Chevron U.S.A. Inc.
2410 Camino Ramon, San Ramon, California • Phone (415) 842-9500
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Marketing Operations

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

February 21,1990

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

Re: Chevron Service Station #9-0338
5500 Telegraph Avenue/55th
Oakland, CA 94609

Dear Mr. Shahid:

Enclosed we are forwarding the Well Installation Report dated February 14, 1990, conducted by our consultant GeoStrategies, Inc. for the above referenced site. As indicated in the report, three borings were advanced and completed into groundwater monitoring wells. Analytic results of all soil and groundwater samples showed no detectable hydrocarbons. Levels of ICAP metals were detected in the groundwater sample collected from the well adjacent to the used oil tank. It is suspected that these metal concentrations exist naturally in the formation as we would expect to see hydrocarbon contaminants if they had come from the used oil tank. In order to verify this theory we will collect water samples in one quarter and have all well samples analyzed for ICAP metals.

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 call me at (415) 842 - 9625.

Very truly yours,
C. G. Trimbach

By John Randall

JMR/jmr
Enclosure

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

GeoStrategies Inc.

KLD FEB 16 '90

WELL INSTALLATION REPORT

Chevron Service Station No. 0338
5500 Telegraph Avenue
Oakland, California

Report No. 7263-2

February 14, 1990

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

February 14, 1990

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

Attn: Mr. Jerry Mitchell

Re: WELL INSTALLATION REPORT
Chevron Service Station No. 0338
5500 Telegraph Avenue
Oakland, California

Gentlemen:

This report summarizes the ground-water monitoring well installation and soil sampling performed by GeoStrategies Inc. (GSI) at the above referenced location (Plate 1). Three soil borings were drilled on November 13, 1989. The borings were subsequently converted into 2-inch-diameter monitoring wells designated C-1, C-2, and C-3. The location of the monitoring wells are shown on Plate 2.

SITE BACKGROUND

Based on the information provided to GSI, the subsurface 1,000 gallon waste oil tank was removed in October 1988. A soil sample from beneath the tank was collected by Blaine Tech Services, Inc. (Blaine). Blaine presented the results of this sampling event in their report dated October 11, 1988. In this report Blaine inadvertently stated that all constituents analyzed were reported as none detected (ND). GSI reviewed the certified analytical reports which indicated that the chemical analyses revealed Total Oil and Grease (TOG) at a concentration of 81 parts per million (ppm). Total Petroleum Hydrocarbons calculated as Diesel (TPH-Diesel) and Volatile Organic Compounds (VOCs) were reported by the laboratory as ND.

In July 1989, Chevron replaced the subsurface piping associated with the underground gasoline storage tanks. During the removal and replacement of the subsurface piping, contaminated soil was discovered in the western-most pipe trench (closest to Telegraph Avenue). Blaine collected soil samples in the gasoline product line trench on July 11 and 14, 1989. Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) ranged from ND to 480 ppm. Blaine issued a report summarizing analytical results and field procedures dated August 9, 1989.

The contaminated soil was excavated and removed from the piping trench in July 1989, in compliance with the Regional Water Quality Control Board (RWQCB) guidelines for investigations associated with leaking underground fuel tanks.

FIELD PROCEDURES

The exploratory soil borings were drilled using a truck mounted, hollow-stem auger drilling rig and 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

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, C-2 and C-3 were drilled with an 8-inch-diameter hollow-stem auger, to total depths of 33, 32.5 and 32.5 feet, respectively. Monitoring wells C-1 through C-3 were constructed through the hollow-stem augers using 2-inch-diameter Schedule 40 PVC well casing, and 0.020-inch factory slotted well screen. Lonestar #2/12 sand was placed in the annular space across the entire screened interval and extended 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 was then placed on the well. The well construction details are presented with the boring logs in Appendix B.

HYDROGEOLOGIC CONDITIONS

Site lithology consisted primarily of sandy clays and silts underlain by clayey gravels and silty sand to the total depth explored. The aquifer units consists of clayey gravel which grades into silty sand, and sand with gravel stratum. A clay unit containing varying amounts of sand and gravel was encountered at approximately 28 feet in all three borings. Based on the data available, this underlying clay unit appears to be continuous across the site.

Groundwater was encountered at approximately 23.5 to 24.5 feet in each boring. The observed water levels rose about 12 feet in 24 hours. This is interpreted to represent both drainage from the clayey gravel and modest potentiometric rise inferring semi-confined conditions. Ground-water elevations were measured by Gettler-Ryan Inc. (G-R) on November 21, 1989. The groundwater gradient was calculated to be 0.01 toward the west-southwest (See Plate 3).

CHEMICAL ANALYSES

Analyses requested for soil and ground-water samples were 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. Ground-water samples collected from Well C-3 were also analyzed for TPH-Diesel using EPA Method 8015 (Modified), Total Oil and Grease (TOG) using EPA Method 503E and ICAP metals due to it's close proximity to the waste oil tank. Soil samples collected from C-3 were also analyzed for ICAP Metals and Volatile Organic Compounds (VOCs) using EPA Method 8240. All samples were analyzed by Superior.

Soil Analytical Results

Soil samples were retained for chemical analysis from borings C-1 through C-3 at depths of 10.5, 15.5 and 25.5 feet. All soil samples analyzed were reported as ND for TPH-Gasoline and BTEX. Soil samples analyzed for VOCs were also reported as ND. ICAP metals (Total Zinc, Total Cadmium and Total Chromium) were detected in samples collected from C-3 at the 10.5, 15.5 and 25.5 foot sample intervals Total Lead was also detected in the 25.5 foot sample from C-3. Soils analytical data are summarized in Table 1. Soil laboratory results from Superior are presented in Appendix C.

Groundwater Analytical Results

Ground-water samples were collected from monitoring wells C-1 through C-3 by G-R on November 21, 1989. Well C-3 was resampled on January 12, 1990 and analyzed for TPH-Diesel and TOG. Floating hydrocarbons were not observed in any of the monitoring wells on-site during these sampling events. TPH-Gasoline and BTEX were reported as ND in all wells, in addition, TPH-Diesel and TOG were reported ND in Well C-3. ICAP metals were detected in ground-water samples collected from Well C-3 at concentrations of 1000 parts per billion (ppb) (Total Zinc), 500 ppb (Total Chromium) and 20 ppb (Total Cadmium). Ground-water analytical results for TPH-Gasoline and BTEX for this sampling event are summarized in Table 2. Ground-water analytical results are presented with the G-R Ground-water Sampling Reports in Appendix D.

Summary of Findings

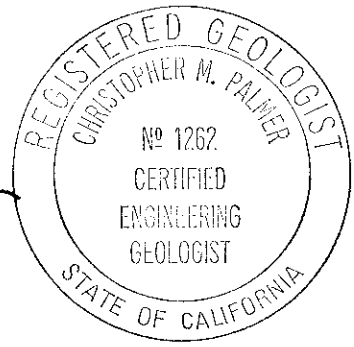
The results of this investigation are summarized below.

- Three exploratory borings were drilled on November 13, 1989, and three ground-water monitoring wells were installed.
- Based on the three exploratory borings, the lithology of the site consists of primarily sandy clays and silts underlain by clay with gravel and sand to the total depth explored of approximately 32.5 to 33 feet.
- All soil samples submitted for analyses were reported as ND for TPH-Gasoline and BTEX. Soil samples collected from boring C-3 also reported ND for TPH-Diesel, TOG and VOCs.
- Ground-water samples collected by G-R on November 21, 1989, reported TPH-Gasoline and BTEX as ND. Samples collected from Well C-3 on January 12, 1990 reported TPH-Diesel and TOG as ND.
- ICAP Metals (Total Zinc, Chromium, Cadmium) were detected in the groundwater sample collected from Well C-3 at concentrations of 1000 ppm, 500 ppb and 20 ppb, respectively. Total Lead was reported as ND. In our opinion these concentrations may be attributed to native geologic material in this region.

If you have any further questions, please call.

GeoStrategies Inc. by,

Melissa L. Wann
Project Geologist



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

MLW/CMP/mlg

Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Potentiometric 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

TABLE 1

SOIL ANALYSES DATA

SAMPLE NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	TPH-D (PPM)	TOG (PPM)	ZINC (PPM)	CADMIUM (PPM)	CHROMIUM (PPM)	LEAD (PPM)
C-1-10.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-1-15.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-1-25.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-2-10.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-2-15.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-2-25.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	N/A	N/A	N/A	N/A	N/A	N/A
C-3-10.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	<10	<20	39	1.0	16	<10
C-3-15.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	<10	<20	60	0.6	12	<10
C-3-25.5	13-Nov-89	25-Nov-89	<1.	<0.05	<0.05	<0.05	<0.05	<10	<20	74	1.4	27	10

TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel
TOG = Total Oil & Grease

PPM = Parts Per Million
N/A = Not Analyzed

NOTE: All data shown as <x are reported as ND (none detected)

Project No. 7263-2

TABLE 2

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-D (PPB)	TOG (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
C-1	21-Nov-89	01-Dec-89	<500.	<0.5	<0.5	<0.5	<0.5	N/A	N/A	123.88	113.13	----	10.75
C-2	21-Nov-89	01-Dec-89	<500.	<0.5	<0.5	<0.5	<0.5	N/A	N/A	124.92	114.17	----	10.75
C-3	21-Nov-89	01-Dec-89	<500.	<0.5	<0.5	<0.5	<0.5	N/A	N/A	125.64	114.36	----	11.28
C-3	12-Jan-90	22-Jan-90	N/A	N/A	N/A	N/A	N/A	<1000	<5000	----	----	----	----

