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

Marketing Operations

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

August 8, 1990

Mr. Edgar B. Howell
Alameda County Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Re: Former Chevron Station #9-4816
301 14th Street
Oakland, California

Dear Mr. Howell:

Enclosed we are forwarding the Soil Boring and Well Installation Report dated August 9, 1990, conducted by our consultant Geostrategies, Inc. for the above referenced site. As indicated in the report, four (4) borings were advanced and completed into groundwater monitoring wells. Based on the soil analytic data, vadose zone contamination appears to be confined to the vicinity of the tank pit. Analytic testing of the groundwater is showing both total petroleum hydrocarbons and benzenes in all of the monitoring wells. Separate-phase hydrocarbon was observed in Well C-3 at a measured thickness of three feet.

The need for additional site assessment is apparent. Included in the report is a Work Plan prepared by Geostrategies, Inc. which describes additional work steps we propose to take at the above referenced site. Chevron has instructed Geostrategies, Inc. to permit and install additional onsite and offsite monitoring wells to further define the extent of the contamination. When contaminant definition is complete, Geostrategies, Inc. will prepare recommendations for appropriate remedial actions. We would appreciate your review and concurrence of this proposed additional work.

Also enclosed is a $744.00 deposit per your request for Alameda County oversight costs associated with remediation at this site.

I declare under penalty of perjury that the information contained in the attached report is true and correct, and that any recommended actions are appropriate under the circumstances, to the best of my knowledge.

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

Very truly yours,
C.G. Trimbach

By Nancy Vukelich
Nancy Vukelich

NLV/jmr
Enclosures

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

GeoStrategies Inc.

SOIL BORING AND WELL INSTALLATION REPORT

Chevron Service Station No. 4816
301 14th Street
Oakland, California

Report No. 7270-1

August 9, 1990

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

August 9, 1990

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

Attn: Mr. Jerry Mitchell

Re: SOIL BORING AND WELL INSTALLATION REPORT
Chevron Service Station No. 4816
301 14th Street
Oakland, California

Gentlemen:

This report summarizes the soil boring, ground-water monitoring well installation and soil sampling performed by GeoStrategies Inc. (GSI) at the above referenced location (Plate 1). Eight soil borings (C-A through C-D and C-1 through C-4) were drilled on June 4 and 5, 1990. Borings C-1 through C-4 were subsequently converted into ground-water monitoring wells. The location of the monitoring wells and borings are shown on Plate 2.

SITE BACKGROUND

Telephone conversations with the Alameda County Health Department indicate that in April and May, 1988 tank tests were performed on the underground storage tanks at the site. The 10,000 gallon supreme unleaded tank failed. In August, 1988 a subsurface pipe joint leading to the service islands was repaired.

Additional site background information is not available at this time. If information becomes available it will be presented with the next report on this site.

FIELD PROCEDURES

The eight exploratory soil borings were drilled using a truck mounted, hollow-stem auger drilling rig. Four of the borings were subsequently converted into ground-water monitoring wells. All field work was performed according to GSI Field Methods and Procedures (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.

Soil Sampling

A 4-inch long brass tube of soil from each sampled 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 the 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 is pierced and the head-space within the jar was tested for total organic vapor measured in parts per million (ppm) 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-1 through C-4 were drilled with an 8-inch-diameter hollow-stem auger to a total depth of 35 feet. The 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. Each boring was over-drilled and backfilled with a 1.5 (C-1) or 2.0 (C-2, C-3, and C-4) foot bentonite seal. Lonestar #2/12 sand was placed in the annular space across the entire screened interval and extended a minimum of 2-feet above the top of the well screen. A 2-foot bentonite seal was placed above the sand pack, followed by a cement grout seal to ground surface. A traffic rated Christy Box was placed at ground surface, and a locking cap with lock was then placed on the well. The well construction details are presented with the boring logs in Appendix B.

HYDROGEOLOGIC CONDITIONS

The site is located on the San Francisco Bay fringe, approximately one mile east of San Francisco Bay. Lake Merritt is located approximately 1/4-mile to the east 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.

Lithology beneath the site consists of clayey sand and sand which grades into silt approximately 31.5 to 33.5 below grade. Ground-water was encountered at approximately 22.5 to 24 feet below grade in each boring. Depth to water measurements, taken by Gettler-Ryan Inc. (G-R) June 13, 1990, indicated that ground-water levels stabilized at 21.97 to 24.75 feet below the surveyed top of the well box. Groundwater elevation data indicate an approximate hydraulic gradient of 0.001 which flows toward the southwest beneath the site. Ground-water elevation data has been plotted and contoured and is presented on Plate 3 as a potentiometric map. A summary of the potentiometric data is presented on 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. Analyses for both soil and groundwater samples were performed by Superior Analytical Laboratories (Superior), a State-certified environmental laboratory located in San Francisco, California.

Soil Analytical Results

The highest TPH-Gasoline concentrations were detected in soil samples from the 20 foot sample interval in borings C-1, C-2, C-3, and C-A through C-D at concentrations ranging from 3 parts per million (ppm) in Boring C-D to 1,900 ppm in Boring C-B. Boring C-4 reported TPH-Gasoline as none detected (ND) from the 20 foot sample interval. The highest concentrations of benzene were also reported from the 20 foot depth interval ranging in concentrations from 0.83 ppm in Boring C-3 to 12 ppm in Boring C-B. A summary of the soil analytical data is presented in Table 2. Soil chemical analytical reports are presented in Appendix C.

Ground-water Analytical Results

Ground-water samples were collected from monitoring wells C-1, C-2, and C-4 by G-R on June 13, 1990. Monitoring Well C-3 was observed to contain greater than three feet in measured thickness of separate-phase hydrocarbons and subsequently was not sampled. TPH-Gasoline was detected in Wells C-1, C-2, and C-4 at concentrations of 26,000 parts per billion (ppb), 15,000 ppb, and 440 ppb, respectively. Benzene was reported Wells C-1, C-2, and C-4 at concentrations of 2,800 ppb, 1100 ppb, and 47 ppb, respectively. TPH-Gasoline and benzene results from this sampling event are presented on Plate 4. A summary of the ground-water analytical results are presented in Table 1. The G-R ground-water sampling report, Chain-of-Custody forms, and Superior analytical reports are presented in Appendix D.

DISCUSSION

Current site potentiometric data indicate an approximate hydraulic gradient of 0.001 which flows toward the southwest. However, based on regional topography and surface drainage patterns it is surmised that the regional ground-water flow direction beneath the site is toward the northeast. This surmised northeast flow direction is further supported by the distribution of chemical concentrations collected from the recently installed monitoring wells at the site. Due to the presence of separate-phase hydrocarbons in Well C-3, groundwater monitoring and separate-phase hydrocarbons removal was initiated on June 14, 1990. Approximately 68.5 gallons of separate-phase hydrocarbons have been bailed from Well C-3 through July 30, 1990. A copy of the monitoring data is presented in Appendix E.

Based on the soil sampling data, vadose zone contamination appears to be confined to the general vicinity of the tank excavation. Soil contamination observed in the surmised down-gradient borings appears to be a result of dissolved hydrocarbons moving along the capillary fringe. The extent of ground-water contamination has not been delineated at the project site.

Summary of Findings

The results of this investigation are summarized below.

- Eight exploratory borings were drilled on June 4 and June 5, 1990. Four borings were converted into ground-water monitoring wells designated C-1 through C-4.

- Based on the exploratory borings, the lithology of the site consists primarily clayey sand and sand underlain by silt to the total depth explored of 35.0 feet.

- Soil samples reported TPH-Gasoline in all borings from the 20 foot sample interval except borings C-2 and C-4. The highest concentration of TPH-Gasoline was 1,900 ppm from boring C-B. Benzene was detected at 12 ppm from Boring C-B from the 20 foot sample interval.

- Ground-water samples collected by G-R on June 13, 1990 detected TPH-Gasoline in Wells C-1 (26,000 ppb), C-2 (15,000 ppb) and C-4 (440 ppb). Separate-phase hydrocarbons were observed in Well C-3 at greater than three feet in measured thickness.

PLANNED SITE ACTIVITIES

Based on the review of the available data, GSI recommends that four additional ground-water monitoring wells be installed at the site. The location of these wells are presented on Plate 2. The configuration of the proposed wells will provide chemical analytical data to ascertain the extent of the hydrocarbon plume and provide additional data to calculate the local ground-water flow direction and gradient.

- One monitoring well will be installed on-site to ascertain the lateral extent of the hydrocarbon plume near the western edge of the property.

- One well will be installed off-site in Harrison Street to ascertain the extent of the hydrocarbon plume in the cross-gradient direction.

- Based on hydrocarbon concentrations detected in well C-1, two monitoring wells will be installed off-site in 14th Street to ascertain the extent of offsite migration in the surmised down-gradient direction.

- GSI recommends that a six-inch-diameter recovery well be installed in the vicinity of monitoring well C-3 for future remedial measures.

- Bailing of separate-phase hydrocarbons will continue on a weekly schedule until the recovery well is installed and pumping initiated.

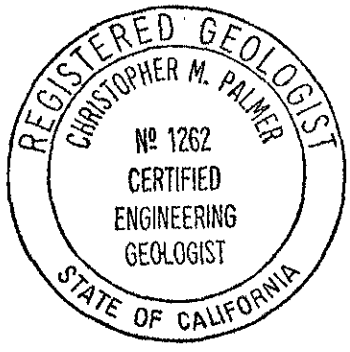
- All wells will be sampled quarterly for TPH-Gasoline and BTEX.

- A one-half mile radius well survey will be completed to identify wells in the site vicinity.

