GeoStrategies Inc.

WELL INSTALLATION REPORT

Chevron Service Station No. 4587
609 Oak Street
Oakland, California

Report No. 7191-4

November 30, 1990

Chevron U.S.A. Inc.
2410 Camino Ramon, San Ramon, California • Phone (415) 842-9500
Mail Address: PO Box 5004, San Ramon, CA 94583-0804

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Marketing Operations

D. Moller
Manager, Operations
S. L. Patterson
Area Manager, Operations
C. G. Trimbach
Manager, Engineering

December 30, 1990

Mr. Rafat Shahid
Alameda County
Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Re: Chevron Service Station #9-4587
609 Oak Street
Oakland, CA

Dear Mr. Shahid:

Enclosed we are forwarding a Well Installation Report dated November 30, 1990, conducted by our consultant GeoStrategies, Inc. for the above referenced site.

As indicated in the report, four (4) borings were advanced. Three (3) of these borings were completed into groundwater monitoring wells designated C-4, C-5 and C-6. The fourth boring was completed as a future recovery well designated CR-1. No detectable levels of petroleum hydrocarbons were detected in the soil samples collected with the exception of future recovery well CR-1 which detected Benzene at the groundwater interface at a concentration of .26 ppm. Groundwater analysis is detecting hydrocarbon contamination in Monitoring Wells C-2 and C-3. Separate-phase hydrocarbons were observed in Monitoring Well C-1 and tank backfill wells B and C at measured thicknesses of .02, .01 and .03 feet, respectively. Purging of the phase-separated hydrocarbons will continue until a dedicated recovery system can be designed and installed.

If you have any questions or comments please do not hesitate to call Nancy Vukelich at (415) 842-9581.

Very truly yours,
C. G. Trimbach

By _____
Nancy Vukelich

NLV/jmr
Enclosure

cc: Mr. Lester Feldman
RWQCB-Bay Area
1800 Harrison Street
Suite # 700
Oakland, CA 94612

Mr. Ken Betts
770 Wesley Way
Oakland, CA 94610

Mr. W.T. Scudder
Chevron Property Management Specialist

GeoStrategies Inc.
2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545
(415) 352-4800

November 30, 1990

Gettler-Ryan Inc.
2150 West Winton Avenue
Hayward, California 94545

Re: WELL INSTALLATION REPORT
Chevron Service Station No. 4587
609 Oak Street
Oakland, California

Gentlemen:

This report summarizes the ground-water monitoring well installation and soil sampling performed by GeoStrategies Inc. (GSI) at the above referenced location (Plate 1). Four exploratory soil borings were drilled on September 10 and 11, 1990. Three of these borings were subsequently completed as 2-inch diameter ground-water monitoring wells designated C-4, C-5 and C-6. The fourth boring was completed as a recovery well designated CR-1 on October 22, 1990. An additional ground-water monitoring well will be installed pending access permission. The well locations are shown on Plate 2.

SITE BACKGROUND

Three ground-water monitoring wells (C-1, C-2 and C-3) were installed by Gettler-Ryan Inc. (G-R) in July 1983. G-R prepared a letter dated July 19, 1983, documenting the monitoring well installations. Three tank backfill monitoring wells (A, B and C) are also located on the site.

In July 1986, monitoring of the ground-water and tank backfill wells was implemented at the site.

In December 1989, G-R conducted ground-water sampling at the site. Results were presented in a G-R Groundwater Sampling Report dated December 21, 1989.

GSI prepared a work plan dated April 4, 1990, to address the need for further delineation of the hydrocarbon plume.

FIELD PROCEDURES

Four exploratory soil borings were drilled on September 10 and 11, 1990. All borings were drilled using a truck mounted hollow-stem auger drilling rig. Three borings were completed as ground-water monitoring wells and one was completed as a recovery well. All field work was performed according to GSI Field Methods and Procedures presented in Appendix A.

Soil samples were collected at five-foot depth intervals, using a modified California split-spoon sampler fitted with clean brass tube liners. A GSI geologist supervised the drilling, described soil samples using the Unified Soil Classification System (ASTM D-2488) as well as geologic observations and prepared a lithology log for each borehole. Exploratory boring logs are presented in Appendix B.

A four-inch long brass tube of soil from each sample interval was used to perform head-space analysis in the field to screen for the presence of Volatile Organic Compounds (VOCs). Head-space analysis involved transferring soil from a brass liner into a clean glass jar and immediately covering the jar with aluminum foil secured with a ring-type threaded lid. After approximately twenty minutes, the foil was pierced and the head-space within the jar was tested for total organic vapor measured in parts per million using an Organic Vapor Monitor (OVM) photoionization detector. Head-space analysis results are presented on the boring logs in Appendix B.

Selected soil samples retained for chemical analysis were collected in clean brass liners, covered on both ends with aluminum foil and sealed with plastic end caps. The samples were labeled, entered on a Chain-of-Custody form and transported in a cooler with blue ice to Superior Analytical Laboratory (Superior), a State-certified laboratory located in San Francisco, California.

Monitoring Well Construction

Borings C-4 through C-6 were drilled with 8-inch-diameter hollow-stem augers to a total depth of 30.0 feet. The monitoring wells were constructed through the hollow-stem augers using 2-inch-diameter Schedule 40 PVC well casing, and 0.020-inch factory slotted well screen. Lonestar #2/12 sand was placed in the annular space across the entire screened interval and extended at least two feet above the top of the screen. A 2-foot bentonite seal was placed above the filter pack, followed by a cement grout. A traffic-rated box was placed at the ground surface, and a locking cap was then placed on the well. The well construction details are presented with the boring logs in Appendix B.

GEOLOGY

Regional Geology

The project site is located on the San Francisco Bay Plain fringe, approximately one mile east of the San Francisco Bay. Lake Merritt is located approximately 1/2-mile to the northeast of the site. The area is underlain by unconsolidated, Pleistocene-age silty and clayey sand of the Merritt Formation and at depth by the Alameda Formation. The Merritt Formation is approximately 40 feet thick in this area and overlies a sandy, silty clay which comprises the upper part of the Alameda Formation.

Site Lithology

Based on the exploratory borings, the lithology beneath the site consists of interbedded sand and clayey sand. Groundwater was first encountered at depths of approximately 13 to 15 feet below ground surface and was observed to stabilize between 9.5 and 11.5 feet. The observed rise in water levels is attributed to a slow groundwater entry into the monitoring well. This water-bearing strata is considered semi-confined. A clay unit was encountered in Boring CR-1 to approximately 7.5 feet below ground surface. This unit was also observed on-site in previously drilled borings.

Ground-water elevation data collected prior to ground-water sampling indicate an approximate hydraulic gradient of 0.006 which flows toward the southeast beneath the site (Plate 3). A summary of the potentiometric data is presented in Table 1.

CHEMICAL ANALYSES

Soil and ground-water samples were analyzed for Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) according to EPA Method 8015 (Modified), and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) according to EPA Method 8020. In addition, the ground-water sample from recovery well CR-1 was analyzed for Volatile Organic Compounds according to EPA Method 624, base/neutral and acid extractables, and priority pollutant metals. All soil and ground-water samples were analyzed by Superior.

Soil Analytical Results

Soil samples were selected for chemical analysis from boring C-4 and C-5 at the 10.5 foot and 15.5 foot sample intervals and from boring C-6 at the 9.0 foot and 15.0 foot sample intervals. In addition, samples were selected from boring CR-1 at the 5.0 foot, 10.0 foot and 15.0 foot sample intervals.

TPH-Gasoline was reported as none detected (ND) in all samples. Benzene was only detected in boring CR-1 at the 15 foot sample interval at 0.26 parts per million (ppm). A summary of the soil analytical data is presented in Table 1. A copy of the Superior soil analytical report is presented in Appendix C.

Ground-water Analytical Results

Prior to ground-water sampling, each well was monitored for separate-phase hydrocarbons using an oil-water interface probe. A clean, clear acrylic bailer was used to confirm interface probe results. Separate-phase hydrocarbons were observed in monitoring wells C-1 and B and tank backfill Well C at 0.02, 0.01 and 0.03 feet, respectively. Consequently, these wells were not sampled. TPH-Gasoline was detected in monitoring wells C-2, C-3, CR-1 and tank backfill Well A ranging in concentrations from 410 parts per billion (ppb) in Well C-3 to 31,000 ppb in tank backfill well A. Benzene was detected in monitoring Wells C-2, C-3, C-5, CR-1 and tank backfill Well A at concentrations ranging from 0.8 ppb in Well C-5 to 23,000 ppb in tank backfill Well A. A chemical concentration map (Plate 4) was prepared using TPH-Gasoline and benzene results from this quarter's sampling.

The analysis for volatile organics in recovery well CR-1 revealed 1, 2-Dichloroethane (1,2-DCA) at a concentration of 60 ppb. Also, several base/neutral and acid extractables were detected in the ground-water sample from CR-1. These include Di-n-octylphthalate, 2-Methylnaphthalene, and naphthalene and were detected at 13 ppb, 10 ppb and 47 ppb, respectively. Phenol, 2,4-Dimethylphenol and 4-Nitrophenol were detected at 47 ppb, 16 ppb and 9 ppb, respectively.

A summary of the ground-water analytical data is presented in Table 2. A copy of the G-R Groundwater Sampling Report, Chain-of-Custody forms and Superior analytical reports are presented in Appendix D.

Summary of Findings

The results of this investigation are summarized below.

- Four exploratory borings were drilled on September 10, 1990. Three borings were completed as ground-water monitoring wells and one boring was completed as a recovery well at a later date.

- Based on the borings and regional geology, the lithology of the site consists primarily of sand and clayey sand. Groundwater occurrence appears semi-confined.

- A low concentration of benzene was reported in Boring CR-1 at the 15 foot sample interval. All other soil samples were reported as ND for TPH-Gasoline and benzene.

- Ground-water samples collected by G-R on October 30, 1990, reported concentrations of TPH-Gasoline from 410 ppb (C-3) to 31,000 ppb (A). TPH-Gasoline was reported as ND in Wells C-4, C-5 and C-6. Benzene concentrations ranged from 0.8 ppb (C-5) to 23,000 ppb (A). Benzene was not detected in Wells C-4 and C-6. Analyses for volatile organics and base/neutral and acid extractable compounds revealed low concentrations of several compounds.

If you have any questions, please call.

GeoStrategies Inc. by,

Randall S. Young
Geologist

Christopher M. Palmer
Senior Geologist
C.E.G. 1262, R.E.A. 285

RSY/CMP/mlg

Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Potentiometric Map
Plate 4. TPH-Gasoline/Benzene Concentration Map

Appendix A: GSI Field Methods and Procedures
Appendix B: Exploratory Boring Logs and Well Construction Details
Appendix C: Soil Analytical Report
Appendix D: Gettler-Ryan Inc. Groundwater Sampling Report

TABLE 2

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
C-1	30-Oct-90	----	----	----	----	----	----	16.07	5.30	0.02	10.79
C-2	30-Oct-90	02-Nov-90	28000	3700	1900	1200	4300	16.84	5.68	----	11.16
C-3	30-Oct-90	02-Nov-90	410	4	4	2	9	16.48	6.04	----	10.44
C-4	30-Oct-90	02-Nov-90	<50	<0.5	<0.5	<0.5	<0.5	16.53	4.97	----	11.56
C-5	30-Oct-90	02-Nov-90	<50	0.8	<0.5	<0.5	0.5	14.70	4.73	----	9.97
C-6	30-Oct-90	02-Nov-90	<50	<0.5	<0.5	<0.5	<0.5	13.87	4.44	----	9.43
A	30-Oct-90	02-Nov-90	31000	23000	110	1100	160	----	----	sheen	11.20
B	30-Oct-90	----	----	----	----	----	----	----	----	.01	11.19
C	30-Oct-90	----	----	----	----	----	----	----	----	.03	10.84
CR-1	30-Oct-90	08-Nov-90	9600	7100	65	610	190	----	----	----	10.51

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS
Benzene 1.0 ppb Xylenes 1,750 ppb Ethylbenzene 680 ppb

CURRENT DHS ACTION LEVELS
Toluene 100 ppb

TPH-G = Total Petroleum Hydrocarbons as Gasoline
PPB = Parts Per Billion

TB = Trip Blank

Note: 1. All data shown as <x are reported as ND (none detected)
2. Static Water elevations referenced to mean sea level (MSL). Elevations are corrected for free product using a correction factor of 0.8.
3. DHS Action Levels and MCLs are subject to change pending State review
4. Wells C-1, B and C contained separate-phase hydrocarbons and were not sampled.