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS

Benzene 1.0 ppb Xylenes 1,750 ppb Ethylbenzene 680 ppb

CURRENT DHS ACTION LEVELS

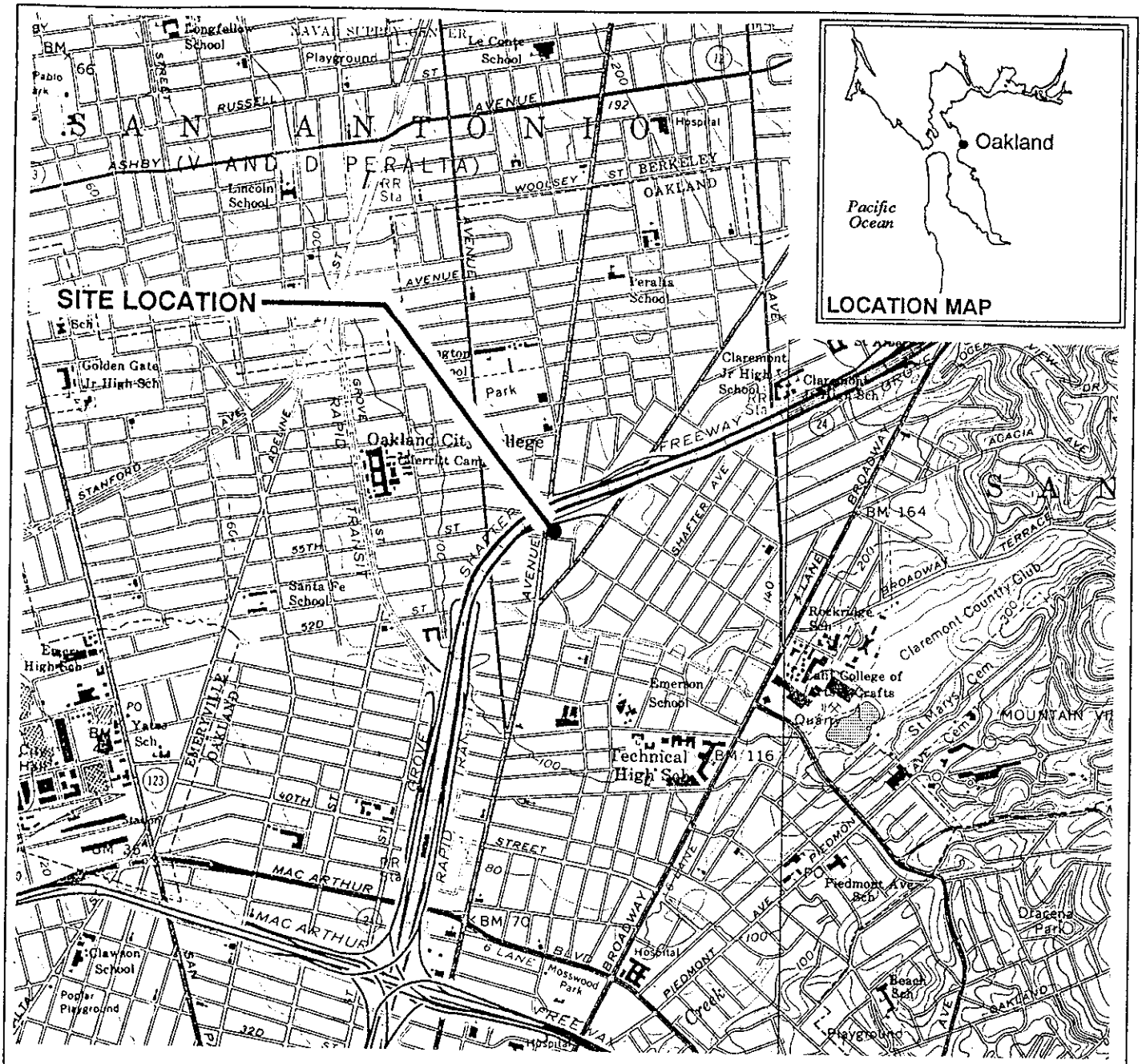
Toluene 100 ppb

TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel
TOG = Total Oil & Grease

PPB = Parts Per Billion
N/A = Not Analyzed

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

Project No. 7263-2



Base Map: USGS Topographic Map

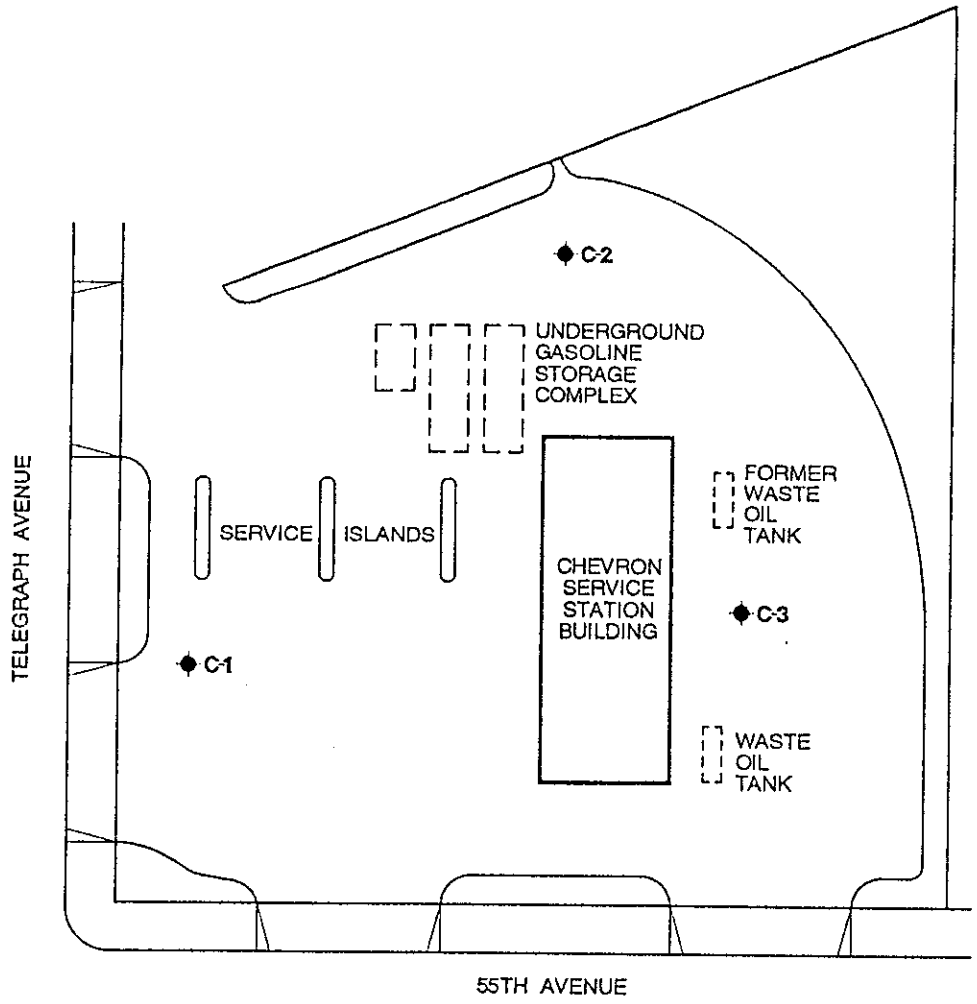
Approximate Scale : 1" = 2000'

GeoStrategies Inc.

Vicinity Map
Chevron Service Station #0338
5500 Telegraph Avenue
Oakland, California

PLATE 1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263		1/90		



Approx. Ground-water Flow Direction

EXPLANATION

C-1 Ground-water monitoring well location

N

0 40 80

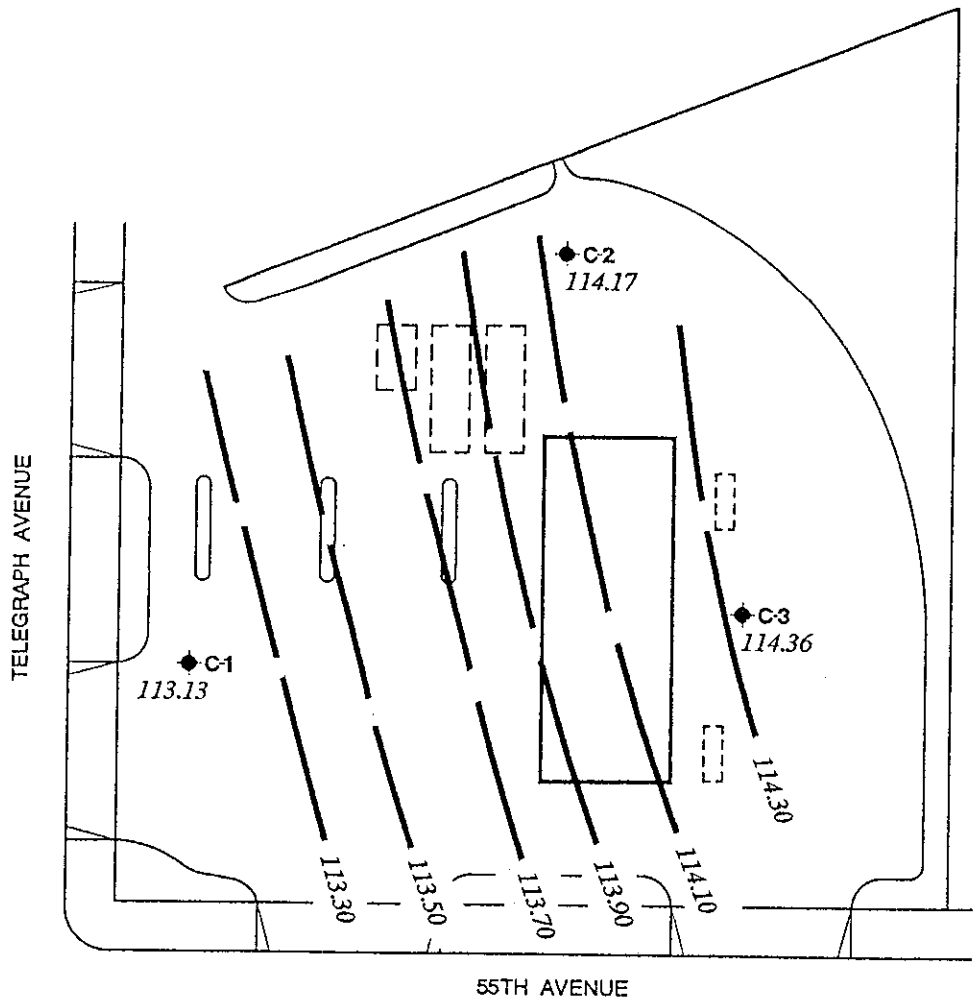
Scale in Feet

GSI GeoStrategies Inc.