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. Chemical Concentration Map

Appendix A. Field Methods and Procedures
Appendix B. Exploratory Boring Logs/Well Construction Details
Appendix C. Soil Analytical Report
Appendix D. G-R Groundwater Sampling Reports
Appendix E. Monitoring Data

TABLE 1

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH (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	13-Jun-90	21-Jun-90	26000	2800	5100	400	2600	30.82	8.85	----	21.97
C-2	13-Jun-90	21-Jun-90	15000	1100	1900	260	1700	30.91	8.83	----	22.08
C-3	13-Jun-90	----	----	----	----	----	----	31.02	----	>3.0	24.75
C-4	13-Jun-90	21-Jun-90	440	47	47	3	61	31.42	8.69	----	22.73
TB	13-Jun-90	21-Jun-90	<50	<0.5	<0.5	<0.5	<0.5	----	----	----	----

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 = Total Petroleum Hydrocarbons as Gasoline
PPB = Parts Per Billion
TB = Trip Blank

Note: 1. Water Level elevations referenced to mean sea level
2. DHS Action Levels and MCLs are subject to change pending State review
3. All data shown as <x are reported as none detected (ND)

TABLE 2

SOIL ANALYSES DATA

BORING NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
C-1-15	04-Jun-90	15-Jun-90	1	0.05	<0.05	<0.05	<0.05
C-1-20	04-Jun-90	15-Jun-90	800	3.6	32	13	77
C-1-25	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-2-10	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-2-15	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-2-22	05-Jun-90	15-Jun-90	11	1.1	1.7	0.15	0.87
C-3-5	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-3-10	04-Jun-90	15-Jun-90	<1	0.13	<0.05	<0.05	<0.05
C-3-15	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-3-20	04-Jun-90	15-Jun-90	840	0.93	15	9.0	63
C-3-25	04-Jun-90	15-Jun-90	3	0.07	0.05	<0.05	0.19
C-4-20	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-4-25	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05

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

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

Report No. 7270-1

TABLE 2

SOIL ANALYSES DATA

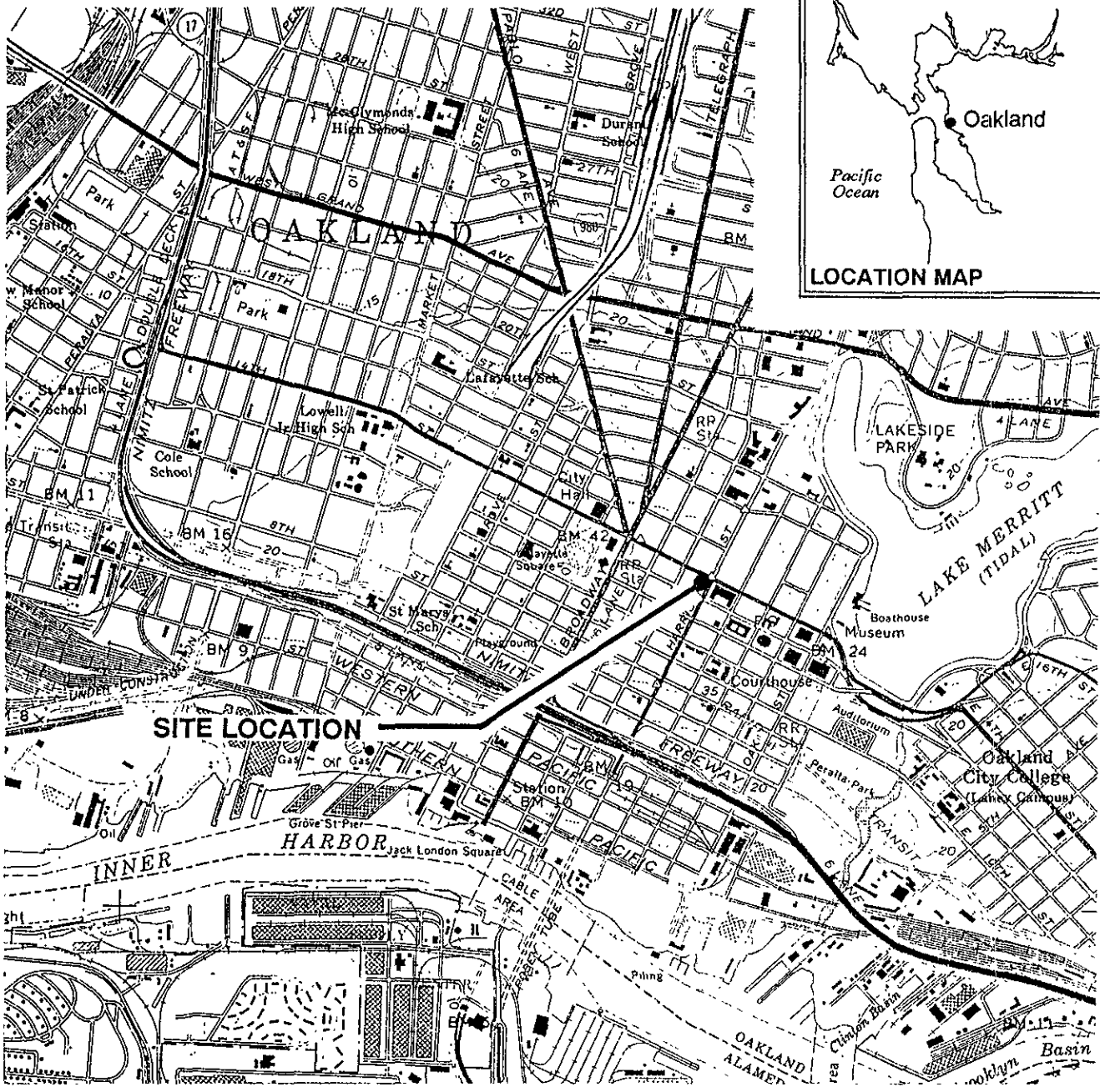
BORING NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
C-A-10	04-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-A-15	04-Jun-90	15-Jun-90	2	<0.05	<0.05	<0.05	0.10
C-A-20	04-Jun-90	15-Jun-90	1200	5.6	43	18	120
C-A-25	04-Jun-90	15-Jun-90	2	0.10	0.06	<0.05	0.09
C-B-10	05-Jun-90	17-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-B-15	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-B-20	05-Jun-90	15-Jun-90	1900	12	80	26	150
C-B-25	05-Jun-90	15-Jun-90	9	1.3	0.83	0.05	0.31
C-C-10	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-C-15	05-Jun-90	15-Jun-90	<1	0.22	<0.05	<0.05	<0.05
C-C-20	05-Jun-90	15-Jun-90	360	0.75	9.9	4.8	30
C-C-25	05-Jun-90	15-Jun-90	290	1.5	8.0	3.1	19
C-D-5	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-D-10	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05
C-D-15	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05

TABLE 2

SOIL ANALYSES DATA

BORING NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
C-D-20	05-Jun-90	15-Jun-90	3	0.32	0.32	<0.05	0.15
C-D-25	05-Jun-90	15-Jun-90	<1	<0.05	<0.05	<0.05	<0.05

ILLUSTRATIONS



Base Map: USGS Topographic Map

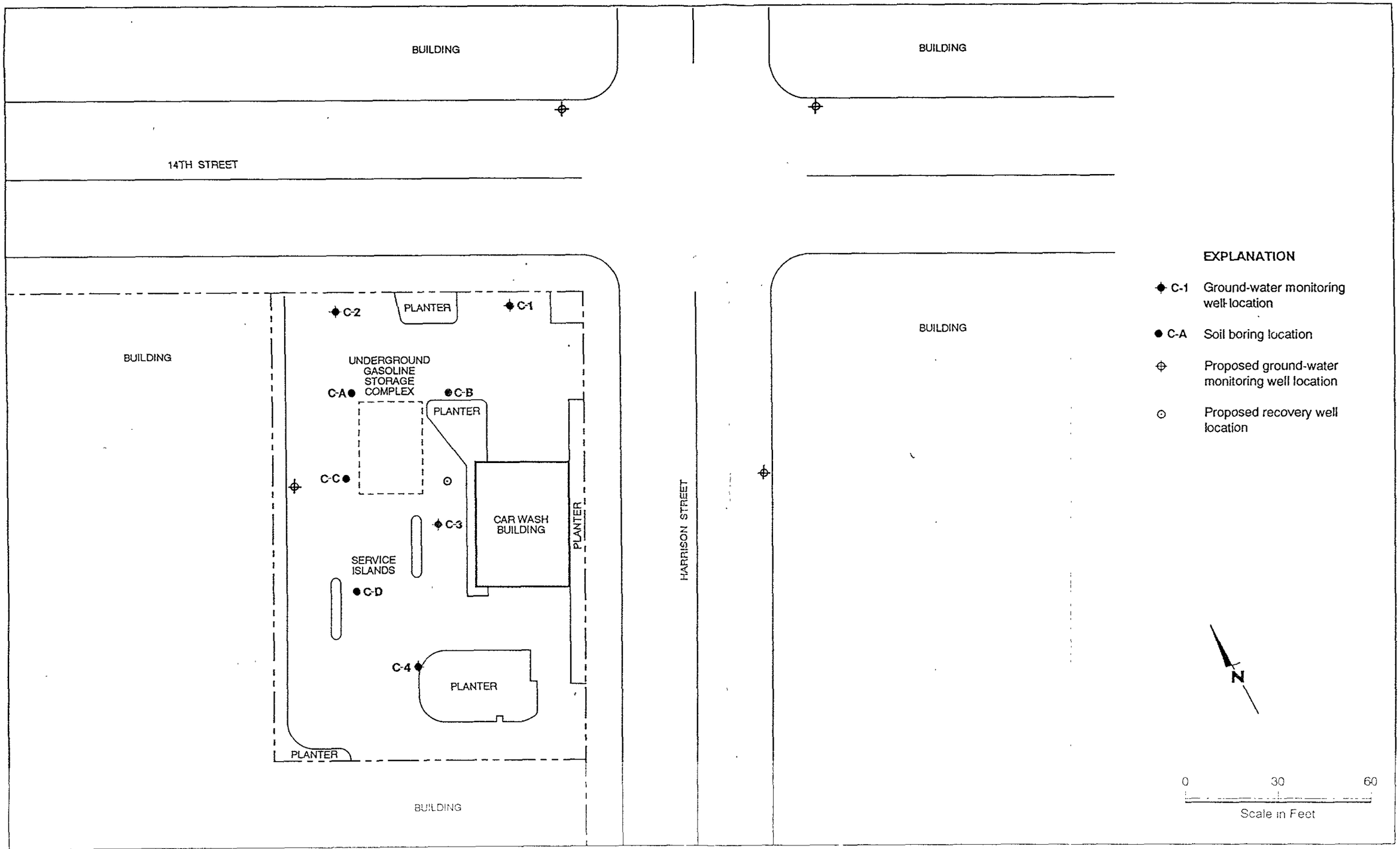
Approximate Scale : 1" = 2000'

GeoStrategies Inc.