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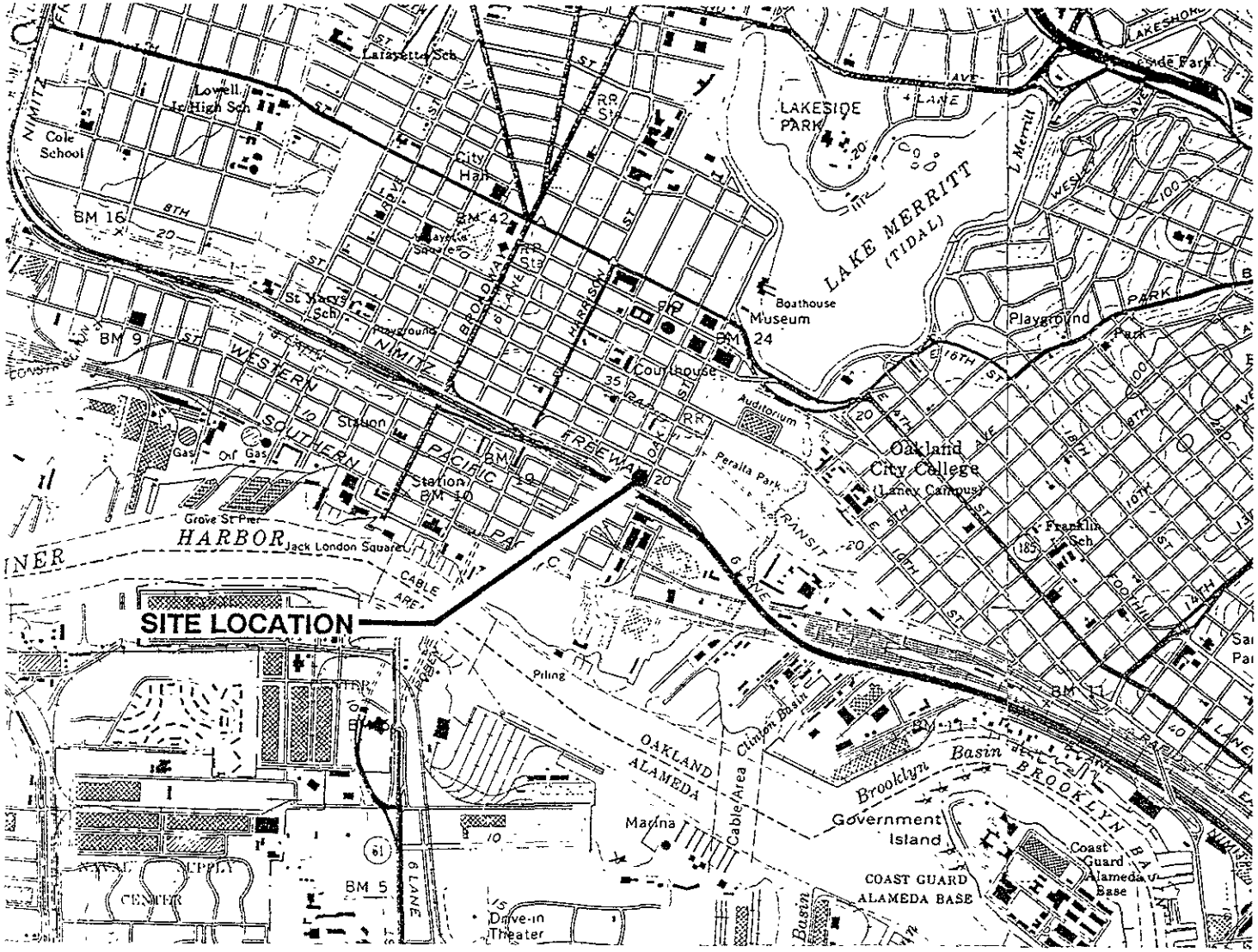
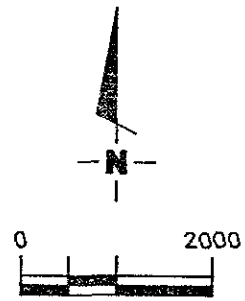
TABLE 2

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
CD-A	30-Oct-90	02-Nov-90	30000	23000	150	1000	180	----	----	----	----
CF-3	30-Oct-90	02-Nov-90	<50	<0.5	0.6	<0.5	0.5	----	----	----	----

ILLUSTRATIONS





Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
Chevron Service Station #4587
609 Oak Street
Oakland, California

PLATE 1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
7191	RG/CEG	10/90	

TABLE 1

SOIL ANALYSES DATA

BORING NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
C-4-10.5	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-4-15.5	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-5-10.5	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-5-15.5	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-6-9	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-6-15	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
CR-1-5	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
CR-1-10	10-Sep-90	19-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
CR-1-15	10-Sep-90	19-Sep-90	<1	0.26	<0.05	<0.05	<0.05

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline
PPM = Parts Per Million

Note: 1. All data shown as <x are reported as ND (none detected).

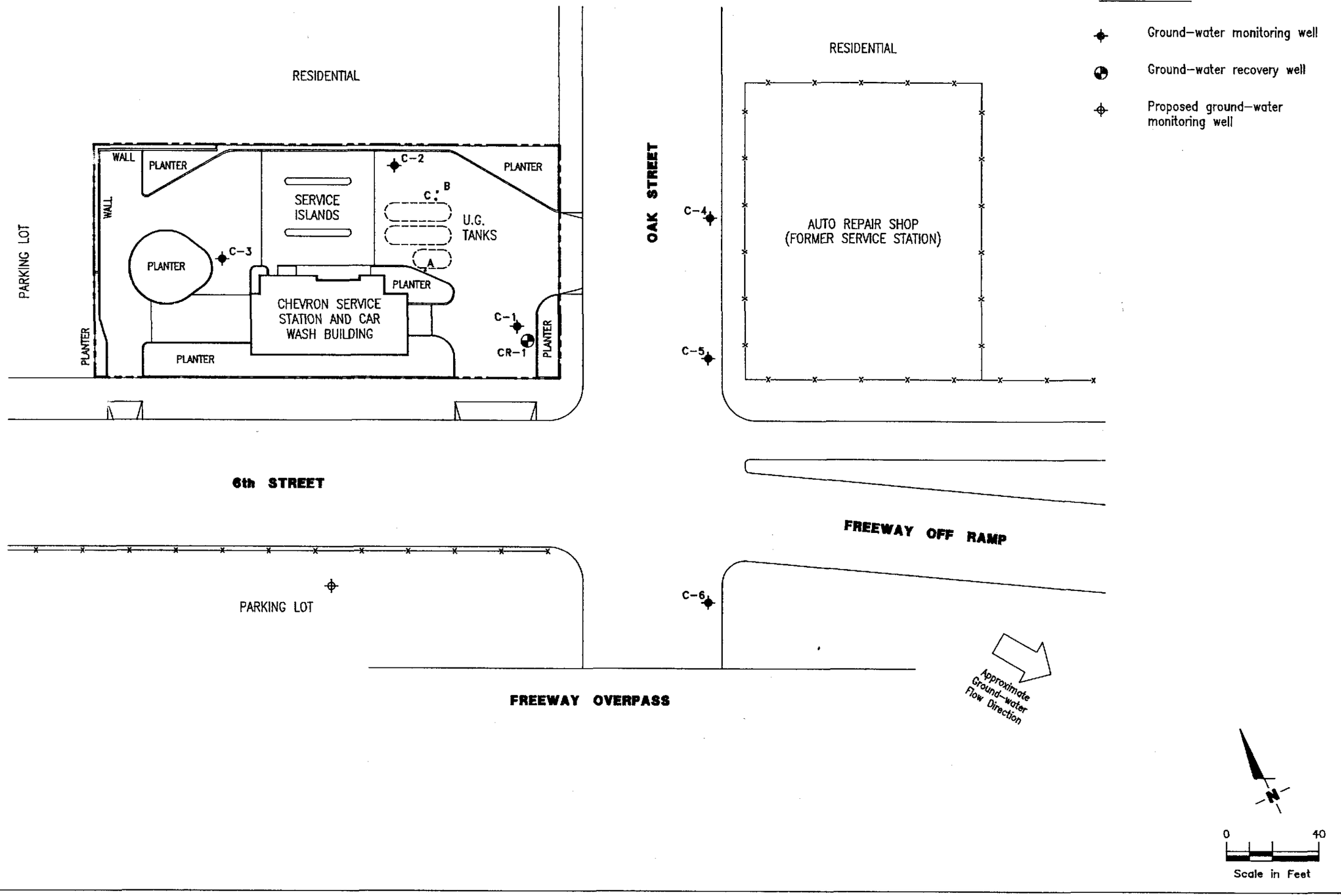


PLATE 2

SITE PLAN
Chevron Service Station #4587
609 Oak Street
Oakland, California

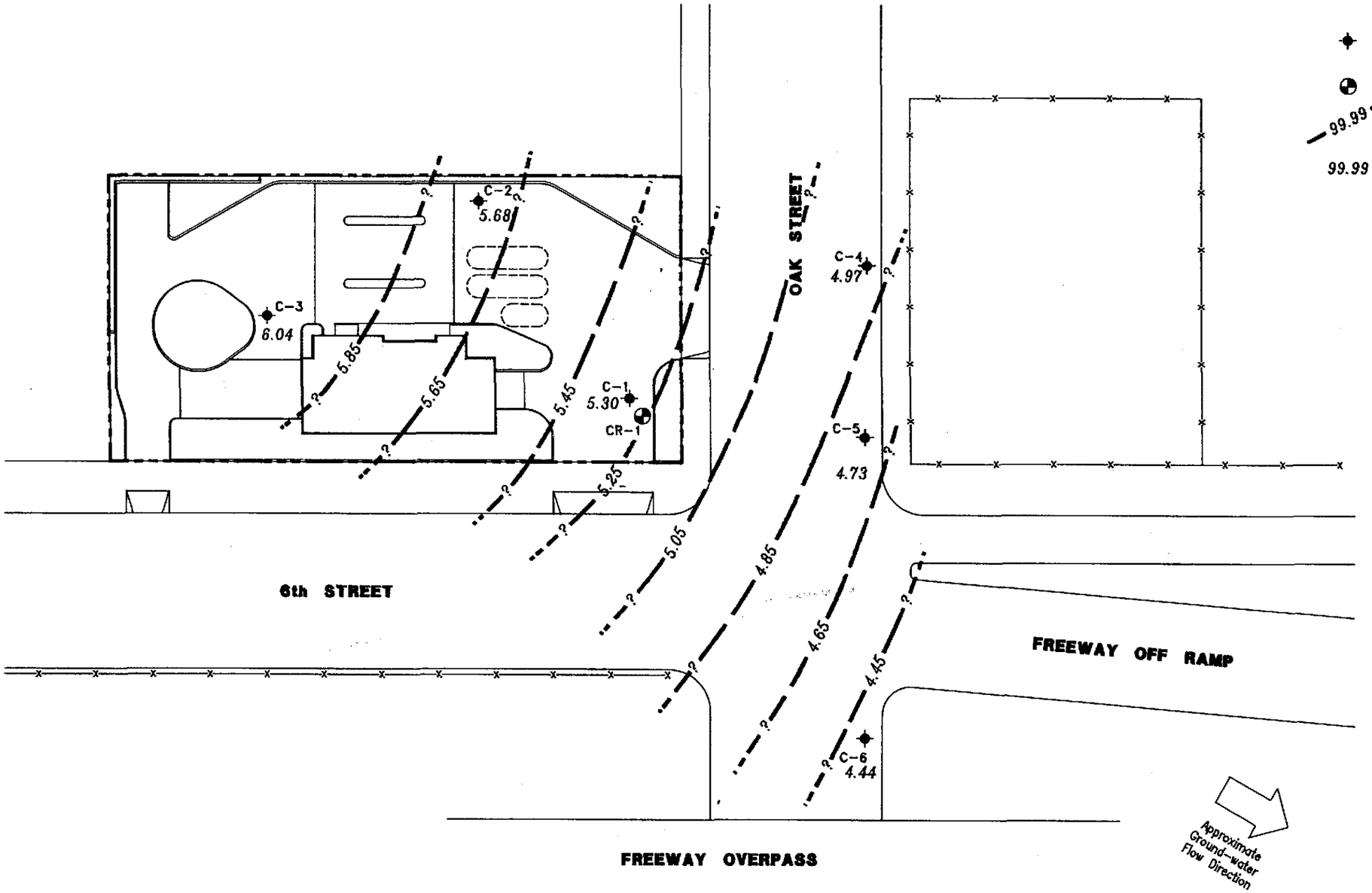
DATE 11/90

REVISED DATE

REVIEWED BY RC/CEG

JOB NUMBER 7191

GeoStrategies Inc.



EXPLANATION

- Ground-water monitoring well
- Ground-water recovery well
- 99.99 — Ground-water elevation contour Approximate Gradient = 0.006
- *99.99* — Ground-water elevation in feet referenced to Mean Sea Level (MSL) measured on October 30, 1990

Note: Contours may be influenced by irrigation practices and/or site construction activities.