Site Plan
Chevron Service Station #0338
5500 Telegraph Avenue
Oakland, California

PLATE **2**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CEG 1262	1/90		



Approx. Ground-water Flow Direction

EXPLANATION

C-1 — Ground-water monitoring well location

113.70 — Ground-water elevation contour
Approximate Gradient = 0.01

114.17 — Ground-water elevation in feet referenced to Mean Sea Level (MSL) measured on November 21, 1989

N

0 40 80
Scale in Feet

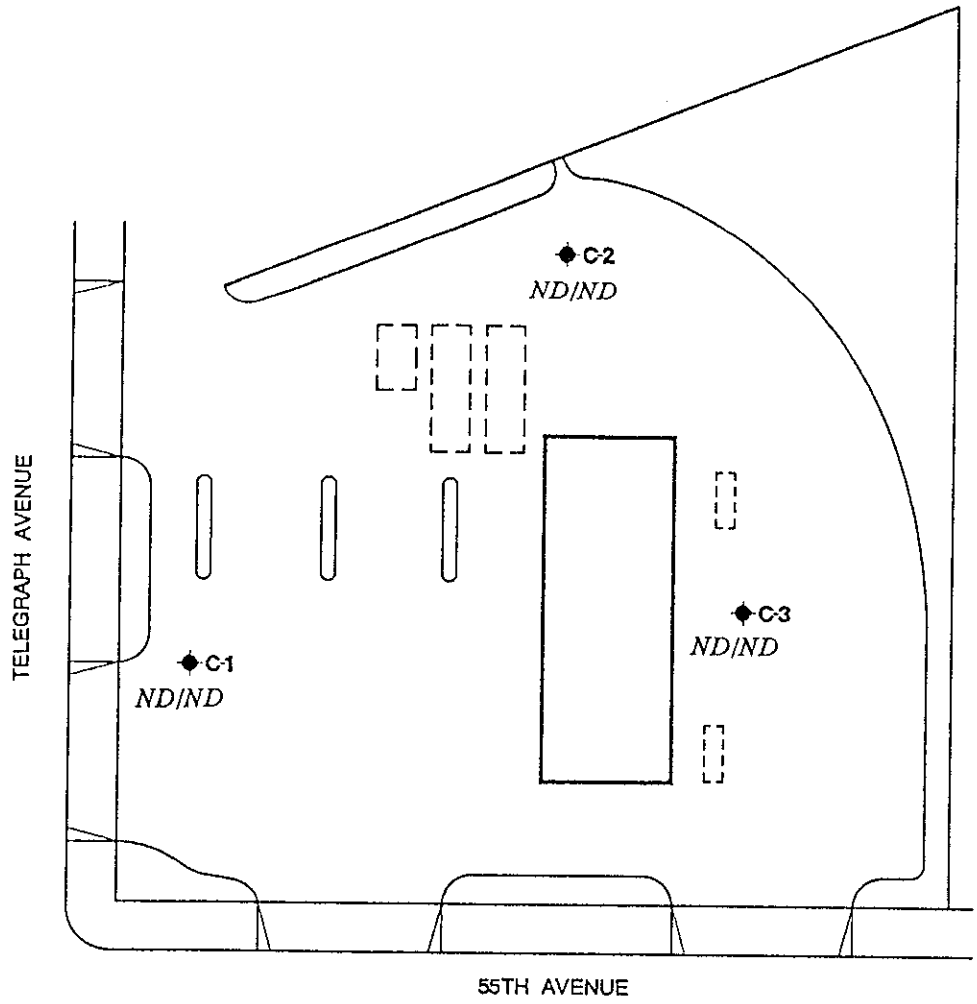
Note: Contours may be influenced by irrigation practices and/or site construction activities

GeoStrategies Inc.

Potentiometric Map
Chevron Service Station #0338
5500 Telegraph Avenue
Oakland, California

PLATE
3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CEG 1262	1/90		



EXPLANATION

◆ C-1	Ground-water monitoring well location
ND/ND	TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline)/Benzene concentrations in ppb sampled on November 21, 1989
ND	Not Detected (see laboratory reports for detection limits)

N

0 40 80

Scale in Feet

GeoStrategies Inc.

TPH-G/Benzene Concentration Map
Chevron Service Station #0338
5500 Telegraph Avenue
Oakland, California

PLATE 4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	RWP CEG 1262	1/90		

FIELD METHODS AND PROCEDURES

EXPLORATION DRILLING

Mobilization

Prior to any drilling activities, 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 ground water. 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 tremied 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

Monitoring wells will be developed using a submersible pump, bladder pump or bailer. All well developing equipment will be decontaminated prior to development using a steam cleaner and/or Alconox detergent wash. Wells will be developed until discharge water is visibly clear and free of sediment. The adequacy of well development will be assessed by the GSI geologist. Indicator parameters (pH, specific conductance, and temperature) will be monitored and recorded during well development. Field instrument calibrations will be performed according to manufacturer's specifications.

Well Surveying

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

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

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

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

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

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

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

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

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

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

August 15, 1989

Guidance and Reference Documents Used to Collect Groundwater Samples

These documents are used to verify Gettler-Ryan Inc. sampling procedures and consistent with current regulatory guidance. If site specific work and sampling plans are required, those plans will be developed from these 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, Section 2647 (October, 1986)
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)
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)
Santa Clara Valley Water District	Investigation and Remediation at Fuel Leak sites: Guidelines for Investigation and Technical Report Preparation (March 1989)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983
Site Specific (as needed)	General and specific regulatory documents as required.

Chain-of-Custody Record

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

Chevron Facility Number: 0378
Consultant Release Number:
Consultant Project Number: 7263
Consultant Name: Geo Strategies Inc.
Address: 2140 W Winton Ave Hayward
Fax Number: 783-1089
Project Contact (Name): Jerry Mitchell
(Phone): 415-352-4800

Chevron Contact (Name): Mike Brown
(Phone):
Laboratory Name: Superior Analytical Lab
Contract Number: 2646690
Samples Collected by (Name): Randall Young
Collection Date: 11/13/89
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	HOLD			Remarks
C-1-5.5		1	S	G	10:35	—	X								X			
C-1-20.5		1	S	G	11:10	—	X								X			
C-1-30.5		1	S	G	11:30	—	X								X			
C-2-5.5		1	S	G	13:20	—	X								X			
C-2-20.5		1	S	G	14:00	—	X								X			
C-2-30.5		1	S	G	14:15	—	X								X			
C-3-5.5		1	S	G	15:30	—	X								X			
C-3-20.5		1	S	G	16:00	—	X								X			
C-3-30.5		1	S	G	16:15	—	X								X			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Randall Young	GSI	11/13/89 11:30	D. P.	EXPRESS-IT	11-17 16:10
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
		11-18 9:40			11/18 9:40

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

Chain-of-Custody Record

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

Chevron Facility Number 0338
Consultant Release Number
Consultant Project Number 7263
Consultant Name Geostrategies Inc.
Address 2140 W. Winton Ave, Hayward
Fax Number 783-1089
Project Contact (Name) Jerry Mitchell
(Phone) 415-352-4800

Chevron Contact (Name) Mike Brown
(Phone)
Laboratory Name Superior Analytical Lab
Contract Number 2646690
Samples Collected by (Name) Randall Young
Collection Date 11/13/89
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	Cd, Cr, Pb, Zn TCLP in AA			Remarks
C-1-10.5		1	S	G	10:50		X	X			X							
C-1-15.5		1	S	G	11:00		X	X			X							
C-1-25.5		1	S	G	11:15		X	X			X							
C-2-10.5		1	S	G	13:45		X	X			X							
C-2-15.5		1	S	G	13:55		X	X			X							
C-2-25.5		1	S	G	14:10		X	X			X							
C-3-10.5		1	S	G	15:45		X	X	X	X	X	X			X			
C-3-15.5		1	S	G	15:50		X	X	X	X	X	X			X			
C-3-25.5		1	S	G	16:10		X	X	X	X	X	X			X			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSI	11/13/89 11:30	D. [illegible]	Express-It	11-17 16:10	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	5 Days
[signature]		11-18 9:30	[signature]		11/18 9:44	10 Days

Printed in U.S.A.

MS-5136 (6 89)

gettler — ryan inc.

December 14, 1989

GROUNDWATER SAMPLING REPORT

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

Referenced Site: Chevron Service Station #0338
5500 Telegraph Ave/55th St.
Oakland, California

Sampling Date: November 21, 1989

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on November 21, 1989 at the referenced location. The site is occupied by an operating service station located on the northeast corner of Telegraph Avenue and 55th Avenue. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products, diesel and waste oil.

There are currently three groundwater monitoring wells on site at the locations shown on the attached site map. Prior to sampling, all monitoring wells were inspected for total well depth, water levels, and 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 10.75 to 11.28 feet below grade. Separate phase hydrocarbons were not observed in any of the monitoring wells.