Vicinity Map
Chevron Service Station #4816
301 14th Street
Oakland, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270		5/90		



GeoStrategies Inc.

Site Plan
Chevron Service Station #4816
301 14th Street
Oakland, California

PLATE
2

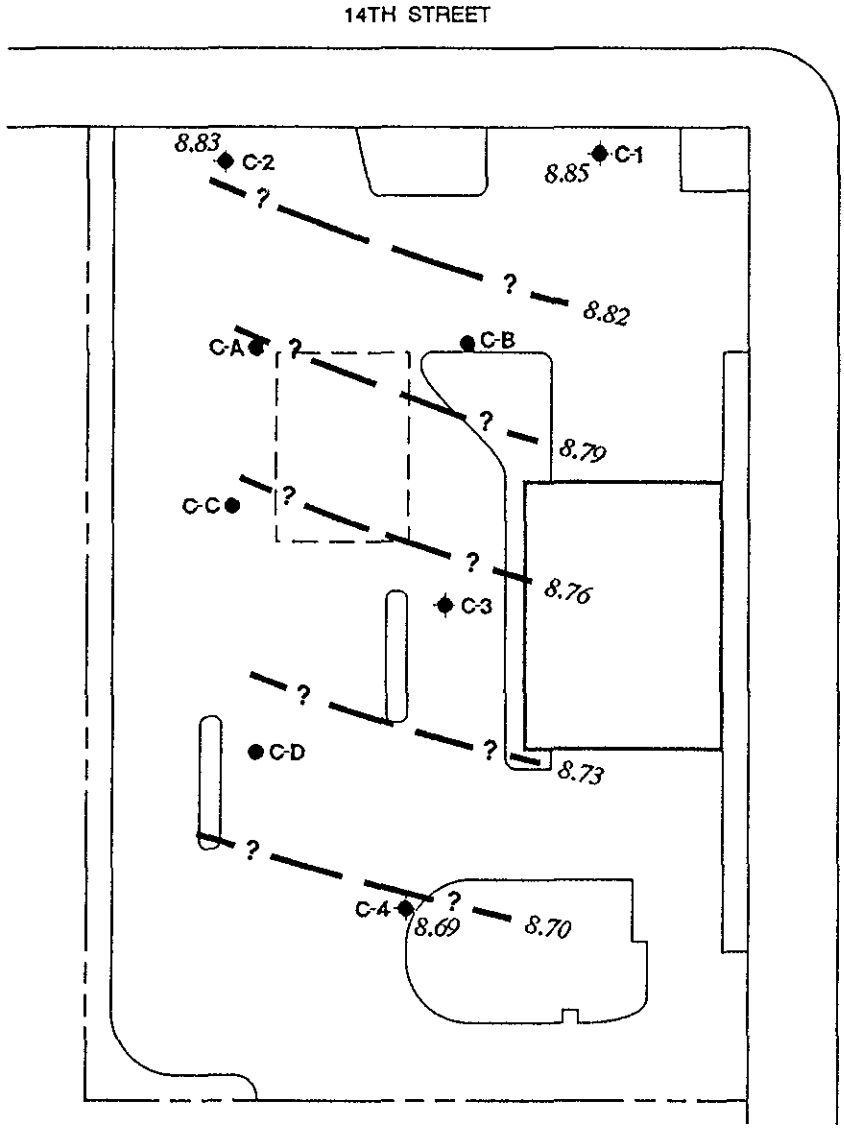
JOB NUMBER
7270

REVIEWED BY PROJECT G.
CMPCEG 1262

DATE
3/90

REVISED DATE

REVISED DATE



EXPLANATION

- C-1 — Ground-water monitoring well location
- C-A — Soil boring location
- 8.69 — Ground-water elevation contour
  Approximate Gradient = 0.001
- 8.70 — Ground-water elevation in feet referenced to Mean Sea Level (MSL) measured on June 13, 1990

Notes: Well C-3 not used in contouring

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

N

0 30 60

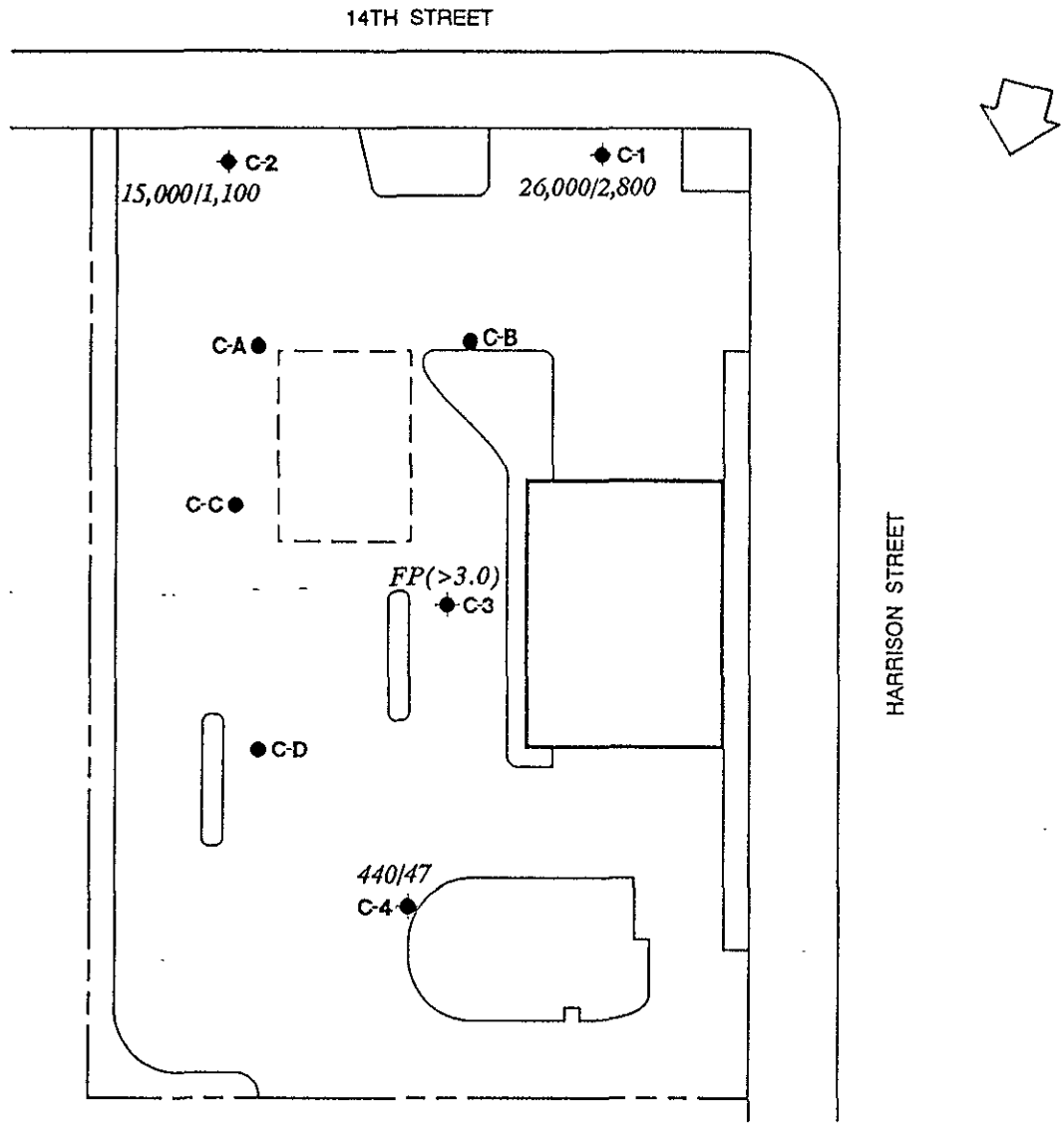
Scale in Feet

GeoStrategies Inc.

Potentiometric Map
Chevron Service Station #4816
301 14th Street
Oakland, California

PLATE **3**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CWP 08/12/92	7/90		



EXPLANATION

◆ C-1	Ground-water monitoring well location
● C-A	Soil boring location
440/47	TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline)/Benzene concentrations in ppb sampled on June 13, 1990
FP(>3.0)	Floating Product (thickness in feet)

N

0 30 60

Scale in Feet

GeoStrategies Inc.

TPH-G/Benzene Concentration Map
Chevron Service Station #4816
301 14th Street
Oakland, California

PLATE 4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	RG/CEG 12/62	7/90		

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.

April 20, 1990

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).

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 HC1 to pH<2	14 days (maximum)
Benzene Toluene Ethylbenzene Xylenes (BTEX)	EPA 8020	mg/l ug/l mg/l	50 ml. vial glass, Teflon lined septum 1 l glass, Teflon	cool, 4 C HC1 to pH<2	7 days (w/o preservative) 14 days (w preservative)
Oil & Grease	SM 503E	ug/l	lined septum	H2SO4 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	14 days (maximum)
Semi-Volatile Organics	8270	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool , 4 C	14 days (maximum)
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 of
	Logged by:	Driller:	
Drilling method:	Casing installation data:		
Hole diameter:	Top of Box Elevation:	Datum:	