PLATE 3

POTENTIOMETRIC MAP
Chevron Service Station #4587
609 Oak Street
Oakland, California

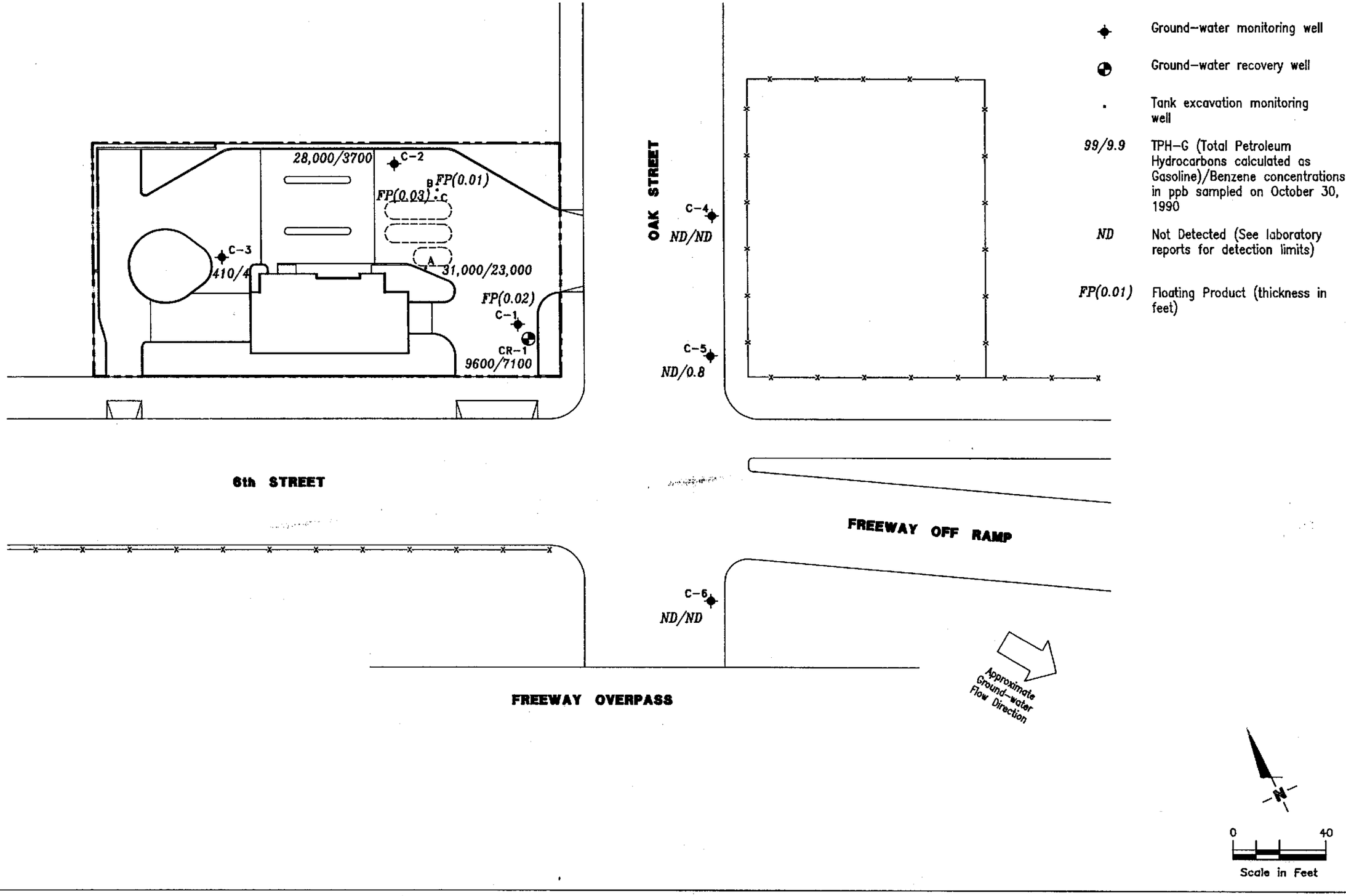
DATE 11/90

REVISED DATE

GeoStrategies Inc.

JOB NUMBER 7191

REVIEWED BY RC/CEG



EXPLANATION

- Ground–water monitoring well
- Ground–water recovery well
- Tank excavation monitoring well
- *99/9.9* TPH–G (Total Petroleum Hydrocarbons calculated as Gasoline)/Benzene concentrations in ppb sampled on October 30, 1990
- *ND* Not Detected (See laboratory reports for detection limits)
- *FP(0.01)* Floating Product (thickness in feet)

PLATE 4

TPH–G/BENZENE CONCENTRATION MAP
Chevron Service Station #4587
609 Oak Street
Oakland, California

GeoStrategies Inc.

GSI

JOB NUMBER	DATE	REVIEWED BY RG/CEG	REVISED DATE
7191	11/90	RG/CEG 12/92	

APPENDIX A

FIELD METHODS AND PROCEDURES

FIELD METHODS AND PROCEDURES

EXPLORATION DRILLING

Mobilization

Prior to any drilling activities, GeoStrategies Inc. (GSI) will verify that necessary drilling permits have been secured.

Utility locations will be located and drilling will be conducted so as not to disrupt activities at a project site. GSI will obtain and review available public data on subsurface geology and if warranted, the location of wells within a half-mile of the project site will be identified. Drillers will be notified in advance so that drilling equipment can be inspected prior to performing work.

Drilling

The subsurface investigations are typically performed to assess the lateral and vertical extent of petroleum hydrocarbons present in soils and groundwater. Drilling methods will be selected to optimize field data requirements as well as be compatible with known or suspected subsurface geologic conditions.

Monitoring wells are installed using a truck-mounted hollow-stem auger drill rig or mud-rotary drill rig. Typically, the hollow-stem rig is used for wells up to 100 feet, if subsurface conditions are favorable. Wells greater than 100-feet deep are typically drilled using mud-rotary techniques. When mud rotary drilling is used, an electric log will be performed for additional lithological information. Also during mud rotary drilling, precautions will be taken to prevent mud from circulating contaminants by using a conductor casing to seal off contaminated zones. Samples will be collected for lithologic logging by continuous chip, and where needed by drive sample or core as specified by the supervising geologist.

Soil Sampling

Shallow soil borings will be drilled using a truck-mounted hollow-stem auger drilling rig, unless site conditions favor a different drilling method. Drilling and sampling methods will be consistent with ASTM Method D-1452-80. The auger size will be a minimum 6-inch nominal outside-diameter (O.D). No drilling fluids will be used during this drilling method. The augers and other tools used in the bore hole will be steam cleaned before use and between borings to minimize the possibilities of cross-contamination between borings.

Soil samples are typically collected at 5-foot intervals as a minimum from ground surface to total depth of boring. Additional soil samples will be collected based on significant lithologic changes and/or potential chemical content. Soil samples from each sampling interval will be lithologically described by a GSI geologist (Figure 1). Soil colors will be described using the Munsell Color Chart. Rock units will be logged using appropriate lithologic terms, and colors described by the G.S.A. Rock Color Chart.

Head-space analyses will be performed to check for the evidence of volatile organic compounds. Head-space analyses will be performed using an organic vapor analyzer; either an OVA, HNU, or OVM. Organic vapor concentrations will be recorded on the GSI field log of boring (Figure 1). The selection of soil samples for chemical analysis are typically based on the following criteria:

1) Soil discoloration
2) Soil odors
3) Visual confirmation of chemical in soil
4) Depth with respect to underground tanks (or existing grade)
5) Depth with respect to ground water
6) OVA reading

Soil samples (full brass liners) selected for chemical analysis are immediately covered with aluminum foil and the liner ends are capped to prevent volatilization. The samples are labeled and entered onto a Chain-of-Custody form, and placed in a cooler on blue ice for transport to a State-certified analytical laboratory.

Soil cuttings are stockpiled on-site. Soils are sampled and analyzed for site-specific chemical parameters. Disposition of soils is dependent of chemical analytical results of the samples.

Soil Sampling - cont.

Soil borings not converted to monitoring wells will be backfilled (sealed) to ground surface using either a neat cement or cement-bentonite grout mixture. Backfilling will be tremied by continuously pumping grout from the bottom to the top of the boring where depth exceeds 20' or as required by local permit requirements.

All field and office work, including exploratory boring logs, are prepared under the direction of a registered geologist.

Monitoring Well Installation

Monitoring well casing and screen will be constructed of Schedule 40, flush-joint threaded polyvinylchloride (PVC). The well screen will be factory mill-slotted unless additional open area is required (eg. conversion to an extraction well in a low-yield aquifer). The screen length will be placed adjacent to the aquifer material to a minimum of 2-feet above encountered water. No screen shall be placed in a borehole that potentially creates hydraulic interconnection of two or more aquifer units. Screen slot size and well sand pack will be compatible with encountered aquifer materials, as confirmed by sieve analysis.

Monitoring wells will be completed below grade (Figure 2) unless special conditions exist that require above-grade completion design. In the event a monitoring well is required in an aquifer unit beneath an existing aquifer, the upper aquifer will be sealed off by installing a steel conductor casing with an annular neat cement or cement-bentonite grout seal. This seal will be continuously tremie pumped from the bottom of the annulus to ground surface.

The monitoring well sand pack will be placed adjacent to the entire screened interval and will extend a recommended minimum distance of 2-feet above the top of the screen. No sand pack will be placed that interconnects two or more aquifer units. A minimum 2-foot bentonite pellet or bentonite slurry seal will be placed above the sand pack. Sand pack, bentonite, and cement seal levels will be confirmed by sounding the annulus with a calibrated weighted tape. The remaining annular space above the bentonite seal will be grouted with a bentonite-cement mixture and will be tremie-pumped from the bottom of the annular space to the ground surface. The bentonite content of the grout will not exceed 5 percent by weight. A field log of boring and a field well completion form will be prepared by GSI for each well installed.

Decontamination of drilling equipment before drilling and between wells will consist of steam cleaning, and/or Alconox wash.

Well Development

All newly installed wells will be properly developed within 48 hours of completion. No well will be developed until the well seal has set a minimum of 12 hours. Development procedures will include one or more of the methods described below:

Bailing

Bailing will be used to remove suspended sediments and drilling fluids from the well, where applicable. The bailer will be raised and lowered through the column of water in the well so as to create a gentle surging action in the screened interval. This technique may be used in conjunction with other techniques, such as pumping, and may be used alone if the well is of low yield.

Pumping

Pumping will be used in conjunction with bailing or surging. The pump will be operated in such a manner as to gently surge the entire screened interval of the well. This may involve operating the pump with a packer type mechanism attached and slowly raising and lowering the pump, or by cycling the pump off and on to allow water to move in and out of the screened interval. Care will be used not to overpump a well.

Surging

Surging will be performed on wells that are screened in known or suspected high yield formations and/or on larger diameter (recovery) wells. A surge block will be raised and lowered through the entire screened interval, forcing water in and out of the well screen and sand pack. Pumping or air lifting will be used in conjunction with this method of development to remove any sediment brought into the well during surging.

Air Lifting

Air lifting will be used to remove sediment from wells as an alternative to pumping under certain conditions. When appropriate, a surge block designed for use with air lifting will be used to agitate the entire screened interval and water will be lifted out of the well using forced air. When air lifting is performed, the air source will be either nitrogen or filtered air and the procedure will be performed gently to prevent any damage to the well screen or casing and to insure that discharged water is contained.

Well Development - cont.

All well developing equipment will be thoroughly decontaminated prior to development using a steam cleaner and/or Alconox detergent wash and clean water rinse. During development procedures, field parameters (temperature, specific conductance and pH) will be monitored and recorded on well development forms (Figure 3). Equilibration requirements consist of a minimum of three readings with the following accuracy standards:

pH	± 0.1 pH units
Specific Conductance	± 10% of full scale reading
Temperature	± 0.5 degrees Celsius

The wells will be developed until water is visibly clear and free of sediment, and well purging parameters stabilized. A minimum of 8 to 10 well volumes will be purged from each well, if feasible. If well purging parameters have not stabilized before 10 casing volumes have been removed, well development will continue until purging parameters have stabilized and formation water is being drawn into the well. The adequacy of well development will be judged by the field technician performing the well development and based on known formation conditions.

Well Surveying

Monitoring wells will be surveyed to obtain top of box elevations to the nearest ±0.01 foot. Water level measurements will be recorded to the nearest ±0.01 foot and referenced to Mean Sea Level (MSL). If additional wells are required, then existing and newly installed wells are surveyed relative to MSL.

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

The sampling and analysis procedures employed by Gettler-Ryan Inc. (G-R) for ground-water sampling and monitoring follow specific Quality Assurance/Quality Control (QA/QC) guidelines. Quality Assurance objectives have been established by G-R to develop and implement procedures for obtaining and evaluating water quality and field data in an accurate, precise, and complete manner so that sampling procedures and field measurements provide information that is comparable and representative of actual field conditions. Quality Control (QC) is maintained by G-R by using specific field protocols and requiring the analytical laboratory to perform internal and external QC checks. It is the goal of G-R to provide data that are accurate, precise, complete, comparable, and representative. The definitions for accuracy, precision, completeness, comparability, and representativeness are as follows:

- Accuracy - the degree of agreement of a measurement with an accepted referenced or true value.

- Precision - a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of the standard deviation.

- Completeness - the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.

- Comparability - expresses the confidence with which one data set can be compared to another.

- Representativeness - a sample or group of samples that reflects the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

As part of the G-R QA/QC program, applicable federal, state, and local reference guidance documents are followed. The procedures outlined in these regulations, manuals, handbooks, guidance documents, and journals are incorporated into the G-R sampling procedures to assure that; (1) ground-water samples are properly collected, (2) ground-water samples are identified, preserved, and transported in a manner such that they are representative of field conditions, and (3) chemical analysis of samples are accurate and reproducible.

gettler — ryan inc. (415) 783-7500
general and environmental contractors

Guidance and Reference Documents Used to Collect Groundwater Samples

These documents are used to verify G-R sampling procedures and are consistent with current regulatory guidance. If site specific work and sampling plans are required, those plans will be developed from these documents, and newly received applicable documents.

U.S.E.P.A. - 330/9-51-002	NEIC Manual for Groundwater/Subsurface Investigation at Hazardous Waste Sites
U.S.E.P.A. - 530/SW611	Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities (August, 1977)
U.S.E.P.A. - 600/4-79-020	Methods for Chemical Analysis of Water and Wastes (1983)
U.S.E.P.A. - 600/4-82-029	Handbook for Sampling and Sample Preservation of Water and Wastewater (1982)
U.S.E.P.A. - 600/4-82-057	Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (July, 1982)
U.S.E.P.A. - SW-846#, 3rd Edition	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (November, 1986)
40 CFR 136.3e,Table II (Code of Federal Regulations)	Required Containers, Preservation Techniques, and Holding Times
Resources Conservation and Recover Act (OSWER 9950.1)	Groundwater Monitoring Technical Enforcement Guidance Document (September, 1986)
California Regional Water Quality Control Board (Central Valley Region)	A Compilation of Water Quality Goals (September, 1988); Updates (October, 1988)
California Regional Water Quality Control Board (North Coast, San Francisco Bay, and Central Valley)	Regional Board Staff Recommendations for Initial Evaluations and Investigation of Underground Tanks: Tri-Regional Recommendations (June, 1988)

Guidance and Reference Documents Used to Collect Groundwater Samples (cont.)