The wells were then purged and sampled. 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. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. The purge water was drummed for proper disposal. Details of the final well purging results are presented on the attached Table of Monitoring Data.

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. 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 at Superior Analytical Laboratory located at 1385 Fairfax Street, Suite D., 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.

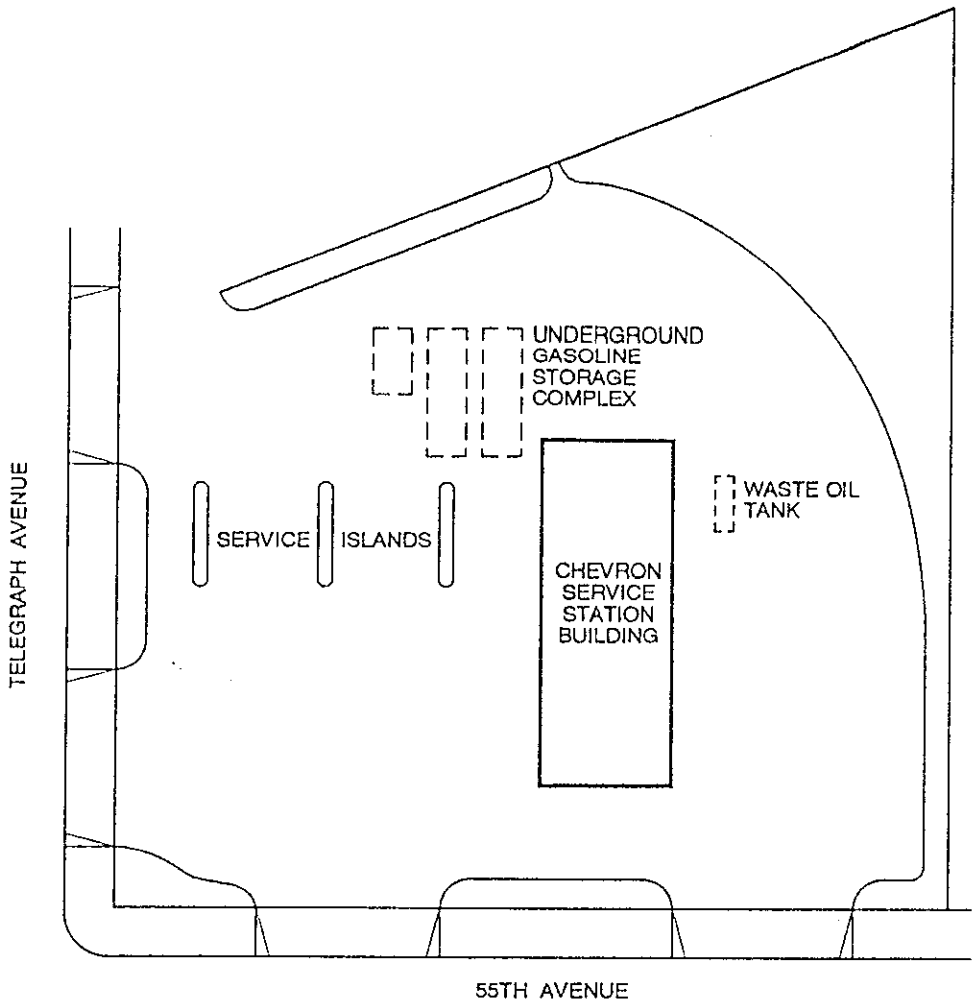
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	C-1	C-2	C-3
Casing Diameter (inches)	2	2	2
Total Well Depth (feet)	30.1	29.1	28.0
Depth to Water (feet)	10.75	10.75	11.28
Free Hydrocarbons (feet)	none	none	none
Reason Not Sampled	----	----	----
Calculated 4 Case Vol.(gal.)	16.0	15.6	14.2
Did Well Dewater?	yes	no	no
Volume Evacuated (gal.)	12	16	13
Purging Device	Bailer	Bailer	Bailer
Sampling Device	Bailer	Bailer	Bailer
Time	09:08	10:35	09:57
Temperature (F)*	67.8	64.2	65.4
pH*	7.05	7.06	6.83
Conductivity (umhos/cm)*	1925	873	864

* Indicates Stabilized Value



EXPLANATION

◆ C-1 Ground-water monitoring well location

N

0 40 80

Scale in Feet

GeoStrategies Inc.

Site Plan
Chevron Service Station #0338
5500 Telegraph Avenue
Oakland, California

PLATE 1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
263		9/89		

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10298
CLIENT: Chevron USA
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/22/89
DATE REPORTED: 12/05/89

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10298- 1	C-1	11/21/89	12/01/89
10298- 2	C-2	11/21/89	12/01/89
10298- 3	C-3	11/21/89	12/01/89

Laboratory Number:	10298 1	10298 2	10298 3
ANALYTE LIST	Amounts/Quantitation Limits (ug/L)		
OIL AND GREASE:	NA	NA	NA
TPH/GASOLINE RANGE:	ND<500	ND<500	ND<500
TPH/DIESEL RANGE:	NA	NA	NA
BENZENE:	ND<0.5	ND<0.5	ND<0.5
TOLUENE:	ND<0.5	ND<0.5	ND<0.5
ETHYL BENZENE:	ND<0.5	ND<0.5	ND<0.5
XYLENES:	ND<0.5	ND<0.5	ND<0.5

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • 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: 10298

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; RPD Diesel = NA
MS/MSD Average Recovery = NA: Duplicate RPD = NA

8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 500ug/L
Daily Standard run at 2mg/L; RPD Gasoline = <15%
MS/MSD Average Recovery = 100%: Duplicate RPD = 1%

8020/BTXE
Minimum Quantitation Limit in Water: 0.50ug/L
Daily Standard run at 20ug/L; RPD = <15%
MS/MSD Average Recovery = 99%: Duplicate RPD = <5%

Richard Srna, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10298
CLIENT: CHEVRON USA
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/22/89
DATE REPORTED: 12/05/89
DATE ANALYSED: 12/2/89

ANALYSIS FOR ETHYLENE DIBROMIDE
by EPA Method 504

LAB #	Sample Identification	Concentration (ug/l)
1	C-1	ND<0.05
2	C-2	ND<0.05
3	C-3	ND<0.05

ug/L - parts per billion (ppb)

Minimum Detection Limit for EDB in water = 0.05 ug/l

QA/QC Summary: 5-PT Response factor % RSD = 12.5 %
MS/MSD average recovery = 95 %
RPD = 1.4 %

Richard Srna, Ph.D.

Laboratory Director

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

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

LABORATORY NO.: 80298
CLIENT: Chevron
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/30/89
DATE REPORTED: 12/04/89

ANALYSIS FOR TOTAL ZINC
by SW-846 Method 7950

LAB #	Sample Identification	Concentration (ug/L) Total Zinc
1	C-3	1000

ug/L - parts per billion (ppb)

Method Detection Limit for Zinc in Soil: 0.2 mg/kg
Method Detection Limit for Zinc in Water: 10 ug/L

QAQC Summary: MS/MSD Average Recovery : 122%
Duplicate RPD : 1.1%

Edward R. Morales

Laboratory Manager

^Z

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825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

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

LABORATORY NO.: 80298
CLIENT: Chevron
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/30/89
DATE REPORTED: 12/04/89

ANALYSIS FOR TOTAL LEAD
by SW-846 Method 7420

LAB #	Sample Identification	Concentration (ug/L) Total Lead
1	C-3	ND<500

ug/L - parts per billion (ppb)

Method Detection Limit for Lead in Soil: 10 mg/kg
Method Detection Limit for Lead in Water: 500 ug/L

QAQC Summary: MS/MSD Average Recovery : 86%
Duplicate RPD : 0.4%

Edward R. Morales
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

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

LABORATORY NO.: 80298
CLIENT: Chevron
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/30/89
DATE REPORTED: 12/04/89

ANALYSIS FOR TOTAL CHROMIUM
by SW-846 Method 7190

LAB #	Sample Identification	Concentration (ug/L) Total Chromium
1	C-3	500

ug/L - parts per billion (ppb)

Method Detection Limit for Chromium in Soil: 2 mg/kg
Method Detection Limit for Chromium in Water: 100 ug/L

QAQC Summary: MS/MSD Average Recovery : 125%
Duplicate RPD : 2%

Edward R. Morales
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

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

LABORATORY NO.: 80298
CLIENT: Chevron
CLIENT JOB NO.: 3263

DATE RECEIVED: 11/30/89
DATE REPORTED: 12/04/89

ANALYSIS FOR TOTAL CADMIUM
by SW-846 Method 7130

LAB #	Sample Identification	Concentration (ug/L) Total Cadmium
1	C-3	20

ug/L - parts per billion (ppb)

Method Detection Limit for Cadmium in Soil: 0.2 mg/kg
Method Detection Limit for Cadmium in Water: 10 ug/L

QAQC Summary: MS/MSD Average Recovery : 106%
Duplicate RPD : 2%

Edward R. Morales
Laboratory Manager

10298 JH

Chain-of-Custody Record

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

Chevron Facility Number * 0338
Consultant Release Number
Consultant Project Number 3263
Consultant Name Gettler Ryan
Address 1992 National Ave Hayward CA
Fax Number 415 783-1089
Project Contact (Name) J. Mitchell
(Phone) 783-7560

Chevron Contact (Name) M.K. Brown
(Phone)
Laboratory Name Superior
Contract Number # 2646690
Samples Collected by (Name) John P. Zwerzyzb
Collection Date 11/21/89
Signature John P. Zwerzyzb

	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	ICAP (Metals)			Remarks
									Analyses To Be Performed										
1	C-1		7	W		9:10	None/HCl	Y	✓			✓			✓				
2	C-2		6	W		10:35	None/HCl	Y	✓			✓			✓				
3	C-3	80298-1	9	W		10:01	None/HCl/HNO3	Y	✓			✓	[illegible]		✓	✓ (Cd, Cr, Pb, Zn)			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
J. P. Zwerzyzb	G/R	11/21/89/5:45	[illegible]	Express St	1025 11/22/89	24 Hrs
Jason Belalla	Organization	11/22/1434	Received By (Signature)	Organization	Date/Time	48 Hrs
	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	5 Days
						10 Days

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.