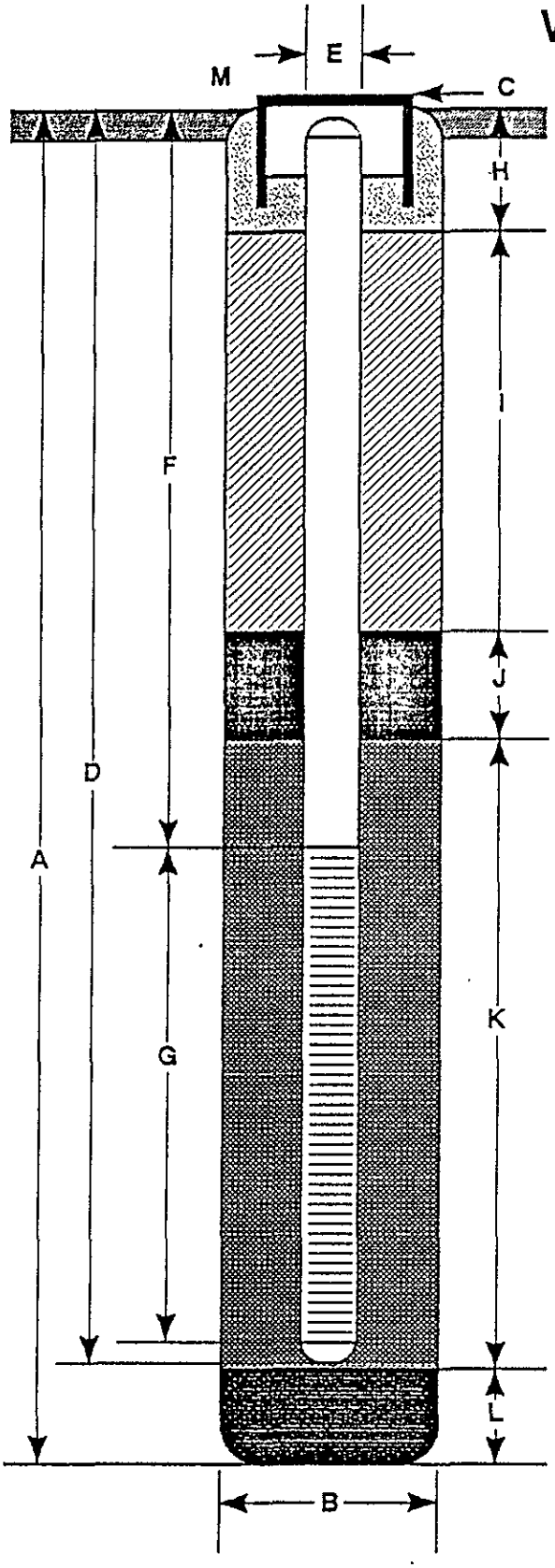
Water Level				
Time				
Date				

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

GeoStrategies Inc.

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_____

GETTLER–RYAN INC.

General and Environmental Contractors

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 _____

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

Gettler - Ryan Inc.
ENVIRONMENTAL DIVISION

Chain of Custod
FIGURE (

COMPANY _____ JOB NO. _____

JOB LOCATION _____

ITY _____ 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: _____

ATE COMPLETED _____ FOREMAN _____

APPENDIX B
BORING LOGS AND
WELL CONSTRUCTION DETAILS

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-1
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data: (See Well Construction Detail)		
Hole diameter: 8-Inches	Top of Box Elevation: 30.82		Datum: MSL

								Water Level	23.0'	24.7'	22.5'	22.0'
								Time	09:30	09:45	10:10	10:40
								Date	06/04/90	06/04/90	06/04/90	06/04/90
PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description				
								PAVEMENT SECTION - 4 inches				
				1								
								SAND (SP) - yellow brown (10YR 5/6), loose, dry; 95%				
				2				fine sand; 5% fines; no chemical odor.				
				3								
	500	S&H	C-1-	4				very dense; no chemical odor.				
0	6 "	push	4.0									
				5								
				6								
				7								
								dense; no chemical odor.				
	4	S&H		8								
	7		C-1-									
0	14		9.0	9								
				10								
				11								
				12								
				13								
	10	S&H		14				COLOR CHANGE to grey (7.5YR 5/0) at 13.5 - 15.0 feet.				
	13		C-1-					wet; no chemical odor.				
0	20		15.0	15								
				16								
								chemical odor in cuttings at 16.0 feet.				
				17								
				18								
								"soft" at 18.0 feet.				
	11	S&H		19								
	22		C-1-					COLOR CHANGE to grey (5Y 4/1) at 19.0 feet.				
132	36		20.0	20				moderate to strong chemical odor.				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 12/92	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-1
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2 of 2
	Logged by: RSY	Driller: Bayland	
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				saturated; weak chemical odor.
	20		C-1-					
76	30		25.0	25				
				26				
				27				
				28				
								very dense, saturated; slight H_2S odor.
	13			29				
	26	S&H	C-1-					
59	40		30.0	30				
				31				
				32				
				33				
	6	S&H		34				SILT (ML) - greyish brown (2.5Y 5/2), stiff, moist; 100%
	7		C-1-					silt; no chemical odor.
0	9		35.0	35				
				36				Bottom of boring at 35.0 feet.
								Bottom of sample at 35.0 feet.
				37				06/04/90
				38				
				39				
				40				

Remarks:

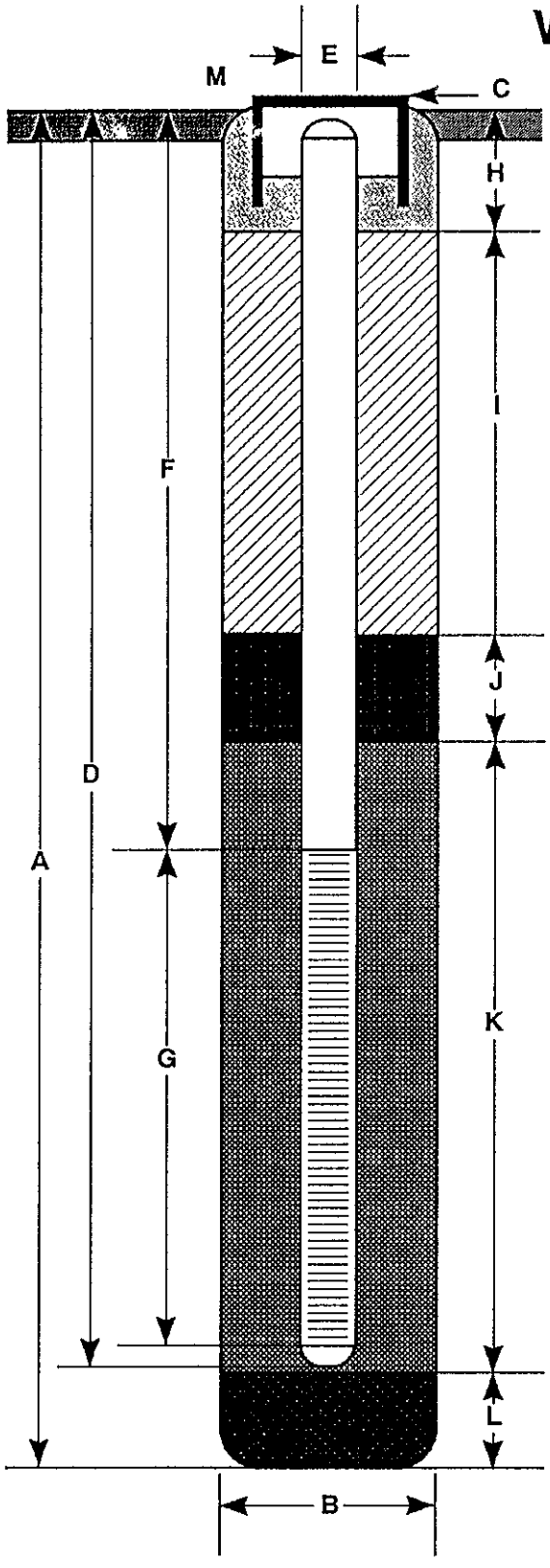
GeoStrategies Inc.

Log of Boring

BORING NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	RMP 06/12/92	06/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 35 ft.

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

C Top of Box Elevation: 30.82 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 33.5 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 18.5 ft.

G Perforated Length: 15 ft.
Perforated Interval from 18.5 to 33.5 ft.
Perforation Type: Factory Slot
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 14.5 ft.
Backfill Material: Concrete Grout

J Seal from 14.5 to 16.5 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 16.5 to 33.5 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: 1.5 ft.
Seal Material: Bentonite Pellets

M Christy box with locking well cap.

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CMP CEG 1262	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No.: C-2
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data: (See Well Construction Detail)		
Hole diameter: 8-Inches	Top of Box Elevation: 30.91		Datum:

Water Level	22.5	
Time	09:25	
Date	06/05/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.0 feet
				1				
				2				
				3				
	250	S&H	C-2-	4				CLAYEY SAND (SC) - yellow brown (10YR 5/6), medium dense, moist; 85% fine sand; 15% clay; clay laminae;
2	500	push	4.0					voids with oxidation stains.
				5				clay content decreases at 4.0 feet to 10%.
				6				
				7				
				8				
	9	S&H		9				
	15		C-2-					
4	18		10.0	10				SAND with CLAY (SP-SC) - dark yellow brown (10YR 4/6), dense, moist; 10% clay; trace well rounded gravel;
				11				no chemical odor.
				12				
				13				
	10	S&H		14				no chemical odor.
	15		C-2-					
40	24		15.0	15				
				16				
				17				
				18				
								COLOR CHANGE to olive (5Y 4/3) at 19.0 feet.
	10	S&H		19				strong chemical odor.
	20		C-2-					
240	29		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CMP CEG 12/92	06/90		

Field location of boring:	Project No.: 7270	Date: 06/05/90	Boring No:
(See Plate 2)	Client: Chevron USA #4816		C-2
	Location: 3100 14th Street		Sheet 2
	City: Oakland, California		of 2
	Logged by: RSY	Driller: Bayland	
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				
	12	S&H						very dense, saturated; strong chemical odor.
	22		C-2-	22				
370	36		22.5			▽		
				23				
				24				
				25				
				26				
				27				
				28				
	3	S&H		29				COLOR CHANGE to dark yellow brown (10YR 4/4) at
	19		C-2-					28.5 feet.
37	29		30.0	30				dense; no chemical odor.
				31				
				32				
				33				
	4	S&H		34				SILTY (ML) - olive (5Y 5/3), very stiff, moist, low plasticity;
	9		C-2-					trace coarse sand and fine gravels; trace roots; no
0	13		35.0	35				chemical odor.
				36				Bottom of boring at 35.0 feet.
								Bottom of sample at 35.0 feet.
				37				06/05/90
				38				
				39				
				40				

Remarks:

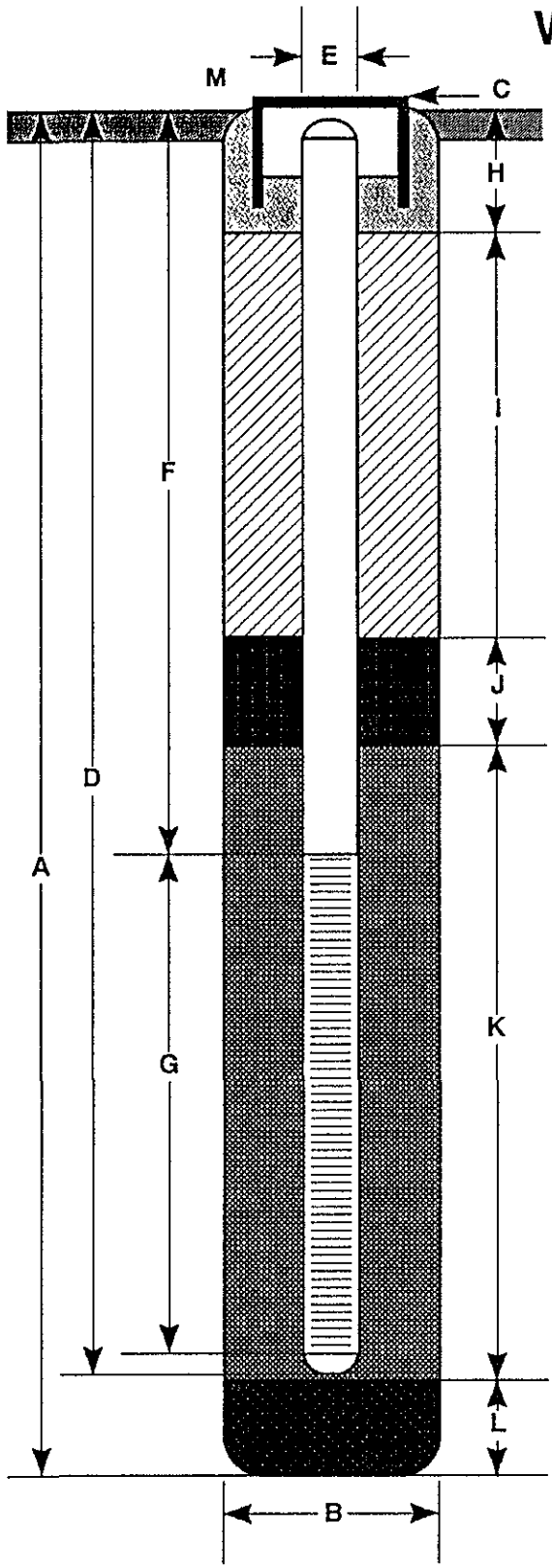
GeoStrategies Inc.

Log of Boring

BORING NO. C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	RWP 06/11/262	06/90		

WELL CONSTRUCTION DETAIL



A	Total Depth of Boring	35 ft.
B	Diameter of Boring	8 in.
	Drilling Method	Hollow Stem Auger
C	Top of Box Elevation	30.91 ft.
	[X] Referenced to Mean Sea Level	
	[ ] Referenced to Project Datum	
D	Casing Length	33 ft.
	Material	Schedule 40 PVC
E	Casing Diameter	2 in.
F	Depth to Top Perforations	18 ft.
G	Perforated Length	15 ft.
	Perforated Interval from 18 to 23	ft.
	Perforation Type	Factory Slot
	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 14	ft.
	Backfill Material	Concrete Grout
J	Seal from 14 to 16	ft.
	Seal Material	Bentonite Pellets
K	Gravel Pack from 16 to 33	ft.
	Pack Material	Lonestar #2/12 Sand
L	Bottom Seal	2 ft.
	Seal Material	Bentonite Pellets
M	Christy box with locking well cap.	

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.

C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	Dump well 12-92	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-3
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data: (See Well Construction Detail)		
Hole diameter: 8-Inches	Top of Box Elevation: 31.02		Datum: MSL

Water Level	24.0	22.0	
Time	13:10	13:50	
Date	06/04/90	06/04/90	

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				CLAYEY SAND (SC) - dark brown (10YR 4/3), dense, moist; 80% fine sand; 20% clay; no chemical odor.
	450	S&H		4				
	500	push	C-3-					
0	500		5.0	5				
				6				
				7				
				8				
	250	S&H		9				*decrease clay to 10%; no chemical odor.*
	350	push	C-3-					
80	500		10.0	10				
				11				SAND with CLAY (SP-SC) - dark brown (10YR 4/3), dense, moist; 10% clay; no chemical odor.
				12				
				13				
	4	S&H		14				weak chemical odor.
	12		C-3-					
218	22		15.0	15				
				16				
				17				
				18				
	8			19				
	21	S&H	C-3-					very dense; strong chemical odor.
250	39		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	RMP CEG 12/07	06/90		

Field location of boring:	Project No.: 7270	Date: 06/04/90	Boring No:
(See Plate 2)	Client: Chevron USA #4816		C-3
	Location: 301 14th Street		Sheet 2
	City: Oakland, California		of 2
	Logged by: RSY	Driller: Bayland	
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				
	10	S&H		24		▽		COLOR CHANGE to dark grey (5Y 4/1), dense, saturated; free product; strong chemical odor.
	19		C-3-					
675	29		25.0	25				
				26				
				27				
				28				
	8	S&H		29				dense; free product on sample rods; strong chemical odor.
	18		C-3-					
400	35		30.0	30				
				31				
				32				
				33				SILT (ML) - olive grey (5Y 5/2), very stiff, moist, low plasticity; rootholes; voids; slight oxidation; moderate chemical odor.
	5	S&H		34				
	11		C-3-					
250	14		35.0	35				Bottom of boring at 35.0 feet.
				36				Bottom of sample at 35.0 feet. 06/04/90
				37				
				38				
				39				
				40				

Remarks:

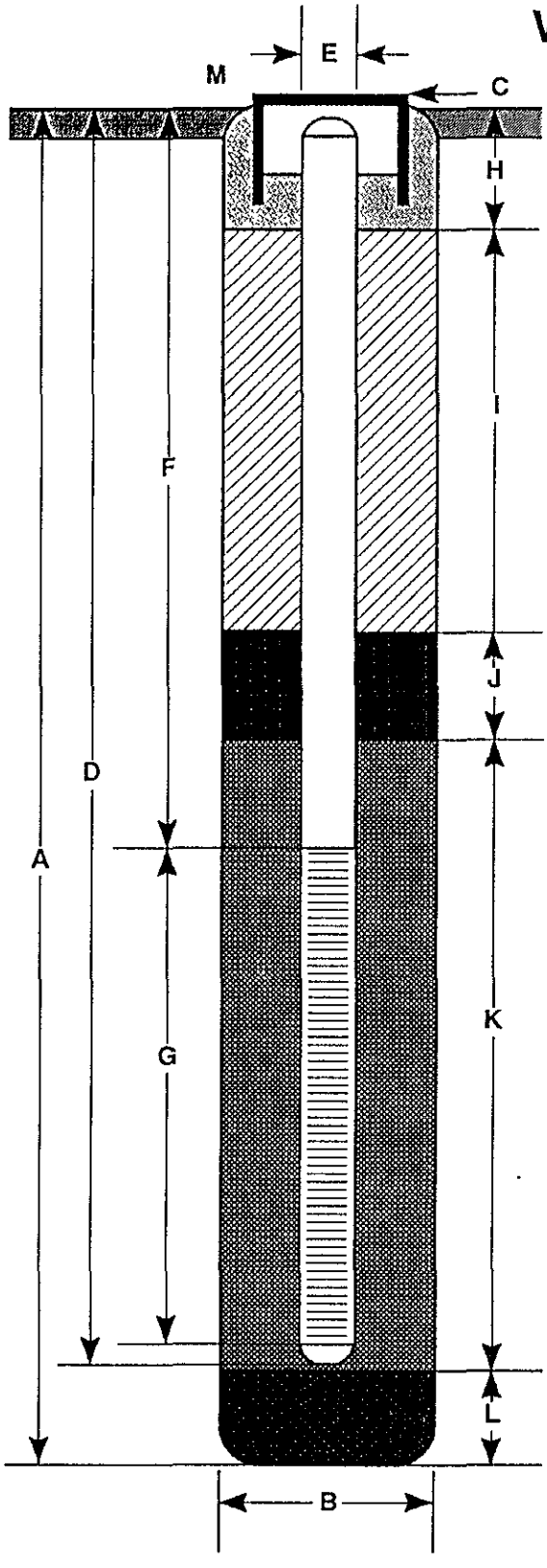
GeoStrategies Inc.

Log of Boring

BORING NO. C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 1262	06/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 35 ft.

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

C Top of Box Elevation: 31.02 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 33 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 18 ft.

G Perforated Length: 15 ft.
Perforated Interval from 18 to 30 ft.
Perforation Type: Factory Slot
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 14 ft.
Backfill Material: Concrete Grout

J Seal from 14 to 16 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 16 to 33 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: 2 ft.
Seal Material: Bentonite Pellets

M Christy box with locking well cap.

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	Dump well 1262	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-4
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data: (See Well Construction Detail)		
Hole diameter: 8-Inches	Top of Box Elevation: 31.42		Datum: MSL

Water Level	23.5	22.5								
Time	15:00	16:00								
Date	06/04/90	06/04/90								

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				
		S&H	C-4-					CLAYEY SAND (SC) - yellow brown (10YR 5/8), very
0	500	push	4.0	4				dense, dry, low plasticity; 60% fine sand; 40% clay; large
				5				root in shoe; no chemical odor.
				6				
				7				
				8				decrease clay content to 10%.
	7	S&H		9				SAND with CLAY (SP-SC) - yellow brown (10YR 5/8),
	10		C-4-					dense, moist; 10% clay; no chemical odor.
0	13		10.0	10				
				11				
				12				
				13				
	5	S&H		14				clay 15-20%; no chemical odor.
	14		C-4-					
0	16		15.0	15				
				16				
				17				
				18				
	8	S&H		19				clay 5-10%; no chemical odor.
	19		C-4-					
20	29		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CWP 06/12/92	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-4
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2 of 2
	Logged by: RSY	Driller: Bayland	
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		▼		
						▽		
	14	S&H		24				very dense, saturated at 23.5 feet; no chemical odor.
	24		C-4-					
35	34		25.0	25				
				26				
				27				
				28				
	12	S&H		29				no chemical odor.
	24		C-4-					
0	32		30.0	30				
				31				
				32				
				33				
	5	S&H		34				SILT (ML) - olive (5Y 5/3), very stiff, moist, medium
	10		C-4-					plasticity; 100% silt; trace coarse sand at 34.0 feet; slight
0	15		35	35				oxidation.
				36				
								Bottom of boring at 35.0 feet.
				37				Bottom of sample at 35.0 feet.
								06/04/90
				38				
				39				
				40				