Regional Water Quality Control Board (Central Valley Region)	Memorandum: Disposal, Treatment, and Refuse of Soils Contaminated with Petroleum Fractions (August, 1986)
State of California Department of Health Services	Hazardous Waste Testing Laboratory Certification List (March, 1987)
State of California Water Resources Control Board	Leaking Underground Fuel Tank (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)
State of California Water Resources Control Board	Title 23, (Register #85.#33-8-17-85), Subchapter 16: Underground Tank Regulations; Article 3, Sections 2632 and 2634; Article 4, Sections 2645, 2646, 2647, and 2648; Article 7, Sections 2670, 2671, and 2672 (October, 1986: including 1988 Amendments)
Alameda County Water District	Groundwater Protection Program: Guidelines for Groundwater and Soil Investigations at Leaking Underground Fuel Tank Sites (November, 1988)
American Public Health Association	Standard Methods for the Examination of Water and Wastewaters, 16th Edition
Analytical Chemistry (journal)	Principles of Environmental Analysis, Volume 55, Pages 2212-2218 (December, 1983)
Napa County	Napa County Underground Storage Tank Program: Guidelines for Site Investigations; February 1989.
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)

Guidance and Reference Documents Used to Collect Groundwater Samples (cont.)

Santa Clara Valley Water District	Investigation and Remediation at Fuel Leak sites: Guidelines for Investigation and Technical Report Preparation (March 1989)
Santa Clara Valley Water District	Revised Well Standards for Santa Clara County (July 18, 1989)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983
American Petroleum Institute	A Guide to the Assessment and Remediation of Underground Petroleum Releases; API Publication 1628, February 1989
American Petroleum Institute	Literature Summary: Hydrocarbon Solubilities and Attenuations Mechanisms, API Publication 4414, August 1985
Site Specific (as needed)	General and specific regulatory documents as required.

Because ground-water samples collected by G-R are analyzed to the parts per billion (ppb) range for many compounds, extreme care is exercised to prevent contamination of samples. When volatile or semi-volatile organic compounds are included for analysis, G-R sampling crew members will adhere to the following precautions in the field:

1. A clean pair of new, disposable gloves are worn for each well being sampled.

2. When possible, samples are collected from known or suspected wells that are least contaminated (i.e. background) followed by wells in increasing order of contamination.

3. Ambient conditions are continually monitored to maintain sample integrity.

When known or potential organic compounds are being sampled for, the following additional precautions are taken:

1. All sample bottles and equipment are kept away from fuels and solvents. When possible, gasoline (used in generators) is stored away from bailers, sample bottles, purging pumps, etc.

2. Bailers are made of Teflon or Stainless Steel. Other materials such as plastic may contaminate samples with phthalate esters which interfere with many Gas Chromatography (GC) analyses.

3. Volatile organic ground-water samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples): sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the neck of the bottle; the Teflon side of the septum (in cap) is positioned against the meniscus, and the cap screwed on tightly; the sample is inverted and the bottle lightly tapped. The absence of an air bubble indicates a successful seal; if a bubble is evident, the cap is removed, more sample is added, and the bottle is resealed.

4. Extra Teflon seals are brought into the field in case seals are difficult to handle and/or are dropped. Dropped seals are considered contaminated and are not used. When replacing seals or if seals become flipped, care is taken to assure that the Teflon seal faces down.

Sample analysis methods, containers, preservatives and holding times are shown on Table 1.

Laboratory and field handling procedures of samples are monitored by including QC samples for analysis with every submitted sample lot from a project site. QC samples may include any combination of the following:

A. Trip Blank: Used for purgeable organic compounds only; QC samples are collected in 40 milliliter (ml) sample vials filled in the analytical laboratory with organic-free water. Trip blanks are sent to the project site, and travel with project site samples. Trip blanks are not opened, and are returned from a project site with the project site samples for analysis.

B. Field Blank: Prepared in the field using organic-free water. These QC samples accompany project site samples to the laboratory and are analyzed for specific chemical parameters unique to the project site where they were prepared.

C. Duplicates: Duplicated samples are collected "second samples" from a selected well and project site. They are collected as either split samples or second-run samples collected from the same well.

D. Equipment Blank: Periodic QC sample collected from field equipment rinsate to verify decontamination procedures.

The number and types of QC samples are determined as follows:

A. Up to 2 wells - Trip Blank Only

B. 2 to 5 Wells - 1 Field Blank and 1 Trip Blank

C. 5 to 10 Wells - 1 Field blank, 1 Trip Blank, and 1 Duplicate

D. More than 10 Wells - 1 Field Blank, 1 Trip Blank, and 1 Duplicate per each 12 wells

E. If sampling extends beyond one day, quality control samples will be collected for each day.

Additional QC is performed through ongoing and random reviews of duplicate samples to evaluate the precision of the field sampling procedures and analytical laboratory. Precision of QC data is accomplished by calculating the Relative Percent Difference (RPD). The RPD is evaluated to assess whether values are within an acceptable range (typically ± 20% of duplicate sample).

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SAMPLE COLLECTION

This section describes the routine procedures followed by G-R while collecting ground-water samples for chemical analysis. These procedures include decontamination, water-level measurements, well purging, physical parameter measurements, sample collection, sample preservation, sample handling, and sample documentation. Critical sampling objectives for G-R are to:

1. Collect ground-water samples that are representative of the sampled matrix and,

2. Maintain sample integrity from the time of sample collection to receipt by the analytical laboratory.

Sample analyses methods, containers, preservation, and holding times are presented in Table 1.

Decontamination Procedures

All physical parameter measuring and sampling equipment are decontaminated prior to sample collection using Alconox or equivalent detergent followed by steam cleaning with deionized water. Any sampling equipment surfaces or parts that might absorb specific contaminants, such as plastic pump valves, impellers, etc., are cleaned in the same manner.

Sample bottles, bottle caps, and septa used for sampling volatile organics are thoroughly cleaned and prepared in the laboratory. Sample bottles, bottle caps, and septa are protected from all potential chemical contact before actual usage at a sample location.

During field sampling, equipment placed in a well are decontaminated before purging or sampling the next well. The equipment are decontaminated by cleaning with Alconox or equivalent detergent followed by steam cleaning with deionized water.

Water-Level Measurements

Prior to purging and sampling a well, the static-water levels are measured in all wells at a project site using an electric sounder and/or calibrated portable oil-water interface probe (Figure 4). Both static water-level and separate-phase product thickness are measured to the nearest ±0.01 foot. The presence of separate-phase product is confirmed using a clean, acrylic or polyvinylchloride (PVC) bailer, measured to the nearest ±0.01 foot with a decimal scale tape.

Water-Level Measurements (continued)

The monofilament line used to lower the bailer is replaced between wells with new line to preclude the possibility of cross-contamination. Field observations (e.g. well integrity, product color, turbidity, water color, odors, etc.) are noted on the G-R Well Sampling Field Data Sheet shown in Figure 4. Before and after each use, the electric sounder, interface probe and bailer are decontaminated by washing with Alconox or equivalent detergent followed by rinsing with deionized water to prevent cross-contamination.

As mentioned previously, water-levels are measured in wells with known or suspected lowest dissolved chemical concentrations to the highest dissolved concentrations.

Well Purging

Before sampling occurs, well casing storage water and interstitial water in the artificial sand pack will be purged using (1) a positive displacement bladder pump constructed of inert, non-wetting, Teflon and stainless steel, (2) a pneumatic-airlift pumping system, (3) a centrifigal pumping system, or (4) a Teflon or Stainless steel bailer (Figure 5). Methods of purging will be assessed based on well size, location, accessibility, and known chemical conditions. Individual well purge volumes are calculated from borehole volumes which take into account the sand packed interval in the well annular space. As a general rule, a minimum of 3 and a maximum of 10 borehole volumes will be purged. Wells which dewater or demonstrate slow recharge periods (i.e. low-yield wells) during purging activities may be sampled after fewer purging cycles. If a low-yield (low recovery) well is to be sampled, sampling will not take place until at least 80 percent of the previously measured water column has been replaced by recharge, or as per local requirements. Physical parameter measurements (temperature, pH, and specific conductance) are closely monitored throughout the well purging process and are used by the G-R sampling crew as indicators for assessing sufficient purging. Purging is continued until all three physical parameters have stabilized. Specific conductance (conductivity) meters are read to the nearest ± 10 umhos/cm, and are calibrated daily. pH meters are read to the nearest ± 0.1 pH units and are calibrated daily. Temperature is read to the nearest 0.1 degree F. Calibration of physical parameter meters will follow manufacturers specifications. Monitoring wells will be purged according to the protocol presented in Figure 5. Collected field data during purging activities will be entered on the G-R Well Sampling Field Data Sheet shown in Figure 4. Copies of the G-R Field Data Sheets will be reviewed by the G-R Sampling Manager for accuracy and completeness.

DOCUMENTATION

Sample Container Labels

Each sample container will be labeled by an adhesive label, noted in permanent ink immediately after the sample is collected. Label information will include:

Sample point designation (i.e. well number or code)

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

In the field, the G-R sampling crew will record the following information on the Well Sampling Data Sheet for each sample collected:

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

Pertinent well data (e.g. depth, product thickness, static water-level, pH, specific conductance, temperature)

Calculated and actual purge volumes

Chain-of-Custody

A Chain-of-Custody record (Figure 6) shall be completed and accompany every sample and every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from time of collections. The record will contain the following information:

- Sample or station number or sample identification (ID)
- Signature of collector, sampler, or recorder
- Date and time of collection
- Place of collection
- Sample type
- Signatures of persons involved in chain of possession
- Inclusive dates of possession

Samples shall always be accompanied by a Chain-of-Custody record. When transferring the samples, the individual relinquishing and receiving the samples will sign, date, and note the time on the Chain-of-Custody record. G-R will be responsible for notifying the laboratory coordinator when and how many samples will be sent to the laboratory for analysis, and what types of analyses shall be performed.

TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

Parameter	Analytical Method	Reporting Units	Container	Preservation	Maximum Holding Time
Total Petroleum Hydrocarbons (Gasoline)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon	cool, 4 C HCl to pH<2	14 days (maximum)
Benzene Toluene Ethylbenzene Xylenes (BTEX	EPA 8020	mg/l ug/l	50 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	7 days (w/o preservative) 14 days (w preservative)
Oil & Grease	SM 503E	mg/l ug/l	1 l glass, Teflon lined septum	H2SO4 or HCl to pH<2	28 days (maximum)
Total Petroleum Hydrocarbons (Diesel)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Halogented Volatile Organics (chlorinated solvents)	8010	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Non chlorinated solvents	8020	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	14 days (maximum)
Volatile Organics	8240	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	14 days (maximum)
Semi-Volatile Organics	8270	mg/l ug/l	1 l amber glass, Teflon lined septum	cool, 4 C	7 days extract 40 days (maximum to analyze)
Specific Conductance (Field test)		umhos/cm			
pH (Field test)		pH units			
Temperature (Field test)		Deg F			

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FIELD EXPLORATORY BORING LOG

FIGURE 1

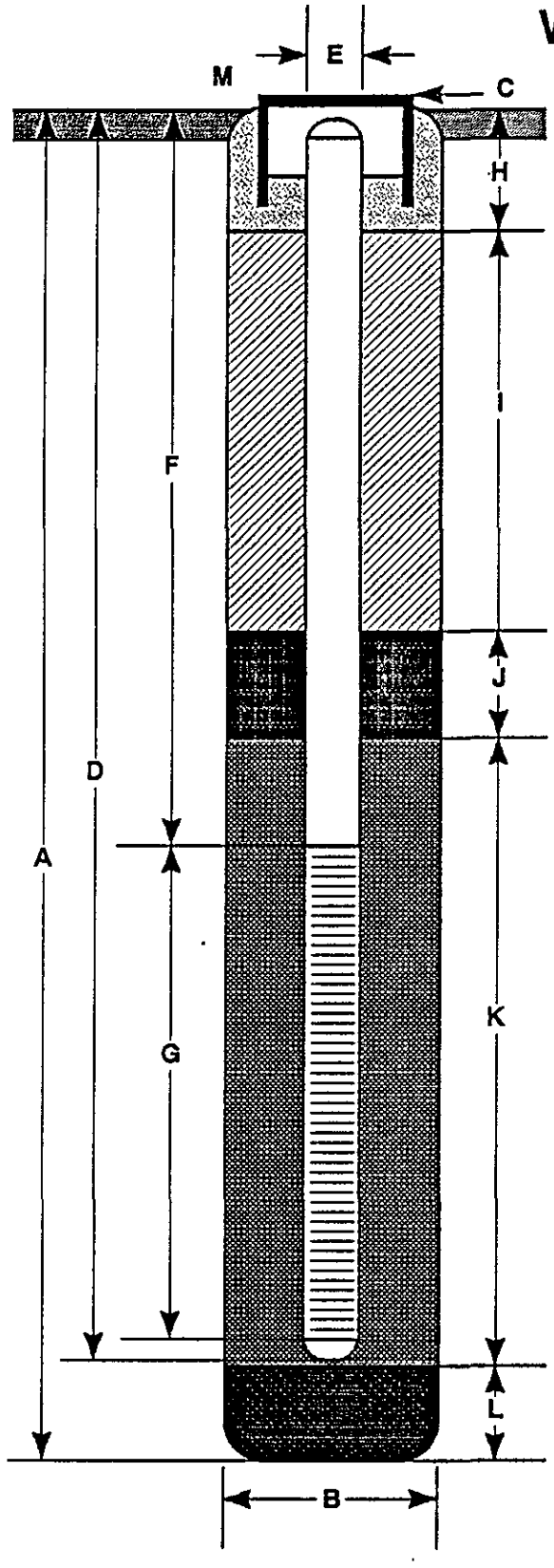
Field location of boring:	Project No.:	Date:	Boring No:
	Client:		
	Location:		
	City:		Sheet
	Logged by:	Driller:	of
Drilling method:	Casing installation data:		
Hole diameter:	Top of Box Elevation:		Datum:

							Water Level	
							Time	
							Date	
PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description

Remarks:

WELL CONSTRUCTION DETAIL

FIGURE 2



A Total Depth of Boring _____ ft.

