/92	450	<0.5	3.3	<0.5	0.8	17.61	0.00	58.63
	03/19/93	450	<0.5	2.3	0.6	<1.5	15.00	0.00	61.24
	06/10/93	250	<0.5	1.3	<0.5	<1.5	16.08	0.00	60.16
	09/08/93	<50	<0.5	<0.5	<0.5	<1.5	17.07	0.00	59.17
	12/21/93	170	<0.5	1.3	<0.5	<0.5	16.60	0.00	59.64
	03/09/94	200	1.8	1.4	<0.5	<0.5	15.83	0.00	60.41
	06/13/94	<50	<0.5	<0.5	<0.5	<0.5	16.57	0.00	59.67
F	05/09/89	<500	<0.5	<0.5	0.6	1.0	18.70	0.00	53.31
	08/09/89	---	---	---	---	---	19.03	0.00	52.98
72.01	11/09/89	---	---	---	---	---	19.02	0.00	52.99
	02/08/90	<50	0.4	<0.3	0.3	<0.6	18.70	0.00	53.31
	05/10/90	---	---	---	---	---	18.98	0.00	53.03
	08/09/90	---	---	---	---	---	18.95	0.00	53.06
	11/13/90	---	---	---	---	---	19.10	0.00	52.91
	03/27/91	64	<0.5	<0.5	<0.5	1	---	---	---
	06/19/91	---	---	---	---	---	18.95	0.00	53.06
	08/21/91	---	---	---	---	---	>19.94	0.00	<52.07
	11/08/91	---	---	---	---	---	>19.94	0.00	<52.07
	02/13/92	<50	<0.5	<0.5	<0.5	<0.5	18.60	0.00	53.41
	05/01/92	---	---	---	---	---	Dry	---	---
71.72	11/18/92	<50	<0.5	<0.5	<0.5	<0.5	14.85	0.00	56.87
	03/19/93	<50	<0.5	<0.5	<0.5	<1.5	14.25	0.00	57.47
	06/10/93	<50	<0.5	<0.5	<0.5	<1.5	13.92	0.00	57.80
	09/08/93	---	---	---	---	---	14.80	0.04	56.95
	12/21/93	<50	<0.5	<0.5	<0.5	<0.5	13.31	0.00	58.41
	03/09/94	<50	<0.5	<0.5	<0.5	<0.5	12.99	0.00	58.73
	06/13/94	<50	<0.5	<0.5	<0.5	<0.5	14.25	0.00	57.47

TABLE 1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS AND MONITORING DATA
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID/ Elevation	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
TBLB	05/09/89	<500	<0.5	<0.5	<0.5	<0.5	---	---	---
	08/09/89	<500	<0.5	<0.5	<0.5	<0.5	---	---	---
	11/09/89	<500	<0.5	<0.5	<0.5	<0.5	---	---	---
	02/08/90	<50	<0.3	<0.3	<0.3	<0.6	---	---	---
	05/10/90	<50	<0.3	<0.3	<0.3	<0.6	---	---	---
	08/09/90	<50	<0.3	<0.3	<0.3	<0.6	---	---	---
	11/13/90	<50	<0.4	<0.3	<0.3	<0.4	---	---	---
	03/27/91	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	06/19/91	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	08/21/91	<50	<0.4	<0.3	<0.3	<0.4	---	---	---
	11/08/91	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	02/13/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	05/01/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	11/18/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	03/19/93	<50	<0.5	<0.5	<0.5	<1.5	---	---	---
	06/10/93	<50	<0.5	<0.5	<0.5	<1.5	---	---	---
	09/08/93	<50	<0.5	<0.5	<0.5	<1.5	---	---	---
	12/21/93	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	03/09/94	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	06/13/94	<50	<0.5	<0.5	<0.5	<0.5	---	---	---

TPH-G =Total petroleum hydrocarbons-as-gasoline
DTW =Depth to groundwater
SPT =Separate-phase hydrocarbon thickness
WTE =Water-table elevation
TB-LB =Trip blank, lab blank
--- =Not applicable, not sampled, not measured

Data from May 9, 1989, through February 13, 1992, taken from *First Quarter 1992 Groundwater Monitoring Report*, dated February 28, 1992 (Weiss Associates).
All elevations are given as feet above mean sea level.
Concentrations shown in parts per billion.

TABLE 2
SEPARATE-PHASE HYDROCARBONS BAILED
MONITORING WELLS B AND B-3
Chevron Service Station No. 9-1026
3701 Broadway, Oakland, California

Well ID	Date	Amount Product Bailed (gallons)	Total Product Bailed (gallons)
B	06/22/93	0.66	0.66
	06/29/93	0.25	0.91
	07/09/93	0.25	1.16
	07/15/93	0.25	1.41
	07/20/93	0.50	1.91
	07/27/93	0.50	2.41
	08/06/93	0.01	2.42
	08/10/93	0.08	2.50
	08/16/83	0.22	2.72
	08/25/93	0.25	2.97
	08/31/93	0.03	3.00
	09/10/93	0.01	3.01
	09/16/93	0.15	3.16
B-3	06/22/93	0.33	0.33
	06/29/93	0.25	0.58
	07/09/93	0.25	0.83
	07/15/93	0.25	1.08
	07/20/93	0.50	1.58
	07/27/93	0.11	1.69
	08/06/93	0.01	1.70
	08/10/93	0.01	1.71
	08/16/93	0.01	1.72
	08/25/93	0.02	1.74
	08/31/93	0.01	1.75
	09/10/93	0.01	1.76
	09/16/93	0.01	1.77

