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
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Area Manager, Operations
C. G. Trimbach
Manager, Engineering

November 19, 1990

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

Re: Former Chevron Station #9-2960
2416 Grove Way/Redwood Road
Castro Valley, CA

Dear Mr. Shahid:

Enclosed we are forwarding the Well Installation Report dated November 15, 1990, conducted by our consultant GeoStrategies, Inc. for the above referenced site. As indicated in the report, three (3) borings were advanced and completed into groundwater monitoring wells. Analytic results of all soil and groundwater samples showed no detectable hydrocarbons.

Groundwater samples were also collected from the existing wells at this time. Analytic results of the groundwater remain consistent with previous sampling results. Phase-separated hydrocarbons were observed in Monitoring Well C-1 at a measured thicknexx of .71 feet. Purging of Well C-1 will continue until a dedicated recovery system can be designed and installed.

Please note that an additional monitoring well proposed in GeoStrategies, Inc. Work Plan dated April 4, 1990, could not be installed due to overhead utilities. A moratorium has been placed on encroachment permits by the AWPA due to current road construction. At completion of this construction we will evaluate locations for a cross-gradient well to define the extent of the hydrocarbons in the surmised cross-gradient direction.

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

Very truly yours,
C. G. Trimbach

By Nancy Vukelich
Nancy Vukelich

NLV/jmr
Enclosure

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

Jerri Garber
First Presbyterian Church
2490 Grove Way
Castro Valley, CA 95646

Mr. W.T. Scudder
Chevron Property Management Specialist

GeoStrategies Inc.

WELL INSTALLATION REPORT

Chevron Service Station No. 2960
2416 Grove Way
Castro Valley, California

Report No. 7170-7

November 15, 1990

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

November 15, 1990

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

Re: WELL INSTALLATION REPORT
Chevron Service Station No. 2960
2416 Grove Way
Castro Valley, 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 (C-5 through C-7) were drilled on August 27, 1990 and completed as ground-water monitoring wells. Monitoring well locations are shown on Plate 2.

SITE BACKGROUND

In October 1986, EMCON Associates (EMCON) installed four ground-water monitoring wells (C-1 through C-4) at the former Chevron Service Station. Ground-water samples were collected from each site monitoring well. The highest concentrations of dissolved hydrocarbons were reported from Well C-1, located in the vicinity of the former underground storage tank complex. EMCON issued a memorandum dated November 4, 1986, presenting the results of this investigation.

Gettler-Ryan Inc. (G-R) began monthly ground-water monitoring at the site in March 1987.

In October 1989, G-R began quarterly ground-water sampling at the site. During this initial sampling, Well C-1 was observed to contain 0.91 feet of separate-phase hydrocarbons. Historical chemical analytical results for the site are summarized in Table 1.

In January 1990, G-R began interim recovery of separate-phase hydrocarbons from Well C-1. This remediation is accomplished by a combination of bailing and pumping separate-phase hydrocarbons and groundwater from the well. Interim recovery has continued to be performed on a monthly basis.

FIELD PROCEDURES

Three exploratory soil borings (C-5 through C-7) were drilled using a truck mounted, hollow-stem auger drilling rig. These borings were subsequently completed as ground-water monitoring wells. Field work was performed according to GSI Field Methods and Procedures (Appendix A). Soil samples were collected at approximately five-foot depth intervals for borings drilled using the hollow-stem auger. These samples were collected 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.

A 4-inch long brass tube of soil from each sample interval was used to perform head-space analysis. The analysis was performed 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 was 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.

Monitoring Well Construction

Borings C-5, C-6, and C-7 were drilled with an 8-inch-diameter hollow-stem auger to total depths of 30.0, 34.0, and 34.0 feet, respectively. Monitoring wells C-5 through C-7 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 a minimum of two feet above the top of the well screen. A 2-foot bentonite seal was placed above the sand pack, followed by a concrete seal to ground surface. An underground vault with cover 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

The site is located in the Castro Valley basin, approximately one-quarter mile north of San Lorenzo Creek. The area is underlain by unconsolidated, undifferentiated Quaternary-age deposits of stream alluvium and slope wash up to 30 feet thick (Robinson, 1956).

Lithology beneath the site consists predominantly of sands and gravels to the total depth explored of 34.0 feet. The aquifer strata are interbedded sand and silt with minor beds of clayey gravel. **basal aquitard was not identified beneath the site.**

Groundwater was encountered at approximately 19.5 to 21.0 feet below grade in each boring. Depth to water measurements from the newly installed wells, taken by G-R on October 25, 1990, **indicated that ground-water levels stabilized at 17.92 to 20.91 feet below existing grade and indicate unconfined conditions.** The hydraulic gradient was calculated from G-R water-levels to be 0.006. Groundwater flows to the southwest beneath the site, based on the hydraulic gradient calculation. A summary of potentiometric data are presented in Table 3. Ground-water elevation data have been plotted and contoured and are presented on Plate 3 as a potentiometric map.

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 ground-water samples were performed by Superior in San Francisco.

Soil Analytical Results

Soil samples selected for analysis were collected from depths ranging from 9.5 to 20.5 feet below grade. As a result of sampler refusal, together with low OVM readings, a limited number of soil samples were analyzed. TPH-Gasoline and BTEX analyses were reported as none detected (ND) for each soil sample. A summary of the soil analytical data are presented in Table 2. Soil chemical analytical reports are presented in Appendix C.

