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COMPREHENSIVE SITE EVALUATION AND PROPOSED FUTURE ACTION PLAN

at

Chevron Service Station 9-1153
3126 Fernside Boulevard
Alameda, California

prepared for

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

December 20, 1994

Weiss Associates

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prepared by

Weiss Associates
5500 Shellmound Street
Emeryville, CA 94608

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Staff Engineer

Eric W. Anderson
Project Geologist

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.

Eric M. Nichols December 20, 1994
Registered Civil Engineer
No. 42695

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SUMMARY

The subject site at 3126 Fernside Boulevard in Alameda, California is a former Chevron service station. In 1986, three ground water monitoring wells were installed to evaluate soil and ground water conditions at this site. Ground water samples obtained from these three wells contained TPH-G at up to 760 parts per billion (ppb). In 1992 and 1993, four additional wells were installed to further characterize plume and hydrogeologic conditions crossgradient and downgradient of the site.

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

- ***The ground water, human health and environmental impacts at this site are limited:*** Ground water impacts are not likely to extend significantly beyond downgradient monitoring well MW-7 because hydrocarbons in that well are more than an order of magnitude less than the hydrocarbon concentrations found in ground water from source area well C-1. A discussion of potential risks at this site found that there is less than a $1x10^{-6}$ lifetime cancer risk to site residents by inhalation of hydrocarbon vapors from the subsurface beneath and in the vicinity of the onsite house.

- ***All potential source areas will have been remediated:*** Five USTs, associated piping and dispenser islands, approximately 100 cubic yards of source area soil and most of the potential hydrocarbon contaminated soil beneath the residence has been removed from the site.

- ***The site has been remediated to the extent feasible:*** The extraction trench has removed and treated approximately 100,000 gallons of ground water in two and a half years, yet only 54 lbs of hydrocarbons have been recovered. The shallow ground water table reduces the viability of other remedial technologies such as SVE or bioventing. Therefore, no cost-effective technologies exist that would significantly accelerate cleanup of hydrocarbons in ground water or soil at this site.

Therefore, we submit that:

- The hydrocarbons remaining in the site subsurface do not present a significant threat to human health or to the quality of the surrounding aquifer; and

- All economically and technically feasible measures have been taken to reduce the contaminant plume.

We request that the Alameda County Department of Environmental Health (ACDEH) approve and implement a reduced sampling plan and, once the downgradient edge of the plume is fully defined, establish a non-attainment area encompassing the residual plume associated with the former Chevron station.

INTRODUCTION

At the request of Chevron U.S.A. (Chevron), Weiss Associates has prepared this site evaluation for former Chevron Service Station 9-1153, located at 3126 Fernside Boulevard, Alameda, California. 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 former Chevron service station site is located at the corner of Fernside Boulevard and Gibbons Drive, in a mixed commercial and residential area of Alameda, California (Appendix A). The site is bounded on the northwest by residential buildings, the northeast by Fernside Boulevard and on the south by Gibbons Drive. Residential and commercial buildings lie across Fernside Boulevard to the northeast, a former Phillips service station converted to an auto repair shop lies across Gibbons Drive and High Street to the southeast and a residential area is located across Gibbons Drive to the south of the site. The site is currently occupied by a single family residential dwelling.

The site is located on the eastern side of Alameda Island, approximately 400 ft from a tidal inlet that connects the Brooklyn Basin to the northeast with San Leandro Bay to the southwest. San Leandro Bay is part of the larger San Francisco Bay. Alameda Island is composed primarily of dune sands of the Merritt Formation which is up to 65 ft thick. The Merritt Formation is underlain by the Alameda Formation consisting of marine and continental deposits of gravel, sand, silt and clay. The local land

surface slopes gently toward the tidal inlet east of the site. The site elevation is approximately 8 ft above mean sea level (msl) and the topography is essentially flat.

SITE INVESTIGATIONS

1986 Station Demolition: Five underground storage tanks (USTs) were in use at the site for approximately 30 years prior to the end of service station operations in June 1986. The USTs were excavated and removed with an unspecified volume of soil when the station was demolished on June 4, 1986. None of the soil samples collected by Blaine Tech Services (BTS) of San Jose, California on June 4, 1986 contained total petroleum hydrocarbons as gasoline (TPH-G) or total oil and grease (TOG) above 1 and 11 parts per million (ppm), respectively. **No soil samples were collected from beneath the product lines or pump islands.** Although up to 1,400 ppm TPH-G were detected in stockpile soil samples, the stockpiles were aerated and re-sampled and analytic results showed TPH-G concentrations below detection limits. The aerated soil was used to backfill the UST pit.

1986 Monitoring Well Installation: EMCON Associates, Inc. (EMCON) of San Jose, California installed ground water monitoring wells C-1, C-2 and C-3 on August 18, 1986 (Appendix A). Strong product odors were noted in shallow soils from borings C-1 and C-2. No soil samples were analyzed for chemical compounds. Ground water samples collected from wells C-1, C-2 and C-3 on September 4, 1986 contained TPH-G at 15,000, 1,100 and 50 parts per billion (ppb), respectively. Benzene was detected in wells C-1, C-2 and C-3 at 760, 49 and 3.2 ppb, respectively. A summary of the analytic results for ground water are included in Appendix B.

1987 Soil Vapor Contaminant Assessment (SVCA): In July 1987, EA Engineering, Science, and Technology (EA) of Lafayette, California conducted a SVCA at the former service station site and prepared a risk assessment. Soil vapor samples were collected from approximately 3 ft below ground surface (bgs) from 8 onsite and 4 offsite locations. Benzene was detected in vapor points V1, V2, V3 and V4, in the southeast portion of the site, at 110, 1,900, 120 and 70 ppm, respectively. The highest soil vapor concentration, 1,900 ppm, was measured at vapor point V2, approximately 35 ft east of the

former UST pit excavation and 10 ft east of one of the former pump islands. A vapor sampling point location map is presented in Appendix A and summary tables of SVCA results are presented in Appendix B.

The discussion of risk prepared by EA concluded that no significant threat to human health or the environment was posed by the hydrocarbons in soil vapor and ground water at the site due to the moderate levels of hydrocarbons vapors in soil and site hydrogeological conditions. The assessment noted that hydrocarbon vapors did have a potential for odor and nuisance problems at the site but concentrations were below the lower flammable limit for gasoline. The risk assessment recommended either soil vapor venting or a vapor barrier over the more-contaminated site locations to mitigate nuisance odors if a residence was to be constructed over those locations. A more detailed discussion of this risk assesment is presented in Appendix E.

1987 Area Well Survey: In August 1987, Pacific Environmental Group, Inc. (PEG) of Santa Clara, California conducted a well survey and identified 47 wells within approximately 0.5 mile of the site. The majority of these wells were used for ground water monitoring or cathodic protection but some were used for irrigation. None of the wells were listed as municipal drinking water supply wells. A summary of the usage and depth of these wells is presented in Appendix B.

1989 House Construction and Destruction of Monitoring Well C-2: During construction of a residence on the site in early 1989, Chevron has indicated that the majority of the soil beneath the house was removed for installation of the foundation. Ground water monitoring well C-2 was apparently destroyed during construction activities prior to May 1989.

1989 Soil Vapor Contaminant Assessment (SVCA): EA conducted a second SVCA at the former Chevron site on May 4 and 10, 1989. Soil vapor samples were collected from between 2 and 4.5 ft bgs from 29 onsite and 3 offsite locations. As in the previous SVCA, the highest benzene concentrations were detected in the southeast portion of the site, in an area downgradient of the former storage tanks and pump islands and over 60 ft away from the residence. Up to 2,300 ppm benzene was detected in a

soil vapor sample in the southeast portion of the site. A site map of the soil vapor sampling points is presented in Appendix A and summary tables of SVCA analytic results are presented in Appendix B.

Based on the data from the 1989 SVCA, EA discussed the potential risk to the inhabitants of the residence from residual hydrocarbon vapors in soil beneath the residence. EA found that concentrations of 10 ppm benzene which were found in soil vapor near the front porch of the residence would result in a maximum lifetime cancer risk of less than 1×10^{-6}. [1] Benzene was not detected in any samples from directly beneath the house at a detection limit of 1 ppm.

1989 Soil and Ground Water Investigation: In July 1989, EA collected soil samples from between 0.5 and 9.5 ft bgs in five shallow onsite borings and three shallow offsite borings (SB1 through SB8) (Appendix A). The highest concentrations of TPH-G and benzene, toluene, ethylbenzene and xylenes (BTEX) were found in the areas east of the UST complex and pump islands. Hydrocarbons were not detected in soil samples from the northwestern corner of the site. Low hydrocarbon concentrations were found in soil samples from offsite soil borings SB-6, SB-7 and SB-8. Grab water samples collected from the soil borings and analyzed for TPH-G and BTEX contained up to 52,000 ppb benzene (onsite soil boring SB-1). Soil and ground water results are summarized in the Results of Soil and Groundwater Concentrations in the Vicinity of Former Chevron SS 9-1153, 3126 Fernside Boulevard, Alameda, California, June 1989 table in Appendix B.

1990 Ground Water Extraction Well Installation: On December 6 and 7, 1990, EA installed ground water extraction well RW-1 and an extraction/recovery trench in the area east of the driveway leading to the residence. Due to a limited predicted yield for the recovery well, the trench was installed to increase ground water yield and improve capture of the contaminant plume and flow volume to the treatment system. The ground water extraction and treatment system became operational on October 3, 1991.

[1] A more detailed discussion of risk assessments performed at this site will be submitted in an addendum to follow the submittal of this report.

1992 Monitoring Well Installation: On May 15, 1992, Groundwater Technology, Inc. (GTI) of Concord, California installed ground water monitoring wells MW-4, MW-5 and MW-6 to further delineate the extent of dissolved hydrocarbons in ground water beneath the site. Analytic results of soil samples collected during drilling showed TPH-G and BTEX concentrations below detection limits. Ground water samples collected on June 4, 1992 from the 5 site monitoring wells showed TPH-G in wells C-1, MW-5 and MW-6 at 34,000, 560 and 210 ppb, respectively. Benzene was detected in wells C-1, MW-4, MW-5 and MW-6 at 9,400, 0.8, 110 and 54 ppb, respectively. Analytic results tables for soil and ground water are presented in Appendix B and the boring logs for wells MW-4, MW-5 and MW-6 are presented in Appendix C.

1993 File Review: A March 1993 review of RWQCB and City of Alameda Fire Department files found that European Auto Repair, located at 1928 High Street adjacent and cross-gradient of the former Chevron service station, removed several USTs and piping associated with a former Phillips service station at that site in June 1987. Analytic results of soil samples collected during the tank removal showed that TPH-G was not detected but toluene and xylenes were present. No ground water samples were collected. Copies of the laboratory reports and a map of the former Phillips service station site are included in Appendix B.

1993 Offsite Ground Water Sampling: During March 1993, Weiss Associates (WA) collected ground water samples in three temporary offsite borings crossgradient and downgradient of the ground water extraction trench. Ground water samples collected from 2-inch diameter soil borings BH-A, BH-B and BH-C contained benzene at 6.4, 2.1 and 3,200 ppb, respectively.

1993 Monitoring Well Installation: On November 11, 1993, Groundwater Technology installed ground water monitoring well MW-7 and temporary monitoring well TMW-1 to further characterize upgradient and downgradient soil and ground water conditions near the site. Analytic results of soil samples collected at 5 ft bgs showed low concentrations of TPH-G and benzene in MW-7 (63 ppm and 1.3 ppm, respectively) and were non-detect in TMW-1. Ground water samples collected on November 11 and 30, 1993 from wells TMW-1 and MW-7 contained benzene below the detection limit and at 110

ppb, respectively. Analytic results tables for soil and ground water are presented in Appendix B and the boring logs for wells TMW-1 and MW-7 are presented in Appendix C.

Ground Water Sampling: Ground water has been gauged and sampled at this site since August 1986. The results of ground water samples collected from these wells are summarized in tables presented in Appendix B.

REMEDIAL ACTIONS

Excavation: The USTs, associated piping and all above-ground structures were removed during station demolition in June 1986. An unspecified volume of soil was excavated from the tank vicinity, stockpiled and aerated, then used as backfill for the excavation pits. In addition, most of the soil from beneath the house was removed during construction of the foundation.

Ground Water Extraction System: Ground water extraction well RW-1 was installed in the area east of the driveway leading to the residence. An extraction/recovery trench was connected to well RW-1 to enhance the ground water extraction rate since soils in the area are of low permeability. Ground water from the trench and well was extracted from RW-1 with an electric pump. The treatment system consists of two 200-lb. aqueous-phase carbon vessels in series. Treated ground water was discharged to the sanitary sewer as permitted by the East Bay Municipal Water District (EBMUD).

Extracted ground water yields have been low since pumping commenced in 1991. As of May 31, 1994, approximately 99,850 gallons of hydrocarbon-impacted ground water had been removed at a pumping rate of approximately 0.08 gallons per minute (gpm). The treatment system was temporarily shut off on May 31, 1994 due to a malfunctioning pressure regulator. A performance summary of the extraction system is presented in Appendix B.

EVALUATION OF NON-ATTAINMENT AREA CRITERIA AND FUTURE ACTION PLAN

The distribution of the remaining hydrocarbons and the site hydrogeologic and chemical conditions indicate that after further plume delineation, this site is a candidate for reduced action and establishment of a non-attainment area (NAA). In the following section, RWQCB criteria for establishment of a NAA are considered for determining the most appropriate combination of cleanup and plume management options at the site to reasonably protect the beneficial uses of ground water and limit any potential human health and environmental risks.

DISCUSSION OF NON-ATTAINMENT AREA CRITERIA

Category I, 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 consist primarily of clay, silty clay, sandy clay, clayey sand and sand to the total depth explored, approximately 23 ft. All site monitoring wells except MW-7 have high permeability sand from the ground surface to approximately 5 ft bgs then low or moderate permeability saturated silty clay or clayey sand to approximately 12 ft. Monitoring well MW-7 has low permeability sediments from the ground surface to approximately 13 ft.

Ground Water Flow: The surface elevation at the site is approximately 8 ft above msl. The depth to water in site wells ranges from 3 to 5 ft bgs. The ground water flow direction is generally eastward toward the tidal canal at a gradient of approximately 0.01 ft per ft. A ground water elevation contour map is presented in Appendix A. Compiled water level data for monitoring wells C-1, C-3 and MW-4 through MW-7 are presented in the Historical Ground Water Monitoring and Analytic Results table included in Appendix B.

Plume Location: Hydrocarbons in ground water are found primarily in the eastern portion of the site near monitoring well C-1. Low to moderate hydrocarbon concentrations are found in ground water samples from crossgradient monitoring well MW-5, but ground water from crossgradient monitoring well MW-4, approximately 50 ft downgradient of MW-5, shows no detectable hydrocarbons. Hydrocarbon concentrations in downgradient monitoring well MW-6 currently fluctuate between non-detect and low to moderate levels. Low to moderate hydrocarbon concentrations are also currently found in downgradient monitoring well MW-7. Ground water in MW-7 could potentially be impacted by possible hydrocarbon releases from the former Phillips service station approximately 30 ft east of MW-7.

Plume Stability: Hydrocarbon concentrations in downgradient monitoring well MW-7 are more than an order of magnitude less than the hydrocarbon concentrations in ground water from source area well C-1. Apparently, plume mitigation through natural attenuation mechanisms, such as sorption, dispersion, volatilization through the unsaturated zone, and/or chemical and biological activity have degraded the hydrocarbon plume, thereby limiting the concentration of hydrocarbons in ground water offsite and the magnitude of offsite plume migration.

Category I, 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.

Ground water impacts associated with the hydrocarbon plume at this site are limited since it is not likely that hydrocarbons in ground water extend more than several dozen feet beyond perimeter monitoring wells. The documented hydrocarbon concentration decrease between C-1 and MW-7 indicates that ground water impacts at this site are reduced by orders of magnitude downgradient of the source area. In addition, low permeability soils found in the vicinity of MW-7 will naturally attenuate further hydrocarbon migration. Separate phase hydrocarbons are not found at this site. Since ground water in the site vicinity is very shallow and is not likely to ever be used as a drinking water source, the

If so bottles HC are removed, explain why system influent detected 71,000 ppb TPHg. 17,000 ppb benzene etc. on 3/22/94 still.

costs to reduce hydrocarbon concentrations in site ground water to drinking water standards are not justified by the benefits received reserving this water for the unlikely event will be used as a drinking water supply.

In 1989, EA evaluated the potential risk to residents of the house onsite from airborne hydrocarbon vapors originating from soils beneath and in the vicinity of the house and calculated that there is a lifetime cancer risk of less than $1x10^{-6}$. A more detailed discussion of this risk assesment is presented in Appendix E.

Category II, criterion a. An appropriate cleanup program including adequate source removal and free product removal has been fully implemented and reliably operated for a period of time which is adequate to understand both the hydrogeology of the site and pollutant dynamics.

Five USTs and associated piping and dispenser islands were removed as part of the site demolition in 1986. Based on the footprint of the stockpiled soil excavated during the UST removal (Appendix A), approximately 100 cubic yards of source area soil were removed and aerated to non-detect hydrocarbon levels prior to being used for backfill onsite. In addition, most of the soil beneath the residence was removed during construction of the house foundation. The ground water extraction trench, located downgradient of the area with the highest hydrocarbon concentrations, was positioned to best capture hydrocarbons in ground water at this site. However, only 54 lbs of hydrocarbons were recovered in a two and a half year period even though approximately 100,000 gallons of ground water were extracted and treated.

Category II, criterion b. Ground water pollutant concentrations have reached an asymptotic level (the mass removed from the groundwater is no longer significant) using appropriate technology.

As discussed in the section above, approximately 100,000 gallons of ground water have been treated during two and a half years of ground water extraction yet only 54 lbs of hydrocarbons have

been recovered. Using this technology, significant hydrocarbon mass cannot be removed from ground water due to the low permeability soils in the eastern portion of the site.

Category II, criterion c. Best available technologies are not technically or economically feasible to achieve further significant reduction in pollutant concentrations.

The only appropriate remedial technology for this site, ground water extraction, has not recovered significant hydrocarbon mass to justify its continued operation. Other technologies, such as soil vapor extraction and treatment, would not be appropriate remedial alternatives because the thin, uncapped unsaturated zone would allow too much atmospheric air from the surface preventing the formation of a suitable vacuum and adequate radius of influence.

Category II, 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.

Our plan for containing and managing the remaining risks posed by residual hydrocarbons at this site includes: 1) continued ground water monitoring for hydrocarbons within and on the perimeter of the plume for a limited period of time; and 2) implementation of a contingency plan if monitoring indicates significant migration and/or increasing concentrations in the plume.

Our proposed ground water monitoring schedule and contingency plan are presented in the Future Action Plan below.

FUTURE ACTION PLAN

Continued Ground Water Monitoring: The hydrocarbon plume appears to be limited to the eastern portion of the site and immediately downgradient. Once the downgradient edge of the plume has been

defined, quarterly sampling and analysis of the downgradient wells will provide adequate information and assurance that the impact of this plume is contained and that there are no unnecessary human health or environmental risks. Continued quarterly monitoring of all other site wells will not yield additional significant information concerning hydrocarbon concentrations in ground water at this site. To ensure that the plume is contained and to maintain compatibility with health risk concerns while reducing monitoring at this site, we plan to:

1. Discontinue monitoring in well C-3. This monitoring well will provide no significant new information since the ground water flow direction at this site is consistently eastward and this well is upgradient of the plume and has been clean during nearly every quarter sampled.