APPENDIX C

BORING LOGS

Drilling Log

GROUNDWATER TECHNOLOGY

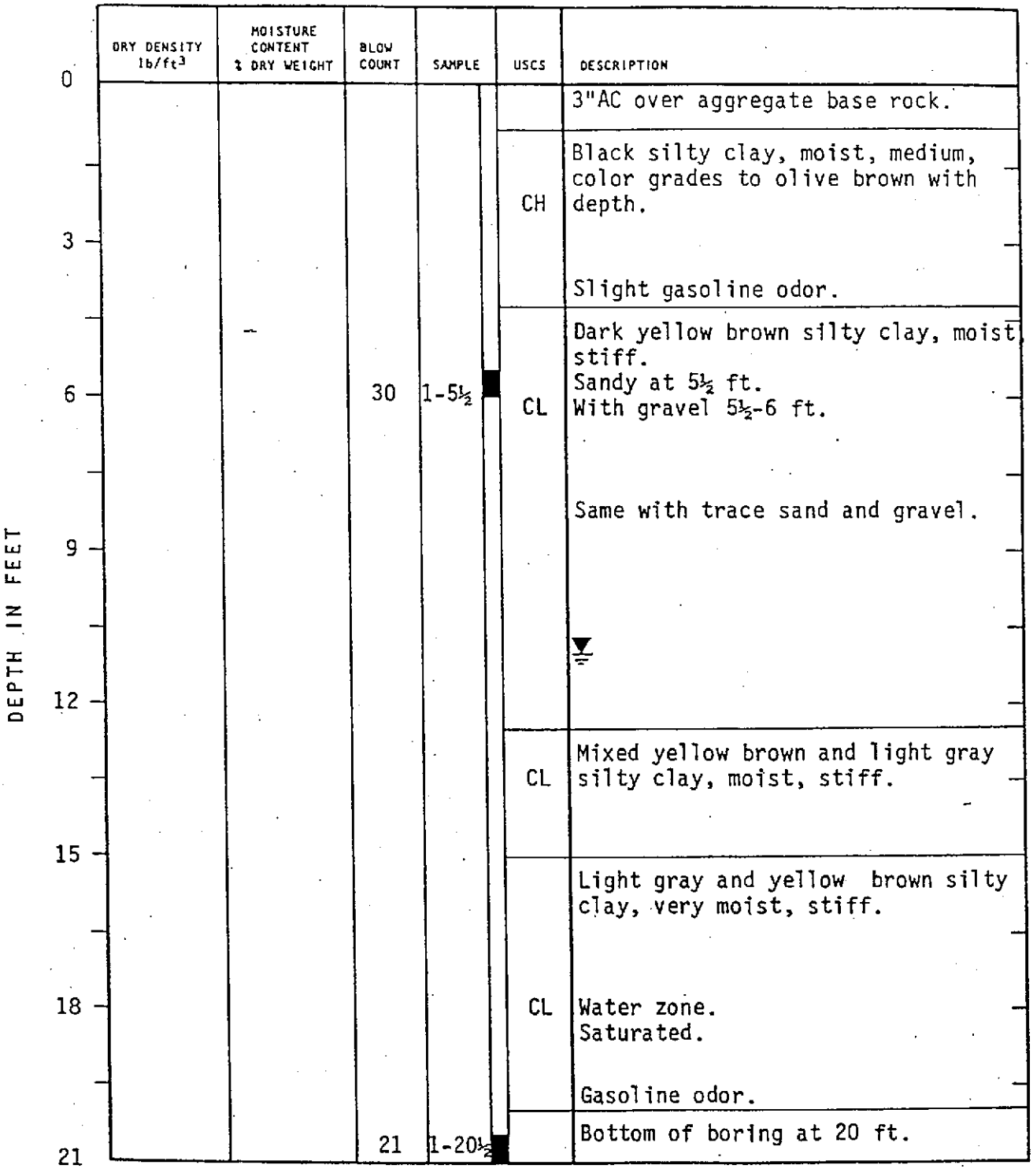
Monitoring Well B-1

Page 1 missing

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.

Location Oakland, California Project No. 02320 2782 Date drilled 10/28/92

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24					CL	(thin gravel interbed at 24.5 to 25 feet)
26			25 15 25 30			Light brown CLAY (saturated, firm, trace black organic clasts)
28						Work area readings with PID to 12 ppm, respirators removed. Light brown silty, sandy CLAY (saturated, firm)
30			30 25 50 54		CL	
32						
34						
36			35		SM	Brown silty fine sand (saturated)
38						End of boring. Constructed monitoring well.
40						
42						
44						
46						
48						
50						
52						
54						
56						