Ground-water Analytical Results

Ground-water samples were collected from Wells C-5 through C-7 by G-R on October 3, 1990. These wells are scheduled to be sampled on a monthly basis for the first quarter as outlined in the Alameda County Health Care Services Agency (ACHCS) letter to Chevron dated May 31, 1990. TPH-Gasoline and BTEX were reported as ND for ground-water samples from Wells C-5 through C-7.

Ground-water samples were collected from Wells C-2 through C-7 by G-R on October 25, 1990. Separate-phase hydrocarbons were observed in Well C-1 at a measured thickness of 0.71 feet and therefore was not sampled. TPH-Gasoline was detected in samples from Wells C-2 and C-3 at concentrations of 1300 and 750 parts per billion (ppb), respectively. Benzene was detected in samples from Wells C-2, C-3, and C-4 at concentrations of 390, 510, and 2 ppb, respectively. Samples from Wells C-5 through C-7 were reported as ND for both TPH-Gasoline and benzene. Ground-water analytical results for TPH-Gasoline and BTEX for the October 3 and 25, 1990, samplings are summarized in Table 3. TPH-Gasoline and benzene concentrations for the October 25, 1990 sampling have been plotted and are presented on Plate 4. The Superior certified analytical reports are included with the G-R Ground-water Sampling Reports presented in Appendix D.

INTERIM RECOVERY

Recovery of separate-phase hydrocarbons from Well C-1 was conducted by G-R on October 3, 1990. Prior to pumping, the water-level in Well C-1 was measured at 19.24 feet below grade and hydrocarbons were recorded at a thickness of 1.22 feet. Approximately 100 gallons of groundwater and hydrocarbons were pumped from well C-1, two gallons of which were estimated to be separate-hydrocarbons. Pumping of Well C-1 was not performed in the month of September due to construction activities at the site. Interim recovery of separate-phase hydrocarbons will continue on a monthly basis until a dedicated recovery system can be designed and installed.

DISCUSSION

An additional monitoring well, recommended in the GSI Proposed Work Plan dated April 4, 1990, could not be installed at this time. The monitoring well was proposed to evaluate the extent of hydrocarbons in the surmised cross-gradient direction. The well location was proposed southeast of the site on Grove Way. The Alameda Public Works Agency (APWA) is currently conducting street improvements in the proposed well area and hence, has placed a moratorium on encroachment permits. Efforts to relocate the well across from the site on Grove Way were not successful due to overhead utilities. The location of a cross-gradient well will be re-evaluated after completion of the APWA improvements.

SUMMARY OF FINDINGS

The results of this investigation are summarized below.

- Three exploratory borings (C-5 through C-7) were drilled off-site on August 27, 1990. These borings were subsequently completed as ground-water monitoring wells.

- Based on the exploratory borings, the site lithology consists primarily of sands and gravels. An aquitard was not encountered for the total depth explored beneath the site.

- Soil samples collected from the borings were reported as ND for both TPH-Gasoline and BTEX analytes.

- Ground-water samples collected by G-R on October 3, 1990 from Wells C-5 through C-7 were reported as ND for TPH-Gasoline and BTEX.

- Ground-water samples were collected from Wells C-2 through C-7 by G-R on October 25, 1990. TPH-Gasoline was detected in Wells C-2 and C-3 at concentrations of 1300 and 750 ppb, respectively. Benzene was identified in Wells C-2, C-3, and C-4 at concentrations of 390, 510, and 2 ppb, respectively. Wells C-5 through C-7 were reported as ND for TPH-Gasoline and benzene. Well C-1 was observed to contain separate-phase hydrocarbons at a thickness of 0.71 feet.

- Pumping of separate-phase hydrocarbons from Well C-1 was performed by G-R on October 3, 1990. Approximately two gallons of hydrocarbons were recovered.

If you have any questions, please call.

GeoStrategies Inc. by,

Kevin D. McGraw for

Robert C. Mallory
Geologist

Christopher M. Palmer

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

REGISTERED GEOLOGIST
CHRISTOPHER M. PALMER
№ 1262
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

RCM/CMP/mlg

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

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

QC Review: DHP

References Cited

Robinson, G. D., 1956, Geology of the Hayward Quadrangle, U. S. Geologic Survey Map GQ 88.

TABLE 1

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	E.B. (PPB)	XYLENES (PPB)
23-Oct-86	C-1	37000.	6400.	3700.	----	4300.
23-Oct-86	C-2	30000.	2700.	1900.	----	1500.
16-Oct-89	C-2	600	260	34	1.7	41
04-Jan-90	C-2	2600	470	150	23	130
05-Apr-90	C-2	500	280	29	6.3	19
02-Jul-90	C-2	2400	670	110	17	76
25-Oct-90	C-2	1300	390	47	9	58
23-Oct-86	C-3	3300.	49.	24.	----	20.
16-Oct-89	C-3	900	640	4.2	1.6	16
04-Jan-90	C-3	920	430	7	6	7
05-Apr-90	C-3	930	690	3.4	5.1	4.8
02-Jul-90	C-3	1700	590	11	4.8	9.4
25-Oct-90	C-3	750	510	2	6	5
23-Oct-86	C-4	570.	3.	4.	----	5.
16-Oct-89	C-4	<500	12	1.0	<0.5	0.8
04-Jan-90	C-4	<500	5	<0.5	<0.5	0.9
05-Apr-90	C-4	<50	6.6	<0.5	<0.5	0.7
02-Jul-90	C-4	71	1.1	<0.5	<0.5	<0.5
25-Oct-90	C-4	<50	2	<0.5	<0.5	<0.5
03-Oct-90	C-5	<50	<0.5	<0.5	<0.5	<0.5
25-Oct-90	C-5	<50	<0.5	<0.5	<0.5	<0.5
03-Oct-90	C-6	<50	<0.5	<0.5	<0.5	<0.5
25-Oct-90	C-6	<50	<0.5	[illegible]	<0.5	<0.5
03-Oct-90	C-7	<50	<0.5	<0.5	<0.5	<0.5
25-Oct-90	C-7	<50	<0.5	[illegible]	<0.5	<0.5