Remarks:

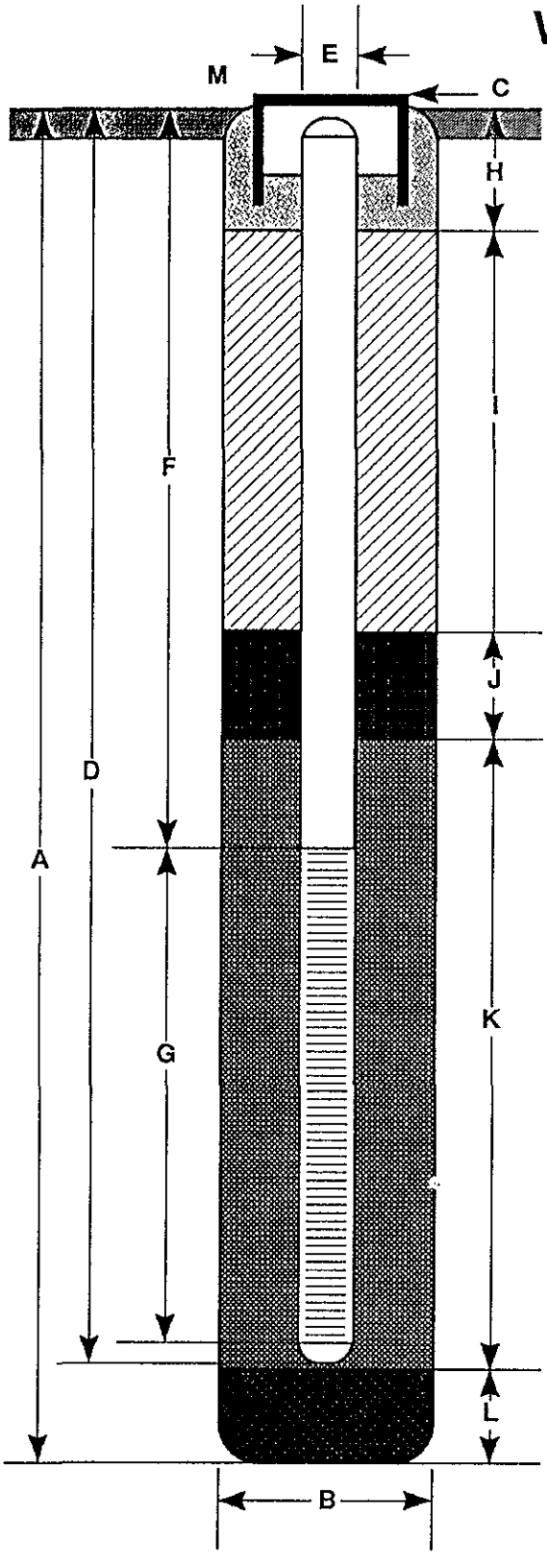
GeoStrategies Inc.

Log of Boring

BORING NO. C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CWP CEG 1262	06/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 35 ft.

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

C Top of Box Elevation: 31.42 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 33 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 18 ft.

G Perforated Length: 15 ft.
Perforated Interval from 18 to 33 ft.
Perforation Type: Factory Slot
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 14 ft.
Backfill Material: Concrete Grout

J Seal from 14 to 16 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 16 to 33 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: 2 ft.
Seal Material: Bentonite Pellets

M Christy box with locking well cap.

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.

C-4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CMP CEG 12/92	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/04/90	Boring No: C-A
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	23.5	
Time	11:30	
Date	06/04/90	

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				CLAYEY SAND (SC) - yellow brown (10YR 5/6), stiff, dry; 65% fine sand; 35% clay; no chemical odor.
				3				
	400	S&H		4				
	500	push	C-A-					
0	500		5.0	5				
				6				
				7				
				8				
	5	S&H		9				SAND (SP) - dark grey (5Y 4/1), medium dense, moist; 95% fine sand; 5% fines; no chemical odor.
	13		C-A-					
0	16		10.0	10				
				11				
				12				
				13				
	8	S&H		14				COLOR CHANGE to very dark grey (5Y 4/1); no chemical odor.
	20		C-A-					
111	20		15.0	15				
				16				
				17				
				18				
	8			19				
	20	S&H	C-A-					
230	30		20.0	20				strong chemical odor.

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-A

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CMP 06/12/62	06/90		

Field location of boring:	Project No.: 7270	Date: 06/04/90	Boring No:
(See Plate 2)	Client: Chevron USA #4816		C-A
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2 of 2
	Logged by: RSY	Driller: Bayland	
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				very dense, saturated; moderate chemical odor.
	12	S&H		24		▽		
	20		C-A-					
430	32		25.0	25				
				26				Bottom of boring at 25.0 feet.
								Bottom of sample at 25.0 feet.
				27				06/04/90
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-A

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 1262	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No: C-B
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	23.5	
Time	14:15	
Date	06/05/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.0 feet
				1				
				2				
				3				
	350	S&H	C-B-	4				SAND (SP) - dark yellow brown (10YR 4/6), dense, moist; 95% fine sand; 5% fines; trace roots; no chemical
0	500	push	4.0					odor.
				5				
				6				
				7				
				8				
	4	S&H		9				COLOR CHANGE to olive grey (5Y 4/2) at 8.5 feet;
	7		C-B-					medium dense; no chemical odor.
8	11		10.0	10				
				11				
				12				
				13				
	7	S&H		14				
	13		C-B-					dense; weak chemical odor.
80	24		15.0	15				
				16				
				17				
				18				
	8	S&H		19				strong chemical odor.
	20		C-B-					
420	28		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-B

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 11/26/2	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No: C-B
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2 of 2
	Logged by: RSY	Driller: Bayland	
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				
						▽		moderate chemical odor.
	12	S&H		24				
	22		C-B-					
500	34		25.0	25				
				26				
								Bottom of boring at 25.0 feet.
				27				Bottom of sample at 25.0 feet.
								06/05/90
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-B

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 11262	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No: C-C
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	23.5
Time	13:00
Date	06/05/90

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.0 feet
				1				
				2				
				3				
	350	S&H	C-C-	4				SAND (SP) - dark yellow brown (10YR 4/6), dense, dry;
0	500	push	4.5					95% fine sand; 5% clay; trace roots; no chemical odor.
				5				
				6				
				7				
				8				
	11	S&H		9				
	19		C-C-					moist; no chemical odor.
10	19		10.0	10				
				11				
				12				chemical odor in cuttings at 12.0 feet.
				13				
	8	S&H		14				moist
	10		C-C-					COLOR CHANGE to olive grey (5Y 4/2) at 13.5 feet;
50	13		15.0	15				weak chemical odor.
				16				
				17				
				18				
	11	S&H		19				no fines; strong chemical odor.
	19		C-C-					
450	27		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-C

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 1262	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No: C-C
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2 of 2
	Logged by: RSY	Driller: Bayland	
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				
						▽		saturated; free product; strong chemical odor.
	13	S&H		24				
	22		C-C-					
419	27		25.0	25				
				26				Bottom of boring at 25.0 feet.
								Bottom of sample at 25.0 feet.
				27				06/05/90
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks:

GSI GeoStrategies Inc.

Log of Boring

BORING NO. C-C

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	[illegible] 12/62	06/90		

Field location of boring: (See Plate 2)	Project No.: 7270	Date: 06/05/90	Boring No: C-D
	Client: Chevron USA #4816		
	Location: 301 14th Street		
	City: Oakland, California		Sheet 1 of 2
	Logged by: RSY	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	23.5		
Time	11:15		
Date	06/05/90		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.0 feet
				1				
				2				
				3				
	350-	S&H	C-D-	4				CLAYEY SAND (SC) - yellowish brown (10YR 5/6), very dense, dry; 75-80% fine sand; 20-25% clay; decreases to 10% at 4.0 feet; trace rootholes; no chemical odor.
	500/8"	push	4.0					
0				5				
				6				
				7				
				8				
	20	S&H		9				SANDY with CLAY (SP-SC) - yellow brown (10YR 5/6), very dense, moist; 85-90% fine sand; 5-10% clay; no chemical odor.
	27		C-D-					
	44		10.0	10				
6								
				11				
				12				
				13				
	12	S&H		14				no chemical odor.
	28		C-D-					
16	36		15.0	15				
				16				
				17				
				18				
	8	S&H		19				very weak chemical odor.
	20		C-D-					
220	26		20.0	20				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-D

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CEG 1262	06/90		

Field location of boring:	Project No.: 7270	Date: 06/05/90	Boring No:
(See Plate 2)	Client: Chevron USA #4816		C-D
	Location: 301 14th Street		
	City: Oakland, California		Sheet 2
	Logged by: RSY	Driller: Bayland	of 2
	Casing installation data:		
Drilling method: Hollow Stem Auger			
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
								moderate chemical odor in cuttings at 21.0 feet.
				21				
				22				
				23				
						▽		saturated; no fines; no chemical odor.
	12	S&H		24				
	24		C-D-					
22	36		25.0	25				
				26				
								Bottom of boring at 25.0 feet.
				27				Bottom of sample at 25.0 feet.
								06/05/90
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO.