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) samples 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.

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 3). 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.

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general and environmental contractors

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 3. 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 4). 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 4. Collected field data during purging activities will be entered on the G-R Well Sampling Field Data Sheet shown in Figure 3. 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

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Chain-of-Custody

A Chain-of-Custody record (Figure 5) 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.

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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			

GeoStrategies Inc.

FIELD EXPLORATORY BORING LOG

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:

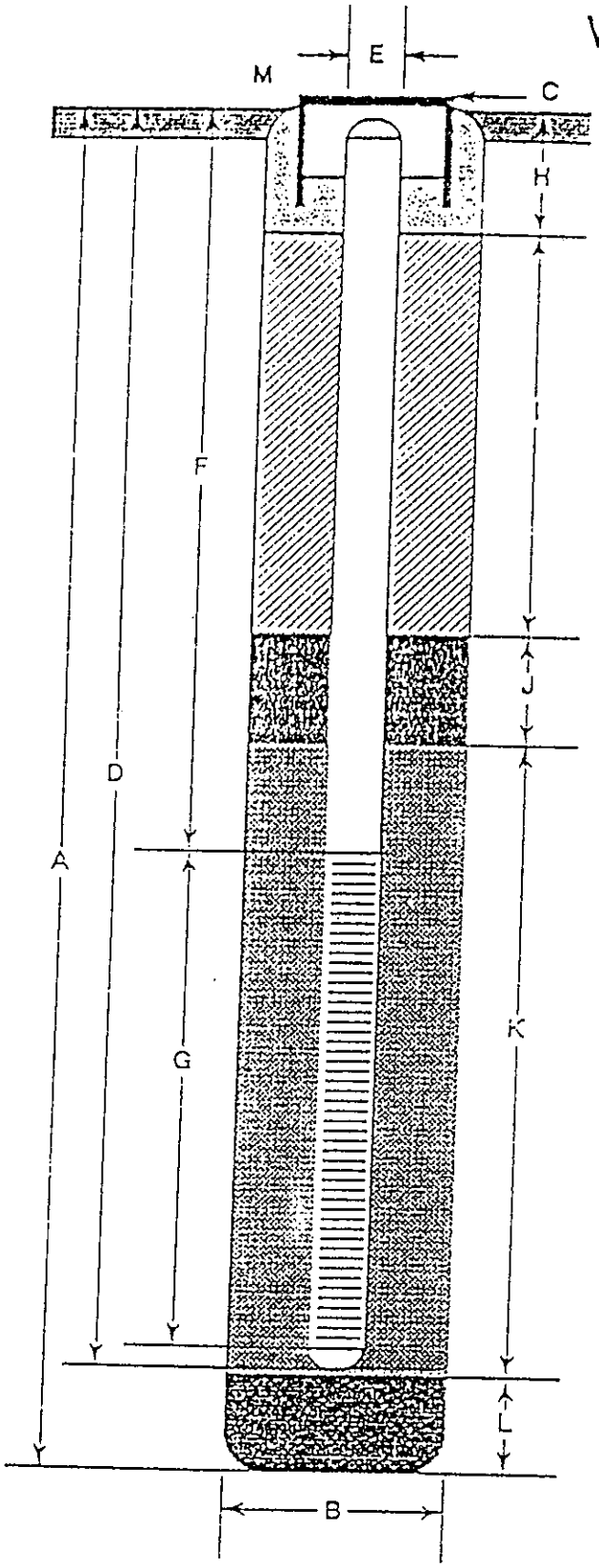
Water Level				
Time				
Date				

FID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description

Remarks:

FIGURE 1

WELL CONSTRUCTION DETAIL



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 _____

GeoStrategies Inc.

Well Construction Detail

WELL NO.

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

FIGURE 2

GETTLER-RYAN INC.
General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

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

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

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

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

Time	pH	Conductivity	Temperature	Volume

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

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 3

Monitoring Well Sampling Protocol Schematic

Sampling Crew Reviews Project Sampling Requirments/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

$V = \pi(r/12)^2 h(\_\_\_\_ \#\ vol)(7.48) = \_\_\_\_\_$/gallons

V = Purge volume (gallons)
π = 3.14159
h = Height of Water Colum (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 Initials Measured Water Colum Height in Feet within 24 hrs. of Evacuation.

↓

Measure Groundwater Stability Indicator Parameters (pH, Temp., Conductivity)

↓

Collect Sample and Complete Chain-of-Custody

↓

Preserve Sample According to Required Chemical Analysis

↓

Transport to Anayltical 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%
Temperaure:	1.0 degree 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

FIGURE 4

Gettler - Ryan Inc.
ENVIRONMENTAL DIVISION

Chain of Custody

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

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

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

FIGURE 5

Field location of boring: (See Plate 2)	Project No.: 7263	Date: 11/13/89	Boring No: C-1
	Client: Chevron Service Station #0338		
	Location: 5500 Telegraph Avenue		
	City: Oakland, California		Sheet 1 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation: 123.88		Datum: MSL

Water Level	24.5	10.75
Time	11:15	09:08
Date	11-13-89	11-21-89

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				CLAY with SAND (CL) - very dark brown (10YR 2/2), damp, medium stiff; 15% coarse sand; mottled light brown; brick and wood fragments to 3.0 feet; low plasticity; open voids; no chemical odor.
0	100	S&H		4				
	150	push	C-1					
	200		5.0	5				
				6				
				7				SILT with SAND (ML) - dark yellow brown (10YR 4/6); 15% very fine sand.
				8				
				9				
0	100	S&H						
	250	push	C-1	10				
	250		10.5					CLAYEY GRAVEL (GC) - gray (7.5YR 6/0), dense, moist; 75% angular gravel; sand stringers; pockets of silt - 2 mm; no chemical odor.
				11				
				12				
				13				
				14				
0	9	S&H						COLOR CHANGE to dark yellow brown (10YR 4/6); no chemical odor.
	12		C-1	15				
	14		15.5					
				16				
				17				
				18				less gravel at 18.0 feet; no chemical odor.
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CEG 1262	11/89		

Field location of boring:

(See Plate 2)

Project No.:	7263	Date: 11/13/89	Boring No: C-1
Client:	Chevron Service Station #0338		
Location:	5500 Telegraph Avenue		
City:	Oakland, California		Sheet 2 of 2
Logged by:	R.S.Y.	Driller: Bayland	

Drilling method: Hollow-Stem Auger

Hole diameter: 8-Inch

Casing installation data:

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
0	7	S&H						
	9		C-1	20				
	14		20.5					SILTY SAND (SM) - dark yellow brown (10YR 4/6), medium dense, very moist; 80% very fine sand; 20% silt; no chemical odor.
				21				
				22				
				23				
				24				
0	4	S&H				▽		COLOR CHANGE to light gray (7.5YR 6/0), saturated; organic fragments; no chemical odor.
	7		C-1	25				
	10		25.5					
				26				
				27				
				28				
				29				SANDY CLAY (CL) - dark yellow brown (10YR 4/4), very stiff, moist; 10% well rounded gravels; 30% fine sand; no chemical odor.
0	4	S&H						
	11		C-1	30				
	20		30.5					
				31				
	10	S&H		32				same as above; no chemical odor.
	19							
	23			33				Bottom of sample at 33.0 feet.
								Bottom of boring at 33.0 feet.
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

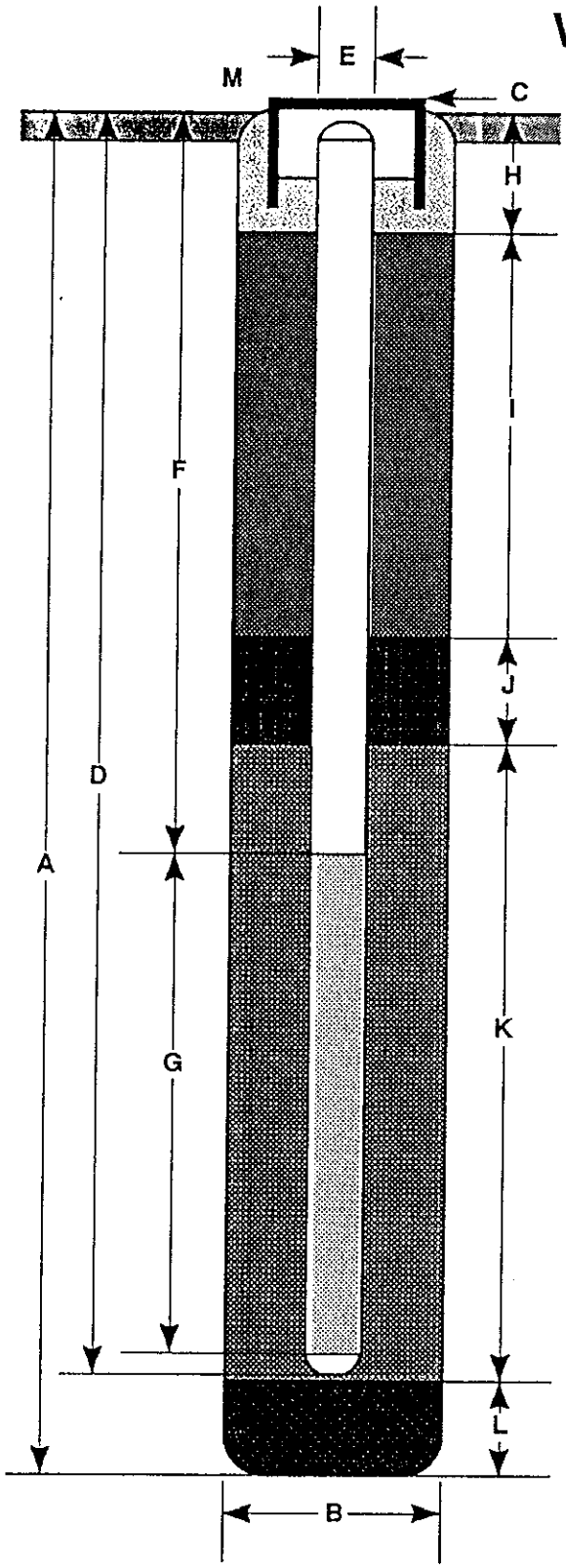
GSI GeoStrategies Inc.