ALL DATA SHOWN AS <X ARE REPORTED AS ND (NONE DETECTED)

ETHYLBENZENE AND XYLENES COMBINED PRIOR TO OCTOBER 1989

TABLE 2

SOIL ANALYSES DATA

SAMPLE I.D.	SAMPLE DATE	ANALYZED DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
C-5-9.5	27-Aug-90	05-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-6-15.0	27-Aug-90	05-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-6-20.5	27-Aug-90	05-Sep-90	<1	<0.05	<0.05	<0.05	<0.05
C-7-14.5	27-Aug-90	05-Sep-90	<1	<0.05	<0.05	<0.05	<0.05

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

Note: 1. All data shown as <x are reported as ND (None Detected).

TABLE 3

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
C-1	03-Oct-90	----	----	----	----	----	----	153.36	135.21	0.65	18.67
C-1	25-Oct-90	----	----	----	----	----	----	153.36	135.22	0.71	18.71
C-2	25-Oct-90	01-Nov-90	1300	390	47	9	58	151.84	135.24	----	16.60
C-3	03-Oct-90	----	----	----	----	----	----	154.13	134.97	----	19.16
C-3	25-Oct-90	30-Oct-90	750	510	2	6	5	154.13	134.85	----	19.28
C-4	25-Oct-90	30-Oct-90	<50	2	<0.5	<0.5	<0.5	156.00	135.57	----	20.43
C-5	03-Oct-90	09-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	153.38	135.60	----	17.78
C-5	25-Oct-90	30-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	153.38	135.46	----	17.92
C-6	03-Oct-90	09-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	152.84	134.70	----	18.14
C-6	25-Oct-90	30-Oct-90	<50	<0.5	1	<0.5	<0.5	152.84	134.55	----	18.29
C-7	03-Oct-90	09-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	155.34	134.52	----	20.82
C-7	25-Oct-90	30-Oct-90	<50	<0.5	1	<0.5	<0.5	155.34	134.43	----	20.91

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

CURRENT DHS ACTION LEVELS
Toluene 100 ppb

TPH-G = Total Petroleum Hydrocarbons as Gasoline
PPB = Parts Per Billion CF = Field Blank TB = Trip Blank

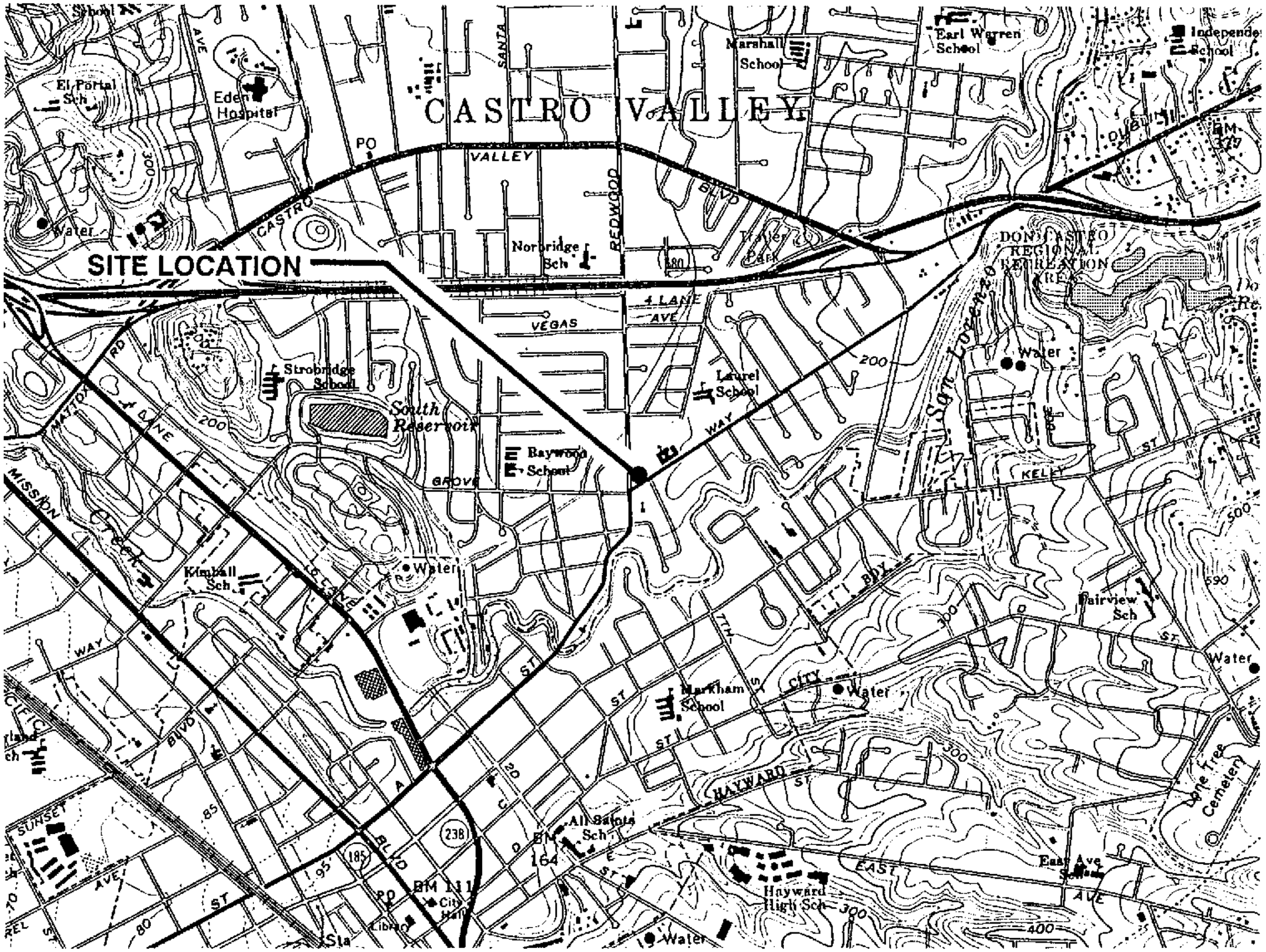
Note: 1. All data shown as <x are reported as ND (none detected).
2. Static Water elevations referenced to mean sea level (MSL). Elevations are corrected for free product using a correction factor of 0.8.
3. DHS Action Levels and MCLs are subject to change pending State review.
4. Wells C-2 and C-4 were not accessible on October 3, 1990.