B Diameter of Boring _____ in.
Drilling Method _____

C Top of Box Elevation _____ ft.
☐ Referenced to Mean Sea Level
☐ Referenced to Project Datum

D Casing Length _____ ft.
Material _____

E Casing Diameter _____ in.

F Depth to Top Perforations _____ ft.

G Perforated Length _____ ft.
Perforated Interval from _____ to _____ ft.
Perforation Type _____
Perforation Size _____ in.

H Surface Seal from _____ to _____ ft.
Seal Material _____

I Backfill from _____ to _____ ft.
Backfill Material _____

J Seal from _____ to _____ ft.
Seal Material _____

K Gravel Pack from _____ to _____ ft.
Pack Material _____

L Bottom Seal _____ ft.
Seal Material _____

M _____

Note: Depths measured from initial ground surface

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Well Construction Detail

WELL NO.

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE

WELL DEVELOPMENT FORM FIGURE 3

Page_____ of_____

==========

(to be filled out in office)

Client_____ SS#_____ Job#_____

Name_____ Location_____

Well#_____ Screened Interval_____ Depth_____

Aquifer Material_____ Installation Date _____

Drilling Method_____ Borehole Diameter_____

Comments regarding well installation:_____

_____

_____

==========

(to be filled out in the field) Name_____

Date_____ Development Method_____

Total Depth_____ - Depth to liquid_____ = WaterColumn_____

Product thickness_____

_____ x _____ x _____ x 0.0408 = _____gals
Water Column Diameter (in.) #Vol

Purge Start_____ Stop_____ Rate_____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity
0					

Total gallons removed_____ Development stop time_____

Depth to liquid _____at_____(time)

Odor of water_____ Water discharged to_____

Comments_____

_____

_____

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WELL SAMPLING FIELD DATA SHEET

FIGURE 4

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) _____ x _____ x(VF) _____ = (Estimated Purge Volume) _____ gal.

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

(Estimated Purge Volume) _____ gal. / (Purging Flow Rate) _____ gpm. = (Anticipated Purging Time) _____ min.

Time	pH	Conductivity	Temperature	Volume

Did well dewater? _____ If yes, time _____ Volume _____

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 5

Monitoring Well Sampling Protocol Schematic

Sampling Crew Reviews Project Sampling Requirements/Schedule

↓

Field Decontamination and Instrumentation Calibration

↓

Check Integrity of Well (Inspect for Well Damage)

↓

Measure and Record Depth to Water and Total Well Depth (Electric Well Sounder)

↓

Check for Floating Product (Oil/Water Interface Probe)

Floating Product Present

↓

Confirm Product Thickness (Acrylic or PVC Bailer)

↓

Collect Free-Product Sample

↓

Dissolved Product Sample Not Required

↓

Record Data on Field Data Form

Floating Product Not Present

↓

Purge Volume Calculation

$V = \pi (r/12)^2 h(\_\% \text{ vol})(7.48) = \_\_\_ / \text{gallons}$

V = Purge volume (gallons)

$\pi = 3.14159$

h = Height of Water Column (feet)

r = Borehole radius (inches)

↓

Evacuate water from well equal to the calculated purge volume while monitoring groundwater stabilization indicator parameters (pH, conductivity, temperature) at intervals of one casing volume.

Well Dewaters after One Purge Volume (Low yield well)

↓

Well Recharges to 80% of Initial Measured Water Column Height in Feet within 24 hrs. of Evacuation.

↓

Measure Groundwater Stability Indicator Parameters (pH, Temperature, Conductivity)

↓

Collect Sample and Complete Chain-of-Custody

↓

Preserve Sample According to Required Chemical Analysis

↓

Transport to Analytical Laboratory

Well Readily Recovers

↓

Record Groundwater Stability Indicator Parameters from each Additional Purge Volume

Stability indicated when the following Criteria are met:

pH :	± 0.1 pH units
Conductivity:	± 10%
Temperature:	1.0 degrees F

Groundwater Stability Achieved

↓

Collect Sample and Complete Chain-of-Custody

↓

Preserve Sample According to Required Chemical Analysis

↓

Transport to Analytical Laboratory

Groundwater Stability Not Achieved

↓

Continue Purging Until Stability is Achieved

↓

Collect Sample and complete Chain-of-Custody

↓

Preserve Sample According to Required Chemical Analysis

↓

Transport to Analytical Laboratory

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Chain of Custody
FIGURE 6

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

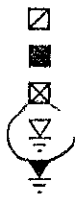
REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

APPENDIX B
EXPLORATORY BORING LOGS
WELL CONSTRUCTION DETAILS

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 15% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 15% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

Perm	- Permeability
Consol	- Consolidation
LL	- Liquid Limit (%)
PI	- Plastic Index (%)
G_s	- Specific Gravity
MA	- Particle Size Analysis
2.5 YR 6/2	- Soil Color according to Munsell Soil Color Charts (1975 Edition)
5 GY 5/2	- GSA Rock Color Chart



- No Soil Sample Recoverd
- "Undisturbed" Sample
- Bulk or Classification Sample
- First Encountered Ground Water Level
- Piezometric Ground Water Level

Penetration - Sample drive hammer weight - 140 pounds falling 30 inches. Blows required to drive sampler 1 foot are indicated on the logs

GeoStrategies Inc.

Unified Soil Classification - ASTM D 2488-85 and Key to Test Data

Field location of boring: (See Plate 2)	Project No.: 7191	Date: 09/10/90	Boring No: C-4
	Client: Chevron USA S.S. No. 4587		
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-inches	Top of box Elevation: 16.53		Datum: MSL

Water Level	15.0'	11.56'
Time	1200	1140
Date	09/10/90	10/30/90

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				PAVEMENT SECTION - 1.0 feet.
				1				
				2				SAND (SP) - dark yellow brown (10YR 4/6), dense, damp; 90% fine sand; 10% clay; no chemical odor.
				3				
				4				
0	500	S&H		5				
		push						
				6				
				7				COLOR CHANGE to olive gray (5Y 4/2) at 6.5 feet.
				8				
				9				
	3	S&H						
	4		C-4-	10				CLAYEY SAND (SC) - dark gray (7.5 YR 4/0), medium
0	8		10.5					dense, damp; 65% fine sand; 35% clay; roots; slight
				11				oxidation; no chemical odor.
				12		▼		
				13				
				14				
	4	S&H						
	12		C-4-	15		▽		
0	24		15.5					SAND (SP) - yellowish brown (10YR 5/4), dense,
				16				saturated; 95% fine sand; 5% clay; no chemical odor.
				17				
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CEG 1202	9/90		

Field location of boring:	Project No.: 7191	Date: 09/10/90	Boring No:
(See Plate 2)	Client: Chevron USA S.S. No. 4587		C-4
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 2
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-inches	Top of Box Elevation:		Datum:

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	16	S&H		20				
	28		C-4-					
0	24/4"		20.5					very dense; no chemical odor.
				21				
				22				
				23				
				24				no chemical odor.
	11	S&H	C-4-					
0	40		25.0	25				
				26				
				27				smooth drilling at 28.0 feet.
				28				
				29				CLAY (CL) - dark brown (10YR 4/3), stiff, moist; moderate plasticity; 80% clay; 20% silt; no chemical odor.
	12	S&H	C-4-					
0	17		30.0	30				
				31				Bottom of Boring at 30.0 feet.
								Bottom of Sample at 30.0 feet.
				32				09/10/90
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

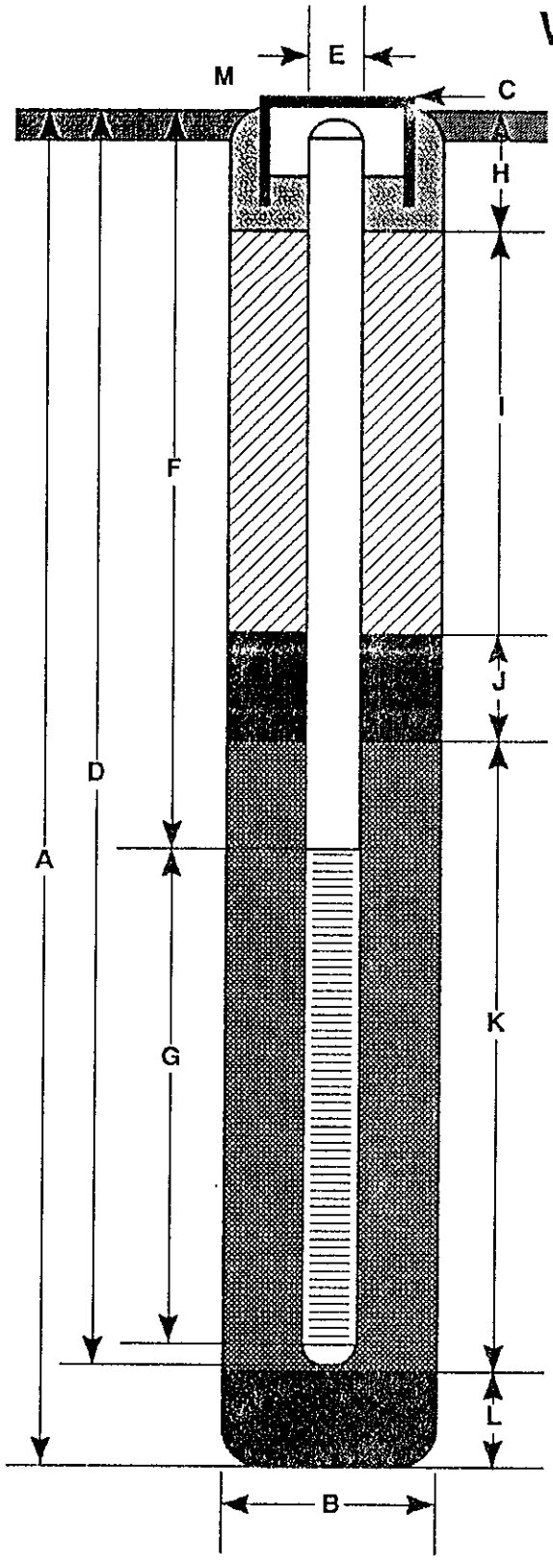
GeoStrategies Inc.

Log of Boring

BORING NO. C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CEG 1201	9/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 30 ft.

B Diameter of Boring: 8 in.
Drilling Method: Hollow Stem Auger

C Top of Box Elevation: 16.53 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 30 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 10 ft.

G Perforated Length: 20 ft.
Perforated Interval from 10 to 30 ft.
Perforation Type: Factory Slotted
Perforation Size: 0.020 in.

H Surface Seal from 0.0 to 1.5 ft.
Seal Material: Concrete

I Backfill from 1.5 to 6 ft.
Backfill Material: Cement Grout

J Seal from 6 to 8 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 8 to 30 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: ft.
Seal Material:

M Traffic-rated box with locking well cap.

Note: Depths measured from initial ground surface.

GSI GeoStrategies Inc.

Well Construction Detail

WELL NO. C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	Chap CEG 1202	09/90		

Field location of boring:	Project No.: 7191	Date: 09/10/90	Boring No:
(See Plate 2)	Client: Chevron USA S.S. No. 4587		C-5
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 1
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-inches	Top of Box Elevation: 14.70		Datum: MSL

Water Level	13'	9.97'	
Time	1000	1147	
Date	09/10/90	10/30/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				PAVEMENT SECTION - 1.5 feet
				1				
				2				
				3				SAND (SP) - yellow brown (10YR 5/6), dense, moist; 95% fine sand; 5% clay; no chemical odor.
				4				
0	400	S&H						
		push		5				
				6				COLOR CHANGE to olive gray (5Y 4/2) at 5 feet; slight increase in clay content to 10%; no chemical odor.
				7				
				8				
				9				
	12	S&H						
	16		C-5-	10		▼		no chemical odor.
0	20		10.5					
				11				
				12				
				13		▽		CLAYEY SAND (SC) - dark brown (7.5YR 4/4), medium dense, saturated; voids, 70% fine sand; 30% clay; no chemical odor
				14				
	4	S&H						
	5		C-5-	15				
0	6		15.5					
				16				
				17				
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	RMP CEG 12/92	9/90		

Field location of boring:

(See Plate 2)

Project No.: 7191	Date: 09/10/90	Boring No.: C-5	
Client: Chevron USA S.S. No. 4587			
Location: 609 Oak Street			
City: Oakland, California		Sheet 2 of 2	
Logged by: R.S.Y.	Driller: Bayland		

Drilling method: Hollow Stem Auger

Hole diameter: 8-inches

Casing installation data:

Top of Bo Elevation: Datum:

Water Level				
Time				
Date				

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	8	S&H						
	13		C-5-	20				SAND (SP) - olive (5Y 5/3), dense, saturated; 100% fine
0	24		20.5					sand; no chemical odor.
				21				
				22				
				23				
				24				
	10	S&H						
	13		C-5-	25				no chemical odor.
0	40		25.5					
				26				
				27				
				28				
				29				
	14	S&H	C-5-					no chemical odor.
0	32		30.0	30				
								Bottom of Boring at 30.0 feet.
				31				Bottom of Sample at 30.0 feet.
								09/10/90
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