2. Conduct quarterly monitoring and reporting at down- and crossgradient wells MW-4, MW-5 and MW-6 through 1995, then annual sampling at the seasonal high water table through 1997. After two years of annual monitoring, cease monitoring unless the contingency plan has been implemented. Monitoring these wells for this period will confirm the stability of the current plume configuration.

3. Reduce monitoring and reporting to semi-annual for well C-1 through 1995 then to annual at the seasonal high water table through 1997. After two years of annual monitoring and reporting, cease monitoring unless the contingency plan has been implemented. Monitoring this source area well will confirm that source area concentrations are stable or decreasing.

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

	1995				1996				1997			
Well ID	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
C-1	G&S		G&S		G&S				G&S			
C-3												
MW-4	G&S	G&S	G&S	G&S	G&S				G&S			
MW-5	G&S	G&S	G&S	G&S	G&S				G&S			
MW-6	G&S	G&S	G&S	G&S	G&S				G&S			
MW-7	G&S	G&S	G&S	G&S	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 go into effect. This plan will ensure that "baseline" conditions are maintained in all wells. Details of the contingency plan are presented in Appendix D.

CONCLUSIONS

Data collected at the site demonstrate the following:

- Ground water beneath the site has been monitored for eight years.
- Source reduction efforts have removed the five USTs, associated piping and dispenser islands, approximately 100 cubic yards of source area soil and most of the soil beneath the residence.
- Low permeability sediments are encountered near source area monitoring well C-1 and near downgradient monitoring well MW-7.
- Although the extraction trench is positioned in the best location to remove hydrocarbons in ground water at this site, 100,000 gallons of ground water extracted during a two and a half year period have yielded only 54 lbs of recovered hydrocarbons.
- Ground water impacts are not likely to extend significantly beyond downgradient monitoring well MW-7 since hydrocarbons in that well are more than an order of magnitude less than the hydrocarbon concentrations found in ground water from source area well C-1.
- No cost-effective technologies exist that would significantly accelerate cleanup of hydrocarbons in ground water or soil at this site. The only appropriate remedial technology for this site, ground water extraction, has not recovered significant mass to justify further operation.
- A discussion of the potential health risks to site residents by inhalation of hydrocarbon vapors from site soils beneath and in the vicinity of the onsite house found that there is less than a $1x10^{-6}$ lifetime cancer risk from this exposure pathway.

Based on these findings, Chevron proposes modification to the ground water monitoring frequency for selected wells, and that a non-attainment area be established in the vicinity of the site. This will allow natural processes to continue to contain and degrade the plume. Once an NAA has been approved for this site, the proposed monitoring and contingency plan will ensure that the risks posed by the residual plume are contained and managed.

Therefore, Chevron requests that the Alameda County Department of Environmental Health (ACDEH) and the RWQCB accept that drinking water standards cannot be attained in all portions of this property and consider redefining the area of attainment of MCLs to exclude the plume associated with this site.

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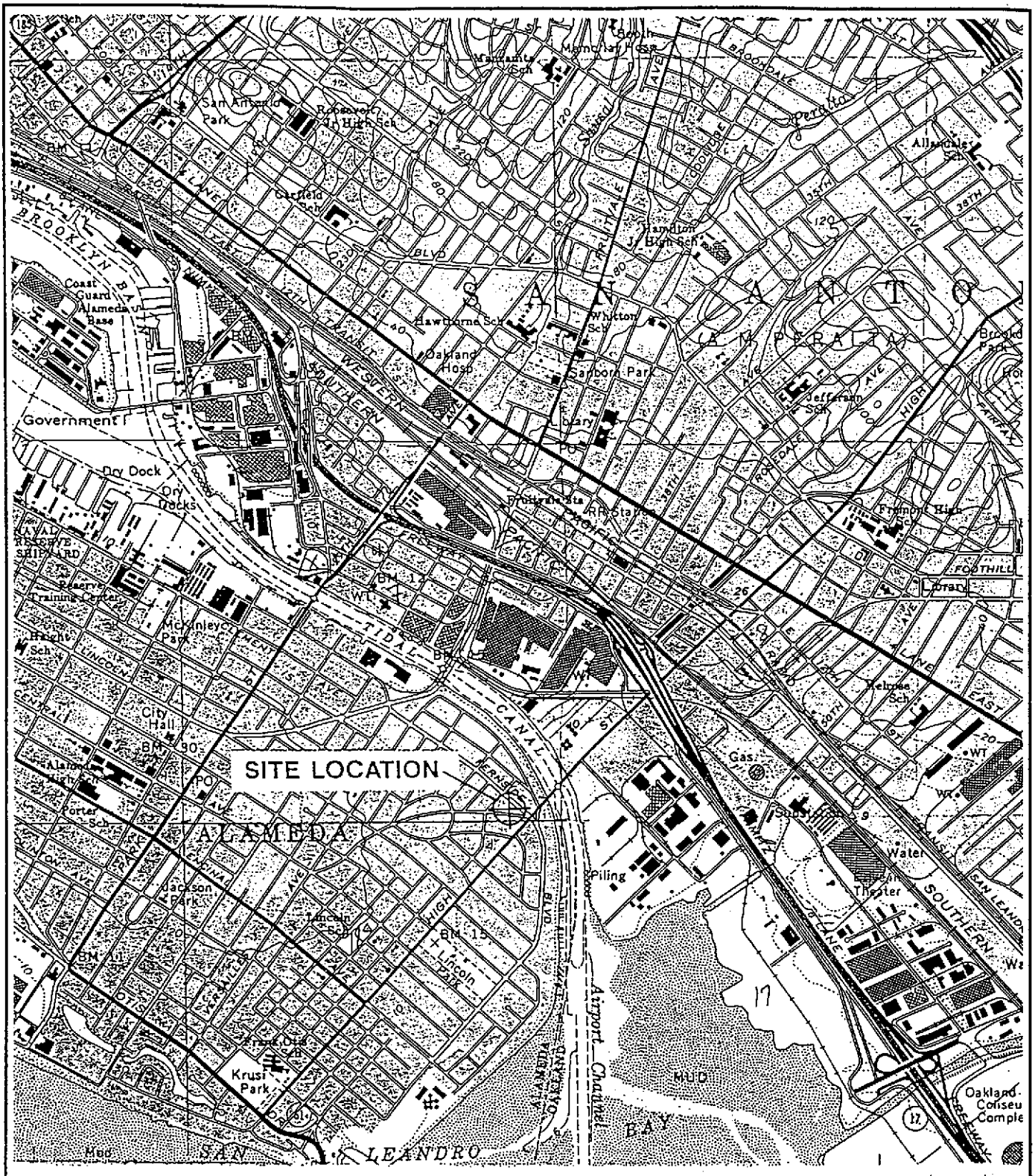

GROUNDWATER TECHNOLOGY 4057 PORT CHICAGO HWY CONCORD, CA 94520 (510) 671-2387	N	SCALE: 0 FEET 2000	SITE LOCATION MAP
		CLIENT: CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1153	DATE: 7/14/92
		LOCATION: 3126 FERNSIDE BLVD. ALAMEDA, CALIFORNIA	FIGURE: 1

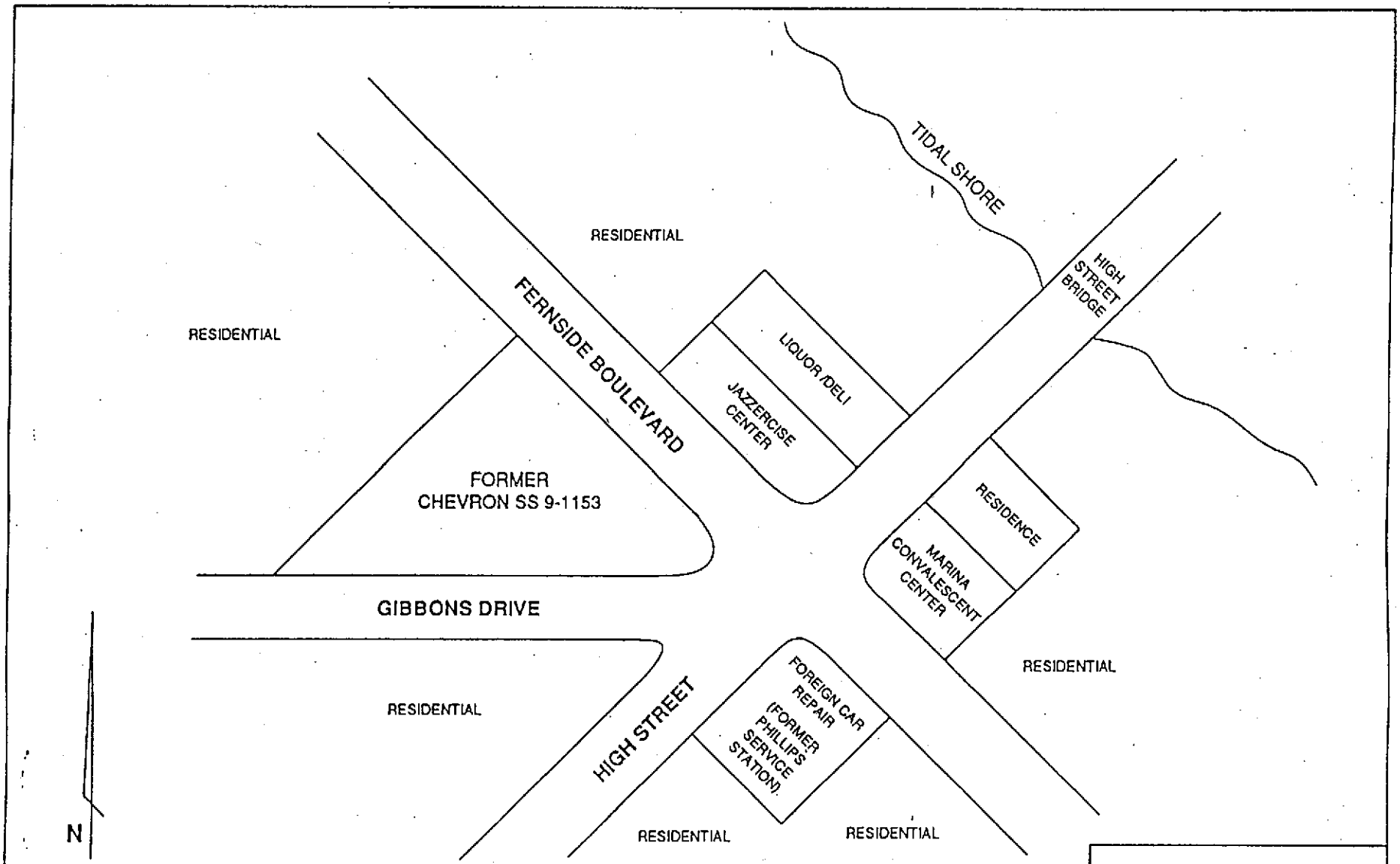

Figure 2. Land use in the vicinity of former Chevron SS 9-1153, Alameda, CA. May 1989.

Drawn	Date
Reviewed CLB	Date 8-18-89

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41 Lafayette Circle
Lafayette, CA. 94549

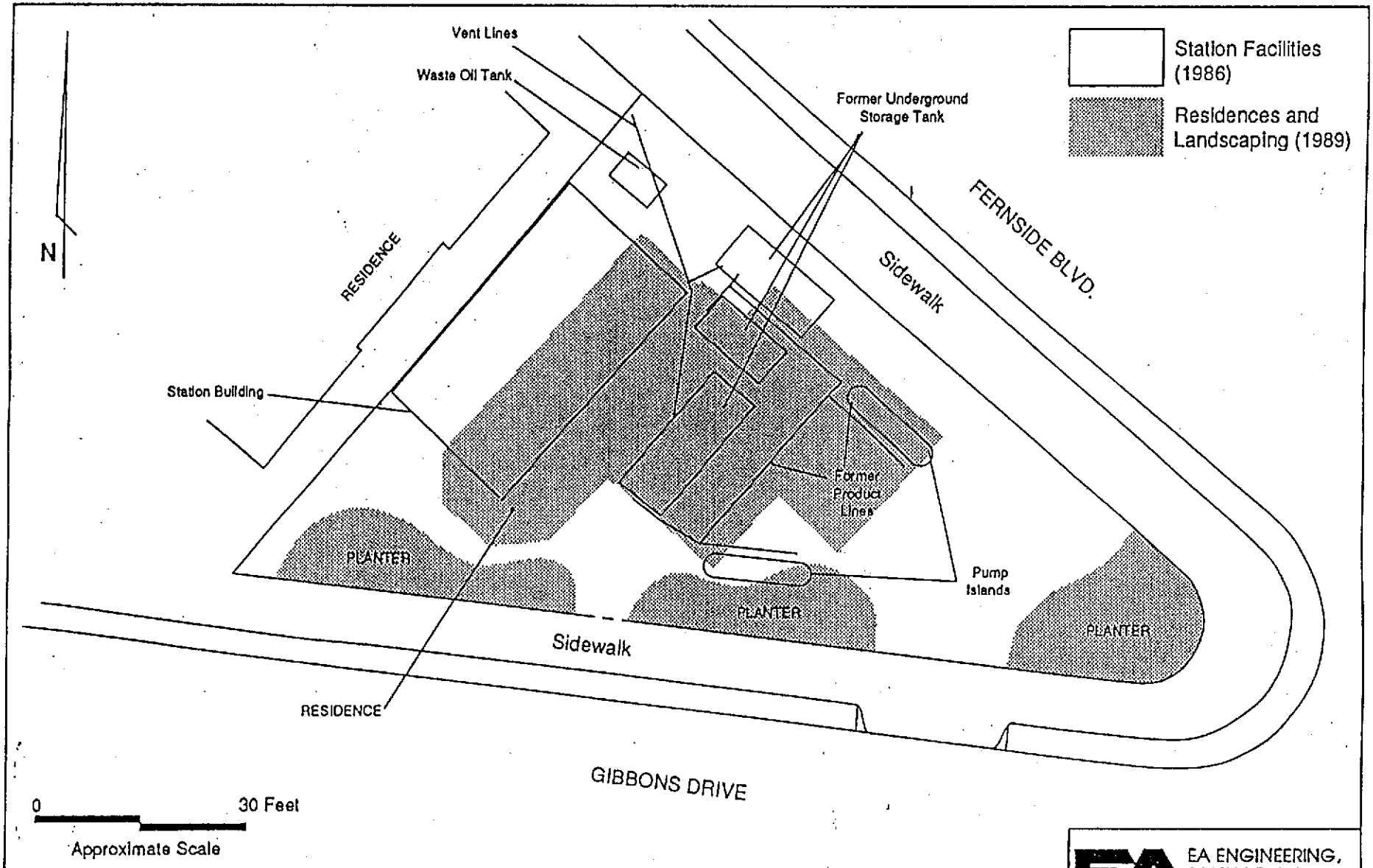

Figure 3. Structures and service station facilities, former Chevron SS 9-1153, Alameda, California, 1986.

Drawn	Date
Reviewed CCB	Date 8-18-89

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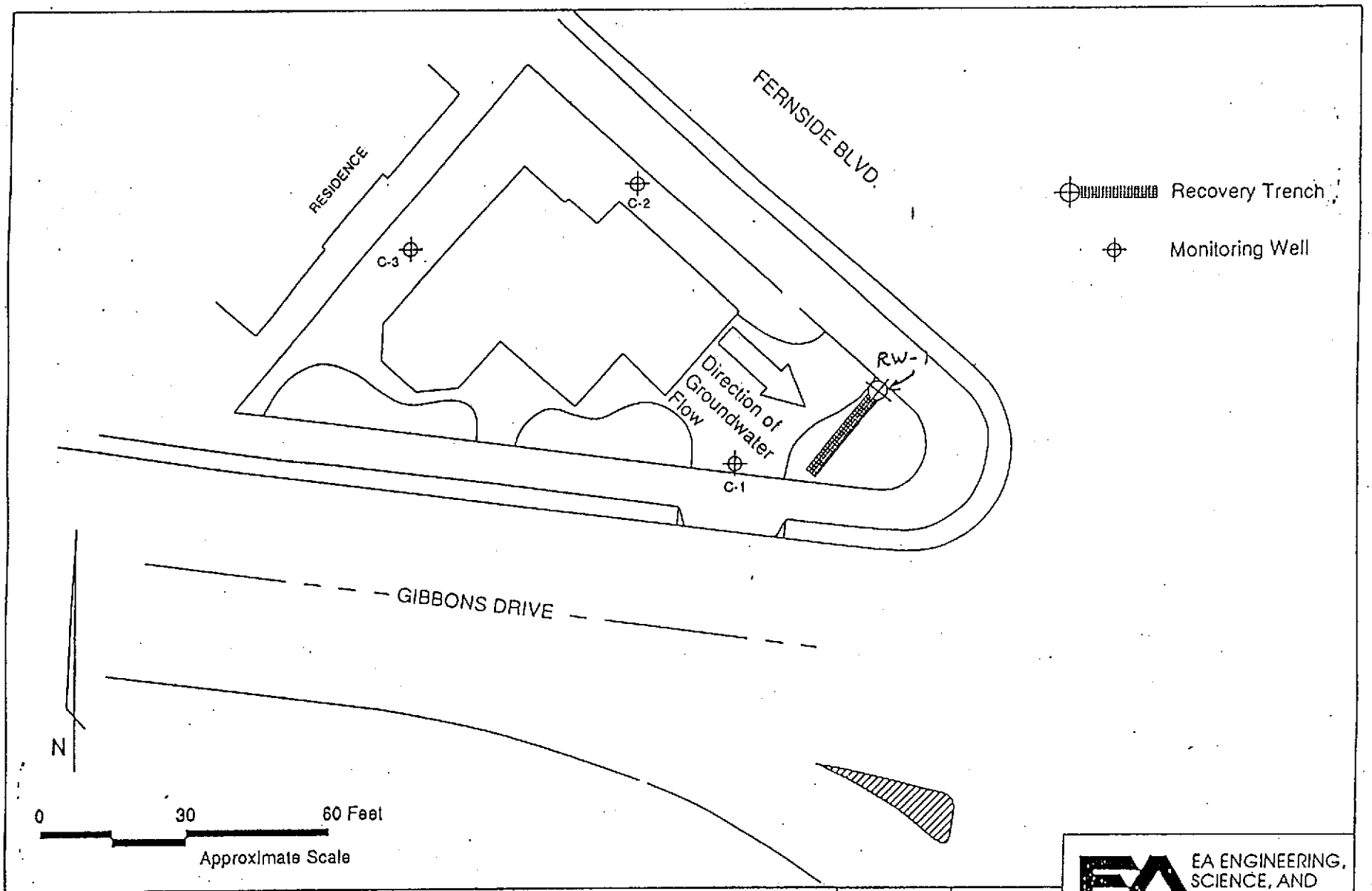

Figure 1. Monitoring/recovery well and recovery trench location, former Chevron SS 9-1153, Alameda, California.