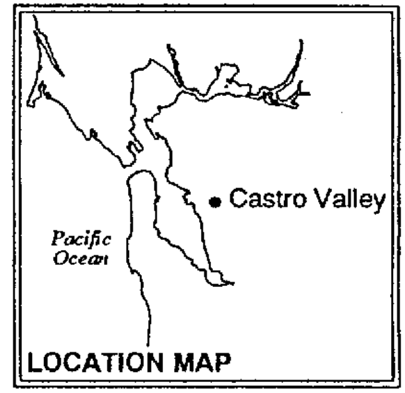
Report No. 7170-7

TABLE 3

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
CF-3	25-Oct-90	30-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	----	----	----	----
TB	03-Oct-90	09-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	----	----	----	----
TB	25-Oct-90	30-Oct-90	<50	<0.5	<0.5	<0.5	<0.5	----	----	----	----





N

0 2000

Scale in Feet

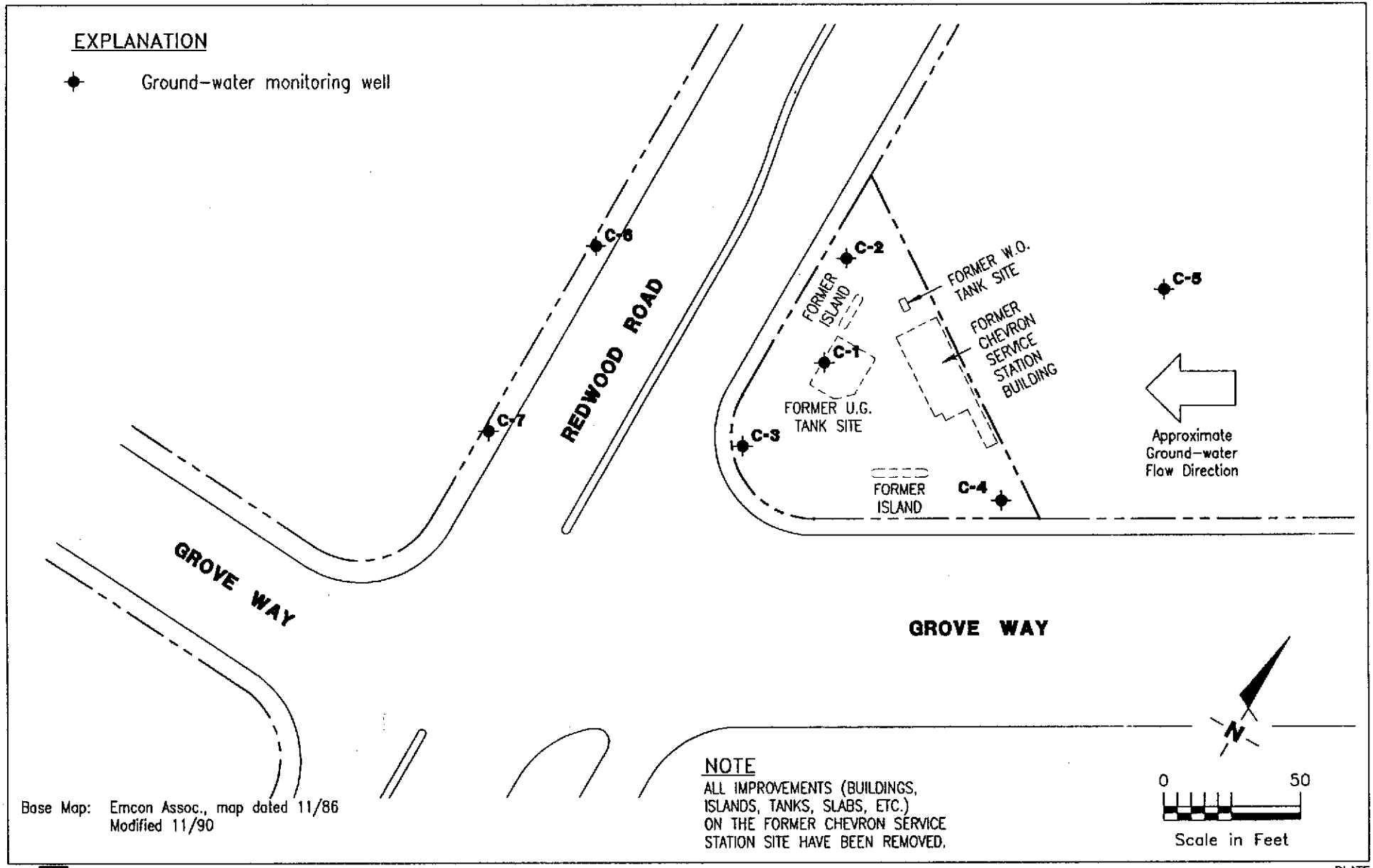
Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7170		10/90	