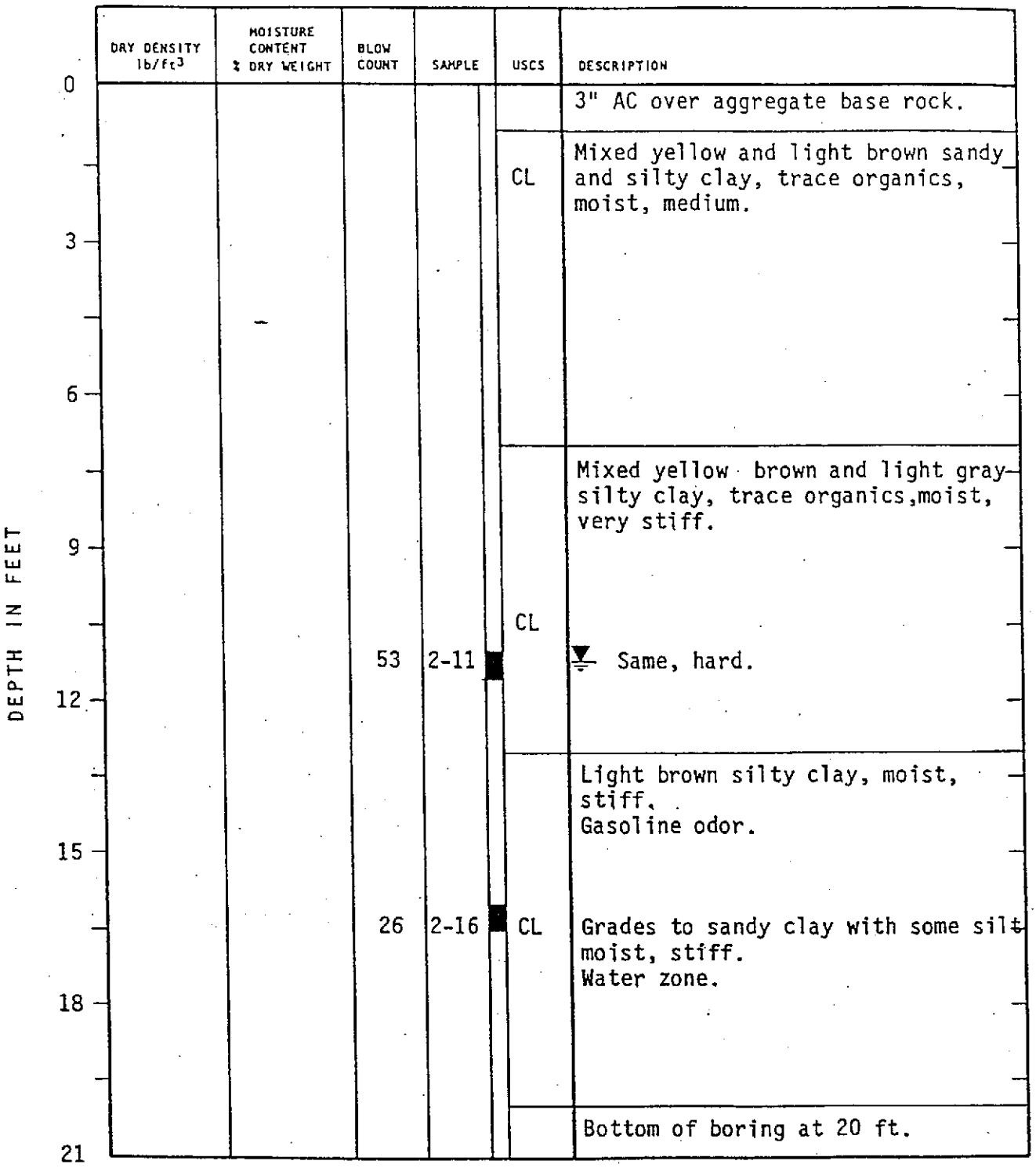


J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

IT/CANDIA'S CHEVRON
OAKLAND, CALIFORNIA

LOG OF BORING NO. B-1

PLATE 2

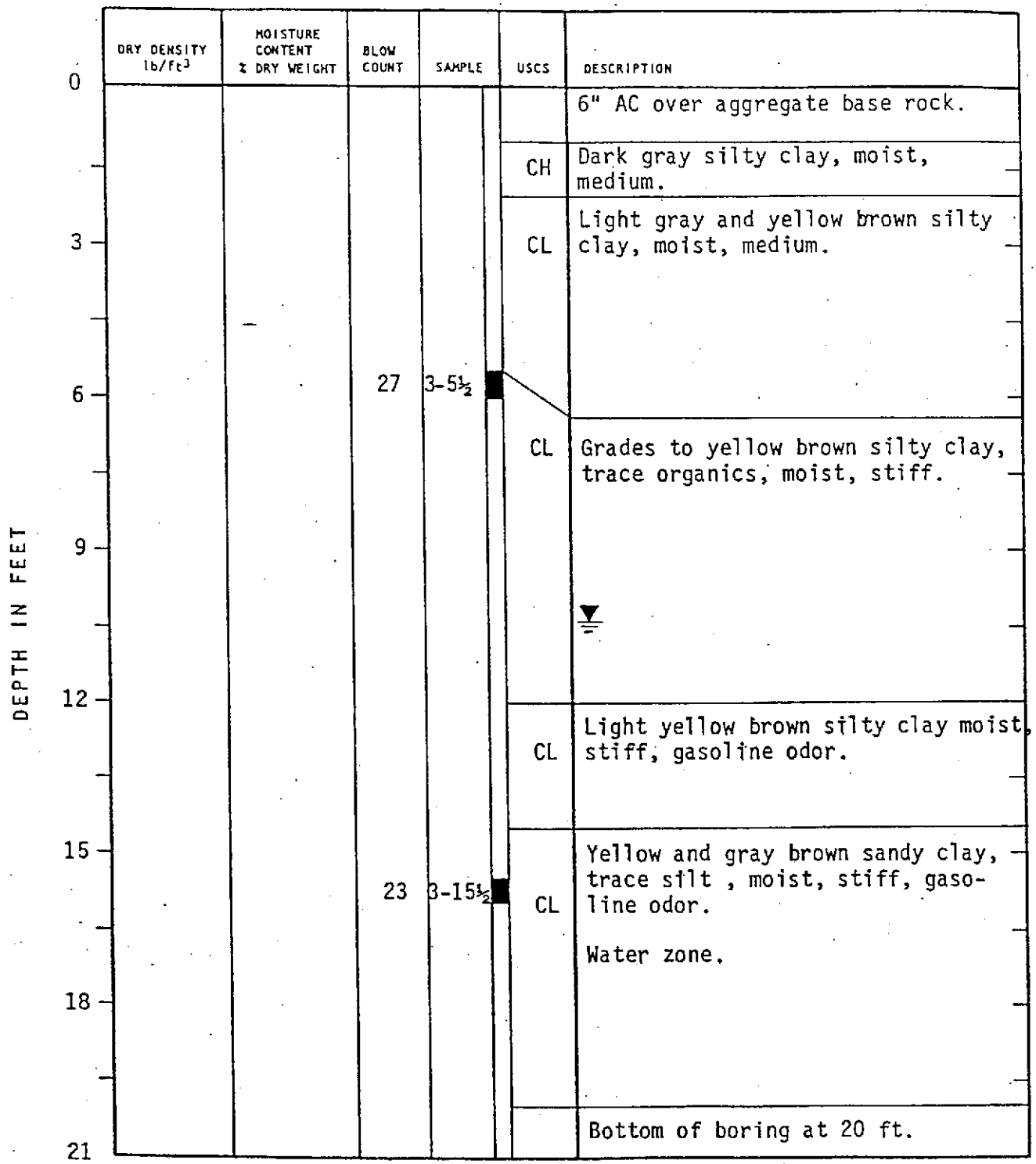


J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

IT/CANDIA'S CHEVRON
OAKLAND, CALIFORNIA

LOG OF BORING NO. B-2

PLATE 3

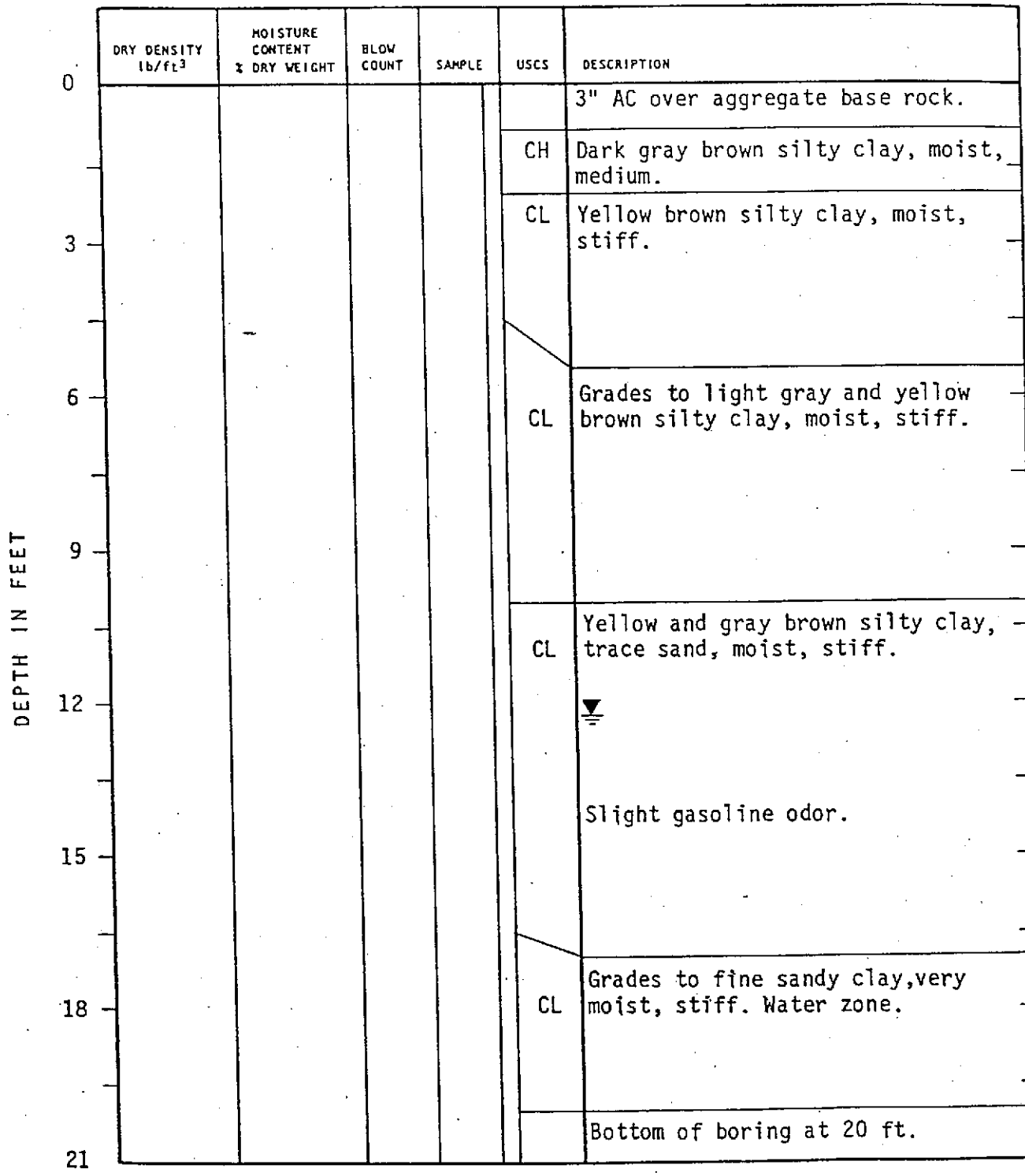


J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