Drawn	Date
Reviewed	Date

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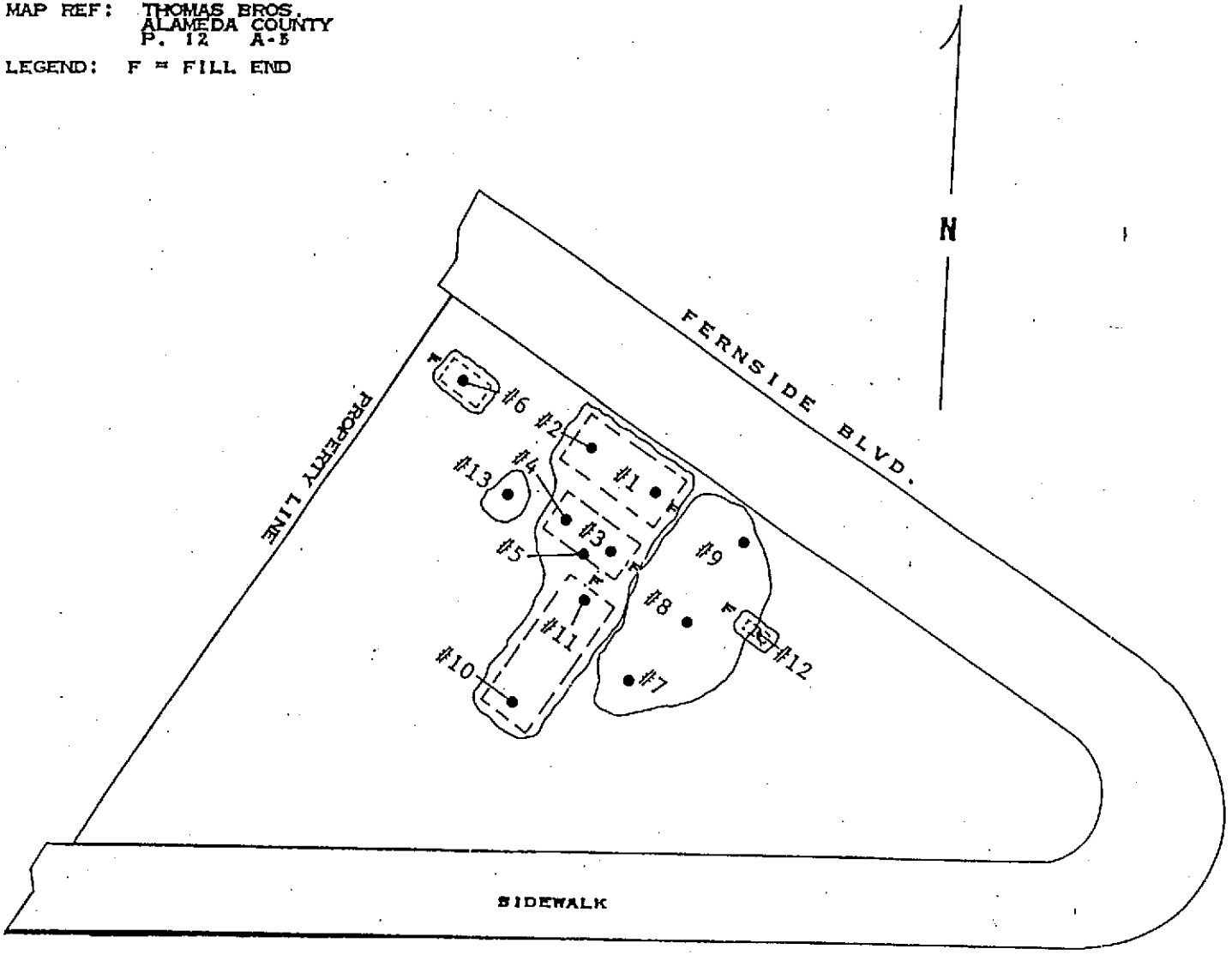
SAMPLING REPORT 86155F1 6-4-86 CHEVRON STATION NO. 1153, FERNSIDE BLVD., ALAMEDA, CA

MAP REF: THOMAS BROS.
ALAMEDA COUNTY
P. 12 A-5

LEGEND: F = FILL END



#1 SOIL FROM 11'
ANALYSIS FOR GASOLINE
AT THERMO ANALYTICAL, INC/ERG
TMA/ERG LAB NO. 7920-1

#2 SOIL FROM 12'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-2

#3 SOIL FROM 10'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-3

#4 SOIL FROM 10.5'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-4

#5 SUBSURFACE WATER SAMPLE
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-5

#6 SOIL FROM 8'
ANALYSIS FOR WASTE OIL
TMA/ERG LAB NO. 7920-6

#7 SOIL FROM STOCKPILE AT 18" BELOW SURFACE
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-7

#8 SOIL FROM STOCKPILE AT 20" BELOW SURFACE
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-8

#9 SOIL FROM STOCKPILE AT 12" BELOW SURFACE
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-9

#10 SOIL FROM 10'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-10

#11 SOIL FROM 12'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-11

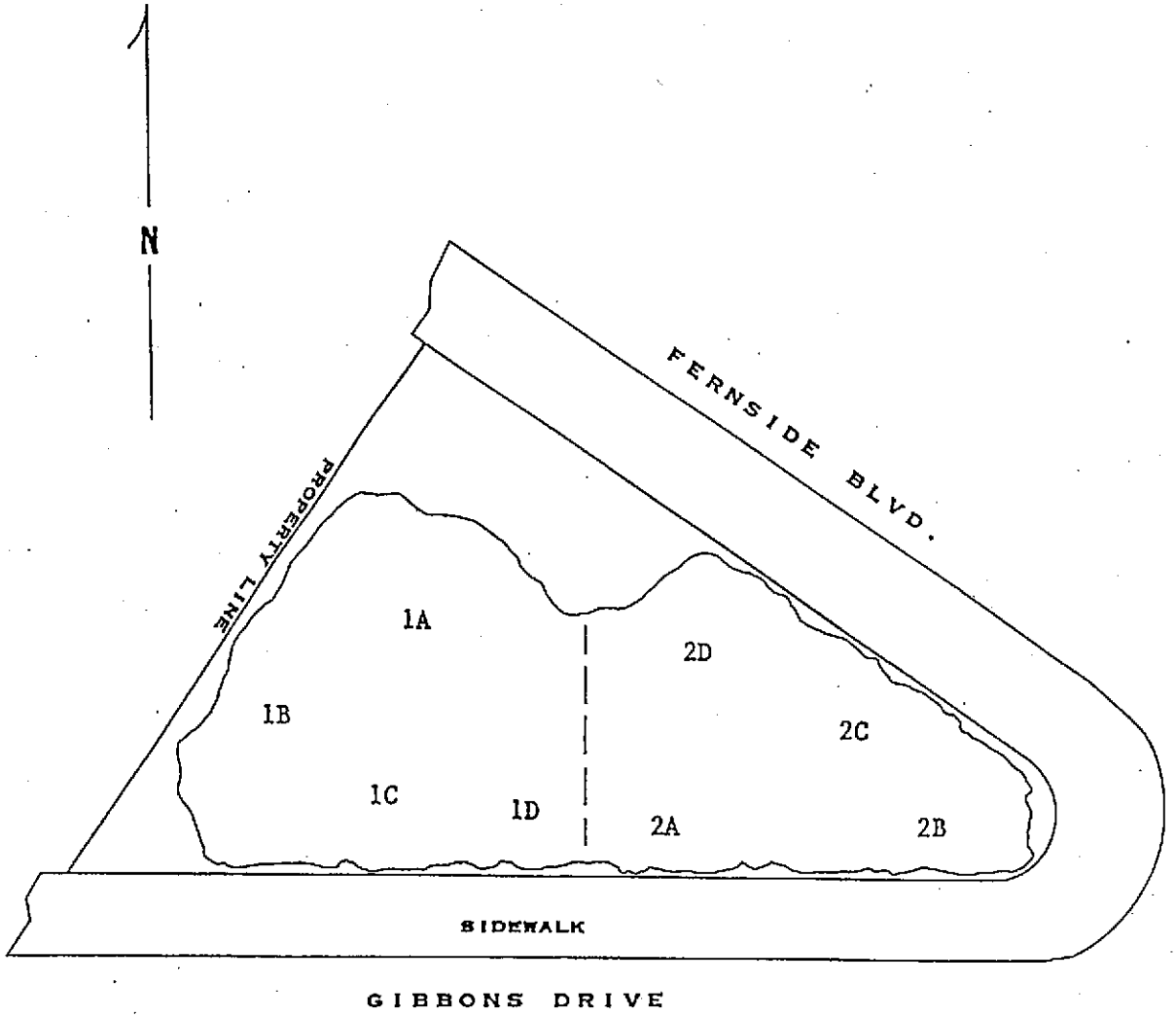
#12 SOIL FROM 10'
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 7920-12

#13 SOIL FROM STOCKPILE AT 12-18" BELOW SURFACE
ANALYSIS FOR WASTE OIL
TMA/ERG LAB NO. 7920-13

SAMPLING PERFORMED BY
FRANK A. CLINE

DIAGRAM PREPARED BY
TAMMIE STALLINGS

SAMPLING REPORT 86188B2 7-7-86 CHEVRON STATION NO. 1153, FERNSIDE BLVD., ALAMEDA, CA



MAP REF: THOMAS BROS.
ALAMEDA COUNTY
P. 12 A-5

#1 STOCKPILE SOIL COMPOSITE FROM SAMPLE POINTS 1A-1D AT 6" BELOW SURFACE
ANALYSIS FOR GASOLINE AT THERMO ANALYTICAL INC/ERG
TMA/ERG LAB NO. 8079-1

#2 STOCKPILE SOIL COMPOSITE FROM SAMPLE POINTS 2A-2D AT 6" BELOW SURFACE
ANALYSIS FOR GASOLINE
TMA/ERG LAB NO. 8079-2

SAMPLING PERFORMED BY
RICHARD C. BLAINE

DIAGRAM PREPARED BY
TAMMIE STALLINGS

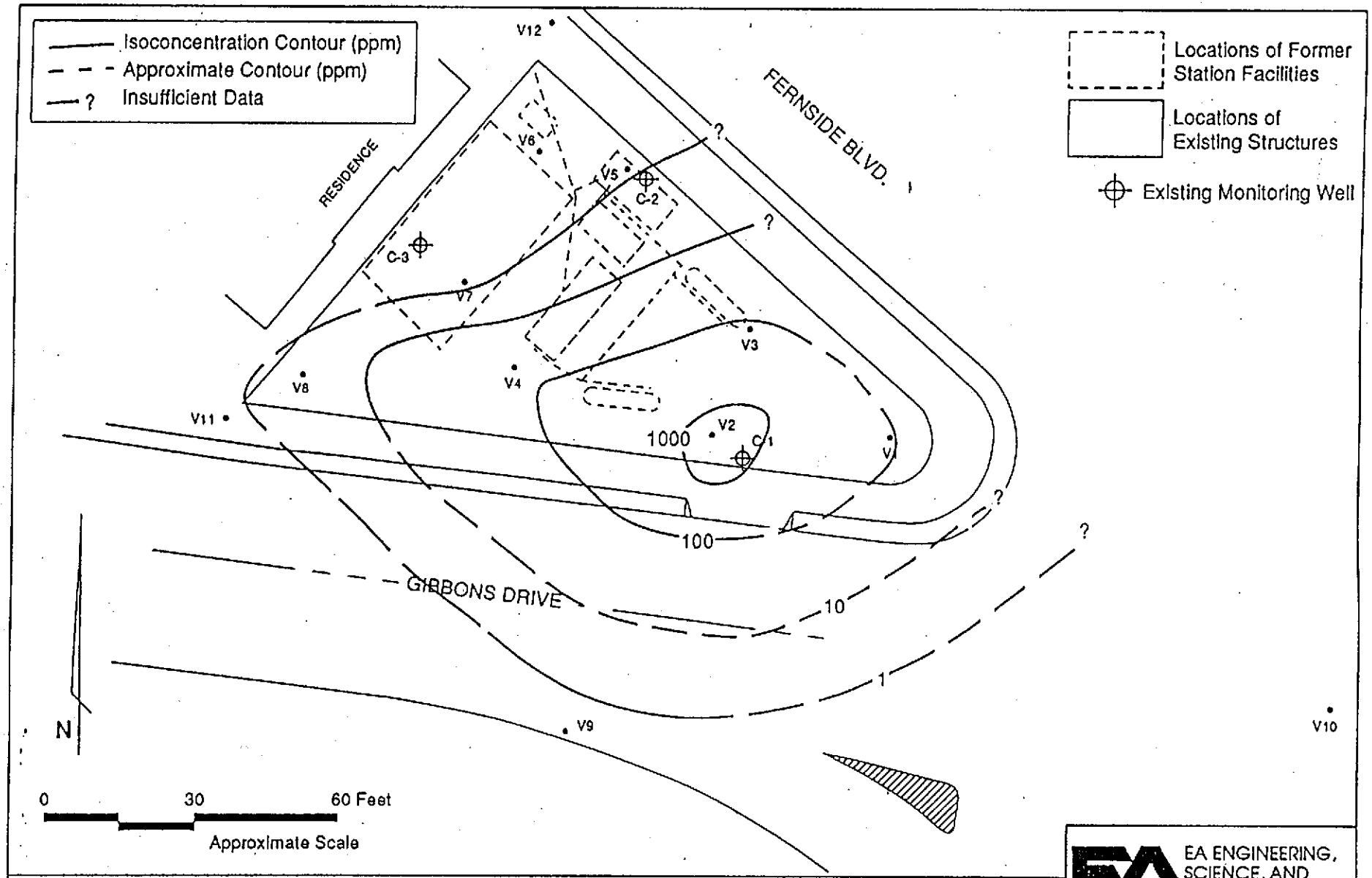


Figure 5. Location of soil vapor sampling points and isoconcentration contours (ppm) of benzene in the soil vapor at a depth of 3 feet, former Chevron SS 9-1153, Alameda, California, July 1987.

Drawn	Date
Reviewed	Date 8-18-89

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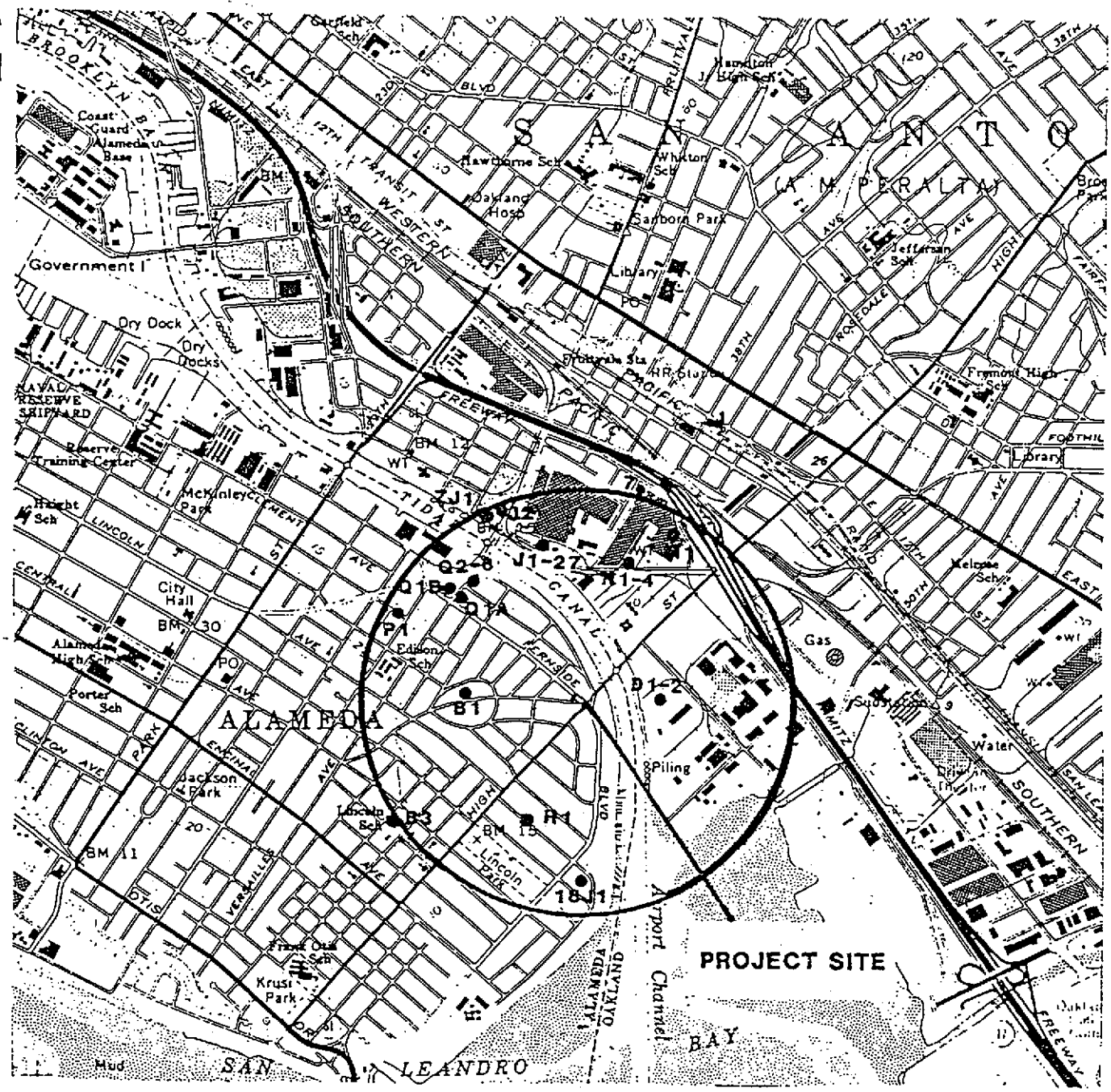

PACIFIC ENVIRONMENTAL GROUP, INC.