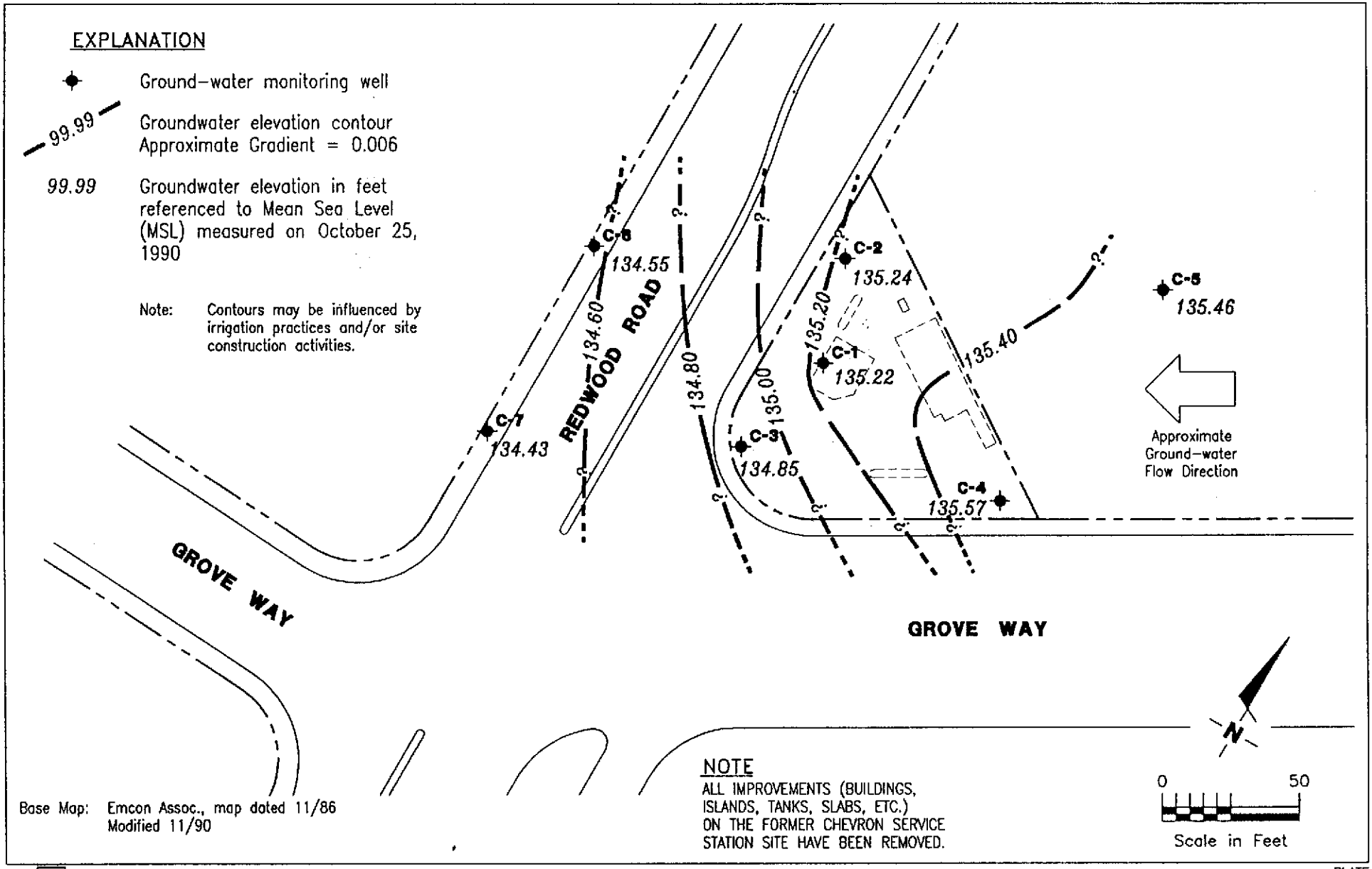


GeoStrategies Inc.

SITE PLAN
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7170	CEG 11/26	11/90	



GeoStrategies Inc.