C-D

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270	CWP CEG 1202	06/90		

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.: 10733
CLIENT: Chevron USA
CLIENT JOB NO.: 7270

DATE RECEIVED: 06/07/90
DATE REPORTED: 06/18/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10733- 1	C-A-10	06/04/90	06/15/90
10733- 2	C-A-15	06/04/90	06/15/90
10733- 3	C-A-20	06/04/90	06/15/90
10733- 4	C-A-25	06/04/90	06/15/90
10733- 5	C-B-10	06/04/90	06/17/90
10733- 6	C-B-15	06/04/90	06/15/90
10733- 7	C-B-20	06/04/90	06/15/90
10733- 8	C-B-25	06/04/90	06/15/90
10733- 9	C-C-10	06/04/90	06/15/90
10733-10	C-C-15	06/04/90	06/15/90

Laboratory Number:	10733 1	10733 2	10733 3	10733 4	10733 5
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	2	1200	2	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	5.6	0.10	ND<0.05
TOLUENE:	ND<0.05	ND<0.05	43	0.06	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	18	ND<0.05	ND<0.05
XYLENES:	ND<0.05	0.10	120	0.09	ND<0.05

Laboratory Number:	10733 6	10733 7	10733 8	10733 9	10733 10
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	1900	9	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	12	1.3	ND<0.05	0.22
TOLUENE:	ND<0.05	80	0.83	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	26	0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	150	0.31	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.: 10733
CLIENT: CHevron USA
CLIENT JOB NO.: 7270

DATE RECEIVED: 06/07/90
DATE REPORTED: 06/18/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10733-11	C-C-20	06/04/90	06/15/90
10733-12	C-C-25	06/04/90	06/15/90
10733-13	C-D-5	06/04/90	06/15/90
10733-14	C-D-10	06/04/90	06/15/90
10733-15	C-D-15	06/04/90	06/15/90
10733-16	C-D-20	06/04/90	06/15/90
10733-17	C-D-25	06/04/90	06/15/90
10733-18	C-1-15	06/04/90	06/15/90
10733-19	C-1-20	06/04/90	06/15/90
10733-20	C-1-25	06/04/90	06/15/90

Laboratory Number:	10733 11	10733 12	10733 13	10733 14	10733 15
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	360	290	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	0.75	1.5	ND<0.05	ND<0.05	ND<0.05
TOLUENE:	9.9	8.0	ND<0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	4.8	3.1	ND<0.05	ND<0.05	ND<0.05
XYLENES:	30	19	ND<0.05	ND<0.05	ND<0.05

Laboratory Number:	10733 16	10733 17	10733 18	10733 19	10733 20
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	3	ND<1	1	800	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	0.32	ND<0.05	0.05	3.6	ND<0.05
TOLUENE:	0.32	ND<0.05	ND<0.05	32	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05	13	ND<0.05
XYLENES:	0.15	ND<0.05	ND<0.05	77	ND<0.05

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

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10733
CLIENT: Chevron USA
CLIENT JOB NO.: 7270

DATE RECEIVED: 06/07/90
DATE REPORTED: 06/18/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10733-21	C-2-10	06/04/90	06/15/90
10733-22	C-2-15	06/04/90	06/15/90
10733-23	C-2-22	06/04/90	06/15/90
10733-24	C-3-5	06/04/90	06/15/90
10733-25	C-3-10	06/04/90	06/15/90
10733-26	C-3-15	06/04/90	06/15/90
10733-27	C-3-20	06/04/90	06/15/90
10733-28	C-3-25	06/04/90	06/15/90
10733-29	C-4-20	06/04/90	06/15/90
10733-30	C-4-25	06/04/90	06/15/90

Laboratory Number:	10733 21	10733 22	10733 23	10733 24	10733 25
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	11	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	1.1	ND<0.05	0.13
TOLUENE:	ND<0.05	ND<0.05	1.7	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	0.15	ND<0.05	ND<0.05
XYLENES:	ND<0.05	ND<0.05	0.87	ND<0.05	ND<0.05

Laboratory Number:	10733 26	10733 27	10733 28	10733 29	10733 30
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	840	3	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	0.93	0.07	ND<0.05	ND<0.05
TOLUENE:	ND<0.05	15	0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	9.0	ND<0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	63	0.19	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

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: 10733

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; RPD 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 = 72%: Duplicate RPD = 13

8020/BTXE
Minimum Quantitation Limit in Soil: 0.05mg/kg
Daily Standard run at 20ug/L; %Diff 8020 = <15
MS/MSD Average Recovery = 91%: Duplicate RPD = 15

Richard Srna, Ph.D.
Laboratory Director

SA # 10733

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: 4816
Consultant Release Number:
Consultant Project Number: 727C
Consultant Name: Kaprall-Ryan Inc.
Address: 2140 W. Winton Ave, Hayward
Fax Number: 783-1089
Project Contact (Name): Jerry Mitchell
(Phone): 352-4800

Chevron Contact (Name):
(Phone):
Laboratory Name: Superior Analytical / Lab
Contract Number: 3523000
Samples Collected by (Name): Randall Young
Collection Date: 6/4 - 6/5/90
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
C-A-10		1	S	G	11:05		✓	✓			✓							
C-A-15		1	S	G	11:15		✓	✓			✓							
C-A-20		1	S	G	11:20		✓	✓			✓							
C-A-25		1	S	G	11:30		✓	✓			✓							
C-B-10		1	S	G	13:50		✓	✓			✓							
C-B-15		1	S	G	14:00		✓	✓			✓							
C-B-20		1	S	G	14:05		✓	✓			✓							
C-B-25		1	S	G	14:15		✓	✓			✓							
C-C-10		1	S	G	12:30		✓	✓			✓							
C-C-25		1	S	G	12:40		✓	✓			✓							
C-C-20		1	S	G	12:50		✓	✓			✓							
C-C-25		1	S	G	13:00		✓	✓			✓							
C-D-5		1	S	G	10:25		✓	✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Randall Young	GSE	6/7/90 11:45		C/R	6-7-90/11:45
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	C/R	6/7/90 13:16			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
				6/7/90	17:20

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

Printed in U.S.A.

MS 5136 (5-89)

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: 4816
Consultant Release Number:
Consultant Project Number: 727(1
Consultant Name: Gettler-Ryan Inc
Address: 2150 W. Winton Ave, Hayward
Fax Number: 783-1089
Project Contact (Name): Jerry Mitchell
(Phone): 352-4800

Chevron Contact (Name):
(Phone):
Laboratory Name: Superior Analytical Labs
Contract Number: 352-3000
Samples Collected by (Name): Randall Young
Collection Date: 6/4/90 6/5/90
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				Remarks
C-1-15		1	S	G	9:15		✓	✓			✓							
C-1-20		1	S	G	9:20		✓	✓			✓							
C-1-25		1	S	G	9:30		✓	✓			✓							
C-2-10		1	S	G	8:50		✓	✓			✓							
C-2-15		1	S	G	9:10		✓	✓			✓							
C-2-22		1	S	G	9:25		✓	✓			✓							
C-3-5		1	S	G	12:30		✓	✓			✓							
C-3-10		1	S	G	12:40		✓	✓			✓							
C-3-15		1	S	G	12:50		✓	✓			✓							
C-3-20		1	S	G	13:00		✓	✓			✓							
C-3-25		1	S	G	13:10		✓	✓			✓							
C-4-20		1	S	G	14:40		✓	✓			✓							
C-4-25		1	S	G	15:00		✓	✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSE	6/7/90 11:45		G/R	6-7-90 1145	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
	G/R	6-7-90 13:16				5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	(10 Days)
			M. Young	d 7/90	13:20	

Printed in U.S.A.

MS-5136 (6 89)

Chain-of-Custody Record

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

Chevron Facility Number 4816
Consultant Release Number
Consultant Project Number 7270
Consultant Name Geo/Resource Ryan Inc.
Address 2150 W. Winton Ave. Hayward
Fax Number 783-1089
Project Contact (Name) Jerry Mitchell
(Phone) 352-4800

Chevron Contact (Name)
(Phone)
Laboratory Name Superior Analytical Labs
Contract Number 3523000
Samples Collected by (Name) Randall Young
Collection Date 6/4 - 6/5/90
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
C-D-10-		1	S	G	10:40		✓	✓			✓							
C-D-15		1	S	G	10:50		✓	✓			✓							
C-D-20		1	S	G	11:00		✓	✓			✓							
C-D-25		1	S	G	11:15		✓	✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSI	6/7/90 11:45		C/R	6-7-90 11:45	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
	C/R	6-7-90/13:16				5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	(10 Days)
				6/7/90	13:20	

Printed in U.S.A.

MS 5135 (6 89)

APPENDIX D
GETTLER-RYAN GROUNDWATER SAMPLING REPORT

gettler — ryan inc.

June 27, 1990

GROUNDWATER SAMPLING REPORT

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

Referenced Site: Chevron Service Station #4816
301 14th Street/Harrison
Oakland, California

Sampling Dates: June 12 and 13, 1990

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on June 12 and 13, 1990 at the referenced location. The site is occupied by a service station located on the southwest corner of Harrison Street and Fourteenth Street. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products.

There are currently four groundwater monitoring wells on site at the location shown on the attached site map. Newly installed wells, C-1, C-2, C-3, and C-4 were purged, developed, monitored, and sampled during this event. 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 21.97 to 24.75 feet below grade. Separate phase hydrocarbons were observed in Well C-3.

Wells C-1, C-2, and C-4 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.

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, supplied by the laboratory, was included and analyzed to assess quality control. Analytical results for the trip blank are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

1992 national avenue • hayward, california 94545-1787 • (415) 783-7500

The samples were analyzed by Superior Analytical, Inc. 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.