CHEVRON STATION #1153
3126 FERNSIDE BLVD. (AT GIBBONS)
ALAMEDA, CALIFORNIA

WELL LOCATION MAP

FIGURE 1
PROJECT NO. 120-36.01

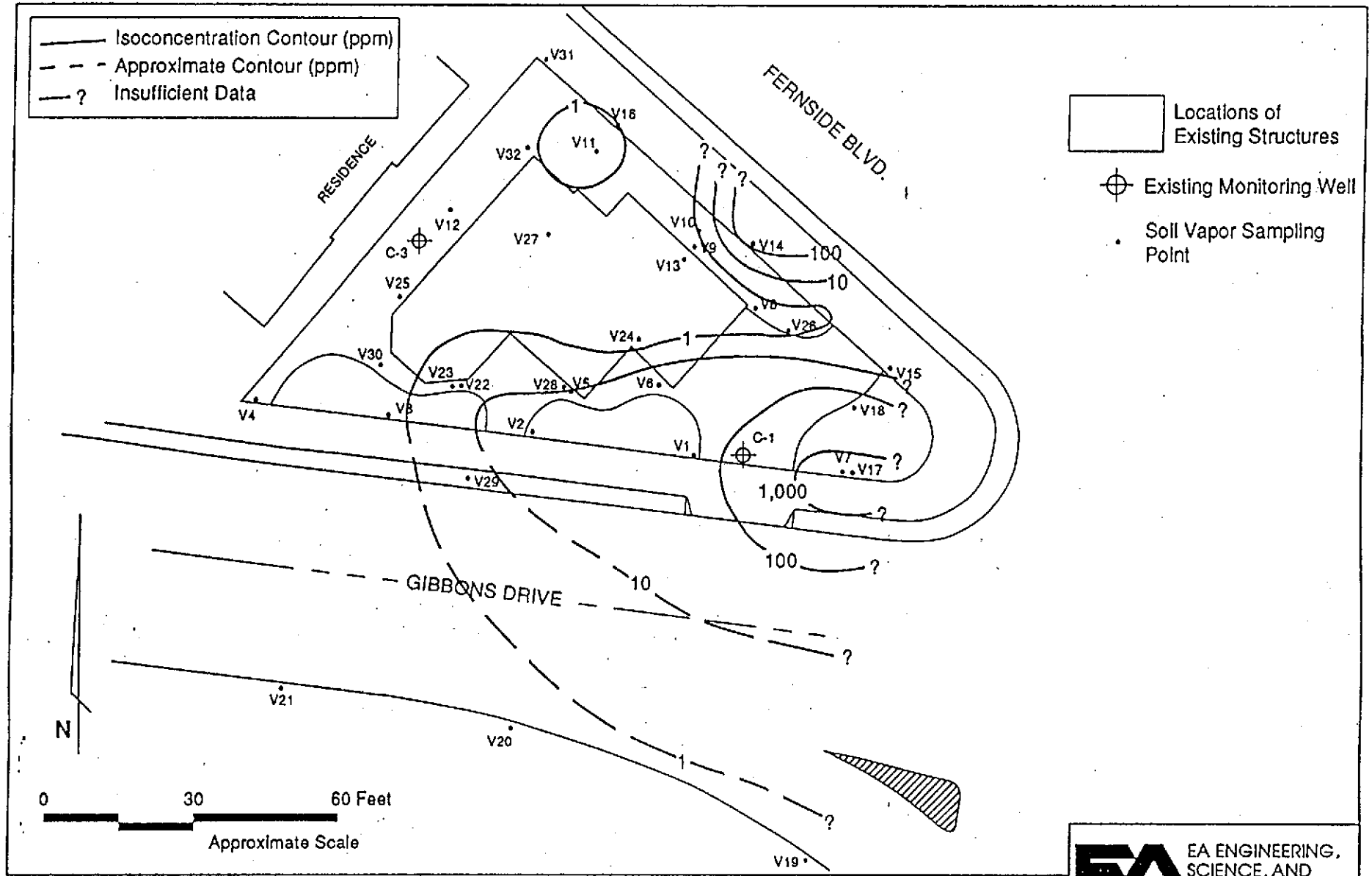

Figure 6. Isoconcentration contours (ppm) of benzene in the shallow soil gas at depths between 2 and 4.5 feet, former Chevron SS 9-1153, Alameda, California, May 1989.

Drawn	Date
Reviewed	Date 8-18-89

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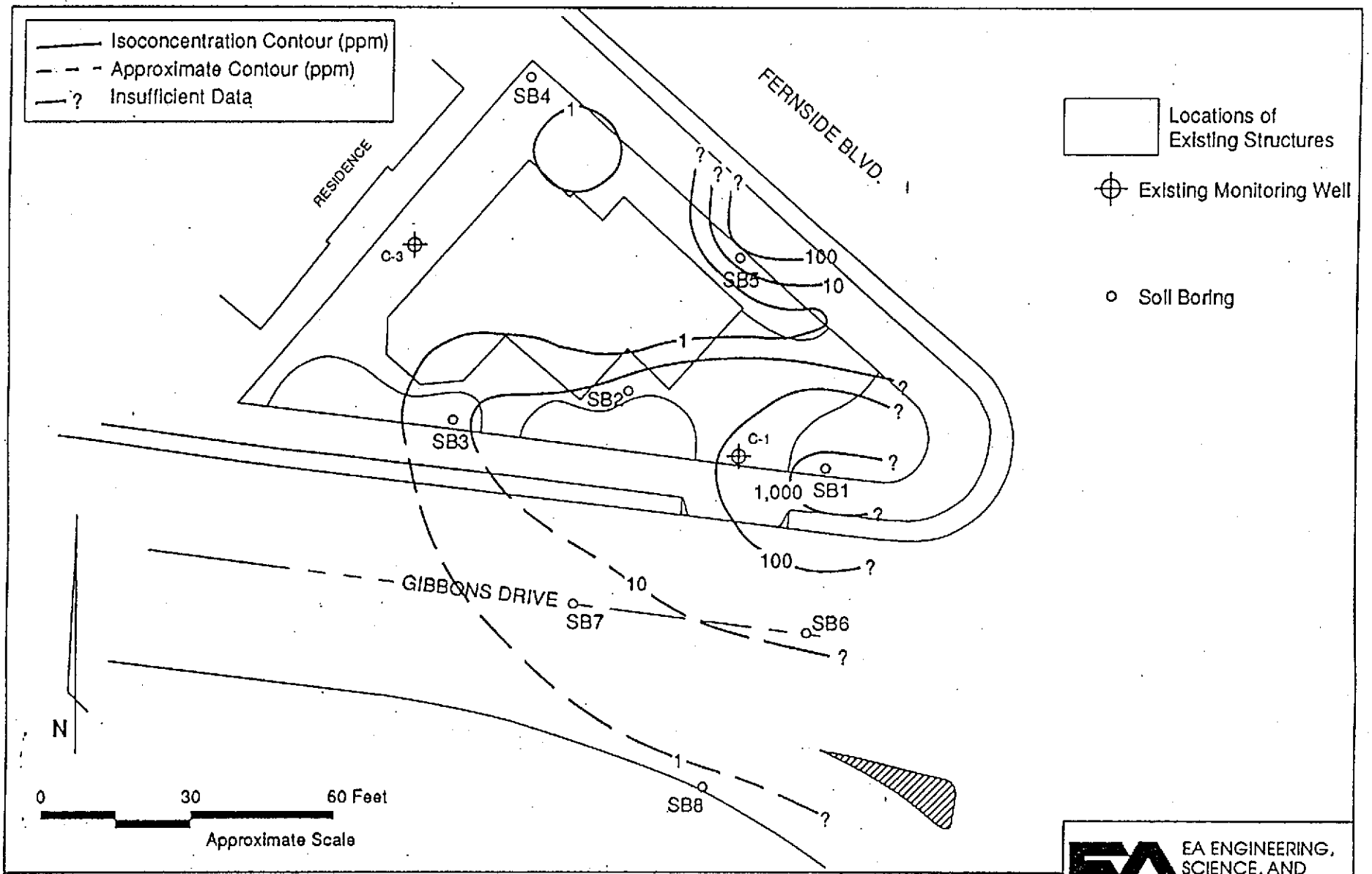

Figure 7. Locations of soil borings and isoconcentration contours (ppm) of benzene in the shallow soil gas at depths between 2 and 4.5 feet, former Chevron SS 9-1153, Alameda, California, May 1989.

Drawn	Date
Reviewed CCB	Date 8-18-89

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

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REPAIR INC.
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ALAMEDA, CALIF
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~~R. L. Stevens Co.~~

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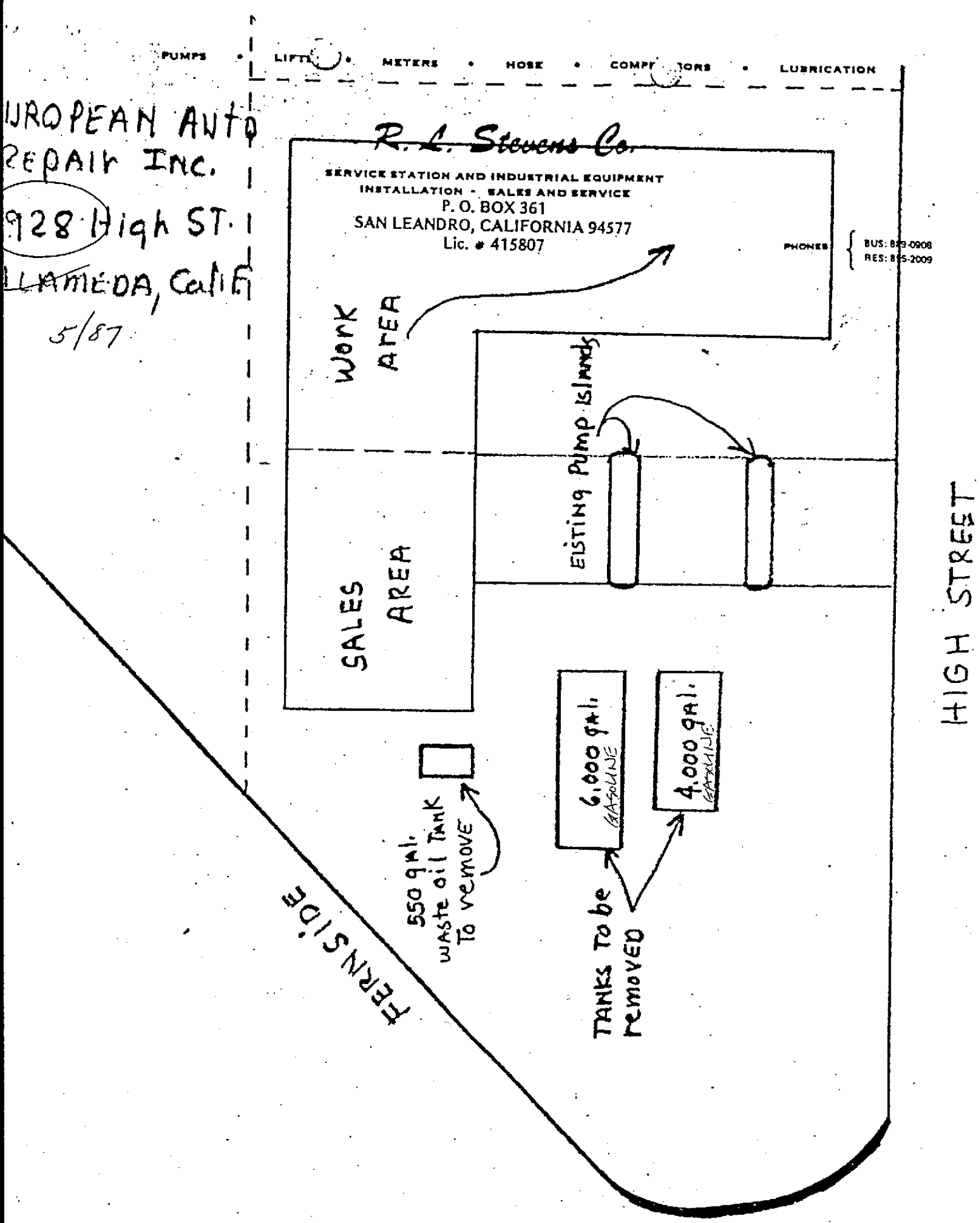
INSTALLATION - SALES AND SERVICE
P. O. BOX 361
SAN LEANDRO, CALIFORNIA 94577
Lic. # 415807

PHONES { BUS: 895-0908
RES: 895-2009



ALL QUOTATIONS VOID AFTER THIRTY [illegible] 3. NOT RESPONSIBLE FOR FIRE, FLOODS, STR[illegible]S OR ACTS BEYOND OUR CONTROL

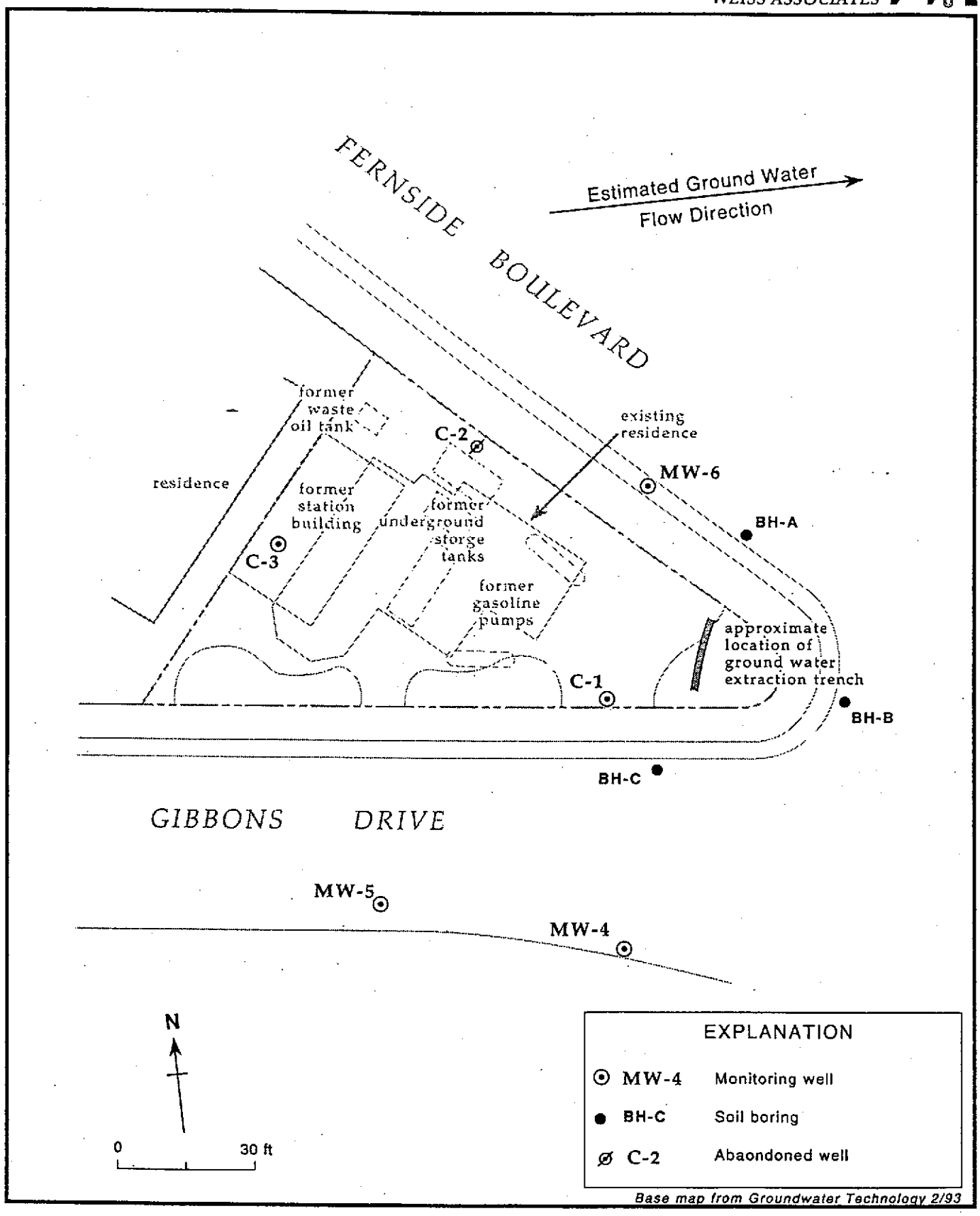
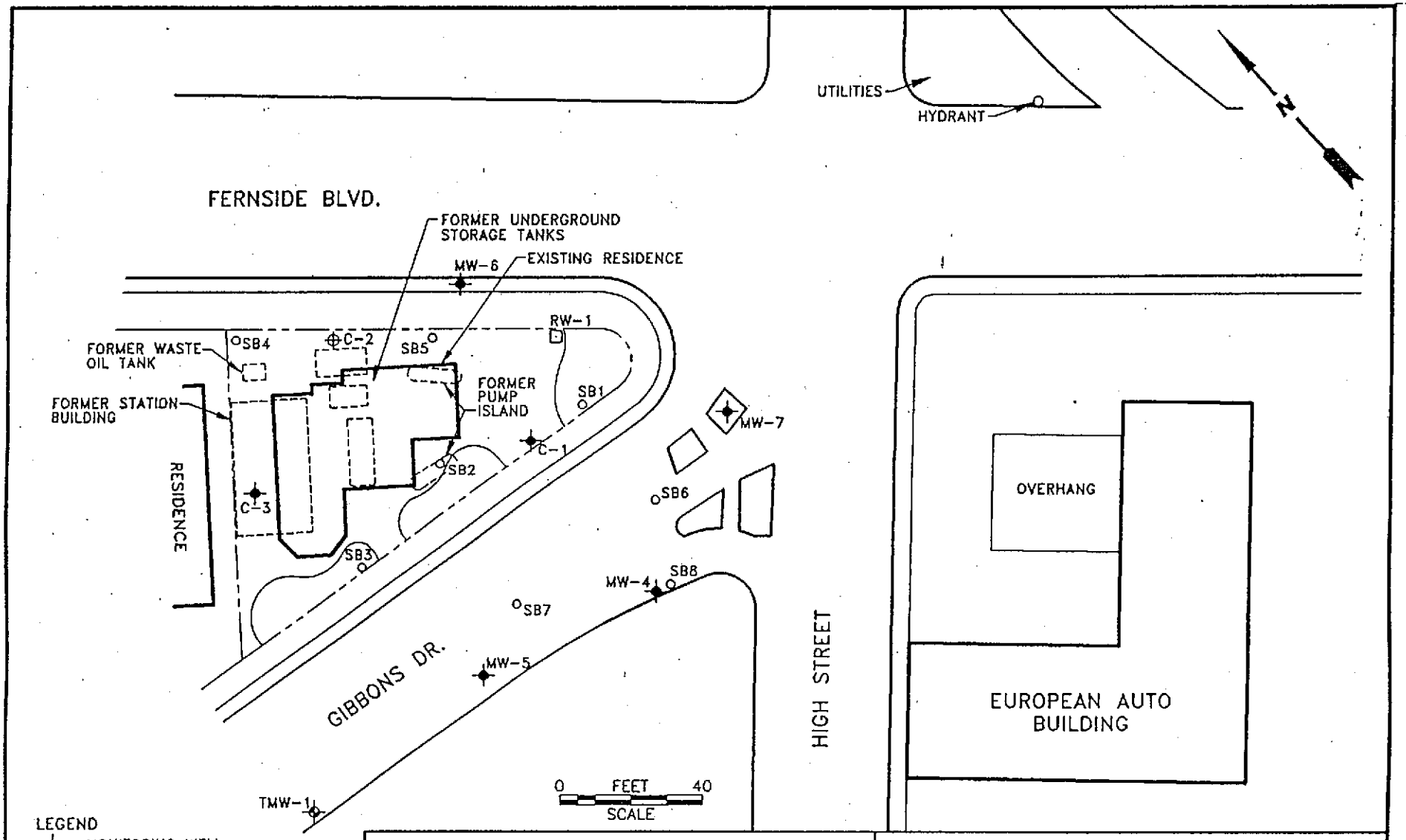


Figure 2. Soil Boring Locations - Former Chevron Service Station #9-1153, 3126 Fernside Boulevard, Alameda, California



GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

SITE PLAN

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1153	3126 FERNSIDE BLVD. ALAMEDA, CALIFORNIA	0	1/7/94

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
	ORK	TW	ML	SP194	020204100	2

 CLOSURE SAMPLES (SOIL, BTS)

TABLE I

ERG #	CLIENT ID	GASOLINE CONCENTRATION (mg/kg or mg/L)
7920-1	86155 F1 #1	ND(1)
7920-2	86155 F1 #2	ND(1)
7920-3	86155 F1 #3	ND(1)
7920-4	86155 F1 #4	ND(1)
7920-5	86155 F1 #5	130 ppm**
7920-6	86155 F1 #6	ND(11)*
7920-7	86155 F1 #7	1400
7920-8	86155 F1 #8	530
7920-9	86155 F1 #9	150
7920-10	86155 F1 #10	ND(1)
7920-11	86155 F1 #11	ND(1)
7920-12	86155 F1 #12	ND(11)*
7920-13	86155 F1 #13	33

*waste oil, by extraction

**water sample (mg/L)

ND = None detected. The limits of detection are in ( ).