IT/CANDIA'S CHEVRON
OAKLAND, CALIFORNIA

LOG OF BORING NO. B-3

PLATE 4



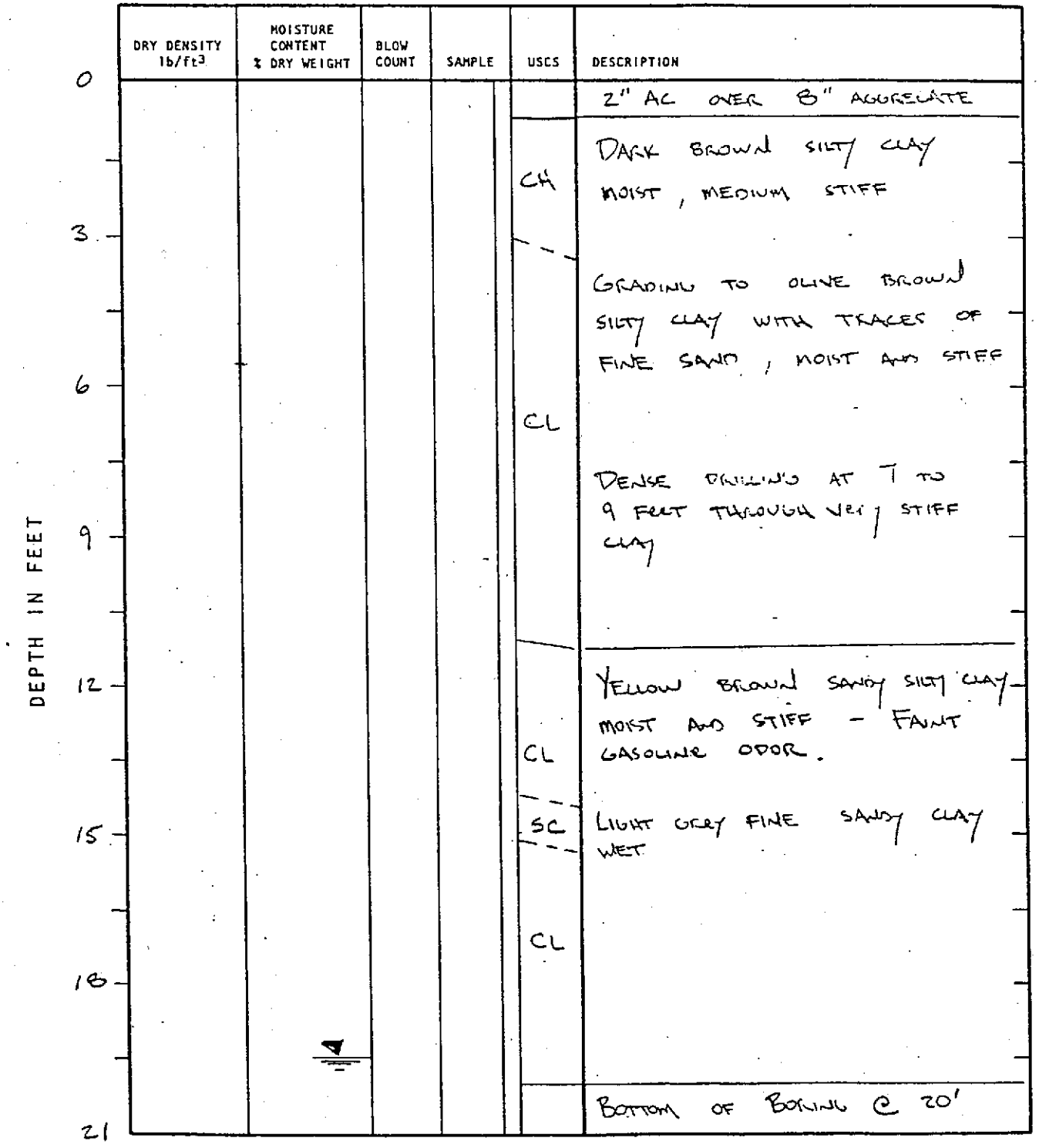
J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

IT/CANDIA'S CHEVRON
OAKLAND, CALIFORNIA

LOG OF BORING NO. B-4

PLATE 5

Appendix B - rough copy



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

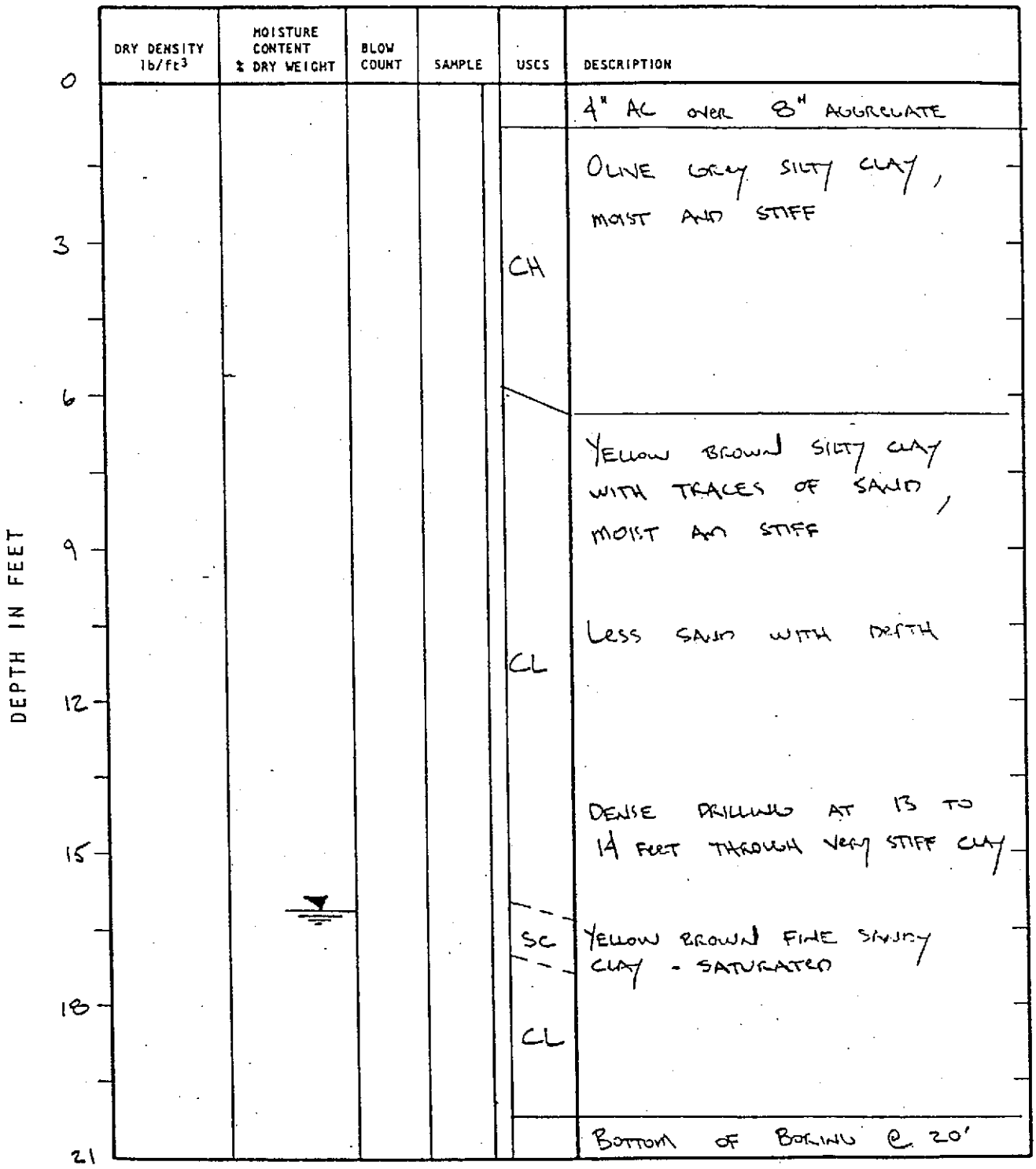
PREPARED BY: DATE:

CHECKED BY: DATE:

LOG OF BORING NO. B-A

PROJECT NO. R-1192-2

PLATE 2



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

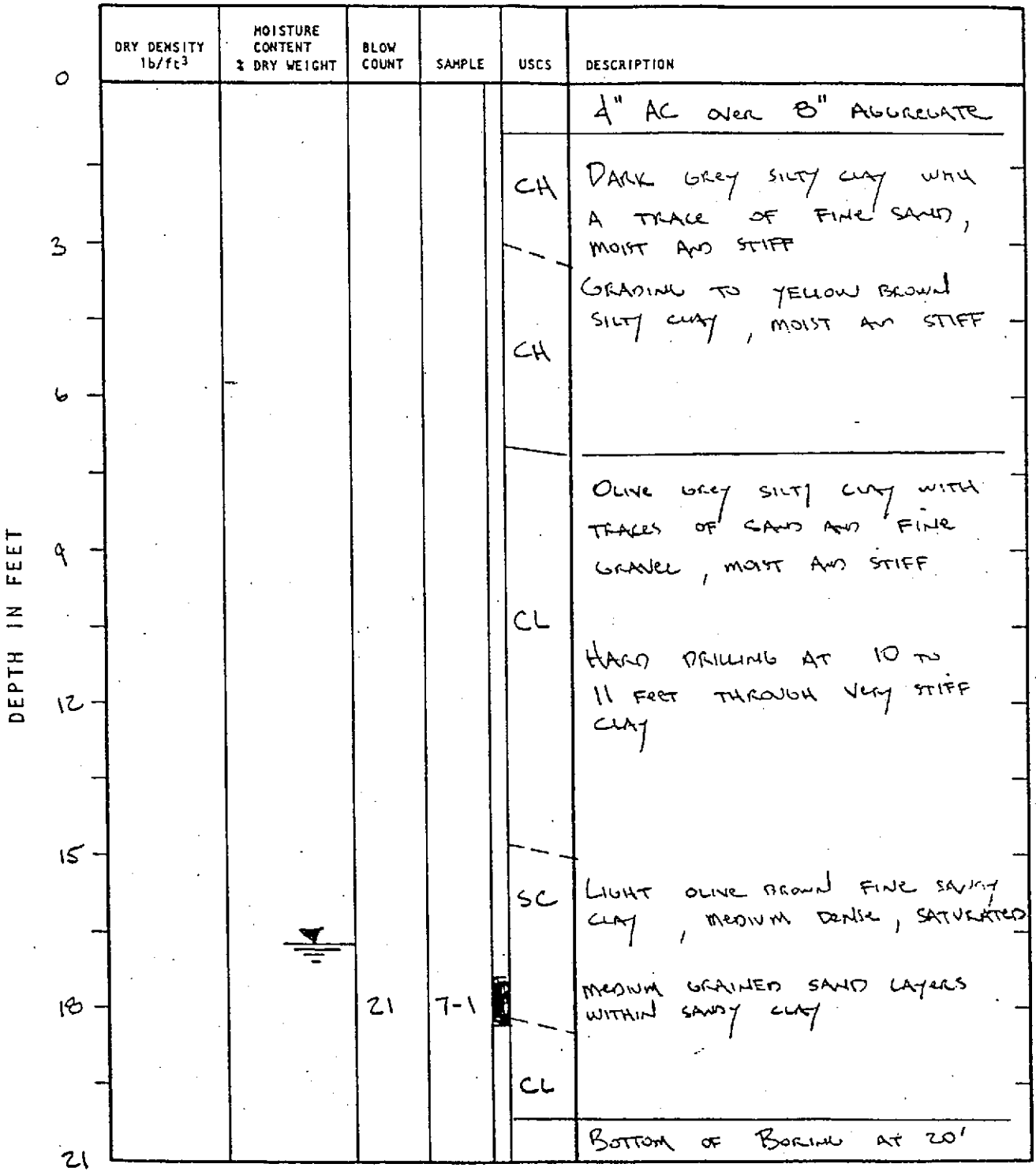
PREPARED BY: DATE:

CHECKED BY: DATE:

LOG OF BORING NO. B

PROJECT NO. B-1192-2

PLATE 3



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

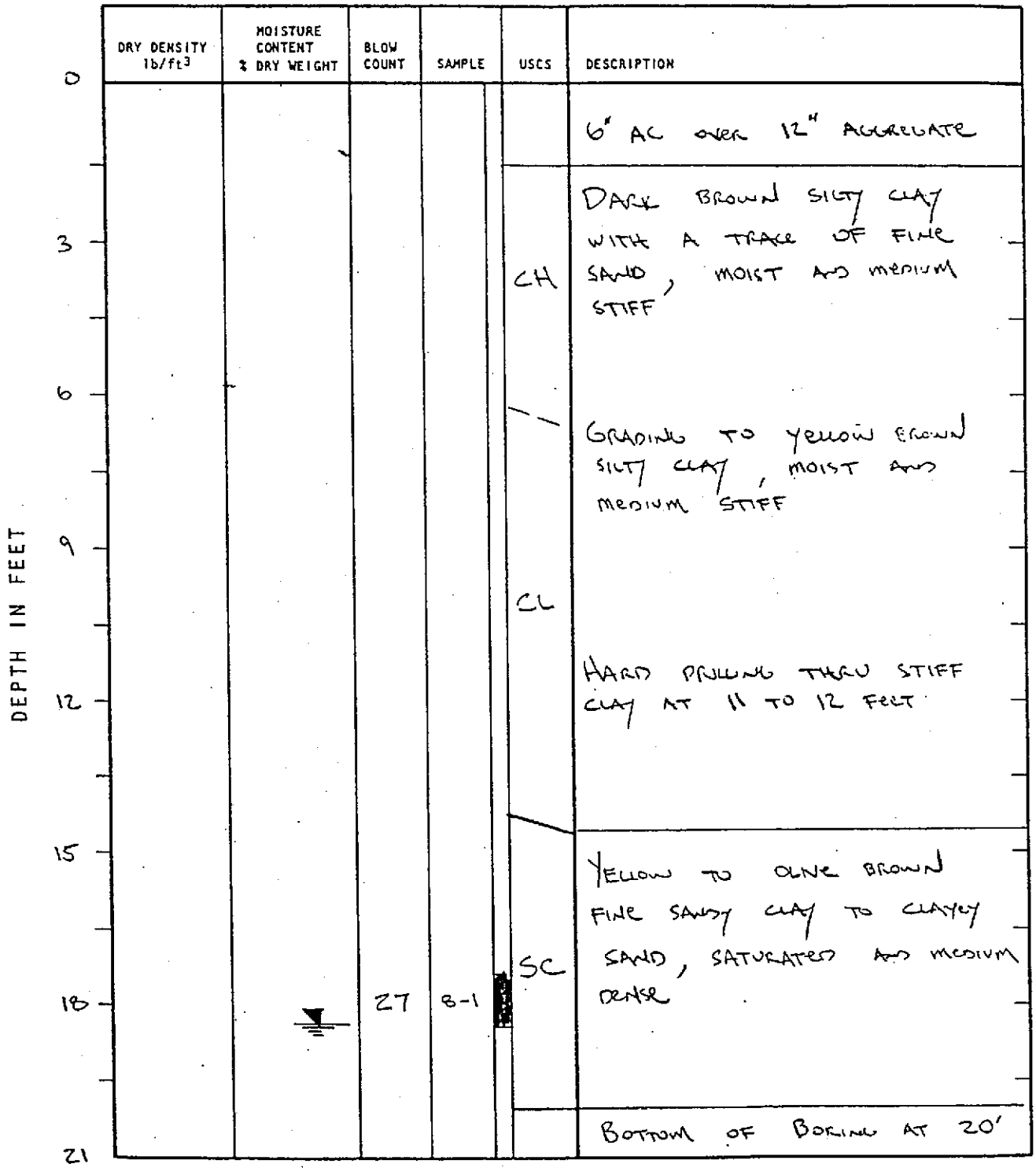
PREPARED BY: DATE:

CHECKED BY: DATE:

LOG OF BORING NO. 7C

PROJECT NO. 8-1192-2

PLATE A



J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

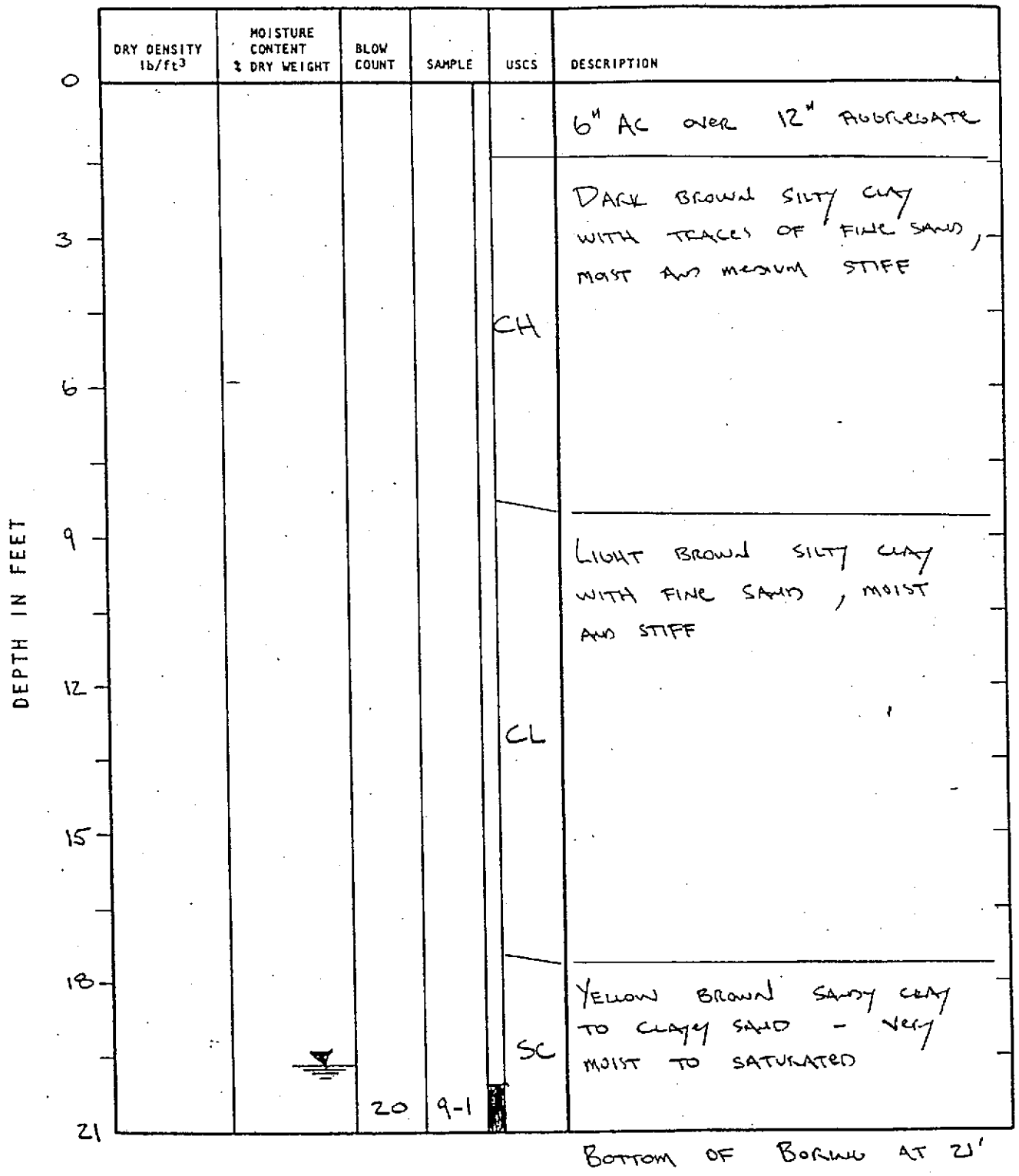
PREPARED BY: DATE:

CHECKED BY: DATE:

LOG OF BORING NO. B-E

PROJECT NO. B-1192-2

PLATE 5



J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING	LOG OF BORING NO. X F	PLATE
PREPARED BY: DATE:		
CHECKED BY: DATE:	PROJECT NO. B-1192-2	

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING EA 1

Coordinates: 122 15' 25" West — 37 49' 30" North

Elevation top of casing: 37.36 ft. msl

Casing below surface: 0.59 ft.

JOB #	CLIENT	LOCATION
CHV-82U	Chevron USA	Oakland, California

DRILLING AND SAMPLING METHODS by HEW DRILLING
10" Hollow Stem Auger; 2" Split Spoon Sampler
Ca. St. Lic. C57384167

				DRILLING START	DRILLING FINISH
WATER LEVEL	15.34				
TIME	8:35			TIME 9:30	TIME 15:00
DATE	4/12/88			DATE 4/11/88	DATE 4/11/88
REFERENCE	T of C				

SURFACE CONDITIONS: Unpaved, Dirt

DESCRIPTION by P. Kahn

Inches Driven / Inches Recover	Blows/6in sampler	OVA Reading	WELL DETAIL	DEPTH In feet	GRAPHIC LOG
				0	
				1	
				2	
				3	
	6			4	CL
18 / 18	12 / 20	5.5		5	
				6	
				7	MH
				8	
	11			9	
18 / 18	11 / 20	10.5		10	
				11	MH
				12	
				13	
	7			14	
18 / 18	6 / 9	15.5		15 ▼	
				16	
				17	ML
				18	
	5			19	
	9 / 13			20	

Fill; rocks, sand, concrete, black clayey soil, organic smell, moist - no fuel odor.

Silty Clay (CL), brown, no odor, moist.
PID = 0 ppm

Clayey Silt (MH), brown with black mottling.

Clayey Silt (MH), light brown, moist with water in fissures, no odor.
PID = 0 ppm

Silt (ML), gray with brown stains, moist, no odor.
PID = 0 ppm

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING EA 1

Coordinates:

Elevation top of casing:

Casing below surface:

JOB #	CLIENT	LOCATION
CHY-82U	Chevron USA	Oakland, Calif.

DRILLING AND SAMPLING METHODS

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME	TIME
DATE					
REFERENCE				DATE	DATE

SURFACE CONDITIONS

DESCRIPTION by P. Kahn

Inches Driven / Inches Recover	Blows/6in sampler	OVA Reading	WELL DETAIL	DEPTH In feet	GRAPHIC LOG	DESCRIPTION
18 / 18	9, 13	20.5		20, 21, 22, 23, 24, 25	MH	Clayey Silt (MH), brown, moist, with black and brown mottling, no odor. PID = 0 ppm
				26, 27, 28, 29, 30, 31	GM	Gravel (GM), with clay lenses, saturated, no odor.
				32, 33, 34, 35, 36, 37	SC	Sand (SC), some clay, coarse to medium sand, no odor.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING EA 2

Coordinates: 122 15' 25" West
37 49' 30" North

Elevation top of casing: 39.55 ft. msl

Casing below surface: 0.08 ft.