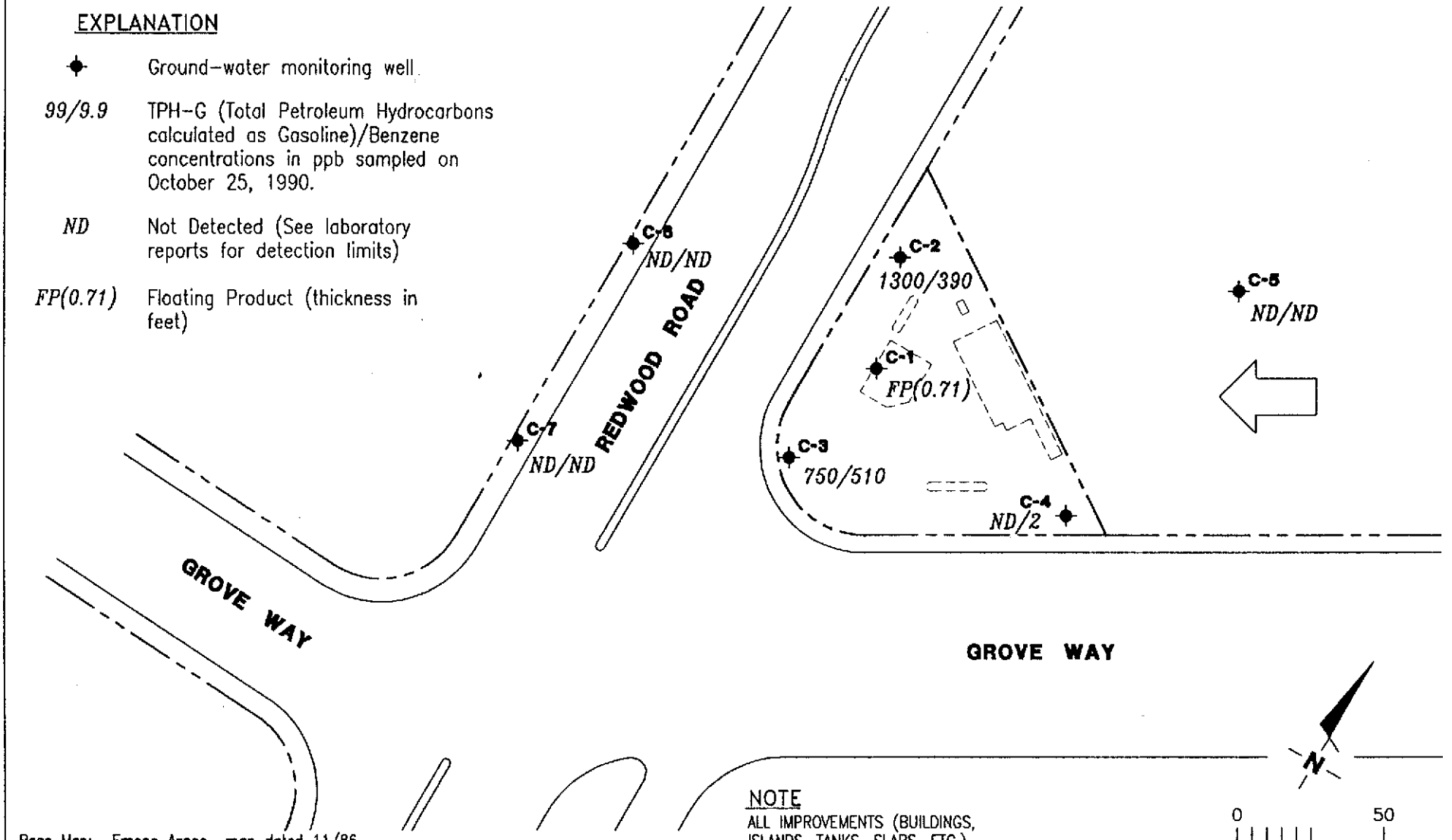
POTENTIOMETRIC MAP
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE 3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7170	CEG 12/92	11/90	

EXPLANATION

- ✦ Ground-water monitoring well.
- *99/9.9* TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline)/Benzene concentrations in ppb sampled on October 25, 1990.
- *ND* Not Detected (See laboratory reports for detection limits)
- *FP(0.71)* Floating Product (thickness in feet)



Base Map: Emcon Assoc., map dated 11/86
Modified 11/90

NOTE
ALL IMPROVEMENTS (BUILDINGS, ISLANDS, TANKS, SLABS, ETC.) ON THE FORMER CHEVRON SERVICE STATION SITE HAVE BEEN REMOVED.

GeoStrategies Inc.

TPH-G/BENZENE CONCENTRATION MAP
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE 4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7170	RG/CEG 12/6/90	11/90	

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.

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.

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

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

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

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

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

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

A. Up to 2 wells - Trip Blank Only

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

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

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

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

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

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SAMPLE COLLECTION

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

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

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

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

Decontamination Procedures

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

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

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

Water-Level Measurements

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

Water-Level Measurements (continued)

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

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

Well Purging

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

DOCUMENTATION

Sample Container Labels

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

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

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

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

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

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

Calculated and actual purge volumes

Chain-of-Custody

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

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

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

TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

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

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FIELD EXPLORATORY BORING LOG