TMA
Thermo Analytical Inc.

TMAIERG
1400 West 53rd Street
Suite 460
Emeryville, CA 94608-2946
(415) 652-2300

July 8, 1986

AERATED SOIL SAMPLING EVENT (CBTS)

Chevron USA
2 Annabel Lane, Suite #200
San Ramon, CA 94583

Attention: Vicki Hobbs

Report #8079 Release #37

Site Location: Chevron Station #1153, Fernside, Alameda.

RE: Two (2) samples submitted on July 8, 1986 for rush-ASAP total hydrocarbon response-gasoline analysis.

Procedure: The samples are analyzed for total hydrocarbon-response-gasoline by following the method described in Attachment 2, Analytical Procedures for Fuel Leak Investigations. The samples are concentrated on a Tekmar LSC-2 automatic sample concentrator prior to injection into a gas chromatograph fitted with a flame ionization detector. Quantitation is performed, as total hydrocarbon response, against known concentrations of heptane-isooctane (55/45). The limit of detection for this method of analysis is one part per million (mg/kg).

The results are displayed in the table below:

ERG #	CLIENT ID	CONCENTRATION (mg/kg)
8079-1	86188 B2 #1	ND(1)
8079-2	86188 B2 #2	ND(1)

ND = None detected. The limits of detection are in ( ).

Submitted by:

Robert B. Flay

Robert B. Flay
Manager, Organics Department

RBF:sml

cc: Rich Blaine
Blaine Tech Service
P.O. Box 5745
San Jose, CA 95150

TABLE 3 SVCA RESULTS, FORMER CHEVRON SS 9-1153, FERNSIDE BOULEVARD AND GIBBONS DRIVE, ALAMEDA, CALIFORNIA, 21 JULY 1987

Sample Location	Depth (ft)	Peaks Prior to Benzene (VS)	Benzene (ppm)	Toluene (ppm)	Peaks Not Otherwise Identified (VS)
V1	3	1,800	110	30	100
V2	3	11,000	1,900	500	1,800
V3	3	5,000	120	50	90
V4	3	660	70	180	180
V5	3	<5	<1	<1	<1
V6	3	20	10	10	10
V7	3	<1	<1	<1	<1
V8	-3	5	5	5	10
V9	3	<1	<1	<1	<1
V10	3	<1	<1	<1	<1
V11	3	<1	<1	<1	<1
V12	3	<1	<1	<1	<1

BLANK DATA

Time Test	Peaks Prior to Benzene (VS)	Benzene (ppm)	Toluene (ppm)	Peaks Not Otherwise Identified (VS)
1001	<0.1	<0.1	1.5	<0.1
1250	0.3	0.5	0.8	<0.1

PERCENTAGE OF STANDARD RECOVERED

	Standard	
Time	Benzene	Toluene
1446	85	84

TABLE 1
SUMMARY OF WELL SURVEY DATA

Wells Within 1/2-mile Radius of the Site

Well Number	Depth (feet)	Year Drilled	Use
2S3W7J1	464	1911	?
2S3W7J2	180	1910	?
2S3W7J1-27	16-30	1986	Monitoring
2S3W7P1	120	1976	Cathodic
2S3W7Q1A	24	1977	[illegible]
2S3W7Q1B	76	1976	Cathodic
2S3W7Q2-6	10-30	1984	Monitoring
2S3W7	292	?	?
2S3W8M1	22	1986	Monitoring
2S3W8N1-4	31	1986	Monitoring
2S3W17D1-2	20, 15	1986	Monitoring
2S3W18B1	55	1977	[illegible]
2S3W18B3	40	1977	[illegible]
2S3W18H1	120	1975	Cathodic
2S3W18J1	16.5	1977	[illegible]

NOTE: Monitoring wells have been grouped together on this table and on the map (Figure 1).

SOURCE: California Department of Water Resources, and Alameda County Flood Control and Water Conservation District.

TABLE 4 CONCENTRATIONS OF HYDROCARBON CONSTITUENTS IN SOIL VAPOR AT FORMER CHEVRON SS 9-1153, 3126 FERNSIDE BOULEVARD, ALAMEDA, CALIFORNIA, 4 MAY 1989

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V1/A	2.5	22	0.25	770	25	<1	23	<1	940	1,800
V1/B	4.5	22	2	410	<1	16	1	<1	78	500
V2/A	2.5	21	0.25	4,100	80	69	17	<1	840	5,100
V2/B	4.5	22	0.5	24	<1	<1	<1	<1	1	25
V3/A	2.5	15	0	2,000	<1	70	1	<1	910	3,000
V3/B	4.5	18	0.5	1	<1	<1	<1	<1	1	2
V4/A	2.5	3	0	1	<1	<1	<1	<1	<1	1
V4/B	4.5	17	0.5	1	<1	<1	<1	<1	1	2
V5/A	2.5	3-17	0.5	2,600	250	2,400	2,400	450	6,500	15,000
V5/B	2.5	5	2	93	8	83	51	<1	310	550
V6/A	2	21	0.1	190	<1	<1	<1	3	5	200
V6/B	3	23	135	1,800	34	39	12	10	500	2,400
V7	2.5	15	0.1	23,000	2,200	2,700	200	43	8,800	37,000
V8/A	2.5	8	0	3	1	<1	<1	<1	2	6
V8/B	4.5	21	0.5	97	1	<1	1	<1	2	100
V9-HS	3	10	0	<1	<1	<1	<1	<1	<1	<1
V10/A	2.5	0.5	0	25	1	1	<1	<1	3	30
V10/B	4.5	22	1	11	1	1	<1	<1	3	15
V11/A	3	0.5	0	26	0.5	1	<1	<1	2	30
V11/B	4.5	21	0.25	360	2	5	2	<1	23	390
V12/A	2.5	0.5	0	1	<1	<1	<1	<1	1	3
V12/B	4.5	21	7	37	<1	<1	<1	<1	3	40

a. Quantification based on V-sec:ppm ratio for pentane (see text). Early peaks from blank data subtracted from sample values.
b. Quantification based on V-sec:ppm ratio for iso-octane (see text).
c. Summation of all detected constituents (see text).
HS = Headspace sample.

c58/91153/10-89/t4

TABLE 4 (Cont.)

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V13/A	3	5	0	<1	<1	<1	<1	<1	1	1
V13/B	4.5	2.7	2	<1	<1	1	<1	<1	2	3
V14	2.5	17	0	13,000	360	310	340	69	2,900	17,000
V15	2.5	19	1	620	8	7	<1	<1	74	710
V16	2.25	17	1	1	<1	<1	<1	<1	2	3

BLANK DATA

Test Time	Peaks Prior to Benzene (ppm)[a]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After Benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
0829	78	0.1	<0.1	<0.5	<0.5	<0.5	<0.1	78
0844*	2	<0.1	-	-	-	-	-	2
1016	6	<0.1	<0.1	<0.5	<0.5	<0.5	0.6	7
1100	7	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	7
1355	17	<0.3	<0.1	<0.5	<0.5	<0.5	<0.5	18
1415	3	<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	3
1548	4	<0.1	<0.1	<0.5	<0.5	<0.5	0.2	4

- Not required to be quantified.

TABLE 4 (Cont.)

PERCENTAGE OF STANDARD RECOVERED

Test Time	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	n-Pentane (ppm)	n-Hexane (ppm)	iso-Octane (ppm)
0858*	100	100	100	100	100	100	100	100
0934**	100	100	100	100	100	100	100	100
1128	101	112	127	119	126	131	105	105
1344	95	113	132	129	133	105	93	95
1539**	100	100	100	100	100	100	100	100
1719	94	86	74	75	75	68	85	107

* Calibrated
** Recalibrated.

TABLE 5 CONCENTRATIONS OF HYDROCARBON CONSTITUENTS IN SOIL VAPOR AT FORMER CHEVRON SS 9-1153, 3126 FERNSIDE DRIVE, ALAMEDA, CALIFORNIA, 10 MAY 1989

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V17	2.5	1	0	37,000	2,300	2,500	670	150	11,000	54,000
V18	2.5	20	10	8,400	490	220	32	10	2,900	12,000
V19/A	2.5	1	0	1	<1	<1	<1	<1	<1	1
V19/B	4.5	2	0.25	<1	<1	<1	<1	<1	<1	<1
V20/A	2.5	1	0	3	<1	<1	<1	<1	<1	3
V20/B	4	1	0	2	<1	<1	<1	<1	<1	2
V21/A	2.5	1	0	9	<1	<1	<1	<1	1	10
V21/B	4	3	0.5	62	<1	<1	<1	<1	<1	62
V22	2.5	20	10	77	7	3	<1	<1	17	100
V23	2	2	1	270	<1	1	<1	<1	30	300
V24/A	2.5	1	0	<1	<1	<1	<1	<1	<1	<1
V24/B	4	2	0.25	<1	<1	<1	<1	<1	<1	<1
V24-HS	4	–	–	1,200	140	500	340	48	790	3,000
V24/C	3.5	3	0.5	7	<1	<1	<1	<1	2	9
V25	2.5	20	15	4	<1	<1	<1	<1	5	9
V26	2	1	0	33	1	<1	<1	<1	1	35
V27	0	0	0	<1	<1	<1	<1	<1	<1	<1
V27/A	2	15	5	56	<1	<1	<1	<1	1	57
V27/B	4	10	5	540	<1	15	<1	<1	62	620
V28/A	2	2	0.1	120	10	25	42	<1	130	330
V28/B	2.5	1	0.5	73	<1	1	6	<1	26	110

a. Quantification based on V-sec:ppm ratio for pentane (see text). Early peaks from blank data subtracted from sample values.
b. Quantification based on V-sec:ppm ratio for iso-octane (see text).
c. Summation of all detected constituents (see text).
— Indicates not quantifiable.
HS = Headspace sample.

c58/91153/10-89/t5

TABLE 5 (Cont.)

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V29	2.5	1	0	2,800	5	49	<1	<1	670	3,500
V30	2	10	5	29	<1	<1	<1	<1	2	31
V31	2.5	1	0	<1	<1	<1	<1	<1	<1	<1
V32	2.5	1	0	2	<1	<1	<1	<1	<1	2

BLANK DATA

Test Time	Peaks Prior to Benzene (ppm)[a]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After Benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
0848	1	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	1
1144	6	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	6
1355	2	<0.1	<0.1	-	-	-	-	2
1448	33	<0.1	<0.1	<0.5	<0.5	<0.5	14	47
1506	3	<0.1	-	-	-	-	-	3
1658	3	<0.1	<0.1	<0.5	<0.5	<0.5	<0.1	3

PERCENTAGE OF STANDARD RECOVERED

Test Time	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	n-Pentane (ppm)	n-Hexane (ppm)	iso-Octane (ppm)
0859*	100	100	100	100	100	100	100	100
1111**	100	100	100	100	100	100	100	100

c58/91153/10-89/t5

TABLE 6 RESULTS OF SOIL AND GROUNDWATER CONCENTRATIONS IN THE VICINITY OF FORMER CHEVRON SS 9-1153, 3126 FERNSIDE BOULEVARD, ALAMEDA, CALIFORNIA, JUNE 1989

Soil Concentrations (mg/kg = ppm)

Well No.	Date	Depth (feet)	Benzene	Toluene	Ethyl-Benzene	Xylenes	Total Petroleum Hydrocarbons
SB1	6-27-89	1	0.002	<0.001	0.001	0.008	0.43
SB1 (replicate)	6-27-89	1	0.001	<0.001	<0.001	0.008	-
SB1	6-27-89	4.5	18	111	37	149	5,500
SB1	6-27-89	6	1	2.200	0.540	1.930	65
SB1	6-27-89	9.5	0.170	0.460	0.140	0.530	10
SB2	6-27-89	1	0.009	0.024	0.010	0.026	<0.05
SB2 (replicate)	6-27-89	1	-	-	-	-	<0.05
SB2	6-27-89	4	45	230	78	283	1,500
SB2	6-27-89	6	0.470	1.300	0.310	1.120	4.7
SB3	6-27-89	0.5	<0.001	<0.001	<0.001	<0.001	0.07
SB3	6-27-89	3.5	2.400	3.200	5.300	17.8	850
SB4	6-29-89	1	<0.001	<0.001	<0.001	<0.001	<0.05
SB4 (replicate)	6-29-89	1	-	-	-	-	<0.05
SB4	6-29-89	4	<0.001	<0.001	<0.001	<0.001	<0.05
SB4	6-29-89	7	<0.001	<0.001	<0.001	<0.001	<0.05
SB5	6-29-89	0.5	0.019	0.017	0.019	0.153	0.25
SB5 (replicate)	6-29-89	0.5	0.020	0.021	0.023	0.178	-
SB5	6-29-89	4	15	81	30	108	1,700
SB5 (replicate)	6-29-89	4	-	-	-	-	1,600
SB5	6-29-89	6	0.260	1.900	1.400	5.200	470
SB6	6-28-89	3.5	0.026	0.100	0.160	0.370	15
SB7	6-28-89	4	0.002	<0.001	<0.001	<0.001	<0.05
SB7 (replicate)	6-28-89	4	0.002	<0.001	<0.001	<0.001	-
SB8	6-29-89	3	<0.001	<0.001	<0.001	<0.001	<0.05

TABLE 6 (continued)

Groundwater Concentrations (ug/L - ppb)

Well No.	Date		Benzene	Toluene	Ethyl-Benzene	Xylenes	Total Petroleum Hydrocarbons
SB1	6-27-89	Water	52,000	64,000	6,700	23,700	110,000
SB2	6-28-89	Water	30,000	59,000	6,600	26,200	160,000
SB4	6-29-89	Water	<1	<1	<1	<1	<50
SB4 (replicate)	6-29-89	Water	<1	<1	<1	<1	<50
SB5	6-29-89	Water	27,000	22,000	4,600	13,400	110,000
SB6	6-27-89	Water	12,000	7,400	2,500	7,100	74,000
SB7	6-28-89	Water	14,000	6,800	3,300	8,200	50,000
SB8	6-29-89	Water	<1	<1	<1	<1	<50
SB8 (replicate)	6-29-89	Water	-	-	-	-	<50
Rinsate	6-29-89	Water	1	<1	<1	<1	<50

TABLE 2
ANALYTICAL RESULTS FOR SOIL SAMPLES
COLLECTED ON MAY 15, 1992
(Concentration in parts per million)

BORING	SAMPLE ID	SAMPLE DEPTH	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH-AS-GASOLINE
MW-4	MW4A	3	<0.005	<0.005	<0.005	<0.005	<1
MW-5	MW5A	3	<0.005	<0.005	<0.005	<0.005	<1
MW-6	MW6A	3	<0.005	<0.005	<0.005	<0.005	<1

$\overline{TPH}$ = Total petroleum hydrocarbons

PRE-HOUSTON ENVIRONMENTAL REPORTING

DATE: 6/29/87
LOG NO.: 4897
DATE SAMPLED: 6/23/87
DATE RECEIVED: 6/23/87
PAGE: Two

Sample Type: Soil

Method and Constituent	Units	Detection Limit	No. 2, 4000 Gallon Gasoline Tank Concentration	No. 3, 6000 Gallon Gasoline Tank Concentration
Modified EPA Method 8015:				
Volatile Hydrocarbons	mg/kg	0.1	< 0.1	< 0.1
Modified EPA Method 8020:				
Benzene	mg/kg	0.01	< 0.01	< 0.01
Toluene	mg/kg	0.01	< 0.01	0.013
Xylene	mg/kg	0.01	0.092	0.066

Ronald H. Ming Chew
Supervisory Chemist

RHC:mln

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 (415) 783-6960

TAL

DATE: 6/29/87

LOG NO.: 4897

DATE SAMPLED: 6/23/87

DATE RECEIVED: 6/23/87

CUSTOMER: R. L. Stevens Company

REQUESTER: Robert Stevens

PROJECT: European Auto Repair Inc., 1928 High Street, Alameda

Sample Type: Soil

Method and Constituent	Units	Detection Limit	No. 1, 550 Gallon Waste Oil Tank Concentration
Modified EPA Method 8015:			
Extractable Hydrocarbons	mg/kg	0.2	< 0.2

TABLE 1
ANALYTICAL RESULTS OF SOIL SAMPLES
Chevron Service Station No. 9-1153
3126 Fernside Boulevard, Alameda, California
(Results in parts per million)

Date	Sample ID	Sample Depth (ft)	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH-G
11/11/93	TMW-1	5	<0.005	<0.005	<0.005	<0.017	<1
	MW-7	5	1.3	0.67	1.6	4.6	63

TPH-G = Total petroleum hydrocarbons-as-gasoline

TABLE 1
HISTORICAL GROUNDWATER MONITORING AND ANALYTICAL RESULTS
Chevron Service Station No. 9-1153
3126 Fernside Boulevard, Alameda, California

Well ID/ Elev	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
C-1	08/18/86	---	---	---	---	---	4.10	---	---
	09/04/86	15,000	760	820	1,500[1]	---[1]	---	---	---
	07/22/87	1,100	250	7	40[1]	---[1]	---	---	---
	05/03/89	6,900	3,800	190	229[1]	---[1]	4.46	---	---
	12/04/89	17,000	8,000	490	470[1]	---[1]	4.16	---	---
	02/14/90	19,000	12,000	990	1,050[1]	---[1]	3.64	---	---
	03/07/90	---	4,260	261	430[1]	---[1]	3.36	---	---
	09/06/91	21,000	10,000	100	240	560	4.43	0.00[2]	---
	12/15/91	20,000	4,900	43	110	330	4.78	0.00[2]	---
	03/03/92	13,000	5,800	730	340	1,200	2.39	0.00[2]	---
4.08	06/04/92	34,000	9,400	350	290	1,200	4.08	0.00	0.00
	10/13/92	24,000	11,000	98	280	530	4.75	0.00	-0.67
	01/11/93	7,100	1,500	130	150	700	2.26	Sheen	1.82
	04/14/93	29,000	7,300	4,000	640	2,300	2.90	Sheen	1.18
	07/13/93	650,000	27,000	18,000	6,300	29,000	3.97	Sheen	0.11
	10/19/93	40,000	12,000	730	1,100	3,600	4.50	0.00	-0.42
7.50	11/30/93	---	---	---	---	---	4.27	0.00	3.23
	01/27/94	36,000	8,600	220	670	1,900	3.35	0.00	4.15
	04/07/94	53,000	12,000	3,500	480	3,300	3.42	0.00	4.08
	07/01/94	65,000	19,000	5,900	1,000	9,000	3.96	0.00	3.54
C-2	08/18/86	---	---	---	---	---	---	---	---
	09/04/86	1,100	49	18	84[1]	---[1]	---	---	---
	07/22/87	<50	1.8	<1.0	<4.0[1]	---[1]	---	---	---
	05/03/89	Abandoned	---	---	---	---	---	---	---