JOB #	CLIENT	LOCATION
CHV-82U	Chevron USA	Oakland, California

DRILLING AND SAMPLING METHODS by HEW DRILLING
10" Hollow Stem Auger; Ca. St. Lic. C57384167
2" Split Spoon Sampler

				DRILLING START	DRILLING FINISH
WATER LEVEL	15.34				
TIME	8:35			TIME 9:00	TIME 15:30
DATE	4/12/88				
REFERENCE	T of C			DATE 4/12/88	DATE 4/12/88

SURFACE CONDITIONS: Unpaved, Dirt

DESCRIPTION by P. Kahn

Inches Driven / Inches Recover	Blows/6in sampler	OVA Reading	WELL DETAIL	DEPTH In feet	GRAPHIC LOG	DESCRIPTION
				0	OL	Cement, black silty loam (soil), (OL).
				1		
				2		Gravel fill.
				3		
	6			4	ML	Sandy Clayey Silt (ML), brown, very coarse sand, lithic fragments, moist, no odor.
18 / 18	12 / 20	5.5		5		
				6		
				7	CL	Silty Clay (CL), brown with minor fine sand, dry, no odor.
				8		
	5			9		
18 / 15	15 / 20	10.5		10		
				11	ML	Sandy Silt (ML), brown, very minor clay, mottled with FeO (red), no odor. PID = 0 ppm
				12		
				13		
	7			14		
18 / 17	12 / 14	15.5		15		
					SM	Silty Sand (SM), grayish brown, extremely fine sand, mottled with FeO (red), no odor. PID = 0 ppm
				17		
				18		
	5			19		
18 / 15	16 / 22			20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING EA 2

Coordinates:

Elevation top of casing:

Casing below surface:

JOB #	CLIENT	LOCATION
CHY-82U	Chevron USA	Oakland, Calif.

DRILLING AND SAMPLING METHODS

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME	TIME
DATE					
REFERENCE				DATE	DATE

SURFACE CONDITIONS

DESCRIPTION by P. Kahn

Inches Driven / Inches Recover	Blows/6in sampler	OVA Reading	WELL DETAIL	DEPTH In feet	GRAPHIC LOG
	15	20.5		20	
	22			21	
				22	
				23	ML
				24	
				25	
				26	
				27	
				28	CL
				29	
				30	

Sandy Silt (ML), brown with red and bluish gray mottling, moderately moist, strong odor. PID = 0 ppm

Increasing clay content with depth.

Decreasing sand.

Silty Clay (CL), brown, very minor sand, moist, no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

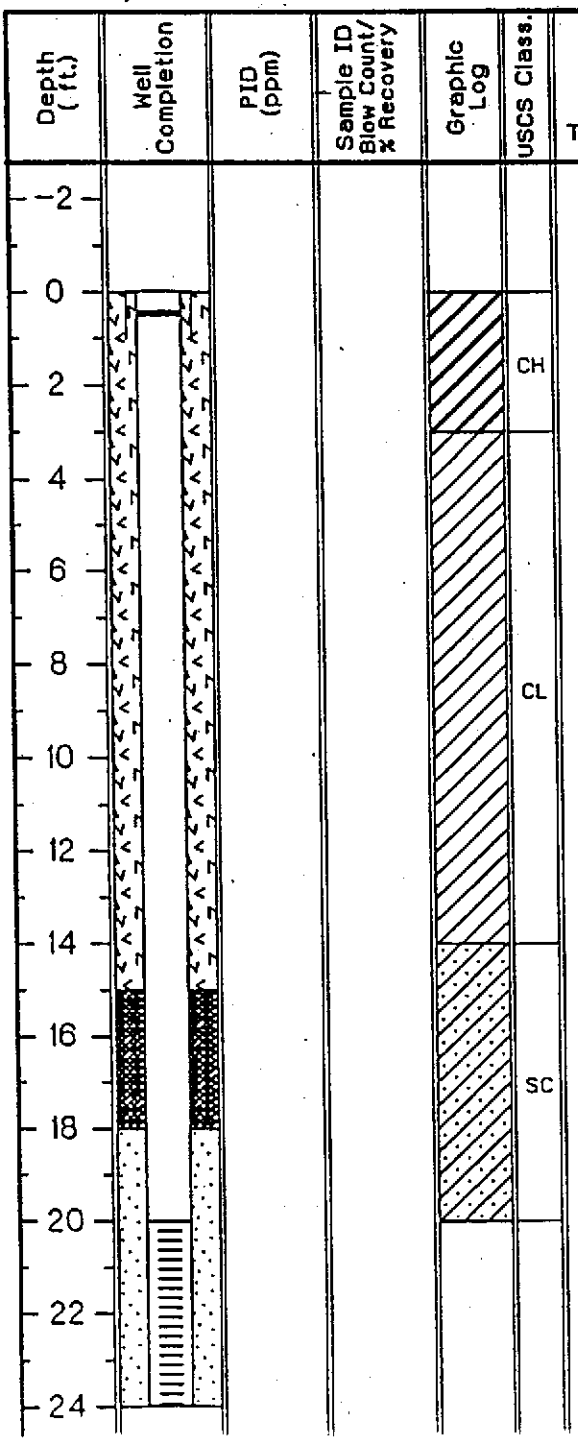
Monitoring Well **MW-E**

Project *CHV/3701 Broadway* Owner *Chevron U.S.A. Products Co.*
Location *Oakland, California* Project No. *02320 2782* Date drilled *10/14/92*
Surface Elev. *70.53 ft.* Total Hole Depth *35 ft.* Diameter *8.5 inches*
Top of Casing *70.07 ft.* Water Level Initial *NA* Static *12.2 ft.*
Screen: Dia *2 in.* Length *15 ft.* Type/Size *0.020 in.*
Casing: Dia *2 in.* Length *20 ft.* Type *SCH 40 PVC*
Filter Pack Material *Clementia #3 sand* Rig/Core Type *Mobile B-51*
Drilling Company *Kvilhaug Well Drilling* Method *Hollow Stem Auger* Permit # *92285*
Driller *Mike Crocker* Log By *Craig Robertson*
Checked By *David Kleesattel* License No. *RG# 5136* *David Kleesattel*

See Site Map For Boring Location

COMMENTS:

Orginal well was 20-feet deep. Lithology is from orginal boring by Kleinfelder & Associates, Groundwater Monitoring Well Installation Report, Candie's Chevron Station, Oakland, California April 6, 1982.



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

This well is a replacement for the original "E" well. The original well was abandoned by extracting the casing and reaming out the annulus. The boring was then extended to 35 feet and a monitoring well constructed as shown in the well completion diagram.

Dark brown silty CLAY (trace of fine sand, moist and medium stiff)

Grades yellow brown

Hard drilling through stiff clay at 11 to 12 feet

Yellow to olive brown fine sandy CLAY to clayey SAND (saturated and medium dense)

The extended portion of the soil boring was not logged.