Log of Boring

BORING NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CMP CEG 1262	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 33 ft.

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

C Top of Box Elevation 123.88 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 30 ft.
Material PVC Schedule 40

E Casing Diameter 2 in.

F Depth to Top Perforations 18 ft.

G Perforated Length 12 ft.
Perforated Interval from 18 to 30 ft.
Perforation Type Machine Slot
Perforation Size 0.020 in.

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

I Backfill from 1.5 to 14 ft.
Backfill Material Cement Grout

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

K Gravel Pack from 16 to 30 ft.
Pack Material Lonestar #2/12 Sand

L Bottom Seal 3 ft.
Seal Material Native Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263		11/89		

Field location of boring:	Project No.: 7263	Date: 11/13/89	Boring No:
(See Plate 2)	Client: Chevron Service Station #0338		C-2
	Location: 5500 Telegraph Avenue		
	City: Oakland, California		Sheet 1
	Logged by: R.S.Y.	Driller: Bayland	of 2
	Casing installation data:		
Drilling method: Hollow-Stem Auger			
Hole diameter: 8-Inch	Top of Box Elevation: 124.92	Datum: MSL	

Water Level	23.0	10.75		
Time	14:10	10:35		
Date	11-13-89	11-21-89		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 0.5 feet
				1				
				2				
				3				
				4				SILT (ML) - very dark grayish brown (10 YR 3/0), medium
0	100	S&H						stiff, dry; trace very fine sand; rootlets; open voids; no
	150	push	C-2	5				chemical odor.
	250		5.5					
				6				
				7				
				8				
				9				
0	500	S&H						
	20		C-2	10				GRAVELLY CLAY (CL) - dark yellow brown (10YR 4/6),
	24		10.5					hard, moist; 35% angular gravel; 10% fine sand; no
				11				chemical odor.
				12				
				13				
				14				
0	9	S&H						
	18		C-2	15				same as above; no chemical odor.
	20		15.5					
				16				
				17				
				18				
				19				

Remarks:

GSI GeoStrategies Inc.

Log of Boring

BORING NO.

C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CMP CEG 1262	11/89		

Field location of boring: (See Plate 2)	Project No.: 7263	Date: 11/13/89	Boring No.: C-2
	Client: Chevron Service Station #0338		
	Location: 5500 Telegraph Avenue		
	City: Oakland, California		Sheet 2 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	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
0	4	S&H		20				CLAYEY GRAVEL (GC) - dark yellow brown (10YR 4/4), medium dense, moist; 70% angular to subround gravel; 30% clay; pockets of calcareous nodules; no chemical odor.
	7		C-2					
	18		20.5					
				21				
				22				
				23				
				24		▽		
0	3	S&H		25				SILTY SAND (SM) - dark yellow brown (10YR 4/6), medium dense, saturated; 75-80% very fine sand; gray staining around organic fragments; no chemical odor.
	3		C-2					
	10		25.5					
				26				
				27				
				28				
				29				GRAVELLY CLAY with SAND (CL) - dark yellow brown (10YR 4/6), very stiff, moist; 20% angular to subround gravel; 15% medium sand; no chemical odor.
0	7	S&H		30				
	10		C-2					
	14		30.5					
				31				
	7	S&H		32				Bottom of sample at 32.5 feet. Bottom of boring at 32.5 feet.
	10							
	15							
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

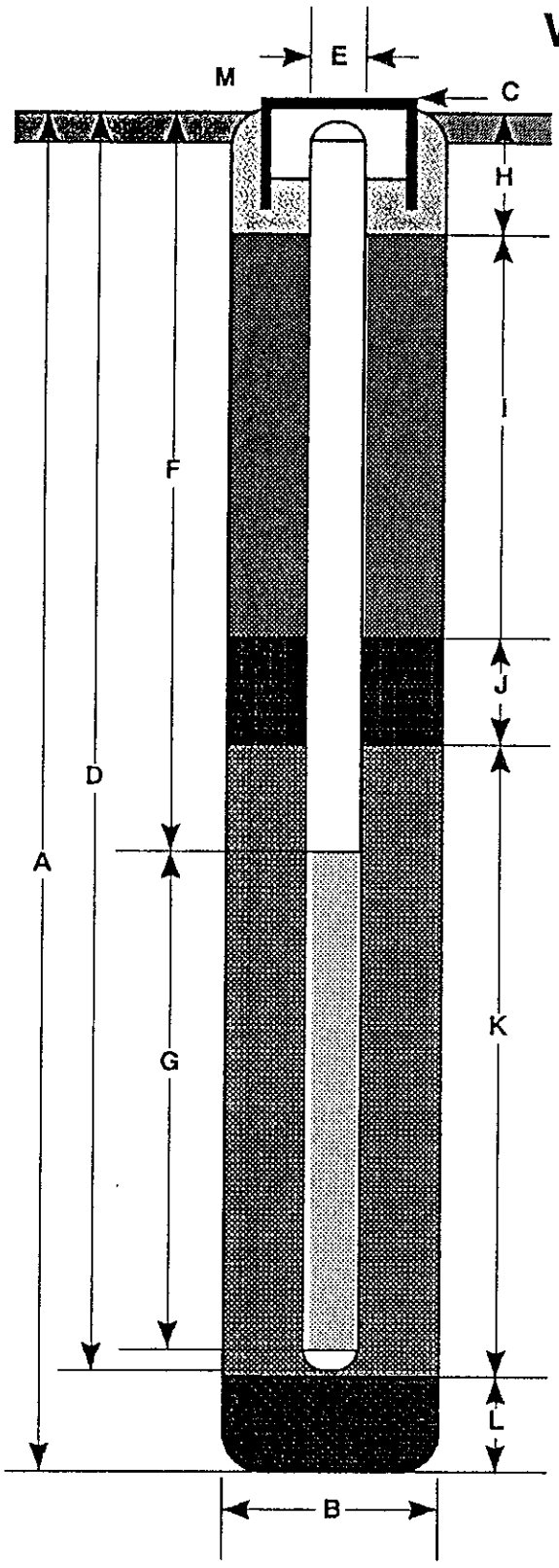
GeoStrategies Inc.

Log of Boring

BORING NO. C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CWP CEG 1262	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 32.5 ft.

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

C Top of Box Elevation: 124.92 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 28.5 ft.
Material: PVC Schedule 40

E Casing Diameter: 2 in.

F Depth to Top Perforations: 10 ft.

G Perforated Length: 18.5 ft.
Perforated Interval from 10 to 28.5 ft.
Perforation Type: Machine Slot
Perforation Size: 0.020 in.

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

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

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

K Gravel Pack from 8 to 28.5 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: 4 ft.
Seal Material: Native Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO.

C-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263		11/89		

Field location of boring:

(See Plate 2)

Project No.:	7263	Date: 11/13/89	Boring No: C-3
Client:	Chevron Service Station #0338		
Location:	5500 Telegraph Avenue		
City:	Oakland, California		Sheet 1 of 2
Logged by:	R.S.Y.	Driller: Bayland	

Drilling method: Hollow-Stem Auger

Hole diameter: 8-Inch

Casing installation data:

Top of Box Elevation: 125.64 Datum: MSL

Water Level	23.5	11.28		
Time	16:00	09:57		
Date	11-13-89	11-21-89		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.5 feet
				1				
				2				
				3				
				4				SILT (ML) - dark brown (10YR 3/3), stiff, damp; trace fine sand; rootlets; no chemical odor.
0	100	S&H						
	100	push	C-3	5				
	150		5.5					
				6				
				7				
				8				
				9				GRAVELLY CLAY (CL) - dark yellow brown (10YR 4/6), very stiff, moist; 20-30% fine angular gravel; oxidation stains; no chemical odor.
0	6	S&H						
	12		C-3	10				
	18		10.5					
				11				
				12				
				13				
				14				
0	4	S&H						CLAYEY GRAVEL (GC) - dark yellow brown (10YR 3/4), medium dense, saturated; 75% angular to subround gravel; 25% clay; oxidation stains; no chemical odor.
	6		C-3	15				
	10		15.5					
				16				
				17				
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	RG CEG 12/92	11/89		

Field location of boring:	Project No.: 7263	Date: 11/13/89	Boring No:
(See Plate 2)	Client: Chevron Service Station #0338		C-3
	Location: 5500 Telegraph Avenue		
	City: Oakland, California		Sheet 2
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	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
0	3	S&H		20				
	6		C-3					CLAYEY SAND (SC) - dark yellow brown (10YR 4/6),
	13		20.5	21				medium dense, very moist; 70% very fine to fine sand;
								30% clay; gray staining around black organic fragments;
				22				trace rounded gravel; no chemical odor.
				23				
				24		▽		
0	7	S&H						
	9		C-3	25				GRAVELLY SAND (SP) - dark yellow brown (10YR 3/4),
	9		25.5					medium dense, saturated; 70% medium to coarse sand;
				26				25-30% well rounded gravel; 5% fines; no chemical odor.
				27				
				28				stiffer at 27.5 feet
				29				
0	7	S&H						SANDY CLAY with GRAVEL (CL) - dark yellow brown
	13		C-3	30				(10YR 4/6), very stiff, moist; 35-40% medium to coarse
	17		30.5					sand; 15% gravel; no chemical odor.
				31				
	7	S&H						
	10			32				
	15							
				33				Bottom of sample at 32.5 feet.
								Bottom of boring at 32.5 feet.
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