TABLE 1
HISTORICAL GROUNDWATER MONITORING AND ANALYTICAL RESULTS
Chevron Service Station No. 9-1153
3126 Fernside Boulevard, Alameda, California

Well ID/ Elev	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
C-3	08/18/86	---	---	---	---	---	4.00	---	---
	09/04/86	50	3.2	5.4	5.8[1]	---[1]	---	---	---
	07/22/87	<50	<0.5	<1.0	<4.0[1]	---[1]	---	---	---
	05/03/89	<50	<0.5	<1.0	<2.0[1]	---[1]	4.15	---	---
	12/04/89	<250	<0.5	<0.5	<0.5[1]	---[1]	4.24	---	---
	02/14/90	<50	<0.5	<0.5	<0.5[1]	---[1]	3.57	---	---
	03/07/90	NA	<5	<5	<5[1]	---[1]	3.31	---	---
	09/06/91	<50	<0.5	<0.5	<0.5	<0.5	4.59	0.00[2]	---
	12/15/91	<50	<0.5	<0.5	<0.5	<0.5	4.84	0.00[2]	---
	03/03/92	<50	<0.5	<0.5	<0.5	<0.5	2.17	0.00[2]	---
4.41	06/04/92	<50	<0.5	<0.5	<0.5	<0.5	4.01	0.00	0.40
	10/13/92	<50	<0.5	<0.5	<0.5	<0.5	4.79	0.00	-0.38
	01/11/93	<50	<0.5	<0.5	<0.5	<0.5	2.01	0.00	2.40
	04/14/93	<50	<0.5	<0.5	<0.5	<0.5	2.76	0.00	1.65
	07/13/93	<50	<0.5	<0.5	<0.5	<1.5	3.96	0.00	0.45
	10/19/93	66	12	1.4	1.0	8.4	4.53	0.00	-0.12
7.83	11/30/93	---	---	---	---	---	4.04	0.00	3.79
	01/27/94	<50	<0.5	<0.5	<0.5	<0.5	3.17	0.00	4.66
	04/07/94	<50	<0.5	<0.5	<0.5	<0.5	3.20	0.00	4.63
	07/01/94	<50	<0.5	<0.5	<0.5	<0.5	3.99	0.00	3.84
MW-4	06/04/92	<50	0.8	<0.5	<0.5	<0.5	3.63	0.00	-0.05
3.58	10/13/92	---	---	---	---	---	---	---	---
	01/11/93	<50	<0.5	<0.5	<0.5	<0.5	1.89	0.00	1.69
	04/14/93	<50	<0.5	<0.5	<0.5	<1.5	2.20	0.00	1.38
	07/13/93	54	2.6	1.6	<0.5	<1.5	3.51	0.00	0.07
	10/19/93	<50	<0.5	<0.5	<0.5	<0.5	4.22	0.00	-0.64
7.01	11/30/93	---	---	---	---	---	4.01	0.00	3.00
	01/27/94	<50	<0.5	<0.5	<0.5	<0.5	2.89	0.00	4.12
	04/07/94	<50	<0.5	<0.5	<0.5	<0.5	3.06	0.00	3.95
	07/01/94	<50	<0.5	<0.5	<0.5	<0.5	3.59	0.00	3.42

TABLE 1
HISTORICAL GROUNDWATER MONITORING AND ANALYTICAL RESULTS
Chevron Service Station No. 9-1153
3126 Fernside Boulevard, Alameda, California

Well ID/ Elev	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
MW-5	06/04/92	560	110	0.5	37	2.2	3.25	0.00	0.36
3.61	10/13/92	1,200	150	<2.5	84	8.6	4.20	0.00	-0.59
	01/11/93	1,300	48	1.0	83	33	1.30	0.00	2.31
	04/14/93	2,600	240	6.1	250	170	1.20	0.00	2.41
	07/13/93	1,700	260	7.8	160	100	3.15	0.00	0.46
	10/19/93	1,900	190	3.3	200	93	3.82	0.00	-0.21
7.04	11/30/94	---	---	---	---	---	3.56	0.00	3.48
	01/27/94	4,000	100	12	210	110	2.42	0.00	4.62
	04/07/94	2,600	170	10	150	88	2.33	0.00	4.71
	07/01/94	2,300	350	9.1	110	76	3.18	0.00	3.86
MW-6	06/04/92	210	54	<0.5	1.9	2.4	3.89	0.00	-0.04
3.85	10/13/92	*10,000	5,300	<10	70	<10	4.56	0.00	-0.71
	01/11/93	100	50	<0.5	<0.5	<0.5	2.36	0.00	1.49
	04/14/93	<50	<0.5	<0.5	<0.5	<0.5	3.15	0.00	0.70
	07/13/93	<50	1.8	<0.5	<0.5	<1.5	3.94	0.00	-0.09
	10/19/93	320	150	<0.5	0.8	0.5	4.40	0.00	-0.55
7.27	11/30/94	---	---	---	---	---	4.16	0.00	3.11
	01/27/94	120	45	<0.5	<0.5	<0.5	3.33	0.00	3.94
	04/07/94	<50	<0.5	<0.5	<0.5	<0.5	3.43	0.00	3.84
	07/01/94	<50	<0.5	<0.5	<0.5	<0.5	3.94	0.00	3.33

TABLE 1
HISTORICAL GROUNDWATER MONITORING AND ANALYTICAL RESULTS
Chevron Service Station No. 9-1153
3126 Fernside Boulevard, Alameda, California

Well ID/ Elev	Date	TPH-G	Benzene	Toluene	Ethyl-benzene	Xylenes	DTW (ft)	SPT (ft)	WTE (ft)
MW-7	11/30/93	480	110	41	4.4	38	5.33	0.00	2.89
8.22	01/27/94	120	21	1.1	2.2	4.8	4.50	0.00	3.72
	04/07/94	2,600	630	39	56	94	4.62	0.00	3.60
	07/01/94	2,200	770	42	<10	92	5.13	0.00	3.09
TMW-1	11/11/93	<1	<0.5	<0.5	<0.5	<0.5	---	0.00	---

TBLB	02/14/90	<50	<0.5	1.1	<0.5	<0.5	---	---	---
	09/06/91	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	12/15/91	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	03/03/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	06/04/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	10/13/92	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	01/11/93	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	04/14/93	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	07/13/93	<50	<0.5	<0.5	<0.5	<1.5	---	---	---
	10/19/93	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	01/27/94	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	04/07/94	<50	<0.5	<0.5	<0.5	<0.5	---	---	---
	07/01/94	<50	<0.5	<0.5	<0.5	<0.5	---	---	---

TPH-G = Total petroleum hydrocarbons-as-gasoline
DTW = Depth to water
SPT = Separate-phase hydrocarbon thickness
WTE = Groundwater elevation in feet above mean sea level
--- = Not applicable/not sampled/not measured
* = Gasoline range concentration reported. The chromatogram shows only a single peak in the gasoline range.
1 = Ethylbenzene and xylenes were reported together.
2 = Product thickness was measured with an MMC flexi-dip interface probe.

Before June 4, 1992, the top-of-casing elevations were unknown.
Analytical results are in micrograms per liter or parts per billion.

GROUNDWATER TECHNOLOGY ®

Table 1. Performance Summary, Chevron Service Station #9-1153, 3126 Fernside Drive, Alameda, California

DATE SAMPLED	TOTAL FLOW (gallons)	FLOW BETWEEN READINGS	DAYS BETWEEN READINGS	AVERAGE FLOW (gpm)	NOTES
10/03/91 a	659	0	0	-	
10/07/91	821	162	4	0.03	
10/18/91	1,051	230	11	0.01	
10/28/91	2,017	966	10	0.07	
11/05/91	2,698	681	8	0.06	
11/15/91	3,546	848	10	0.06	
11/21/91	4,234	688	6	0.08	
12/05/91	5,130	896	14	0.04	
01/06/92	7,788	2,658	32	0.06	
01/28/92	8,961	1,173	22	0.04	
02/10/92	10,597	1,636	13	0.09	
02/18/92	15,181	4,584	8	0.40	
03/06/92	18,157	2,976	17	0.12	
03/13/92	18,991	834	7	0.08	
03/18/92	NM	NM	5	-	
03/24/92	21,042	2,051	6	0.24	
04/29/92	25,392	4,350	36	0.08	
05/12/92	29,862	4,470	13	0.24	
06/09/92	36,730	6,868	28	0.17	
07/14/92	39,950	3,220	35	0.06	
08/11/92	41,880	1,930	28	0.05	
09/09/92	44,043	2,163	29	0.05	
10/07/92	45,840	1,797	28	0.04	
11/10/92	48,742	2,902	34	0.06	
12/30/92	55,797	7,055	50	0.10	
01/12/93	59,091	3,294	13	0.18	
02/10/93	66,506	7,415	29	0.18	
03/09/93	70,412	3,906	27	0.10	
04/22/93	75,176	4,764	44	0.08	
05/10/93	76,443	1,267	18	0.05	
06/21/93	76,460	17	42	0.00	Discharge line found clogged. Cleaned and restarted
07/14/93	78,552	2,092	23	0.06	Pressure regulator repaired. System operational
08/19/93	79,848	1,296	36	0.03	
09/09/93	80,514	666	21	0.02	Carbon drum #1 changed out.
09/17/93	80,722	208	8	0.02	
10/15/93	81,160	438	28	0.01	
10/19/93	81,242	82	4	0.01	Autodialer installed.
10/28/93	82,019	777	9	0.06	Autodialer indicated system off on 11/29/93.
12/07/93	84,316	2,297	40	0.04	System operational when inspected.
03/22/94	94,022	9,706	105	0.06	
04/13/94	95,922	1,900	22	0.06	
04/26/94	97,331	1,409	13	0.08	
05/31/94	99,850	2,519	35	0.05	System shut off indefinitely.

Notes:
a = Values for 10/3/91 thru 2/18/92 based on data collected by EA Engineering, Science, and Technology, Lafayette, CA
gpm = gallons per minute

Table 2. Summary of Analytic Results, Chevron Service Station #9-1153, 3126 Fernside Drive, Alameda, California

		SYSTEM INFLUENT					SYSTEM MIDPOINT First Carbon Effulent					SYSTEM EFFLUENT Second Carbon Effluent				
DATE SAMPLED	LAB	TPH-G	B	E	T	X	TPH-G	B	E	T	X	TPH-G	B	E	T	X
		<----------parts per billion (ppb)---------->														
10/03/91 a	SPA	47,000	7,100	1,300	4,100	4,900	<50	2.1	0.5	1.3	1.7	<50	<0.5	<0.5	<0.5	<0.5
10/07/91	SPA	29,000	57,000	1,000	4,100	4,800	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
10/18/91	SPA	40,000	4,600	660	2,300	2,700	<50	<1	<3	<3	<3	<50	<1	<3	<3	<3
10/28/91	SPA	9,500	900	190	790	1,000	<50	<0.5	<0.5	1.4	<0.5	<50	<0.5	<0.5	1.4	<0.5
11/05/91	SPA	14,000	2,700	330	1,600	1,500	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
11/15/91	SPA	12,000	3,700	300	1,700	1,300	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
11/21/91	SPA	15,000	4,000	360	2,600	1,800	NA	NA	NA	NA	NA	<50	<0.5	<0.5	<0.5	<0.5
12/05/91	SPA	15,000	3,200	290	1,800	1,400	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
01/06/92	SPA	2,000	340	35	190	170	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
01/28/92	SPA	5,300	1,600	100	730	490	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
02/10/92	SPA	27,000	8,700	520	2,800	1,500	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
02/18/92	SPA	22,000	5,700	420	2,800	1,500	88	25	1.5	11	5.6	<50	<0.5	<0.5	<0.5	<0.5
03/06/92	SPA	16,000	2,700	150	940	640	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
03/13/92	SPA	33,000	9,200	520	4,300	2,600	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
03/18/92	SPA	42,000	17,000	720	5,200	2,700	<50	1.4	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
03/24/92	SPA	5,800	5,500	250	1,600	870	<50	1.0	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
04/29/92	SPA	24,000	3,400	260	1,300	1,100	<50	0.7	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
05/12/92	SPA	11,000	1,400	120	600	680	<50	1.2	0.6	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
06/09/92	SPA	48,000	8,600	820	4,500	3,700	<50	1.0	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
07/14/92	SPA	66,000	9,900	1,300	7,400	6,800	<50	0.9	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
08/11/92	SPA	85,000	11,000	1,600	7,500	7,400	<50	1.3	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
09/09/92	SPA	3,400	840	<5	34	220	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
10/07/92	SPA	52,000	9,100	1,100	4,800	5,000	51	2.1	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
11/07/92	SPA	60,000	13,000	920	5,000	4,500	59	3.9	<0.5	0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
12/30/92	SPA	17,000	1,600	150	800	1,200	78	14	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5

-- Table 2 continues on next page --

Table 2. Summary of Analytic Results, Chevron Service Station #9-1153, 3126 Fernside Drive, Alameda, California (continued)

DATE SAMPLED	LAB	SYSTEM INFLUENT TPH-G	B	E	T	X	SYSTEM MIDPOINT First Carbon Effulent TPH-G	B	E	T	X	SYSTEM EFFLUENT Second Carbon Effluent TPH-G	B	E	T	X
		parts per billion (ppb)														
01/19/93	SPA	110,000	16,000	1,300	12,000	6,000	99	25	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
02/10/93	SPA	89,000	6,900	1,300	11,000	7,700	150	32	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
03/09/93	SPA	110,000	18,000	570	13,000	6,500	220	57	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<0.5
04/22/93	SPA	190,000	17,000	2,700	20,000	14,000	910	180	18	22	4.9	<50	<0.5	<0.5	<0.5	<1.5
05/10/93	SPA	150,000	19,000	2,500	18,000	14,000	440	180	<0.5	0.9	<1.5	<50	<0.5	<0.5	<0.5	<1.5
06/21/93	SPA	58,000	7,500	1,800	15,000	11,000	510	160	<0.5	1.2	2.1	<50	<0.5	<0.5	<0.5	<1.5
07/14/93	SPA	67,000	6,600	1,700	7,800	14,000	400	250	<0.5	1.8	<1.5	<50	<0.5	<0.5	<0.5	<1.5
08/19/93	SPA	82,000	8,400	1,200	4,300	9,000	640	210	<0.5	1.2	<1.5	<50	<0.5	<0.5	<0.5	<1.5
09/17/93	SPA	53,000	6,700	940	3,000	6,200	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5	<0.5	<0.5	<1.5
03/22/94	SPA	71,000	17,000	1,100	10,000	6,100	<50	1.6	<0.5	0.6	<0.5	<50	<0.5	<0.5	<0.5	<0.5

Abbreviations:
a = Values for 10/3/91 thru 2/18/92 based on data collected by EA Engineering, science, and Technology, Lafayette, CA
NA = Not Available
TPH-G = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
B = Benzene By EPA Method 8020
E = Ethlybenzene by EPA Method 8020
T = Tolueneby EPA Method 8020
X = Xylenes by EPA Method 8020
<n = Not detected at detection limit of n ppb
SPA = Superior Precision Analytical Lab, San Francisco, California

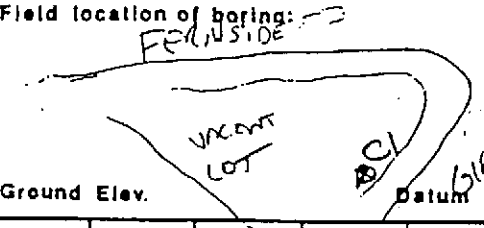
LOG OF EXPLORATORY BORING

EMCON ASSOCIATES

PROJECT No. 900715.01 DATE 8-18-86
CLIENT GR CHEVRON
LOCATION ALAMEDA
LOGGED BY ECL DRILLER BAYLAND

BORING No. G1
Sheet 1 of 1

Field location of boring:



Ground Elev. Datum

Drilling method H-S AUGER
Hole dia. 8"

Casing installation data 3" PVC SLOTTED CASING INSTALLED FROM 22 TO 2 FEET; SOLID TO SURFACE; SAND PACK TO 16"; BENTONITE TO 14"; CONCRETE TO SURFACE.

Water level	4.8'	4.1'		
Time	13.05	16.06		
Date	8-18-86	8-18-86		

Pocket Torr vane TSF	Pocket Penetrometer TSF	Blows/ft. or Pressure PSI	Type of Sample	Sample Number	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
					2		SW	SAND FILL; BROWN (10YR, 5/3); 10-20% FINES; 70-80% FINE SAND; 10-20% MED SAND TO FINE GRAVEL; LOOSE; DRY; NPO.
							SP	
		4/4/4	DR-L	(1)	4			@ 1½ FEET; STRONG GAS ODOR.
	2.5		100%				SC	SAND; DARK GRAY (2.5Y, N4); 5-10% FINES; FINE SAND; LOOSE; WET; STRONG GAS ODOR.
					6			
					8			CLAYEY SAND; DARK GRAY (2.5Y, N4); 30-40% FINES; FINE SAND; VERY STIFF; WET; STRONG GAS ODOR.
	3.0	4/8/16	DR-L	(2)	10			@ 9-10½ FT; DARK GRAYISH BROWN (2.5Y 4/2); FAINT GAS ODOR
			100%		12			
					14		SP	SAND; OLIVE BROWN; (2.5Y, 4/4); 5-10% FINES; 80-90% FINE SAND; 5-10% MEDIUM SAND; MEDIUM DENSE; WET; NO GAS ODOR
		7/12/18	DR-L	(3)	16			
			100%					
					18			
		12/29/30	DR-L	(4)	20			@ 19-20½ FEET; 5% COARSE SAND TO FINE GRAVEL; VERY DENSE; NPO.
			100%					
		10/12/17	DR-L	(5)	22		SC	CLAYEY SAND; GRAYISH BROWN (2.5Y, 5/2); 25-35% FINES TO 50% FINE SAND; VERY STIFF; WET; NPO.
	3.0		100%				CL	
								BOTTOM OF BORING AT 22½ FEET.