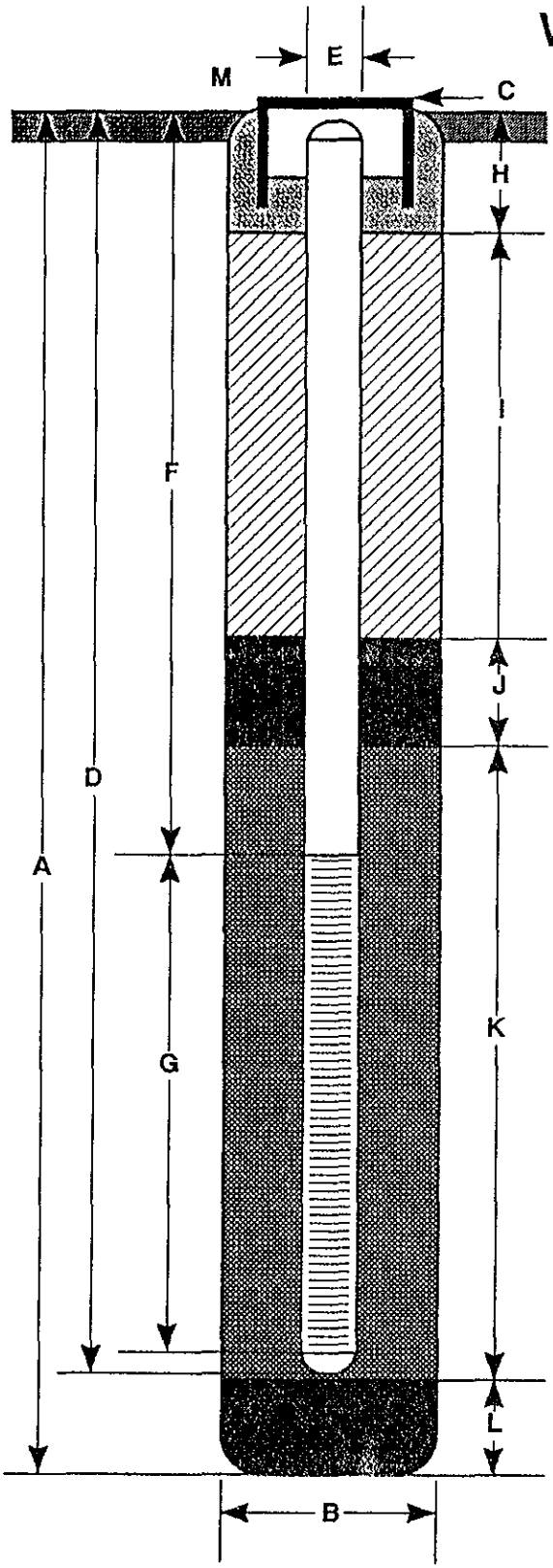
GeoStrategies Inc.

Log of Boring

BORING NO. C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CMP CEG 12/92	9/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 30 ft.

B Diameter of Boring 8 in.
Drilling Method Hollow Stem Auger

C Top of Box Elevation 14.70 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 30 ft.
Material Schedule 40 PVC

E Casing Diameter 2 in.

F Depth to Top Perforations 10 ft.

G Perforated Length 20 ft.
Perforated Interval from 10 to 30 ft.
Perforation Type Factory Slotted
Perforation Size 0.020 in.

H Surface Seal from 0.0 to 1.5 ft.
Seal Material Concrete

I Backfill from 1.5 to 6 ft.
Backfill Material Cement Grout

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 30 ft.
Pack Material Lonestar #2/12 Sand

L Bottom Seal ft.
Seal Material

M Traffic-rated box with locking well cap.

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.

C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	RG CEG 12/92	09/90		

Field location of boring:

(See Plate 2)

Project No.:	7191	Date: 09/11/90	Boring No. C-6
Client:	Chevron USA S.S. No. 4587		
Location:	609 Oak Street		
City:	Oakland, California		Sheet 1 of 2
Logged by:	R.S.Y.	Driller: Bayland	

Drilling method: Hollow Stem Auger

Hole diameter: 8-inches

Casing installation data:

Top of Box Elevation: 13.87 Datum: MSL

Water Level	15.0'	9.43'		
Time	1030	1211		
Date	09/11/90	10/30/90		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION 1.5 feet.
				2				
				3				FILL - SAND (SP) - black (10YR 2/1), loose, dry; 95% fine sand; 5% clay; no chemical odor.
				4				
	150	S&H		5				
	150	push	C-6-					
0	200		5.5					SAND (SP) - gray (7.5YR 5/0), dense, damp; 90% fine sand; 10% clay; no chemical odor.
				6				
				7				
				8				
			C-6-					
0	500	S&H	9.0	9				COLOR CHANGE to dark yellow (10YR 4/6) at 9.0 feet.
		push				▼		
				10				
				11				
				12				
				13				
	7	S&H		14				saturated at 15 feet; no chemical odor.
0	16		C-6-					
	26		15.0	15		▽		
				16				
				17				
				18				CLAYEY SAND (SC) - yellowish brown (10YR 5/4), loose, saturated; rootholes; 70% fine sand; 30% clay; slight oxidation; no chemical odor.
	2	S&H		19				
	3		C-6-					
0	5		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CMP CEG 1262	9/90		

Field location of boring:	Project No.: 7191	Date: 09/11/90	Boring No:
(See Plate 2)	Client: Chevron USA S.S. No. 4587		C-6
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 2
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-inches	Top of Box Elevation:	Datum:	

								Water Level				
								Time				
								Date				
PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description				
				21								
				22								
				23								
	8	S&H		24				SAND (SP) - dark yellowish brown (10YR 4/6), dense,				
	12		C-6-					saturated; 100% fine sand; no chemical odor.				
0	18		25.0	25								
				26								
				27								
				28				COLOR CHANGE to brown (10YR 5/3) at 27.5 feet.				
	14	S&H		29								
	26		C-6-									
0	38		30.0	30								
				31				Bottom of Boring at 30.0 feet.				
								Bottom of Sample at 30.0 feet.				
				32				09/11/90				
				33								
				34								
				35								
				36								
				37								
				38								
				39								
				40								

Remarks:

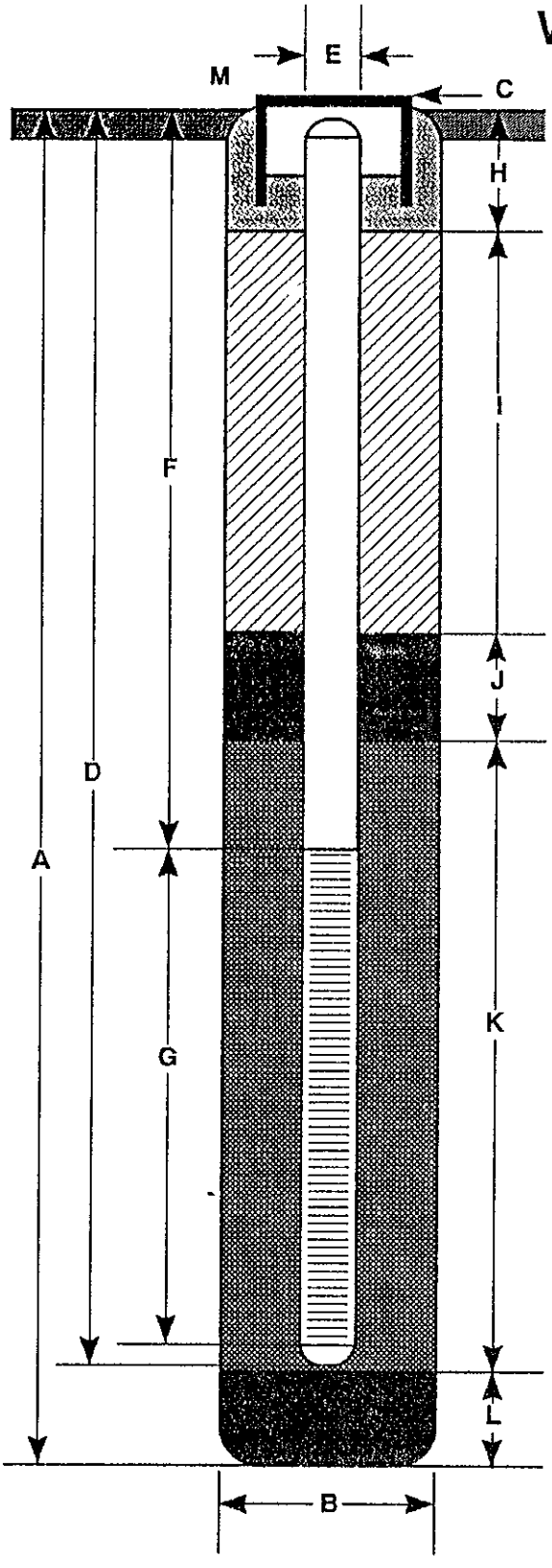
GeoStrategies Inc.

Log of Boring

BORING NO. C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CWP CEG 12/92	9/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 30 ft.

B Diameter of Boring 8 in.
Drilling Method Hollow Stem Auger

C Top of Box Elevation 13.87 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 30 ft.
Material Schedule 40 PVC

E Casing Diameter 2 in.

F Depth to Top Perforations 10 ft.

G Perforated Length 20 ft.
Perforated Interval from 10 to 30 ft.
Perforation Type Factory Slotted
Perforation Size 0.020 in.

H Surface Seal from 0.0 to 1.5 ft.
Seal Material Concrete

I Backfill from 1.5 to 6 ft.
Backfill Material Cement Grout

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 30 ft.
Pack Material Lonestar #2/12 Sand

L Bottom Seal ft.
Seal Material

M Traffic-rated box with locking well cap.

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.
C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CMP CEG 12/92	09/90		

Field location of boring:	Project No.: 7191	Date: 09/11/90	Boring No:
(See Plate 2)	Client: Chevron USA S.S. No. 4587		CR-1
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 1
	Logged by: R.S.Y.	Driller: Bayland	of 2
	Casing installation data:		
Drilling method: Hollow Stem Auger			
Hole diameter: 8-inches	Top of Box Elevation:		Datum:

Water Level	13'	10.51'	
Time	1300	1220	
Date	09/11/90	10/30/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				1				PAVEMENT SECTION - .25 feet
				2				
				3				CLAY (CL) - olive (5Y 5/3), medium stiff, damp, trace sand, medium to high plasticity; no chemical odor.
	50	S&H		4				
	50	push	CR-1-	5				
3	150		5.0					COLOR CHANGE to gray (7.5 YR 5/0) at 4.0 feet; increase coarse sand to 20 %; weak chemical odor
				6				
				7				
				8				gravel and wood fragments at 7.0 feet.
	11	S&H		9				
	8		CR-1-					SAND (SP) - black (10YR 2/1), medium dense, damp; 95% fine sand; 5% clay; moderate chemical odor.
3	8		10.0	10				
				11		▼		
				12				
				13		▽		CLAYEY SAND (SC) - dark yellow brown (10YR 4/4), loose, saturated; 70% fine sand; 25-30% clay; voids; weak chemical odor.
	2	S&H		14				
	3		CR-1-					
80	4		15.0	15				
				16				
				17				
				18				SAND (SP) - dark olive (5Y 3/2), dense, saturated; 100% fine sand; no chemical odor.
	10	S&H		19				
	16		CR-1-					
23	22		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. CR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CEG 12/92	9/90		

Field location of boring:	Project No.: 7191	Date: 09/11/90	Boring No.
(See Plate 2)	Client: Chevron USA		CR-1
	Location: 609 Oak Street		
	City: Oakland, California		Sheet 2
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-inches	Top of Box Elevation:		Datum:

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				21				
				22				
				23				
	15	S&H		24				COLOR CHANGE to dark yellow brown (10YR 4/6); no
	32		CR-1-					chemical odor.
0	38		25.0	25				
				26				
				27				
				28				
	14	S&H		29				no chemical odor.
	23		CR-1					
0	38		30.0	30				Bottom of Boring at 30.0 feet.
				31				Bottom of Sample at 30.0 feet.
				32				09/11/90
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks:

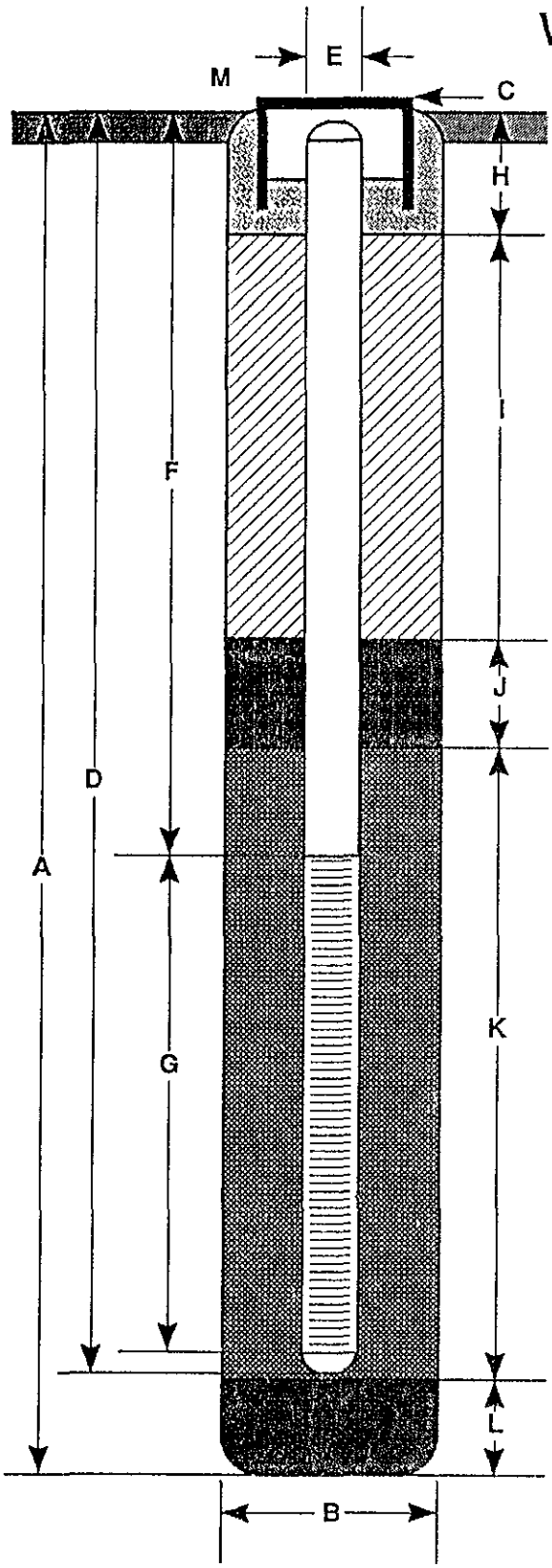
GeoStrategies Inc.