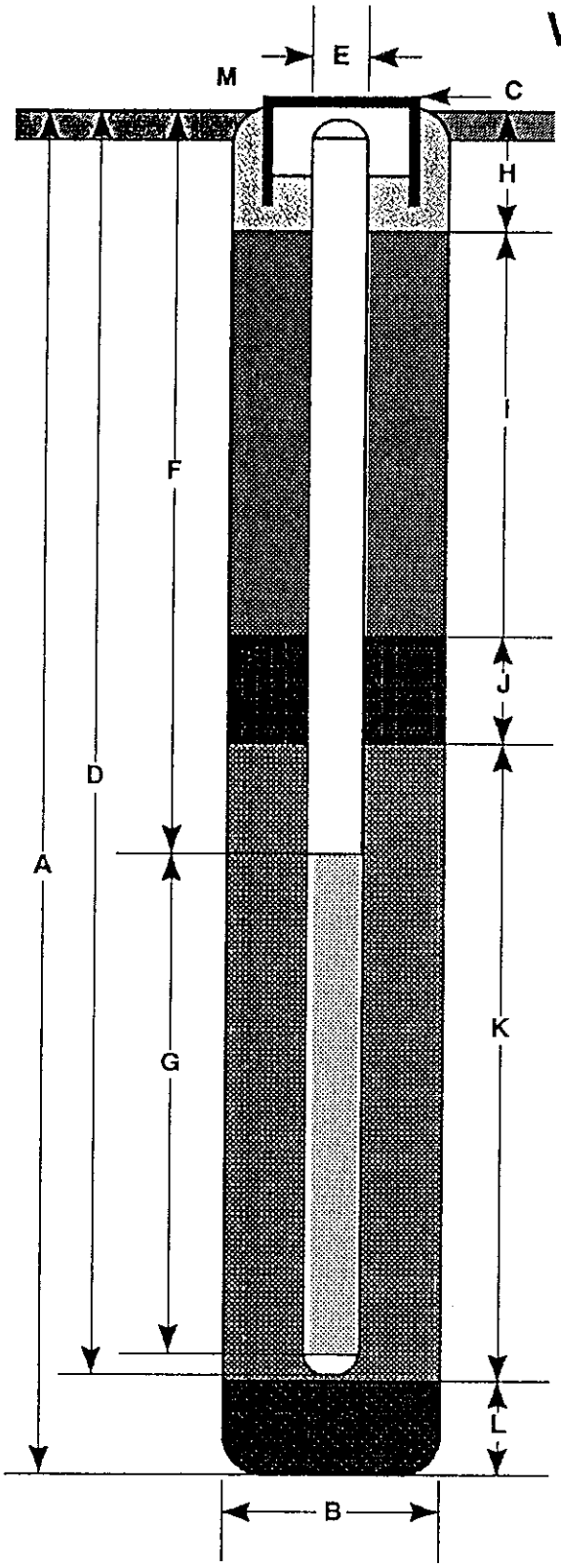
GeoStrategies Inc.

Log of Boring

BORING NO. C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263	CMP CEG 12/92	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 32.5 ft.

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

C Top of Box Elevation 125.64 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 28.5 ft.
Material PVC Schedule 40

E Casing Diameter 2 in.

F Depth to Top Perforations 10 ft.

G Perforated Length 18.5 ft.
Perforated Interval from 10 to 28.5 ft.
Perforation Type Machine Slot
Perforation Size 0.020 in.

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

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

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

K Gravel Pack from 8 to 28.5 ft.
Pack Material Lonestar #2/12 Sand

L Bottom Seal 4 ft.
Seal Material Native Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO.
C-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7263		11/89		

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10291
CLIENT: Chevron USA
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/28/89

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10291- 1	C-1-10.5	11/13/89	11/25/89
10291- 2	C-1-15.5	11/13/89	11/25/89
10291- 3	C-1-25.5	11/13/89	11/25/89
10291- 4	C-2-10.5	11/13/89	11/25/89
10291- 5	C-2-15.5	11/13/89	11/25/89
10291- 6	C-2-25.5	11/13/89	11/25/89
10291- 7	C-3-10.5	11/13/89	11/25/89
10291- 8	C-3-15.5	11/13/89	11/25/89
10291- 9	C-3-25.5	11/13/89	11/25/89
10291-10	C-1-5.5	11/13/89	11/25/89

Laboratory Number:	10291 1	10291 2	10291 3	10291 4	10291 5
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
TOLUENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
XYLENES:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05

Laboratory Number:	10291 6	10291 7	10291 8	10291 9	10291 10
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	ND<20	ND<20	ND<20	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	ND<1	NA
TPH/DIESEL RANGE:	NA	ND<10	ND<10	ND<10	NA
BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	NA
TOLUENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	NA
ETHYL BENZENE:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	NA
XYLENES:	ND<0.05	ND<0.05	ND<0.05	ND<0.05	NA

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • 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

LABORATORY NO.: 10291
CLIENT: Gettler Ryan Inc.
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/28/89

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10291-11	C-1-20.5	11/13/89	
10291-12	C-1-30.5	11/13/89	
10291-13	C-2-5.5	11/13/89	
10291-14	C-2-20.5	11/13/89	
10291-15	C-2-30.5	11/13/89	
10291-16	C-3-5.5	11/13/89	
10291-17	C-3-20.5	11/13/89	
10291-18	C-3-30.5	11/13/89	

Laboratory Number:	10291 11	10291 12	10291 13	10291 14	10291 15
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	NA	NA	NA	NA	NA
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	NA	NA	NA	NA	NA
TOLUENE:	NA	NA	NA	NA	NA
ETHYL BENZENE:	NA	NA	NA	NA	NA
XYLENES:	NA	NA	NA	NA	NA

Laboratory Number:	10291 16	10291 17	10291 18
ANALYTE LIST	Amounts/Quantitation Limits (mg/kg)		
OIL AND GREASE:	NA	NA	NA
TPH/GASOLINE RANGE:	NA	NA	NA
TPH/DIESEL RANGE:	NA	NA	NA
BENZENE:	NA	NA	NA
TOLUENE:	NA	NA	NA
ETHYL BENZENE:	NA	NA	NA
XYLENES:	NA	NA	NA

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • 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: 10291

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 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 = <15%
MS/MSD Average Recovery = 97%: Duplicate RPD = 4%

8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg
Daily Standard run at 2mg/L; RPD Gasoline = <15%
MS/MSD Average Recovery = 93%: Duplicate RPD = <1%

8020/BTXE
Minimum Quantitation Limit in Soil: 0.05mg/kg
Daily Standard run at 20ug/L; RPD = <15%
MS/MSD Average Recovery = 94%: Duplicate RPD = <1%

Richard Srna, Ph.D.
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
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CERTIFICATE OF ANALYSIS

LABORATORY NO. 10291-7
CLIENT: Chevron USA

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/28/89
JOB NO. 7263

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

SAMPLE: C-3-10.5

Compound	mg/kg	Compound	mg/kg
Chloromethane	ND<.05	Cis-1,3-Dichloropropene	ND<.03
Bromomethane	ND<.05	Trichloroethene	ND<.03
Vinyl Chloride	ND<.05	Dibromochloromethane	ND<.03
Chloroethane	ND<.05	1,1,2-Trichloroethane	ND<.03
Methylene Chloride	ND<.05	Benzene	ND<.03
Acetone	ND<.05	Trans-1,3-Dichloropropene	ND<.03
Carbon disulfide	ND<.03	2-Chloroethyl vinyl ether	ND<.03
Trichlorofluoromethane	ND<.03	Bromoform	ND<.03
1,1-Dichloroethene	ND<.03	4-Methyl-2-Pentanone	ND<.05
1,1-Dichloroethane	ND<.03	2-Hexanone	ND<.05
1,2-Dichloroethene (total)	ND<.03	Tetrachloroethene	ND<.03
Chloroform	ND<.03	1,1,2,2-Tetrachloroethane	ND<.03
1,2-Dichloroethane	ND<.03	Toluene	ND<.03
2-Butanone	ND<.1	Chlorobenzene	ND<.03
1,1,1-Trichloroethane	ND<.03	Ethylbenzene	ND<.03
Carbon Tetrachloride	ND<.03	Styrene	ND<.03
Vinyl Acetate	ND<.05	Total Xylenes	ND<.03
Bromodichloromethane	ND<.03	1,3-Dichlorobenzene	ND<.03
1,2-Dichloropropane	ND<.03	1,2&1,4-Dichlorobenzenes	ND<.03

mg/kg = part per million (ppm)
QC DATA:

Surrogate Recoveries		QC Limits water	QC Limits soil
1,2-DCA-d4.....	108%	76-114	81-117
Toluene-d8.....	103%	88-110	81-140
Bromofluorobenzene.....	100%	86-115	74-121

comments:

Richard Srna, Ph.D.
Laboratory Director

OUTSTANDING QUALITY AND SERVICE

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. · SAN FRANCISCO, CA 94124 · PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO. 10291-8
CLIENT: Chevron USA