PRELIMINARY

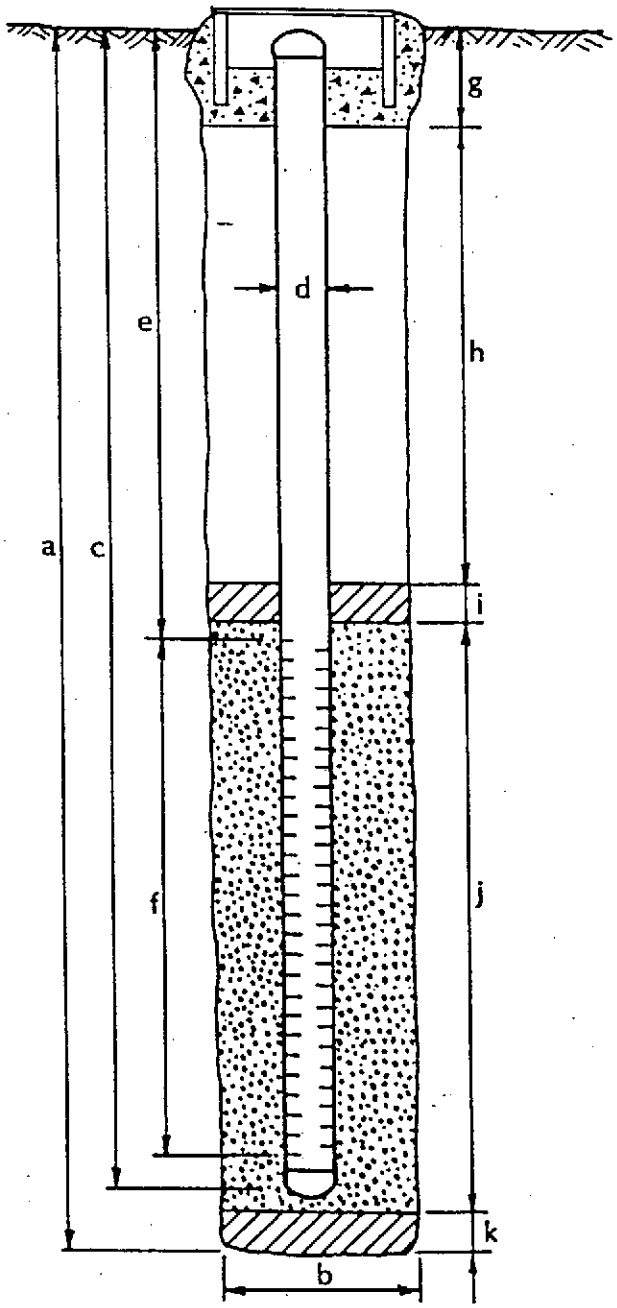
WELL DETAILS

PROJECT NUMBER 800-75.01
PROJECT NAME G-R (Hayward)
COUNTY ALAMEDA
WELL PERMIT NO. _____

BORING / WELL NO. C-1
TOP OF CASING ELEV. _____
GROUND SURFACE ELEV. 7'± MSL
DATUM USGS

DRAFT

G-5 vault box (Std.)



EXPLORATORY BORING

a. Total depth 22½ ft.
b. Diameter 8" in.
Drilling method Hollow-Stem Auger

WELL CONSTRUCTION

c. Casing length 22 ft.
Material Schedule 40 PVC
d. Diameter 3 in.
e. Depth to top perforations 2 ft.
f. Perforated length 20 ft.
Perforated interval from 22 to 2 ft.
Perforation type Machined Slot
Perforation size .020 inch
g. Surface seal 1.2 ft.
Seal material Cement Grout
h. Backfill 0 ft.
Backfill material _____
i. Seal 0.3 ft.
Seal material Bentonite
j. Gravel pack (22 to 1.5 feet) 20.5 ft.
Pack material Coarse Aggregate sand
k. Bottom seal 1.5 ft.
Seal material Bentonite

PLATE

LOG O. EXPLORATORY BORING

EMCON ASSOCIATES

PROJECT NO. [illegible] DATE 8-18-86

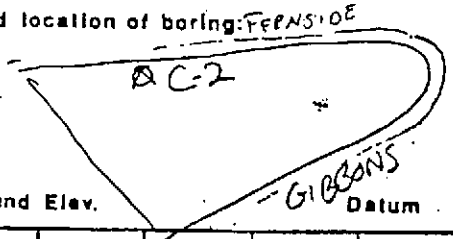
CLIENT GR CHEVRON

LOCATION ALAMEDA

LOGGED BY EBL DRILLER BAYLAND

BORING NO. G-2 Sheet 1 of 1

Field location of boring: FERNSIDE



Ground Elev. Datum

Drilling method HS AUGER

Hole dia. 8"

Casing installation data 3" PVC SLOTTED CASING INSTALLED FROM 22 TO 2 FEET; SOLID CASING FROM 2 FEET TO SURFACE. SAND PACK TO 16"; BENTONITE TO 14"; CONCRETE TO SURFACE.

Water level	4.1'			
Time	16:04			
Date	8-18-86			

Pocket Torr vane TSF	Pocket Penetrometer TSF	Blows/ft. or Pressure PSI	Type of Sample	Sample Number	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
					2		SW	SAND-FILL; OLIVE GRAY; (5Y, 4/2); 10-20% FINES; 55-65% FINE SAND; 10-20% MED TO COARSE SAND; 10-20% FINE TO COARSE GRAVEL LOOSE; MOIST; NO PRODUCT ODOR.
		1/1/1	DR-L 33%	(1)	4		SM	SILTY SAND; VERY DARK GRAY (25Y, N2); 15-25% FINES 70-80% FINE SAND; LOOSE; WET; SLIGHT GAS ODOR
					6			
					8		SC	
	1.0	3/6/5	DR-L 100%	(2)	10			CLAYEY SAND; OLIVE GRAY (5Y, 4/2); 30-40% FINES FINE SAND; STIFF; WET; NO PRODUCT ODOR
					12			
		7/18/19	DR-L 100%	(3)	14		SP	SAND; OLIVE BROWN (25Y, 4/4); 5-10% FINES; 80-90% FINE SAND; 5-10% MEDIUM SAND; DENSE; WET; NO PRODUCT ODOR.
					16			
					18			
					20			@ 20½-22 FEET; 10-15% FINES; MEDIUM DENSE TO DENSE; NO PRODUCT ODOR.
		15/15/15	DR-L 100%	(4)	22			BOTTOM OF BORING AT 22 FEET
					24			
					26			
					28			
					30			

PRELIMINARY

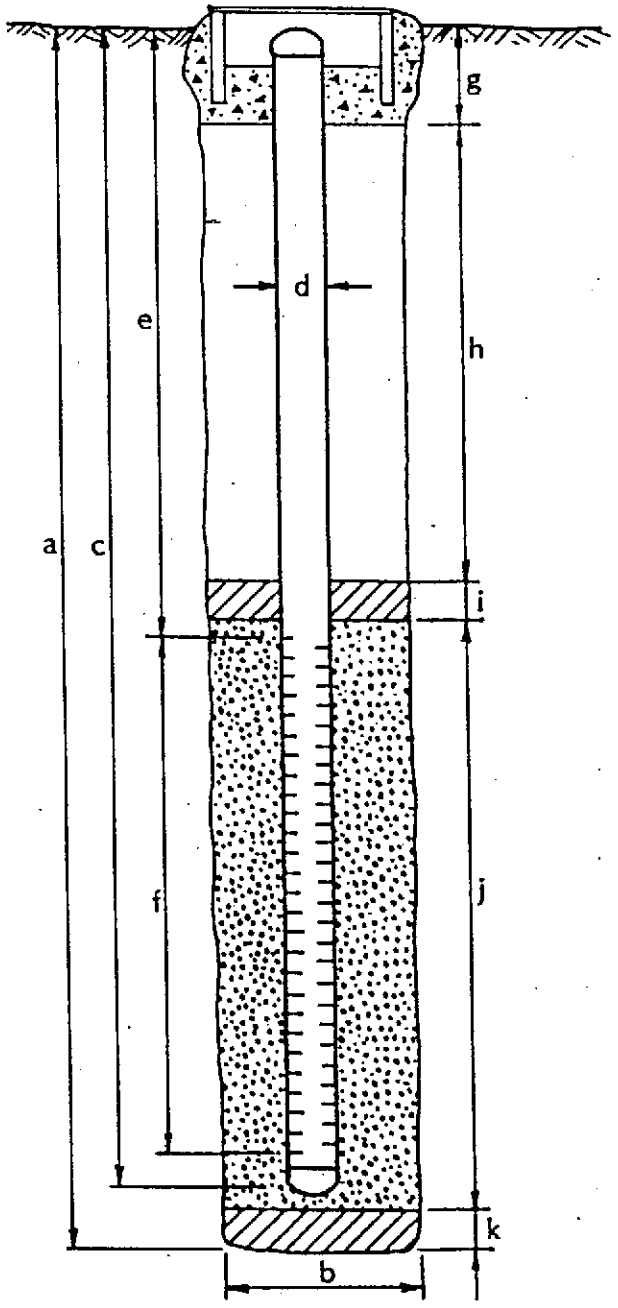
WELL DETAILS

PROJECT NUMBER 800-75.01
PROJECT NAME GR CHEVRON
COUNTY ALAMEDA
WELL PERMIT NO.

BORING / WELL NO. C-2
TOP OF CASING ELEV.
GROUND SURFACE ELEV. 7'± MSL
DATUM USGS

G-5 vault box (Std.)

DRAFT



EXPLORATORY BORING

a. Total depth 22 ft.
b. Diameter 8 in.
Drilling method Hollow Stem Auger

WELL CONSTRUCTION

c. Casing length 22 ft.
Material Schedule 40 PVC
d. Diameter 3 in.
e. Depth to top perforations 2 ft.
f. Perforated length 20 ft.
Perforated interval from 22 to 2 ft.
Perforation type Machined Slot
Perforation size .020 inch
g. Surface seal 1.2 ft.
Seal material Cement Grout
h. Backfill -0- ft.
Backfill material
i. Seal 0.3 ft.
Seal material Bentonite
j. Gravel pack (22 + 0 1.5 Feet) 20.5 ft.
Pack material Coarse Aggregate Sand
k. Bottom seal -0- ft.
Seal material

PLATE

LOG OF EXPLORATORY BORING

EMCON ASSOCIATES

PROJECT No. 800-75.01 DATE 6-18-86
CLIENT GL CHEMICON
LOCATION ALAMEDA
LOGGED BY EBL DRILLER BAYLAND

BORING No. C-3
Sheet 1 of 1

Field location of boring: SIDE

Ground Elev. Datum

Drilling method H-S. AUGER
Hole dia. 8"

Casing installation data 3" PVC SLOTTED CASING INSTALLED FROM 22 TO 2 FEET; SOLID PVC FROM 2 FEET TO SURFACE; SAND PACK FROM 22' TO 18"; BENTONITE FROM 18" TO 14"; CONCRETE FROM 14" TO SURFACE.

Water level	4.0'			
Time	1676			
Date	8-18-86			

Pocket Torvane TSF	Pocket Penetrometer TSF	Blows/ft. or Pressure PSI	Type of Sample	Sample Number	Depth	Sample	Soil Group Symbol (U.S.C.S.)	DESCRIPTION
					2		SM	SAND-FILL; OLIVE GRAY (5Y, 4/2); 10-20% FINES - 60-70% FINE SAND; 10-20% MEDIUM TO COARSE SAND; 10-20% FINE TO COARSE GRAVEL; CONCRETE FRAGMENTS; LOOSE; DRY TO MOIST; FAINT GAS ODOR.
		2/5/7	IR-L 20%	(1)	4		SP	SAND; VERY PALE GREENISH BROWN (10YR, 3/2); 5-10% FINES; FINE SAND; 10-20% MEDIUM TO COARSE SAND; LOOSE; MOIST; NO PRODUCT ODOR
					6			
					8		SC	
	2.0	5/8/11	IR-L 100%	(2)	10			CLAYEY SAND; GRAYISH BROWN (10YR, 5/2); 40-50% FINES; FINE SAND; STIFF; WET; NO PRODUCT ODOR; ROOT FRAGMENTS AND HOLES.
					12			
		9/25/35	IR-L 100%	(3)	14		SP	SAND; BROWN (10YR, 4/3); 5-10% FINES; FINE SAND; 5-10% MEDIUM SAND; DENSE; WET; NO PRODUCT ODOR.
	3.0				16		SC	
					18		SP	CLAYEY SAND; BROWN (10YR, 5/3); 25-35% FINES; FINE SAND; VERY STIFF; WET; NO PRODUCT ODOR.
					20			
		12/14/12	DRL 100%	(4)	22		SC	SAND; BROWN (10YR, 4/3); > 10% FINES; 80-90% FINE SAND; MEDIUM DENSE; WET; NPD
	1.5				24			CLAYEY SAND; DARK GRAY (2.5Y, N4); 35-45% FINES; FINE SAND; STIFF; WET; NPD
					26			
					28			BOTTOM OF BORING AT 22 FEET
					30			

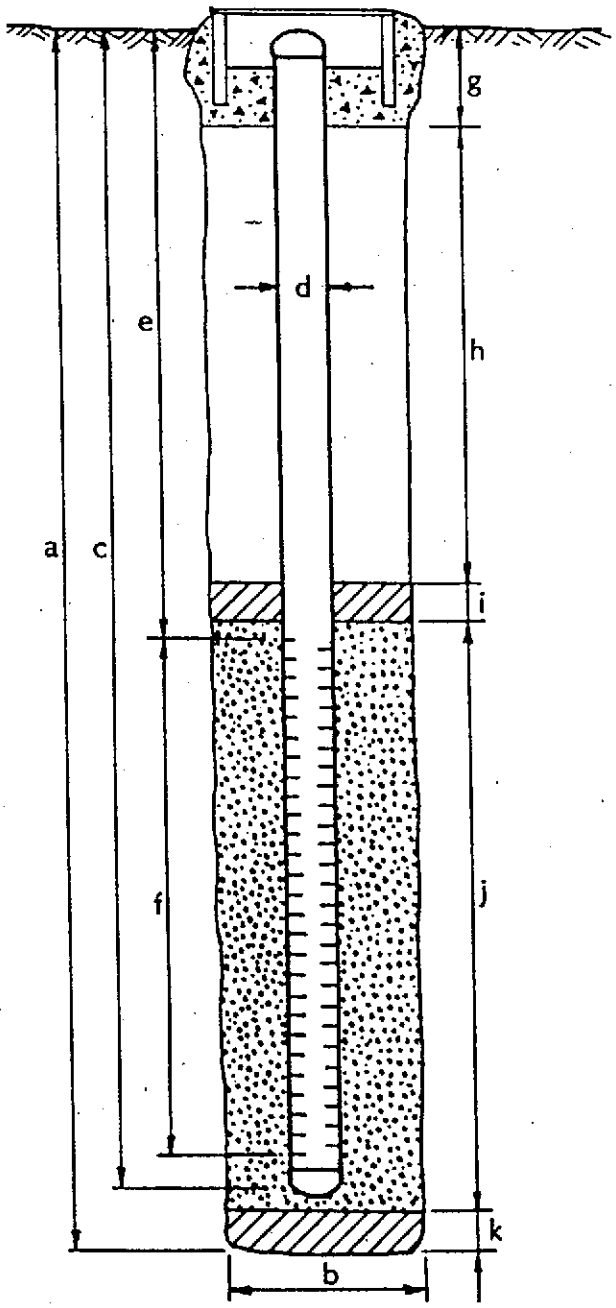
PRELIMINARY

WELL DETAILS

PROJECT NUMBER 800-75.01
PROJECT NAME GR CHEVRON
COUNTY ALAMEDA
WELL PERMIT NO.

BORING / WELL NO. C-3
TOP OF CASING ELEV.
GROUND SURFACE ELEV. 7'± MSL
DATUM USGS

G-5 vault box (Std.)



DRAFT

EXPLORATORY BORING

a. Total depth 22 ft.
b. Diameter 8 in.
Drilling method HOLLOW-STEM AUGER

WELL CONSTRUCTION

c. Casing length 22 ft.
Material SCHEDULE 40 PVC
d. Diameter 3 in.
e. Depth to top perforations 2 ft.
f. Perforated length 20 ft.
Perforated interval from 22 to 2 ft.
Perforation type MACHINED SLOT
Perforation size .020 INCH
g. Surface seal 1.2 ft.
Seal material CEMENT GROUT
h. Backfill 0 ft.
Backfill material
i. Seal 0.3 ft.
Seal material BENTONITE
j. Gravel pack (22 to 1.5 FEET) 20.5 ft.
Pack material COARSE AQUARIUM SAND
k. Bottom seal .0 ft.
Seal material

PLATE

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING SB1

Coordinates:

Elevation top of casing:

Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 10:30	TIME 12:00
DATE				DATE 06/27/89	DATE 06/27/89
REFERENCE					

SURFACE CONDITIONS: Flower bed at southeast corner of the site.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			1.5		0	SP	Gravelly Sand. Dark yellowish brown (10YR 4/2), moist, poorly graded, trace rootlets and organic material - bits of bark, etc., engineered fill, no odor.
			649		1	CL	Silty Clay. Olive gray (5YR 4/1), damp, parting perp. to ground surface, parting surfaces have dark iron staining, abundant rootlets, strong product odor.
			567		2	SP	
			98		3	CL	
			449				
			519		4	SP	Sand. Dusky brown (5YR 2/2), moist, very fine to medium grained, poorly graded, very strong product odor. Sand becomes dark yellowish brown by 2.5ft., strong product odor.
			277				Clay as above in top portion of sample.
			461		5		
			534		6	SP	Same sand as above.
			470		7		
			909		8		
					9	SP	Sand as above, saturated.
			16		10		
			39		11		GLOBULES OF PRODUCT ON WATER WHEN SAMPLED.
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING **SB2**

Coordinates:

Elevation top of casing:
Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL		2.8			
TIME		15:30		TIME 12:25	TIME 13:20
DATE		6/28/89		DATE 06/27/89	DATE 06/27/89
REFERENCE		Grnd.			

SURFACE CONDITIONS: Garden area west of the garage on south side of the house.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0	SP	Gravel and Sand Fill.
			89		1	SP	Sand. Dark yellowish brown (10YR 4/2), saturated, fine to medium grained, poorly sorted, possible product odor.
			25		2		
			716		3	SP	Interbedded Sand and Clay. Sand is dusky brown (5YR 2/2), very fine to medium grained, saturated, area of dark yellowish brown sand that is well sorted. Clay is medium gray (N5), slight to moderate plasticity, very strong product odor, high OVM readings came from both sand and clay.
			624		4		
			517		5		Sand. Olive gray (5YR 3/2) to grayish black (N2), saturated, very fine grained to medium grained, as above, very strong product odor.
			618		6	SP	Same Sand as above.
			658		7		As above.
			457		8	SP	
					9	SP	Rock at 9.5 ft. prevented further boring.
			365		10		
			286		11		SHEEN ON WATER SAMPLED.
			392		12		
			347		13		
			356		14		
			441		15		
					16		
					17		
					18		
					19		
					20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING **SB3**

Coordinates:

Elevation top of casing:

Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 14:35	TIME 15:15
DATE					
REFERENCE				DATE 06/27/89	DATE 06/27/89

SURFACE CONDITIONS: Beside sidewalk and walkway to house entrance on south end of house.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0		SP
			9		1		
			10		2		SP
			931		3		
			856		4		SP
			790		5		
			968		6		
			888		7		
			506		8		
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

Sand. Dark to dusky yellowish brown (10YR 4/2 to 10YR 2/2), saturated, poorly sorted, very fine grained to medium grained, mild product odor.

Sand (as above) except olive gray (5YR 4/1).

As above.