Log of Boring

BORING NO. CR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	CWP CEG 1242	9/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 30 ft.

B Diameter of Boring 12 in.
Drilling Method Hollow Stem Auger

C Top of Box Elevation ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 30 ft.
Material Schedule 40 PVC

E Casing Diameter 6 in.

F Depth to Top Perforations 10 ft.

G Perforated Length 20 ft.
Perforated Interval from 10 to 30 ft.
Perforation Type Continuous Wrap
Perforation Size 0.020 in.

H Surface Seal from 0.0 to 1.5 ft.
Seal Material Cement Grout

I Backfill from 1.5 to 6 ft.
Backfill Material Concrete Grout

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 30 ft.
Pack Material Lonestar #2/12 sand

L Bottom Seal ft.
Seal Material

M Traffic-rated vault box with locking well cap and lock

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Recovery Well Detail
Chevron Service Station
609 Oak Street
Oakland, California

BORING NO.
CR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7191	RG/CEG 1262	11/90		

APPENDIX C
SOIL ANALYTICAL REPORT

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11001
CLIENT: Chevron USA
CLIENT JOB NO.: 7191

DATE RECEIVED: 09/13/90
DATE REPORTED: 09/20/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11001- 1	C-4-10.5	09/10/90	09/19/90
11001- 2	C-4-15.5	09/10/90	09/19/90
11001- 3	C-5-10.5	09/10/90	09/19/90
11001- 4	C-5-15.5	09/10/90	09/19/90
11001- 5	C-6-9	09/10/90	09/19/90
11001- 6	C-6-15	09/10/90	09/19/90
11001- 7	CR-1-5	09/10/90	09/19/90
11001- 8	CR-1-10	09/10/90	09/19/90
11001- 9	CR-1-15	09/10/90	09/19/90
11001-10	CP-4	09/10/90	09/19/90

Laboratory Number:	11001 1	11001 2	11001 3	11001 4	11001 5
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
TOLUENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05

Laboratory Number:	11001 6	11001 7	11001 8	11001 9	11001 10
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	ND<0.05	0.26	ND<0.05
TOLUENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE. UNIT I · SAN FRANCISCO. CA 94124 · PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11001
CLIENT: Chevron USA
CLIENT JOB NO.: 7191

DATE RECEIVED: 09/13/90
DATE REPORTED: 09/20/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11001-11	CP-5	09/11/90	09/19/90
11001-12	CP-6	09/11/90	09/19/90
11001-13	CRP-1	09/11/90	09/19/90

Laboratory Number:	11001 11	11001 12	11001 13
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)		
OIL AND GREASE:	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	ND<0.05
TOLUENE:	ND<0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	ND<0.05	0.35

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
Diesel by Modified EPA SW-846 Method 8015
Gasoline by Purge and Trap: EPA MEthod 8015/5030
ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

QA/QC INFORMATION
SET: 11001

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT

Mg/Kg = part per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Duplicate RPD NA
Minimum Detection Limit in Soil: 20mg/kg

Modified EPA Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg
Daily Standard run at 200mg/L; %Diff Diesel = NA
MS/MSD Average Recovery = NA: Duplicate RPD = NA

8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg
Daily Standard run at 2mg/L; %Diff Gasoline = <15%
MS/MSD Average Recovery = 98%: Duplicate RPD = <1%

8020/BTXE
Minimum Quantitation Limit in Soil: 0.05mg/kg
Daily Standard run at 20ug/L; %Diff = <15%
MS/MSD Average Recovery = 108%: Duplicate RPD = <4%

Richard Srna, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11001
CLIENT: Gettler Ryan Inc.
CLIENT JOB NO.: 7191

DATE RECEIVED: 09/13/90
DATE REPORTED: 09/28/90

ANALYSIS FOR TOTAL ORGANIC LEAD
by DHS Method MAY 1988 LUFT Manual

LAB NO.	Sample Idetnification	Concentration (mg/kg)
10	CP-4	ND<0.05
11	CP-5	ND<0.05
12	CP-6	ND<0.05
13	CRP-1	ND<0.05

mg/kg - parts per million (ppm)

Minimum Detection limit for Organic Lead in Soil: 0.05mg/kg

QAQC Summary:
MS/MSD Average Recovery:52%
Duplicate RPD = <1

Richard Srna, Ph.D.
Laboratory Director

SF # 1100

Chain-of-Custody Record

Chevron U.S.A. Inc.
P.O. Box 5004
San Ramon, CA 94583
FAX (415) 842-9591

Chevron Facility Number: 4587

Consultant Release Number:

Consultant Project Number: 1191

Consultant Name: Geo-Logic-Ryan Inc.

Address: 2150 W. Winton Ave, Hayward

Fax Number: 783-1089

Project Contact (Name): Randy Young

(Phone): 352-4800

Chevron Contact (Name): Nancy Vukelich

(Phone): 842-9581

Laboratory Name: Superior Analytical Labs

Contract Number: 2746840

Samples Collected by (Name): Randall Young

Collection Date: 9/10/90 9/11/90

Signature: Randall Young

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803				Remarks
2-4-10.5		1	S	G	11:50		✓	✓			✓							
2-4-15.5		1	S	G	12:00		✓	✓			✓							
2-5-10.5		1	S	G	9:55		✓	✓			✓							
2-5-15.5		1	S	G	10:05		✓	✓			✓							
2-6-9		1	S	G	10:20		✓	✓			✓							
2-6-15		1	S	G	10:30		✓	✓			✓							
2R-1-5		1	S	G	13:15		✓	✓			✓							
2R-1-10		1	S	G	13:25		✓	✓			✓							
2R-1-15		1	S	G	13:30		✓	✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSI	9/11/90 15:30		Geo-Logic Ryan	9-12-90 15:3	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
	GLR	9-13-90/14:34				5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	10 Days
			Cecilia D. Joaquin		9/13/90 14:35	

ed = USA

MS 5136 (6 89)

SF # 11001

Chain-of-Custody Record

Chevron U.S.A. Inc.
P.O. Box 5004
San Ramon, CA 94: 3
FAX (415) 842-9591

Chevron Facility Number 4587
Consultant Release Number
Consultant Project Number 7191
Consultant Name Geotech-Ryan Inc
Address 2150 W. Winton Ave, Hayward
Fax Number 783-1089
Project Contact (Name) Randall Young
(Phone) 352-4800

Chevron Contact (Name) Nancy Vukelich
(Phone) 842-9581
Laboratory Name Sapuria Analytical Labs
Contract Number 2746840
Samples Collected by (Name) Randy Young
Collection Date 9/10/90, 9/11/90
Signature Randall Young

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Analyses To Be Performed: Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803	Organic Lead			Remarks
CP-4		1	S	C	13:00		✓	✓			✓				✓			
CP-5		1	S	C	10:45		✓	✓			✓				✓			
CP-6		1	S	C	11:00		✓	✓			✓				✓			
CRP-1		1	S	C	14:30		✓	✓			✓				✓			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSE	9/12/90 15:30		Geotech Ryan	9-12-90 15:2	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
	Geotech Ryan	9-13-90 14:34				5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	~~10 Days~~
			Cecilia D. Joaquin		9/13/90 14:35	

ted in USA

MS 5139 (5-89)

APPENDIX D
GETTLER-RYAN INC. GROUNDWATER SAMPLING REPORTS

gettler — ryan inc.

November 1, 1990

GROUNDWATER SAMPLING REPORT

Chevron U.S.A. Inc.
Post Office Box 5004
San Ramon, California 94583-0804

Referenced Site: Chevron Service Station #4587
609 Oak Street/6th
Oakland, California

Sampling Date: October 30, 1990

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 30, 1990 at the referenced location. The site is occupied by an operating service station located on the northwest corner of Oak Street and Sixth Street. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products.

There are currently seven groundwater monitoring wells on site and three groundwater monitoring wells off site at the location shown on the attached site map. Wells C-4 thru C-6 were developed September 18-19, 1990. Well CR-1 was developed October 25, 1990. Prior to sampling, all wells were inspected for total well depth, water levels, and the presence of separate phase hydrocarbons using an electronic interface probe. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase hydrocarbons. Groundwater depths ranged from 9.43 to 11.56 feet below grade. Separate phase hydrocarbons were observed in wells C-1, B and C.

The wells were then purged and sampled. The purge water was contained in drums for proper disposal. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. Each well was purged while pH, temperature, and conductivity measurements were monitored for stability. Details of the final well purging results are presented on the attached Table of Monitoring Data. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. Under such circumstances the sample may not represent actual formation water, due to low flow conditions.

2150 west winton avenue • hayward, california 94545-1210 • (415) 783-7500

Samples were collected, using Teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A trip blank, and a field blank (CF-3), supplied by the laboratory, were included for analysis. The trip blank was broken by the laboratory and could not be analyzed. A duplicate sample (CD-A), was submitted without well designation to assess laboratory performance. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

The samples were analyzed by Superior Analytical Incorporated, located at 1555 Burke, Unit 1, San Francisco, California. The laboratory is assigned a California DHS-HMTL Certification number of 220. The results are presented as a Certified Analytical Report, a copy of which is attached to this report.

Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	C-1	C-2	C-3	C-4	C-5	C-6
Casing Diameter (inches)	3	3	3	2	2	2
Total Well Depth (feet)	----	16.0	17.4	30.1	30.0	30.2
Depth to Water (feet)	10.79**	11.16	10.44	11.56	9.97	9.43
Free Product (feet)	0.02	none	none	none	none	none
Reason Not Sampled	free product	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	----	7.2	10.4	12.6	13.6	14.4
Did Well Dewater?	----	no	yes	no	no	no
Volume Evacuated (gal.)	----	9.0	4.0	15.0	17.0	18.0
Purging Device	----	Bailer	Bailer	Bailer	Bailer	Bailer
Sampling Device	----	Bailer	Bailer	Bailer	Bailer	Bailer
Time	----	11:10	13:20	11:40	11:47	12:11
Temperature (F)*	----	69.1	65.6	68.7	69.5	67.3
pH*	----	6.59	6.51	6.49	6.41	6.58
Conductivity (umhos/cm)*	----	683	381	450	498	507

* Indicates Stabilized Value

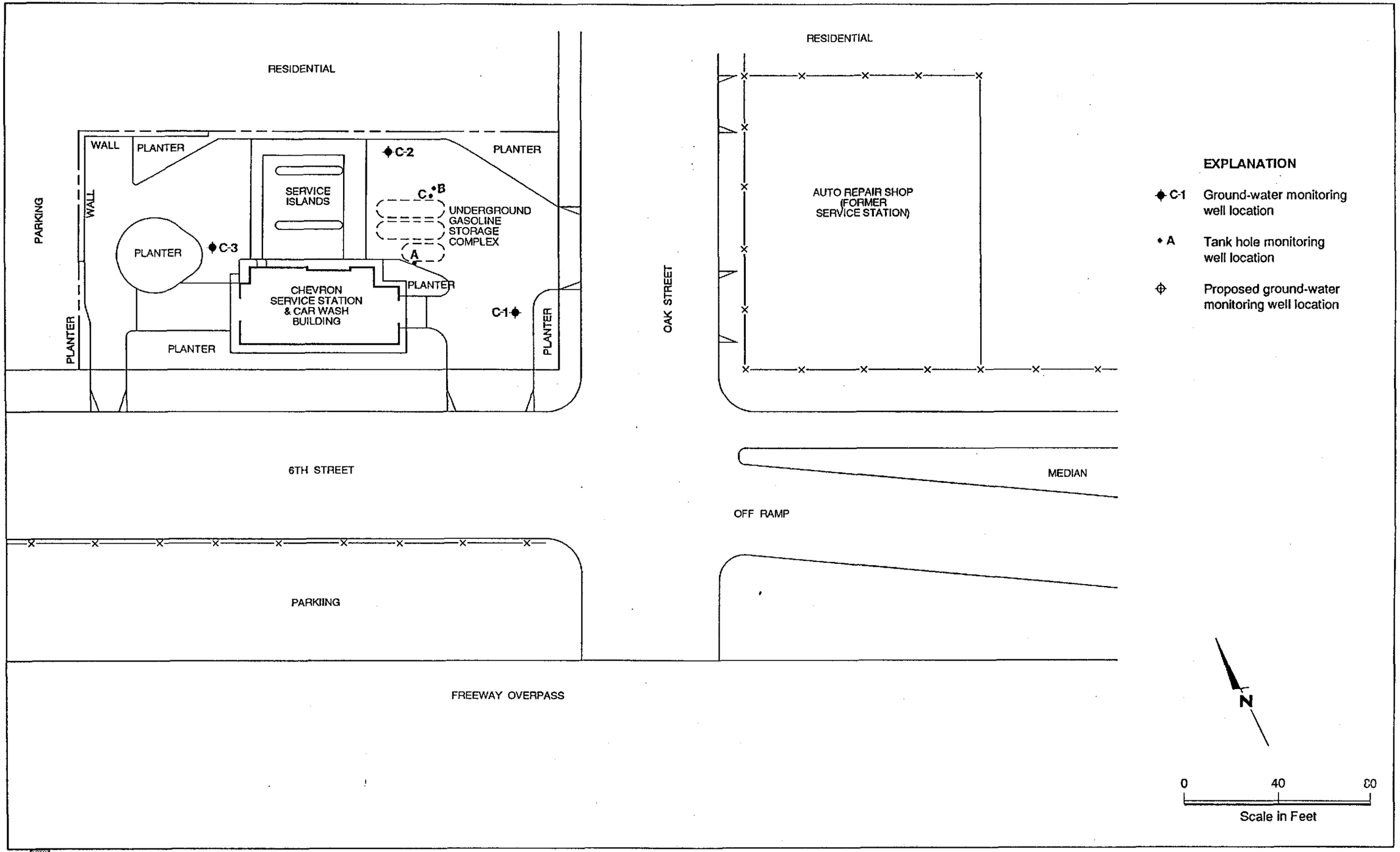
** Not corrected for presence of free product

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	A	B	C	CR-1
Casing Diameter (inches)	2	4	----	6
Total Well Depth (feet)	17.1	----	----	29.6
Depth to Water (feet)	11.20	11.19**	10.84**	10.51
Free Product (feet)	sheen	0.01	0.03	none
Reason Not Sampled	----	free product	free product	----
Calculated 4 Case Vol.(gal.)	4.0	----	----	114.6
Did Well Dewater?	yes	----	----	no
Volume Evacuated (gal.)	3.0	----	----	146.0
Purging Device	Bailer	----	----	Diaphram
Sampling Device	Bailer	----	----	Bailer
Time	12:51	----	----	12:20
Temperature (F)*	71.2	----	----	68.9
pH*	6.83	----	----	6.56
Conductivity (umhos/cm)*	1168	----	----	528

* Indicates Stabilized Value

** Not corrected for presence of free product



GeoStrategies Inc.