FIGURE 1

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

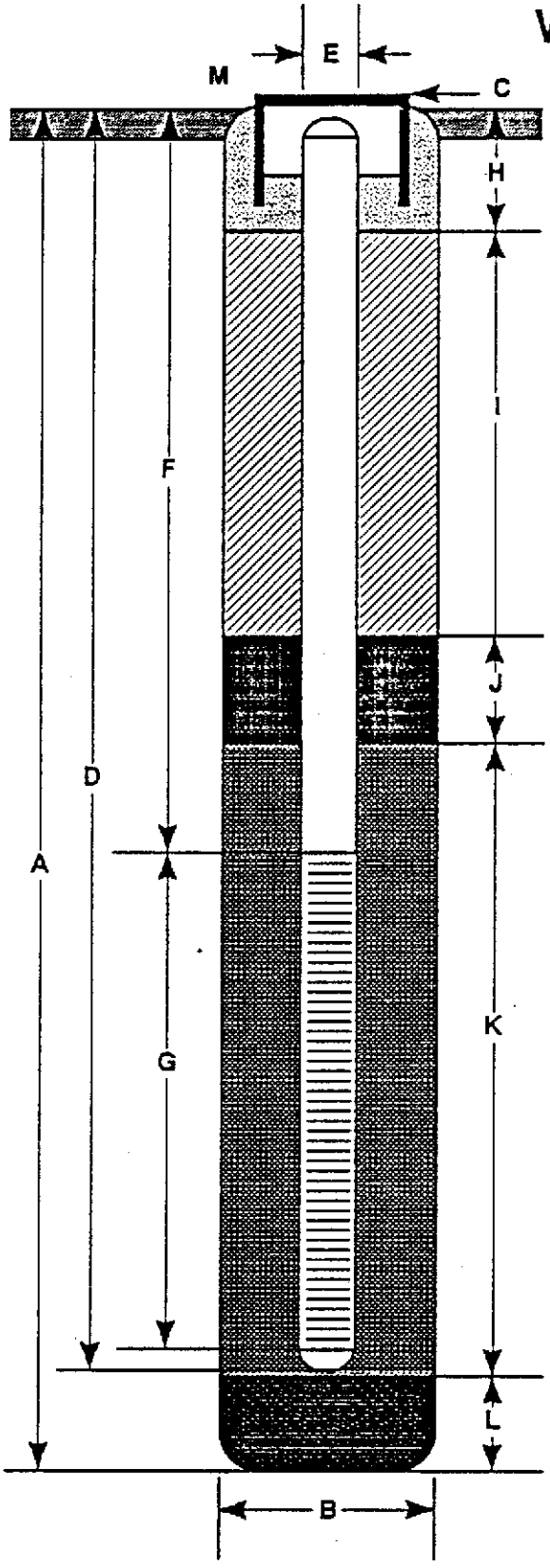
Water Level									
Time									
Date									

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

Remarks:

WELL CONSTRUCTION DETAIL

FIGURE 2



A Total Depth of Boring _____ ft.

B Diameter of Boring _____ in.
Drilling Method _____

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

D Casing Length _____ ft.
Material _____

E Casing Diameter _____ in.

F Depth to Top Perforations _____ ft.

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

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

I Backfill from _____ to _____ ft.
Backfill Material _____

J Seal from _____ to _____ ft.
Seal Material _____

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

L Bottom Seal _____ ft.
Seal Material _____

M _____

Note: Depths measured from initial ground surface

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Well Construction Detail

WELL NO.

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

WELL DEVELOPMENT FORM FIGURE 3

Page_____ of_____

==========

(to be filled out in office)

Client_____ SS#_____ Job#_____

Name_____ Location_____

Well#_____ Screened Interval_____ Depth_____

Aquifer Material_____ Installation Date _____

Drilling Method_____ Borehole Diameter_____

Comments regarding well installation:_____

_____

_____

==========

(to be filled out in the field) Name_____

Date_____ Development Method_____

Total Depth_____ - Depth to liquid_____ = WaterColumn_____

Product thickness_____

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

Purge Start_____ Stop_____ Rate_____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity
0					

Total gallons removed_____ Development stop time_____

Depth to liquid _____at_____(time)

Odor of water_____ Water discharged to_____

Comments_____

_____

_____

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WELL SAMPLING FIELD DATA SHEET

FIGURE 4

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

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

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

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

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

Time	pH	Conductivity	Temperature	Volume

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

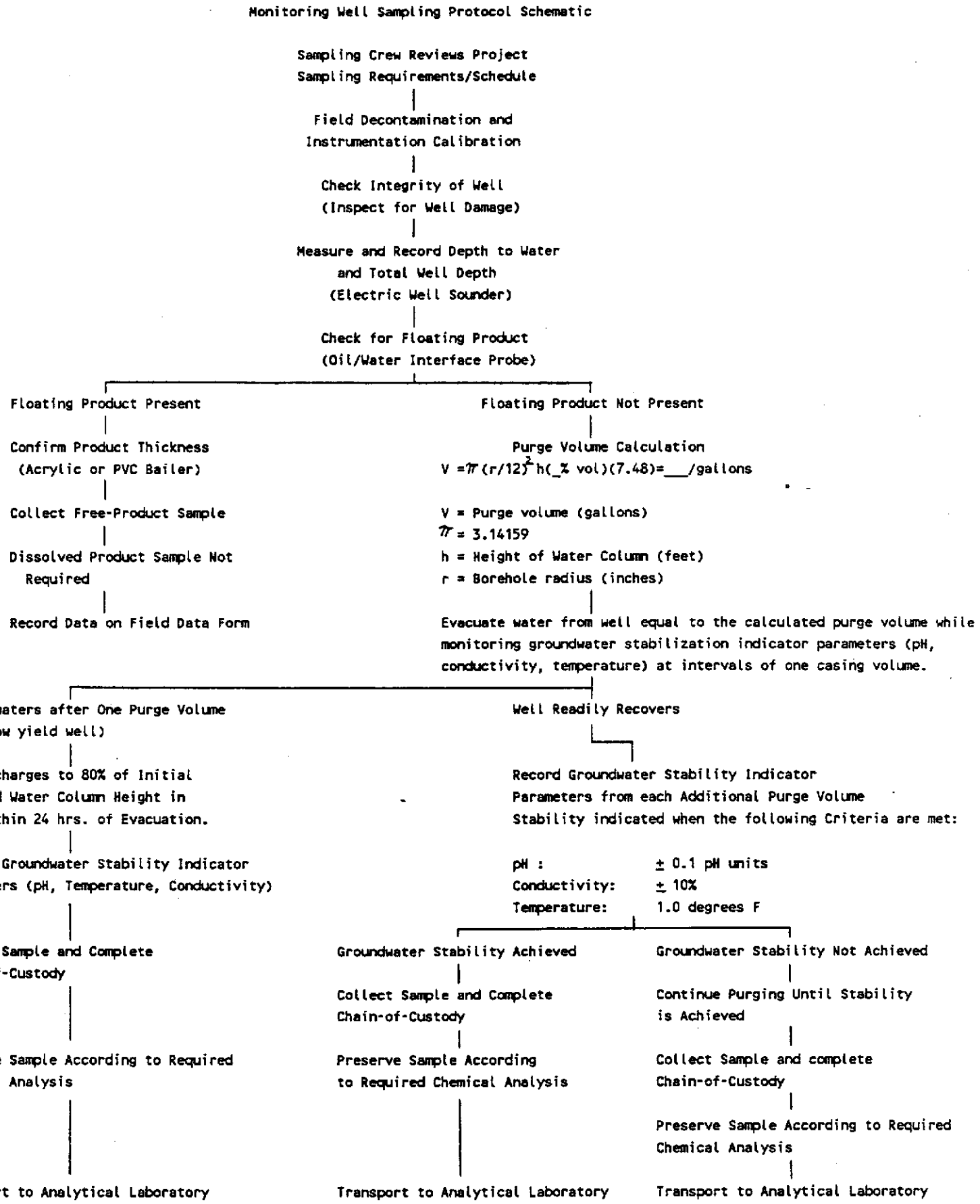
Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