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/28/89
JOB NO. 7263

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

SAMPLE: C-3-15.5

Compound	mg/kg	Compound	mg/kg
Chloromethane	ND<.05	Cis-1,3-Dichloropropene	ND<.03
Bromomethane	ND<.05	Trichloroethene	ND<.03
Vinyl Chloride	ND<.05	Dibromochloromethane	ND<.03
Chloroethane	ND<.05	1,1,2-Trichloroethane	ND<.03
Methylene Chloride	ND<.05	Benzene	ND<.03
Acetone	ND<.05	Trans-1,3-Dichloropropene	ND<.03
Carbon disulfide	ND<.03	2-Chloroethyl vinyl ether	ND<.03
Trichlorofluoromethane	ND<.03	Bromoform	ND<.03
1,1-Dichloroethene	ND<.03	4-Methyl-2-Pentanone	ND<.05
1,1-Dichloroethane	ND<.03	2-Hexanone	ND<.05
1,2-Dichloroethene (total)	ND<.03	Tetrachloroethene	ND<.03
Chloroform	ND<.03	1,1,2,2-Tetrachloroethane	ND<.03
1,2-Dichloroethane	ND<.03	Toluene	ND<.03
2-Butanone	ND<.1	Chlorobenzene	ND<.03
1,1,1-Trichloroethane	ND<.03	Ethylbenzene	ND<.03
Carbon Tetrachloride	ND<.03	Styrene	ND<.03
Vinyl Acetate	ND<.05	Total Xylenes	ND<.03
Bromodichloromethane	ND<.03	1,3-Dichlorobenzene	ND<.03
1,2-Dichloropropane	ND<.03	1,2&1,4-Dichlorobenzenes	ND<.03

mg/kg = part per million (ppm)
QC DATA:

Surrogate Recoveries		QC Limits water	QC Limits soil
1,2-DCA-d4.....	110%	76-114	81-117
Toluene-d8.....	99%	88-110	81-140
Bromofluorobenzene.....	98%	86-115	74-121

comments:

Richard Srna, Ph.D.
Laboratory Director

OUTSTANDING QUALITY AND SERVICE

SUPERIOR ANALYTICAL LABORATORY, INC.
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CERTIFICATE OF ANALYSIS

LABORATORY NO. 10291-9
CLIENT: Chevron USA

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/28/89
JOB NO. 7263

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

SAMPLE: C-3-25.5

Compound	mg/kg	Compound	mg/kg
Chloromethane	ND<.05	Cis-1,3-Dichloropropene	ND<.03
Bromomethane	ND<.05	Trichloroethene	ND<.03
Vinyl Chloride	ND<.05	Dibromochloromethane	ND<.03
Chloroethane	ND<.05	1,1,2-Trichloroethane	ND<.03
Methylene Chloride	ND<.05	Benzene	ND<.03
Acetone	ND<.05	Trans-1,3-Dichloropropene	ND<.03
Carbon disulfide	ND<.03	2-Chloroethyl vinyl ether	ND<.03
Trichlorofluoromethane	ND<.03	Bromoform	ND<.03
1,1-Dichloroethene	ND<.03	4-Methyl-2-Pentanone	ND<.05
1,1-Dichloroethane	ND<.03	2-Hexanone	ND<.05
1,2-Dichloroethene (total)	ND<.03	Tetrachloroethene	ND<.03
Chloroform	ND<.03	1,1,2,2-Tetrachloroethane	ND<.03
1,2-Dichloroethane	ND<.03	Toluene	ND<.03
2-Butanone	ND<.1	Chlorobenzene	ND<.03
1,1,1-Trichloroethane	ND<.03	Ethylbenzene	ND<.03
Carbon Tetrachloride	ND<.03	Styrene	ND<.03
Vinyl Acetate	ND<.05	Total Xylenes	ND<.03
Bromodichloromethane	ND<.03	1,3-Dichlorobenzene	ND<.03
1,2-Dichloropropane	ND<.03	1,2&1,4-Dichlorobenzenes	ND<.03

mg/kg = part per million (ppm)
QC DATA:

Surrogate Recoveries		QC Limits water	QC Limits soil
1,2-DCA-d4.....	106%	76-114	81-117
Toluene-d8.....	99%	88-110	81-140
Bromofluorobenzene.....	101%	86-115	74-121

comments:

Richard Srna, Ph.D.
Laboratory Director

OUTSTANDING QUALITY AND SERVICE

10291

Chain-of-Custody Record

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

Chevron Facility Number 0338
Consultant Release Number
Consultant Project Number 7263
Consultant Name Geo Strategies Inc.
Address 2140 W Winton Ave Hayward
Fax Number 783-1089
Project Contact (Name) Jerry Mitchell
(Phone) 415-352-4800

Chevron Contact (Name) Mike Brown
(Phone)
Laboratory Name Superior Analytical Lab
Contract Number 2646690
Samples Collected by (Name) Randall Young
Collection Date 11/13/89
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	HOLD			Remarks
C-1-5.5		1	S	G	10:35	—	X								X			
C-1-20.5		1	S	G	11:10	—	X								X			
C-1-30.5		1	S	G	11:30	—	X								X			
C-2-5.5		1	S	G	13:20	—	X								X			
C-2-20.5		1	S	G	14:00	—	X								X			
C-2-30.5		1	S	G	14:15	—	X								X			
C-3-5.5		1	S	G	15:30	—	X								X			
C-3-20.5		1	S	G	16:00	—	X								X			
C-3-30.5		1	S	G	16:15	—	X								X			
															X			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Randall Young	GSI	11:30 11/17/89	D. Pu	EXPRESS-IT	11-17 16:10	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	5 Days
		11-18 940			11/18 9 40	10 Days

Chain-of-Custody Record

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

Chevron Facility Number 0338
Consultant Release Number
Consultant Project Number 7263
Consultant Name Geo Strategies Inc.
Address 2140 W. Winton Ave. Hayward
Fax Number 783-1089
Project Contact (Name) Jerry Mitchell
(Phone) 415-352-4800

Chevron Contact (Name) Mike Brown
(Phone)
Laboratory Name Superior Analytical Lab
Contract Number 2646690
Samples Collected by (Name) RANDALL YOUNG
Collection Date 11/13/89
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	Cd, Cr, Pb, Zn ICAP or AA			Remarks
C-1-10.5		1	S	G	10:50		X	X			X							
C-1-15.5		1	S	G	11:00		X	X			X							
C-1-25.5		1	S	G	11:15		X	X			X							
C-2-10.5		1	S	G	13:45		X	X			X							
C-2-15.5		1	S	G	13:55		X	X			X							
C-2-25.5		1	S	G	14:10		X	X			X							
C-3-10.5		1	S	G	15:45		X	X	X	X	X	X			X			
C-3-15.5		1	S	G	15:50		X	X	X	X	X	X			X			
C-3-25.5		1	S	G	16:10		X	X	X	X	X	X			X			

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Randall Young	GSI	11/13/89 11:30	D. [illegible]	EXPRESS-IT	11-17 16:10
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
		11-18 9:45			11/18 9:40

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

Printed in U.S.A.

MS-5136 (6 89)

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD. STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

RECEIVED

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80269
CLIENT: Gettler Ryan Co.
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/29/89
DATE ANALYZED; 11/28/89

ANALYSIS FOR TOTAL ZINC
by SW-846 Method 7950

LAB #	Sample Identification	Concentration (mg/kg) Total Zinc
1	C-3-10.5	39
2	C-3-15.5	60
3	C-3-25.5	74

mg/kg - parts per million (ppm)

Method Detection Limit for Zinc in Soil: 0.2 mg/kg
Method Detection Limit for Zinc in Water: 0.01 mg/L

QAQC Summary: MS/MSD Average Recovery : 77%
Duplicate RPD : 9%

Edward R. Morales
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80269
CLIENT: Gettler Ryan Co.
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/29/89
DATE ANALYZED: 11/28/89

ANALYSIS FOR TOTAL CADMIUM
by SW-846 Method 7130

LAB #	Sample Identification	Concentration (mg/kg) Total Cadmium
1	C-3-10.5	1.0
2	C-3-15.5	0.6
3	C-3-25.5	1.4

mg/kg - parts per million (ppm)

Method Detection Limit for Cadmium in Soil: 0.2 mg/kg
Method Detection Limit for Cadmium in Water: 0.01 mg/L

QAQC Summary: MS/MSD Average Recovery : 93%
Duplicate RPD : 6%

Edward R. Morales
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD, STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

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

LABORATORY NO.: 80269
CLIENT: Gettler Ryan Co.
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/29/89
DATE ANALYZED: 11/28/89

ANALYSIS FOR TOTAL CHROMIUM
by SW-846 Method 7190

LAB #	Sample Identification	Concentration (mg/kg) Total Chromium
1	C-3-10.5	16
2	C-3-15.5	12
3	C-3-25.5	27

mg/kg - parts per million (ppm)

Method Detection Limit for Chromium in Soil: 2 mg/kg
Method Detection Limit for Chromium in Water: 0.1 mg/L

QAQC Summary: MS/MSD Average Recovery : 76%
Duplicate RPD : 18%

Edward R. Morales
Laboratory Manager

SUPERIOR ANALYTICAL LABORATORY INC.
825 ARNOLD. STE. 2 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512

RECEIVED

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 80269
CLIENT: Gettler Ryan Co.
CLIENT JOB NO.: 7263

DATE RECEIVED: 11/20/89
DATE REPORTED: 11/29/89
DATE ANALYZED: 11/27/89

ANALYSIS FOR TOTAL LEAD
by SW-846 Method 7420

LAB #	Sample Identification	Concentration (mg/kg) Total Lead
1	C-3-10.5	ND<10
2	C-3-15.5	ND<10
3	C-3-25.5	10

mg/kg - parts per million (ppm)

Method Detection Limit for Lead in Soil: 10 mg/kg
Method Detection Limit for Lead in Water: 0.5 mg/L

QAQC Summary: MS/MSD Average Recovery : 94%
Duplicate RPD : 15%

Edward R. Morales
Laboratory Manager