AUGER REFUSAL

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING SB4

Coordinates:

Elevation top of casing:
Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 11:55	TIME 14:25
DATE					
REFERENCE				DATE 06/29/89	DATE 06/29/89

SURFACE CONDITIONS: Located at the northernmost corner of the site

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0	SP	Gravelly, Sandy Fill.
			0		1	SP	Sand. Dark yellowish brown (10YR 4/2), damp, very fine grained to medium grained, no odor.
					2		As above.
			0		3		
			0		4	SP	
					5		As above, but mottled dark yellowish brown (10YR 6/6) and light olive gray (5YR 5/2).
			0		6		
			0		7 ▽	SP	As above, but saturated.
			0		8		
			0		9	SP	As above.
					10		As above.
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING SB5

Coordinates:

Elevation top of casing:
Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 14:30	TIME 16:20
DATE					
REFERENCE				DATE 06/29/89	DATE 06/29/89

SURFACE CONDITIONS: Northeast of the house between the garage and the wall.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0	SP	Sandy Fill.
			41				
			263		1	CL	Clay. Olive gray (5YR 3/2), damp, moderately plastic, strong organic (product?) odor.
			254				
			136		2	SP	Sand. Dusky yellowish brown (10YR 2/2), very fine grained to medium grained, poorly sorted, strong product odor.
			162		3		As above, except moist, very strong organic and product odor.
			669				
			730		4	SP	As above, except moist.
			697		5		Sand. Light olive gray, wet.
			438		6		As above, except mottled dark yellowish brown (10YR 6/6) and light olive gray (5YR 5/2), increase in silt/clay.
			486		7	SP	
			523				
			201		8		
			9		9	SP	As above.
			10		10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING SB6

Coordinates:

Elevation top of casing:

Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 10:30	TIME 13:15
DATE					
REFERENCE				DATE 06/08/89	DATE 06/08/89

SURFACE CONDITIONS: In asphalt at center line on Gibbons Drive, southeast of site.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0		Asphalt.
			185		1	SC	Soil with wood.
			225				Sand. Dark yellowish brown (10YR 4/2), moist, very fine grained to medium grained, poorly sorted, wood fibers in upper sample of upper sample tube, very strong product odor.
			343		2	SP	
			150		3		As above, except color change to olive gray (5YR 4/1).
			125				
			585		4	SP	As above, except saturated. Sample had obvious product in it, sheen was apparent throughout, trace clay, strong product odor.
			614		5		
			90		6		As above except increase in clay. Mottled dark yellowish brown (10YR 6/6) and light olive gray (5YR 5/2).
			38				
			6		7	SP	As above except decrease in clay.
			5		8		
			10		9	SP	As above except decrease in clay.
			7		10		
					11		WATER SAMPLE WAS 'VISCOUS' AND TURBID- PROBABLY HAD PRODUCT IN IT. BAILER INTO TSP CLEANER CREATED SHEEN ON WATER.
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

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LOG OF SOIL BORING **SB7**

Coordinates:

Elevation top of casing:
Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL					
TIME				TIME 13:55	TIME 16:00
DATE				DATE 06/28/89	DATE 06/28/89
REFERENCE					

SURFACE CONDITIONS: In asphalt on center line of Gibbons Drive, south of site.

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
					0		Asphalt.
			300		1	SP	
			310				Sand. Olive gray (5YR 3/2), moist, very fine grained to medium grained, poorly sorted, moderate product odor.
			111		2		
			110				Sand. As above except slightly lighter.
			60		3		
			59		4	SP	
			81				Sand. As above except saturated and strong product odor.
			76		5	SP	
			243				Sand. As above except mottled dark olive gray (10YR 6/6) and light olive gray (5YR 5/2), moderate to strong product odor.
			221		6		
			255				As above, possible product odor.
			123		7	SP	
			89				
			68		8		As above, possible product odor.
			5.3				
			8.8		9	SP	As above, possible product odor.
			4				
			3		10		As above.
			3.7				
			4		11		WATER SAMPLE WAS 'VISCOUS'.
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

LOG OF SOIL BORING **SB8**

Coordinates:

Elevation top of casing:

Casing below surface:

CLIENT	SITE NUMBER	LOCATION
Chevron	SS 9-1153	3126 Fernside Drive Alameda, CA.

DRILLING AND SAMPLING METHODS: Sampled using hand-driven modified California Split Spoon Sampler with 1.5" diam. brass liners. Starting at 5ft borehole was hand augered to 4" diam. and sampling was hand taken with 1.5" diam. brass liner from the soil cuttings.

				DRILLING START	DRILLING FINISH
WATER LEVEL		5.2			
TIME		10:55		TIME 09:15	TIME 10:50
DATE		06/29/89		DATE 06/29/89	DATE 06/29/89
REFERENCE					

SURFACE CONDITIONS: In asphalt on far side of Gibbons Drive, south of the site

DESCRIPTION by: C.B. Reaber

Inches Driven	Inches Recover	Blows/6" Sampler	OVA Reading	WELL DETAIL	DEPTH (Feet)	GRAPHIC LOG	
			0		0		Asphalt.
			0		1	SP	Sand. Dusky brown (5yr 2/2) to moderate brown (5YR 3/4), moist, very fine grained to medium grained, poorly sorted, trace rootlets, possible organic odor - no product odor.
			0		2		
					3		Color change to mottled light brown (5YR 5/6) and light olive gray (5YR 6/1), wet, abundant rootlets, no odor.
			0		4	SP	
			0		5		As above.
					6		
			0		7	SP	As above, except saturated, increase in silty clay with depth.
			0		8		As above.
					9	SP	As above.
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
					20		

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well MW-4

Project CHEVRON FERNSIDE — Owner CHEVRON U.S.A. INC.
Location 3126 Fernside Blvd. — Project No. 020202747 — Date drilled 05/15/92
Surface Elev. ____ — Total Hole Depth 16.5 ft. — Diameter 8 inches
Top of Casing 3.58 ft. — Water Level Initial 4.0 ft. — Static 3.63 ft.
Screen: Dia 2 in. — Length 12 ft. — Type/Size 0.020 in.
Casing: Dia 2 in. — Length 3.0 ft. — Type Sched. 40 PVC
Filter Pack Material Lapis Lustre No. 2/12 — Rig/Core Type Mobile B-53/split spoon
Drilling Company Kvilhaug Drilling — Method Hollow stem auger — Permit # ____
Driller Mike Crocker — Log By Steve Kranyak
Checked By David R. Kleesattel — License No. 5136 — David Kleesattel

See Site Map For Boring Location

COMMENTS:

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%
0						6 inches asphalt
0						6 inches base coarse aggregate
2					SM	Brown silty fine SAND (loose, moist, no hydrocaroon odor)
4		0	A 3 4 4			Water level on 06/04/92
4						*Encountered water at 4.0 feet below grade on 05/15/92.*
6		0	B 6 9 15			
8					CL	Brown silty CLAY with some fine sand (medium stiff, moist, no hydrocarbon odor)
10			C 5 5 6			(some fine gravels)
12		0				
14					SM	Brown silty fine SAND (loose, wet, no hydrocarbon odor)
16		0	D 4 3 5			End of boring at 16.5 below grade. Installed monitoring well.

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well MW-5

Project CHEVRON FERNSICE Owner CHEVRON U.S.A. INC.

Location 3126 Fernsice Blvd. Project No. 0202027.47 Date drilled 05/15/92

Surface Elev. ____ Total Hole Depth 16.5 ft. Diameter 8 inches

Top of Casing 3.61 ft. Water Level Initial 4.0 ft. Static 3.25 ft.

Screen: Dia 2 in. Length 12 ft. Type/Size 0.020 in.

Casing: Dia 2 in. Length 3.0 ft. Type Sched. 40 PVC

Filter Pack Material Lapis Lustre No. 2/12 Rig/Core Type Mobile B-53/split spoon

Drilling Company Kvilhaug Drilling Method Hollow stem auger Permit # ____

Driller Mike Crocker Log By Steve Kranyak

Checked By David R. Kleesattel License No. 5136 D R Kleesattel

See Site Map For Boring Location

COMMENTS:

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%
0						6 inches asphalt; 6 inches of base coarse aggregate
2			A 3 4 5		SM	Brown silty fine SAND (loose, wet, no hydrocarbon odor)
4		0				Water elevation on 06/04/92; *Encountered water at 4.0 feet below grade on 05/15/92.*
8					CL	Brown and gray mottled silty CLAY with some fine sand (soft, wet, no hydrocarbon odor)
10		0	B 5 5 6			
14					SM	Brown silty fine SAND (loose, wet, no hydrocarbon odor)
16		0	C 3 5 7			End of boring at 16.5 below grade. Installed monitoring well.

GROUNDWATER TECHNOLOGY

Drilling Log

Monitoring Well MW-6

Project CHEVRON FERNSIDE Owner CHEVRON U.S.A. INC.
Location 3125 Fernside Blvd. Project No. 020202747 Date drilled 05/15/92
Surface Elev. ____ Total Hole Depth 16.5 ft. Diameter 8 inches
Top of Casing 3.85 ft. Water Level Initial 4.0 ft. Static 3.89 ft.
Screen: Dia 2 in. Length 12 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 3.0 ft. Type Sched. 40 PVC
Filter Pack Material Lapis Lustre No. 2/12 Rig/Core Type Mobile B-53/split spoon
Drilling Company Kvilhaug Drilling Method Hollow stem auger Permit # ____
Driller Mike Crocker Log By Steve Kranyak
Checked By David R. Kleesattel License No. 5136 David Kleesattel

See Site Map For Boring Location

COMMENTS:

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%
-2 to 0						
0 to 4		0	A 3, 4, 4		SM	Dark brown silty fine SAND (loose, moist, no hydrocarbon odor)
4						Water elevation on 06/04/92 *Encountered water at 4.0 feet below grade on 05/15/92.*
6 to 8						
8 to 12		0	B 3, 5, 4		CL	Brown and grey mottled silty CLAY with some fine sand (soft, wet, no hydrocarbon odor)
12 to 14						
14 to 16		0	C 4, 5, 7		SM	Brown silty fine SAND (loose, wet, no hydrocarbon odor)
16						End of boring at 16.5 below grade. Installed monitoring well.

GROUNDWATER TECHNOLOGY

Drilling Log

Monitoring Well MW-7

Project 3126 Fernside Blvd. Owner Chevron U.S.A., Inc.
Location Alameda, CA Proj. No. 020204604
Surface Elev. N/A ft. Total Hole Depth 15 ft. Diameter 8 in.
Top of Casing N/A ft. Water Level Initial 7 ft. Static N/A ft.
Screen: Dia 2 in. Length 12 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 3 ft. Type PVC sch 40
Fill Material #3 sand Rig/Core Limited Access/Split Spoon
Drill Co. SES, Inc. Method Hollow Stem Auger
Driller D. Paxinos Log By S.C. Hurley Date 11/11/93 Permit # N/A
Checked By David Kleesattel License No. RG# 5136 (1)-9 Kleesattel

See Site Map For Boring Location

COMMENTS:

The screen was set at approximately 15 feet below grade. The decon water and the soil cuttings were stored in 55-gallon drums and left on site until the contents could be analyzed for proper disposal. Depth to water was approximately 7.0 feet on 11-11-93.

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%
-2							
0							Concrete
2							Asphalt
4		271	5	5 12 11		CL	CLAY, dark brown/olive, about 80% clay, about 20% silt, (very moist, strong hydrocarbon odor).
6							(wet)
8							Clayey SAND, gray, about 60% fine sand, about 30% clay, about 10% silt, (saturated, strong hydrocarbon odor).
10		875	10	6 8 14		SC	
12							(Grading to sand, tan, no hydrocarbon odor).
14		12.4	15	19 28 39			End of boring at 15 feet.
16							
18							
20							
22							
24							

Drilling Log

GROUNDWATER TECHNOLOGY

Soil Boring TMW-1

Project 3126 Fernside Blvd. Owner Chevron U.S.A., Inc.
Location Alameda, CA Proj. No. 020204604
Surface Elev. N/A ft. Total Hole Depth 15 ft. Diameter 8 in.
Top of Casing N/A ft. Water Level Initial 6.5 ft. Static N/A ft.
Screen: Dia N/A in. Length N/A ft. Type/Size N/A in.
Casing: Dia N/A in. Length N/A ft. Type N/A
Fill Material N/A Rig/Core Limited Access/Split Spoon
Drill Co. SES, Inc. Method Hollow Stem Auger
Driller D. Paxinos Log By S.C. Hurley Date 11/11/93 Permit # N/A
Checked By David Kleesattel License No. RG# 5136 D. J. Kleesattel

See Site Map For Boring Location

COMMENTS:

The decon water and soil cuttings were stored 55-gallon drums and left on site until the contents could be analyzed for proper disposal. Depth to water was approximately 6.5 feet on 11-11-93.

Depth (ft.)	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%
0						Asphalt
2						SAND, gray, about 100% fine sand, (about 50% quartz, about 50% mafic minerals).
4	5.6	5	6 9 10			Sandy CLAY, brown, about 80% clay, about 20% fine sand, (moist, no hydrocarbon odor).
6						(wet)
8			8 11 12		CL	
10	5.6	10				(saturated)
14		15	19 29 28			(No recovery. End of boring at 15 feet.)
16						
18						
20						
22						
24						

APPENDIX D
CONTINGENCY PLAN

This contingency plan will ensure compliance with the cleanup goals for the site. Hydrocarbon analyses will be performed to ensure that cleanup goals are not exceeded near the downgradient boundary and that compliance with cleanup goals is maintained.

Well C-1 (Table D-1) will serve as a "guard point" to monitor whether concentrations within the plume remain stable. Wells MW-4, MW-5 and MW-6 and MW-7 will serve as "boundary wells" and will be used to confirm that the plume is not migrating. Ground water from these wells will be sampled quarterly through 1995, then annually through 1997, ceasing at the end of 1997. Ground water from well C-1 will be sampled semi-annually for one year, then annually through 1997, ceasing at the end of 1997. If cleanup goals continue to be maintained at the boundary wells, monitoring will cease in all wells.

If this 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 has been determined for each well based on trends over the last several years. A "trigger" concentration has been determined which represents a significant concentration increase that may indicate possible future non-compliance with the cleanup goal. If a trigger concentration occurs or if 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 at the triggered well the next quarter; and

3) If elevated concentrations are again detected, quarterly monitoring of that well will continue until an appropriate course of action, identified by Chevron and accepted by the ACDEH, is implemented.

Table D-1. Contingency Plan for Maintaining Compliance, Former Chevron Service Station #9-1153 3126 Fernside Boulevard, Alameda, California. All concentrations are for benzene unless otherwise noted.

	Monitoring Well	Baseline Concentration (benzene)	Trigger Concentration (benzene)	Response to Trigger Concentration[1]
Guard Wells	C-1	12,000 ppb	30,000 ppb	1. Notify ACDEH
Boundary Wells	MW-4	0.8 ppb	2 ppb	2. Sample trigger well in the next quarter
	MW-5	180 ppb	500 ppb	
	MW-6	40 ppb	200 ppb	
	MW-7	600 ppb	1000 ppb	3. Identify an appropriate course of action based upon determination of source

Footnotes:

[1] Response is triggered when the trigger condition 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.

APPENDIX E

DISCUSSION OF RISK ASSESMENT

APPENDIX E
DISCUSSION OF RISK ASSESSMENT

In July 1987, EA Engineering, Science, and Technology (EA) of Lafayette, California conducted a soil vapor contaminant assessment (SVCA) at the former service station site and prepared a risk assessment. This assessment concluded that there is no significant risk to human health from airborne hydrocarbon vapors originating in soils beneath, and in the vicinity of the house. However, a detailed discussion of the methodology and assumptions used in the risk assessment are not available. Though inhalation exposure point calculations were not included with the EA Report, indoor air concentrations may have been based upon diffusion of subsurface contaminants through the slab foundation, coupled with a simple box air exchange model to calculate indoor air concentrations. An overview of such an exposure calculation is presented below.

Contaminant diffusion to the surface can be simulated using Fick's law, and exposure concentrations calculated using a simplified box model. The specific form of the model applied below was adopted from the County of Orange, California, Vapor Diffusion Model (Orange County Model) (Orange 1994). Calculations are done below for benzene, the contaminant of greatest concern.

Based on the data from the 1989 SVCA, average soil gas concentrations at depths between 2 and 4.5 ft below the building slab and near the front porch are assumed to be 1 ppm and 10 ppm benzene respectively. The flux is then calculated using:

$$\text{Flux} = \frac{D_e * C_{sg}}{X}$$

Where:

Flux = Contaminant flux at soil surface ($g/(m^2 \times sec)$)

C_{sg} = Contaminant soil gas concentration (0.0032 g/m^3 below building; 0.032 g/m^3 front porch)

D_e = Effective diffusion coefficient in air ($= D_a \frac{Pa^{3.33}}{Pt^2} = 6.86 \times 10^{-7}\ m^2/s$)

D_a = Benzene diffusion coefficient in air (0.088 cm^2/s = 8.8 x 10^{-6} m^2/s; PRG 1994)

P_a = Air filled porosity (0.28 [unitless]; PRG 1994)

P_t = Total porosity (0.43 [unitless]; PRG 1994)

X = Distance between contaminant and surface (3 ft = 0.9 m)

The calculated benzene flux is 2.4 x 10^{-9} g/(m^2 x sec) and 2.4 x 10^{-8} g/(m^2 x sec) below the building slab and near the front porch, respectively. Using these results for contaminant flux to the surface, the concentration within the building is:

$$C = C_{out} + \frac{b * Flux * A}{Q} \times 10^6 = 0.16\ \mu g/m^3$$

where:

C = Indoor air concentration ($\mu g/m^3$)

C_{out} = Outdoor air concentration ($\mu g/m^3$)

$$= \frac{Flux * L}{u * h} \times 10^6 = 0.08\ \mu g/m^3$$

L = Extent of contaminated soil in downwind direction (assume 60 ft = 18 m)

u = Average wind speed (2.25 m/sec; PRG 1994)

h = Distance from floor to ceiling (7.5 ft = 2.3 m; Orange 1994)

b = Factor for attenuation of flux by the foundation of the building, (0.01; ASTM 1994)

A = Building floor area (6,290 ft^2 = 584 m^2)

Q = Ventilation rate = V * E

V = Volume of building = A * h

E = Air exchange rate (0.5 exchanges/ hr = 0.00014 exchanges/ sec; Orange 1994)

Using the model as outlined above, the exposure concentration within the building is calculated to be 0.16 $\mu g/m^3$ (0.05 ppb) which is similar to that presented by EA (0.13 $\mu g/m^3$). Risk characterization for this site is based upon comparison of the site-specific worst-case exposure concentrations in ambient air to the appropriate Preliminary Remediation Goal (PRG) established by the USEPA Region IX. The Region IX PRGs "combine EPA toxicity vales with health-protective exposure assumptions to estimate

"safe" contaminant levels in environmental media" (USEPA Region IX, *Region IX PRGs First Half 1994*, February 1, 1994). Site-specific RME estimates can be compared with the PRG value for that media to evaluate whether adverse risk exists under worst case conditions at the site. The PRG for benzene in ambient air, which is associated with a conservative risk of 10^{-6}, is 0.29 $\mu g/m^3$. Based upon this analysis, the lifetime cancer risk associated with exposure to hydrocarbon vapors originating from the subsurface in the vicinity of the house is less than 10^{-6}.

REFERENCES

EA Engineering, Science, and Technology, October 20, 1989. Report of Soil and Groundwater Investigation, Former Chevron SS 9-1153, 3126 Fernside Boulevard, Alameda, California. 80201.04.

Emergency Standard Guide for Risk-Based Correction Action Applied at Petroleum Release Sites, ASTM ES 38-94. American Society for Testing and Materials, 1994.

Environmental Site Mitigation Manual, Vapor Diffusion Model, 1994. County of Orange, California. 1994.

Stanford J. Smucker; Region IX Preliminary Remediation Goals (PRGs) Second Half 1994; August 1, 1994