Site Plan
Chevron Service Station #4587
609 Oak Street
Oakland, California

PLATE
2

JOB NUMBER
7191

REVIEWED BY RG/CEG

DATE

REVISED DATE

REVISED DATE

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11138
CLIENT: Chevron USA
CLIENT JOB NO.: 3191

DATE RECEIVED: 10/31/90
DATE REPORTED: 11/07/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11138- 1	C-2	10/30/90	11/02/90
11138- 2	C-3	10/30/90	11/02/90
11138- 3	C-4	10/30/90	11/02/90
11138- 4	A	10/30/90	11/02/90
11138- 5	CR-1	10/30/90	11/08/90
11138- 6	CF-3	10/30/90	11/02/90
11138- 7	CD-A	10/30/90	11/02/90
11138- 8	C-5	10/30/90	11/02/90
11138- 9	C-6	10/30/90	11/02/90
11138-10	TRIP	10/30/90	(Broken)

Laboratory Number:	11138 1	11138 2	11138 3	11138 4	11138 5
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	28000	410	ND<50	31000	9600
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	3700	4	ND<0.5	23000	7100
TOLUENE:	1900	4	ND<0.5	110	65
ETHYL BENZENE:	1200	2	ND<0.5	1100	610
XYLENES:	1300	9	ND<0.5	160	190

Laboratory Number:	11138 6	11138 7	11138 8	11138 9	11138 10
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<50	30000	ND<50	ND<50	Broken
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.5	23000	0.8	ND<0.5	Broken
TOLUENE:	0.6	150	ND<0.5	ND<0.5	''
ETHYL BENZENE:	ND<0.5	1000	ND<0.5	ND<0.5	''
XYLENES:	0.5	180	0.5	ND<0.5	''

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
Diesel by Modified EPA SW-846 Method 8015
Gasoline by Purge and Trap: EPA MEthod 8015/5030
ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

QA/QC INFORMATION
SET: 11138

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT

ug/L = part per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Duplicate RPD NA
Minimum Detection Limit in Water: 5000ug/L

Modified EPA Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 1000ug/L
Daily Standard run at 200mg/L; %Diff Diesel = NA
MS/MSD Average Recovery = NA: Duplicate RPD = NA

8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L
Daily Standard run at 2mg/L; %Diff Gasoline = <15%
MS/MSD Average Recovery = 82%: Duplicate RPD = 1

8020/BTXE
Minimum Quantitation Limit in Water: 0.50ug/L
Daily Standard run at 20ug/L; %Diff 8020 = <15%
MS/MSD Average Recovery = 96%: Duplicate RPD = 5

Richard Srna, Ph.D.
Onyi A Nwogu (for)
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO. 11138-5
CLIENT: Chevron USA

DATE RECEIVED: 10/31/90
DATE REPORTED: 11/07/90
JOB NO. 3191

EPA SW-846 METHOD 8240 - VOLATILE ORGANICS
by Gas Chromatography/ Mass Spectrometry

SAMPLE: CR-1

Compound	ug/l	Compound	ug/l
Chloromethane	ND<10	Cis-1,3-Dichloropropene	ND<3
Bromomethane	ND<10	Trichloroethene	ND<3
Vinyl Chloride	ND<10	Dibromochloromethane	ND<3
Chloroethane	ND<10	1,1,2-Trichloroethane	ND<3
Methylene Chloride	ND<10	Benzene (MDL=2)	5800
Acetone	ND<10	Trans-1,3-Dichloropropene	ND<3
Carbon disulfide	ND<3	2-Chloroethyl vinyl ether	ND<3
Trichlorofluoromethane	ND<3	Bromoform	ND<3
1,1-Dichloroethene	ND<3	4-Methyl-2-Pentanone	ND<10
1,1-Dichloroethane	ND<3	2-Hexanone	ND<10
1,2-Dichloroethene (total)	ND<3	Tetrachloroethene	ND<3
Chloroform	ND<3	1,1,2,2-Tetrachloroethane	ND<3
1,2-Dichloroethane(MDL=3)	60	Toluene (MDL=3)	75
2-Butanone	ND<20	Chlorobenzene	ND<3
1,1,1-Trichloroethane	ND<3	Ethylbenzene (MDL=3)	460
Carbon Tetrachloride	ND<3	Styrene	ND<3
Vinyl Acetate	ND<10	Total Xylenes (MDL=3)	190
Bromodichloromethane	ND<3	1,3-Dichlorobenzene	ND<3
1,2-Dichloropropane	ND<3	1,2&1,4-Dichlorobenzenes	ND<3

ug/l = part per billion (ppb)
QC DATA:

Surrogate Recoveries		QC Limits water	QC Limits soil
1,2-DCA-d4.....	84%	76-114	81-117
Toluene-d8.....	92%	88-110	81-140
Bromofluorobenzene.....	101%	86-115	74-121

comments:

Richard Srna, Ph.D.
Laboratory Director

SF #11138

Chain-of-Custody Reco

Chevron U.S.A. Inc.
P.O. Box 5004
San Ramon, CA 94583
FAX (415) 842-9591

Chevron Facility Number: 4587
Consultant Release Number:
Consultant Project Number: 3191
Consultant Name: Gettler - Ryan Inc.
Address: 2150 W. Winton, Hayward CA
Fax Number: 415 783-1089
Project Contact (Name): Tom Paulson
(Phone): (415) 783-7500

Chevron Contact (Name): Nancy Vukelich
(Phone):
Laboratory Name: Superior
Contract Number: 27468.40
Samples Collected by (Name): John P Zwierzycki
Collection Date: 10-30-90
Signature: John P. Zwierzycki

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803				Remarks
C-5		3	W		11.47	HCl	Yes	✓			✓							7H (ages) BTXE
C-6		3	W		12:11	HCl	↓	✓			✓							
Trip		1	W		—	HCl	Yes	✓			✓							

Please initial:
Samples Stored in Ice.
Appropriate containers.
Samples preserved.
VOA's without headspace.
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
John P. Zwierzycki	Gettler-Ryan	10-30-90 16:52	to G/R Refrig		10-30-90/16:52
G/R Refrig		10-31-90 7:30			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)	Organization	Date/Time
	Gettler Ryan	10-31-90/1050			10/31/90

Turn Around Time (Circle Choice)
24 Hrs
48 Hrs
5 Days
(10 Days)

Printed in U.S.A.

SF # 11138

Chain-of-Custody Record

Chevron U.S.A. Inc.
P.O. Box 5004
San Ramon, CA 94583
FAX (415) 842-9591

Chevron Facility Number: 4587
Consultant Release Number:
Consultant Project Number: 3191
Consultant Name: Gettler - Ryan Inc
Address: 2150 W. Winton Ave - Hayward
Fax Number:
Project Contact (Name): Tom Paulson
(Phone): (415) 783-7500

Chevron Contact (Name): Nancy Vakelich
(Phone):
Laboratory Name: Superior
Contract Number: 2746840
Samples Collected by (Name): Guadalupe Sanchez
Collection Date: 10-30-90
Signature: Guadalupe Sanchez

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803	EPA 625	Priority Pollutant Metals		Remarks
C-2		3	W		11:10	HCl	Yes	✓			✓							THC (gas) BTXE
C-3					13:20			✓			✓							
C-4					11:40			✓			✓							
A					12:5[illegible]			✓			✓							
CR-1		8			12:20	none/HCl/HNO_3		✓			✓	✓			✓	✓		EPA 625 Priority Pollutant Metals EPA 624
~~Trip Blank~~		1			—	HCl		✓			✓			RFH				
CF-3		3	W		1320	HCl	Yes	✓			✓							THC (gas) BTXE
CO-A		3	W		—	HCl	Yes	—			✓							

Please initial:
Samples stored in ice. Y
Appropriate containers. Y
Samples preserved. Y
VOA's without headspace. Y
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Guadalupe Sanchez	Gettler-Ryan	10-30-90 16:52	[illegible]		10-30-90 16:52
[illegible]	Gettler-Ryan	10-31-90 7:30			
[illegible]	Gettler Ryan	10-31-90/1050			11/1/90

Received For Laboratory By (Signature):

Turn Around Time (Circle Choice)
24 Hrs
48 Hrs
5 Days
10 Days

Printed in U.S.A.

MS 5136 (6 89)

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.:11138-5
CLIENT: Chevron USA

DATE RECEIVED: 10/31/90
DATE REPORTED: 11/15/90
JOB NO.: 3191

ANALYSIS FOR BASE/NEUTRAL and ACID EXTRACTABLES
by EPA SW-846 Method 8270
Extraction Method: EPA 3510

Sample Identification: CR-1

Analyte	Result (ug/l)	Quantitation Limit (ug/l)
Acenaphthene	ND	1
Acenaphthylene	ND	1
Aniline	ND	1
Anthracene	ND	1
Benzo(a)anthracene	ND	1
Benzo(b)fluoranthene	ND	2
Benzo(k)fluoranthene	ND	1
Benzo(ghi)perylene	ND	1
Benzo(a)pyrene	ND	1
Benzidine	ND	30
Butyl benzyl phthalate	ND	1
Bis(2-chloroethoxy)methane	ND	1
Bis(2-chloroethyl)ether-	ND	1
Bis (2-chloroisopropyl) ether	ND	1
Bis (2-ethylhexyl) phthalate	ND	10
4-Bromophenyl phenyl ether	ND	1
4-Chloroanaline	ND	5
2-chloronaphthalene	ND	1
4-chlorophenyl phenyl ether	ND	1
Chrysene	ND	2
Dibenzo(a,h)anthracene	ND	1
Dibenzofuran	ND	1
Di-n-butyl phthalate	ND	1
1,2-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
3,3'-Dichlorobenzidine	ND	40
Diethylphthalate	ND	1
Dimethyl phthalate	ND	10
2,4-Dinitrotoluene	ND	1
2,6-Dinitrotoluene	ND	1
Di-n-octylphthalate	13	1
Fluoranthene	ND	1

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081

Analyte	8270 Certificate Result (ug/l)	Quantitation Limit (ug/l)
Fluorene	ND	1
Hexachlorobenzene	ND	1
Hexachlorobutadiene	ND	1
Hexachlorocyclopentadiene	ND	1
Hexachloroethane	ND	1
Indeno(1,2,3-cd) pyrene	ND	1
Isophorone	ND	1
2-Methylnaphthalene	10	1
2-Nitroanaline	ND	5
3-Nitroanaline	ND	5
4-Nitroanaline	ND	5
Naphthalene	47	1
Nitrobenzene	ND	1
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	1
Phenanthrene	ND	1
Pyrene	ND	1
1,2,4-Trichlorobenzene	ND	1
ACID EXTRACTABLES		
Benzyl alcohol	ND	1
4-Chloro-3-methylphenol	ND	1
2-Chlorophenol	ND	1
2,4-Dichlorophenol	ND	1
2,4-Dimethylphenol	16	1
2,4-Dinitrophenol	ND	5
2-Methyl-4,6-dinitrophenol	ND	1
2-Methylphenol	ND	1
4-Methylphenol	ND	1
4-Nitrophenol	9	5
2-Nitrophenol	ND	1
Pentachlorophenol	ND	1
Phenol	47	1
2,4,5-Trichlorophenol	ND	1
2,4,6-Trichlorophenol	ND	1

ND = Not detected ug/l = part per billion (ppb)
Analysis subcontracted to Clayton Environmental Labs

Richard Srna, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1555 BURKE, UNIT I • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11138-5
CLIENT: Chevron USA

DATE RECEIVED: 10/31/90
DATE REPORTED: 11/15/90
JOB NO.: 3191

13 PRIORITY POLLUTANT METALS
Methods: EPA 200 series

SAMPLE: CR-1

Compound	Results (mg/l)	(mg/l) Detection limit	EPA METHOD
Antimony	ND	0.005	200.7
Arsenic	0.022	0.005	206.2
Beryllium	ND	0.002	200.7
Cadmium	ND	0.003	200.7
Chromium (total)	0.015	0.005	200.7
Copper	0.008	0.005	200.7
Lead	0.061	0.01	239.2
Mercury	0.0006	0.0005	245.1
Nickel	0.020	0.005	200.7
Selenium	ND	0.005	270.2
Silver	ND	0.002	200.7
Thallium	ND	0.005	200.7
Zinc	0.013	0.005	200.7

mg/l = part per million (ppm)

Analysis subcontracted to Clayton Environmental Lab.

Richard Srna, Ph.D.
Laboratory Director