GROUNDWATER TECHNOLOGY

Drilling Log

Monitoring Well **MW-E**

Project *CHV/3701 Broadway* Owner *Chevron U.S.A. Products Co.*

Location *Oakland, California* Project No. *02320 2782* Date drilled *10/14/92*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						
30						
32						
34						End of boring. Constructed monitoring well.
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						

Drilling Log

GROUNDWATER TECHNOLOGY

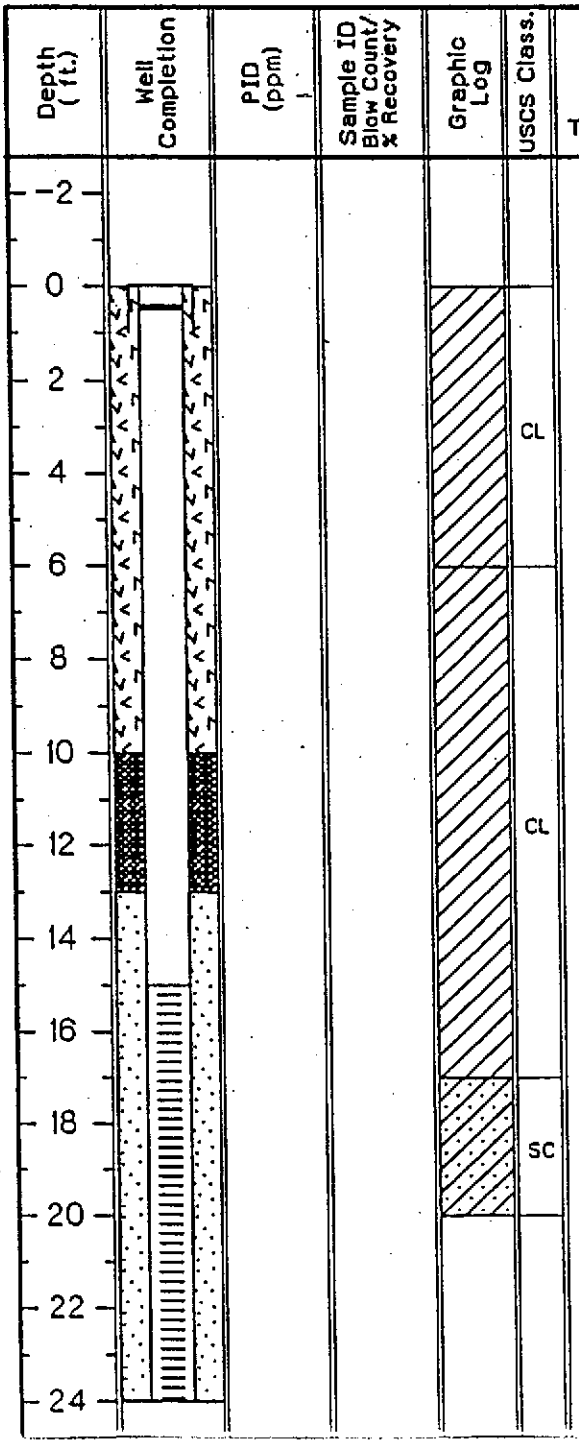
Monitoring Well MW-F

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.
Location Oakland, California Project No. 02320 2782 Date drilled 10/14/92
Surface Elev. 72.45 ft. Total Hole Depth 30 ft. Diameter 8.5 inches
Top of Casing 71.72 ft. Water Level Initial NA Static 14.85 ft.
Screen: Dia 2 in. Length 15 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 15 ft. Type SCH 40 PVC
Filter Pack Material Clementia #3 sand Rig/Core Type Mobile B-51
Drilling Company Kvilhaug Well Drilling Method Hollow Stem Auger Permit # 92285
Driller Mike Crocker Log By Craig Robertson
Checked By Dave Kleesattel License No. RG# 5136 Dave Kleesattel

See Site Map For Boring Location

COMMENTS:

Orginal well was 20 feet deep. Lithology is from orginal boring by Kleinfelder & Associates, Groundwater Monitoring Well Installation Report, Candie's Chevron Station, Oakland, California April 6, 1982.



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

This well is a replacement for the original well identified as MW-F on the site map. The original well was abandoned by extracting the casing and reaming out the annulus. The boring was then extended to 30 feet and a monitoring well constructed as shown in the well completion diagram.

Dark brown silty CLAY (trace of fine sand, moist and stiff)

Light brown silty CLAY (fine sand, moist and stiff)

Yellow brown sandy CLAY to clayey SAND (very moist to saturated)

The extended portion of the soil boring was not logged.

GROUNDWATER TECHNOLOGY

Drilling Log

Monitoring Well **MW-F**

Project *CHV/3701 Broadway* Owner *Chevron U.S.A. Products Co.*
Location *Oakland, California* Project No. *02320 2782* Date drilled *10/14/92*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						
30						End of soil boring. Constructed monitoring well.
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						

APPENDIX D

CONTINGENCY PLAN

APPENDIX D
CONTINGENCY PLAN

An upgradient, offsite source of hydrocarbons has impacted ground water at this site. This Contingency Plan will ensure that the hydrocarbon plume is monitored and provides adequate warning if compliance with the cleanup goals is not maintained for the site. Hydrocarbon analyses will be performed to ensure that cleanup goals are not exceeded at the downgradient boundary and compliance with cleanup goals is maintained.

Wells B, B-1, B-2, B-3 and B-4 (Table D-1) will serve as "guard points" to monitor hydrocarbon concentrations within the plume. Wells EA-1, EA-2, E and F will serve as "boundary wells" and will be used to confirm that the plume is not migrating. Ground water from wells B-1, B-2, B-3 and B-4 will be monitored semi-annually, during the spring and fall through 1996. Ground water from wells EA-1, EA-2, E and F will be monitored annually, during the spring seasonal high water levels through 1996. At the end of 1996, if cleanup goals continue to be maintained at the boundary wells, monitoring will cease in all wells.

If ground water monitoring indicates that certain trigger concentrations occur, this Contingency Plan will be implemented. These trigger concentrations and Contingency Plan responses are summarized in Table D-1. A "baseline" benzene concentration was also determined for each well based on trends over the last several years. A "trigger" concentration was determined to represent a significant concentration increase that may indicate non-compliance with the cleanup goal. When a trigger concentration occurs or when concentrations are increasing at a rate such that the trigger concentration might be met or exceeded before the next sampling event, the Contingency Plan will be implemented.

When triggered, this Contingency Plan calls for three responses:

1) The ACDEH will be notified;

2) Ground water monitoring will be performed in all of the site wells the next quarter; and

3) If the additional monitoring data indicate that the Chevron site is not the source of the hydrocarbons (e.g., if elevated concentrations are detected only in upgradient wells, or if a known offsite source is identified), Chevron will resume the Final Action Plan monitoring schedule.

   If the sampling data indicate that the Chevron site is the source of the hydrocarbons, quarterly monitoring will continue until an appropriate course of action, identified by Chevron and accepted by the ACDEH, is implemented.

Table D-1. Contingency Plan, Chevron Service Station #9-1026, 3701 Broadway, Oakland, California. All conditions are for benzene unless otherwise noted.

	Monitoring Well	Baseline Concentration (benzene in ppb)	Trigger Concentration (benzene in ppb)	Response to Trigger Concentration[1]
Boundary Wells	E	<1	2	1. Notify ACDEH
	F	<1	2	
	EA-1	<1	2	2. Sample all site wells in the next quarter
	EA-2	<1	2	
				3. Resume quarterly monitoring of all wells until an appropriate course of action is determined.
Guard Wells	B	3,000	5,000	
	B-1	500	1,000	
	B-2	30,000	50,000	
	B-3	20,000	30,000	
	B-4	10,000	25,000	

Notes:

[1] Response is implemented when the trigger concentration is met or exceeded, or when concentrations are increasing at a rate such that the trigger condition might be met or exceeded before the next sampling event.