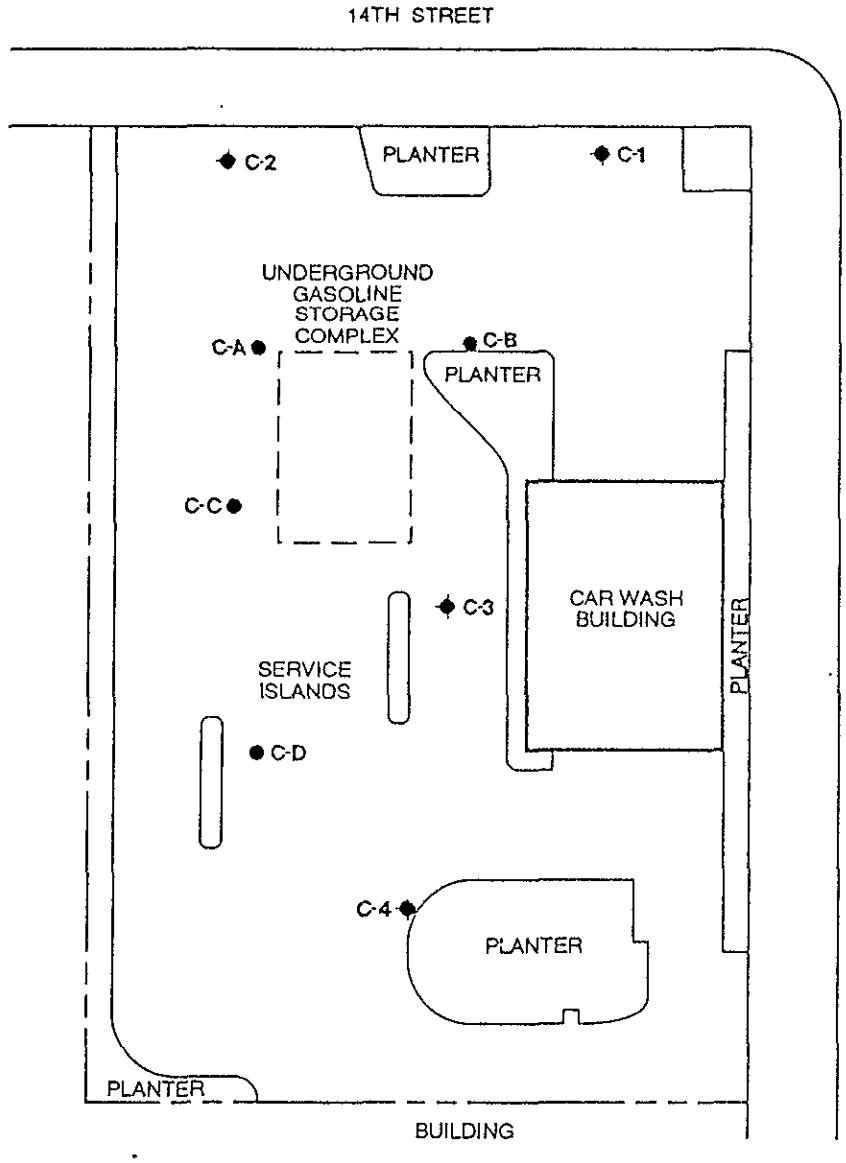
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	C-1	C-2	C-3	C-4
Date Sampled	06-13-90	06-13-90	06-13-90	06-13-90
Casing Diameter (inches)	2	2	2	2
Total Well Depth (feet)	32.7	32.6	----	31.5
Depth to Water (feet)	21.97	22.08	24.75**	22.73
Free Product (feet)	none	none	>3.0	none
Reason Not Sampled	----	----	free product	----
Calculated 4 Case Vol.(gal.)	7.3	7.1	----	6.0
Did Well Dewater?	no	no	----	no
Volume Evacuated (gal.)	9.0	9.0	----	7.5
Purging Device	Bailer	Bailer	----	Bailer
Sampling Device	Bailer	Bailer	----	Bailer
Time	13:46	14:10	----	14:38
Temperature (F)*	65.2	65.8	----	62.9
pH*	7.31	7.30	----	6.95
Conductivity (umhos/cm)*	940	730	----	800

* Indicates Stabilized Value
** Not corrected for presence of free product



EXPLANATION

- C-1 — Ground-water monitoring well location
- C-A — Soil boring location
- Proposed ground-water monitoring well location

N

0 30 60

Scale in Feet

GeoStrategies Inc.

Site Plan
Chevron Service Station #4816
301 14th Street
Oakland, California

PLATE 2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7270				

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

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10754
CLIENT: Chevron USA
CLIENT JOB NO.: 3270

DATE RECEIVED: 06/15/90
DATE REPORTED: 06/25/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10754- 1	C-1	06/13/90	06/21/90
10754- 2	C-2	06/13/90	06/21/90
10754- 3	C-4	06/13/90	06/21/90
10754- 4	Trip Blank	06/13/90	06/21/90

Laboratory Number:	10754 1	10754 2	10754 3	10754 4
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)			
OIL AND GREASE:	NA	NA	NA	NA
TPH/GASOLINE RANGE:	26000	15000	440	ND<50
TPH/DIESEL RANGE:	NA	NA	NA	NA
BENZENE:	2800	1100	47	ND<0.5
TOLUENE:	5100	1900	47	ND<0.5
ETHYL BENZENE:	400	260	3	ND<0.5
XYLENES:	2600	1700	61	ND<0.5

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

C E R T I F I C A T E O F A N A L Y S I S

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: 10754

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 = 95%: Duplicate RPD = 20%

8020/BTXE
Minimum Quantitation Limit in Water: 0.50ug/L
Daily Standard run at 20ug/L; %Diff 8020 = <15%
MS/MSD Average Recovery = 94%: Duplicate RPD = 9%

Richard Srna, Ph.D.
Laboratory Director

SA # 10754

Chain-of-Custody Record

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

Chevron Facility Number 4816
Consultant Release Number
Consultant Project Number 3270
Consultant Name Gettler-Ryan Inc.
Address 2150 W. Winton/Hayward, CA 94545
Fax Number 783-1089
Project Contact (Name) Tom Pulson, Jerry Mitchell
(Phone) 783-7500

Chevron Contact (Name)
(Phone)
Laboratory Name Superior
Contract Number 3523000
Samples Collected by (Name) John Zwierzycki
Collection Date 6-13-90
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	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				Remarks
C-1		3	W		13:46	HCl	Yes	✓			✓							THC(gas) BTXE
C-2		3	↓		19:10	↓	↓	✓			✓							↓
C-4		3			14:38			✓			✓							
Trip		1			—			✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
John P. Zwierzycki	G/R	6-15 / 11:57				24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
						5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	10 Days
			Cecilia H. Jorgensen		6/15/90 11:57	

Printed in U.S.A.

APPENDIX E
MONITORING DATA

CHEVRON USA 4816 OAKLAND - 301 14TH/HARRISON JOB 5270

DATE	WELL	DTH	DTW	HT	BAILED	PPM	LEL	NORM	DTB	EMP	C.ELEV
12-Jun-90	C1		22.05	0.00						JZ	
13-Jun-90	C1		21.97	0.00						JZ	
14-Jun-90	C1		22.03	0.00						SM	
18-Jun-90	C1		22.02	0.00						TL	
20-Jun-90	C1		21.93	0.00						TL	
22-Jun-90	C1		22.11	0.00						TL	
25-Jun-90	C1		21.96	0.00						RA	
27-Jun-90	C1		21.94	0.00						RA	
29-Jun-90	C1		22.08	0.00						RA	
02-Jul-90	C1		21.98	0.00						SM	
06-Jul-90	C1		21.94	0.00						SM	
09-Jul-90	C1		21.94	0.00						TL	
11-Jul-90	C1		21.94	0.00						TL	
13-Jul-90	C1		21.94	0.00						TL	
16-Jul-90	C1		21.90	0.00						RA	
18-Jul-90	C1		21.94	0.00						RA	
20-Jul-90	C1		21.89	0.00						RA	
23-Jul-90	C1		21.88	0.00						SM	
25-Jul-90	C1		21.92	0.00						SM	
27-Jul-90	C1	21.92	(1.00)	0.00						SM	
30-Jul-90	C1		21.91	0.00						TL	
12-Jun-90	C2		22.16	0.00							
13-Jun-90	C2		22.08	0.00							
14-Jun-90	C2		22.15	0.00							
18-Jun-90	C2		22.13	0.00							
20-Jun-90	C2		22.05	0.00							
22-Jun-90	C2		21.99	0.00							
25-Jun-90	C2		22.09	0.00							
27-Jun-90	C2		22.09	0.00							
29-Jun-90	C2		21.94	0.00							
02-Jul-90	C2		22.09	0.00							
06-Jul-90	C2		22.07	0.00							
09-Jul-90	C2		22.09	0.00							
11-Jul-90	C2		22.10	0.00							
13-Jul-90	C2		22.04	0.00							
16-Jul-90	C2		22.00	0.00							
18-Jul-90	C2		22.06	0.00							
20-Jul-90	C2		22.00	0.00							
23-Jul-90	C2		22.04	0.00							
25-Jul-90	C2		22.03	0.00							
27-Jul-90	C2		22.06	0.00							
30-Jul-90	C2		22.04	0.00							
12-Jun-90	C3	21.75	24.75	3.00+							
13-Jun-90	C3	21.75	24.75	3.00+							
14-Jun-90	C3	21.65	24.40	2.75	4.0						
18-Jun-90	C3	21.64	24.24	2.60	2.0						

DATE	WELL	DTH	DTW	HT	BAILED	PPM	LEL	NORM	DTB	EMP	C.ELEV
20-Jun-90	C3	21.59	24.28	2.69	2.5						
22-Jun-90	C3	21.64	24.32	2.68	2.5						
25-Jun-90	C3	21.63	24.16	2.53	4.0						
27-Jun-90	C3	21.61	24.26	2.65	4.0						
29-Jun-90	C3	21.60	24.12	2.52	4.0						
02-Jul-90	C3	21.60	24.18	2.58	5.0						
06-Jul-90	C3	21.57	24.20	2.63	5.0						
09-Jul-90	C3	21.59	24.24	2.65	2.5						
11-Jul-90	C3	21.57	24.26	2.69	2.5						
13-Jul-90	C3	21.57	24.20	2.63	2.5						
16-Jul-90	C3	21.58	24.15	2.57	4.0						
18-Jul-90	C3	21.58	23.99	2.41	4.0						
20-Jul-90	C3	21.55	24.00	2.45	4.0						
23-Jul-90	C3	21.52	24.07	2.55	5.0						
25-Jul-90	C3	21.54	24.20	2.66	5.0						
27-Jul-90	C3	21.56	24.19	2.63	3.5						
30-Jul-90	C3	21.54	24.14	2.60	2.5						
12-Jun-90	C4		22.82	0.00							
13-Jun-90	C4		22.73	0.00							
14-Jun-90	C4		22.81	0.00							
18-Jun-90	C4		22.88	0.00							
20-Jun-90	C4		22.72	0.00							
22-Jun-90	C4		22.76	0.00							
25-Jun-90	C4		22.71	0.00							
27-Jun-90	C4		22.73	0.00							
29-Jun-90	C4		22.72	0.00							
02-Jul-90	C4		22.74	0.00							
06-Jul-90	C4		22.71	0.00							
09-Jul-90	C4		22.81	0.00							
11-Jul-90	C4		22.72	0.00							
13-Jul-90	C4		22.70	0.00							
16-Jul-90	C4		22.69	0.00							
18-Jul-90	C4		22.69	0.00							
20-Jul-90	C4		22.65	0.00							
23-Jul-90	C4		22.65	0.00							
25-Jul-90	C4		22.67	0.00							
27-Jul-90	C4		22.67	0.00							
30-Jul-90	C4		22.64	0.00							

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