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
Floating Product Not Present
Confirm Product Thickness (Acrylic or PVC Bailer)
Collect Free-Product Sample
Dissolved Product Sample Not Required
Record Data on Field Data Form
Purge Volume Calculation
V = π (r/12)² h(_% vol)(7.48)=___/gallons
V = Purge volume (gallons)
π = 3.14159
h = Height of Water Column (feet)
r = Borehole radius (inches)
Evacuate water from well equal to the calculated purge volume while monitoring groundwater stabilization indicator parameters (pH, conductivity, temperature) at intervals of one casing volume.
Well Dewaters after One Purge Volume (Low yield well)
Well Recharges to 80% of Initial Measured Water Column Height in Feet within 24 hrs. of Evacuation.
Measure Groundwater Stability Indicator Parameters (pH, Temperature, Conductivity)
Collect Sample and Complete Chain-of-Custody
Preserve Sample According to Required Chemical Analysis
Transport to Analytical Laboratory
Well Readily Recovers
Record Groundwater Stability Indicator Parameters from each Additional Purge Volume
Stability indicated when the following Criteria are met:
pH : ± 0.1 pH units
Conductivity: ± 10%
Temperature: 1.0 degrees F
Groundwater Stability Achieved
Collect Sample and Complete Chain-of-Custody
Preserve Sample According to Required Chemical Analysis
Transport to Analytical Laboratory
Groundwater Stability Not Achieved
Continue Purging Until Stability is Achieved
Collect Sample and complete Chain-of-Custody
Preserve Sample According to Required Chemical Analysis
Transport to Analytical Laboratory

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ENVIRONMENTAL DIVISION

Chain of Custod
FIGURE 6

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

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

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

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

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

☒	- No Soil Sample Recoverd
■	- "Undisturbed" Sample
⊠	- Bulk or Classification Sample
▽	- First Encountered Ground Water Level
▼	- Piezometric Ground Water Level
Penetration	- Sample drive hammer weight - 140 pounds falling 30 inches. Blows required to drive sampler 1 foot are indicated on the logs

GeoStrategies Inc.

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

Field location of boring:	Project No.: 7170	Date: 08/27/90	Boring No:
(See Plate 2)	Client: Chevron Service Station		C-5
	Location: 2416 Grove Way		
	City: Castro Valley, California		Sheet 1
	Logged by: RCM	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	19.5'	17.0'	
Time	15:30	18:10	
Date	08/27/90	08/27/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 1.5 feet
				2				CLAYEY SILT (ML/CL) - dark grayish brown (10YR 4/2), medium stiff, damp; 60% silt; 40% clay; non-plastic; no chemical odor.
				3				
				4				
0	500	S&H	C-5-					CLAYEY SAND with GRAVEL (SW-SC) - brown (10YR 5/3), medium dense, damp; 70% sand; 20% gravel; 10% clay; no chemical odor.
	500	push	5.0	5				
				6				
				7				
				8				
				9				
	19		C-5-					Sample refusal; cobble in shoe; increasing clay to 20% at 9.5 feet, damp; no chemical odor.
0	22	S&H	9.5	10				
	21							
				11				
				12				
				13				
				14				
0	40	S&H						SANDY CLAY (CL) - dark yellowish brown (10YR 4/4), hard, damp; 50% clay; 45% sand; 5% silt; medium plasticity; no chemical odor.
				15				
				16				
				17		▼		
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RG CEG 12/92	08/90		

Field location of boring: (See Plate 2)	Project No.: 7170	Date: 08/27/90	Boring No: C-5
	Client: Chevron Service Station		
	Location: 2416 Grove Way		
	City: Castro Valley, California		Sheet 2 of 2
	Logged by: RCM	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
	12			20		▽		SILTY SAND (SW-SM) - dark brown (10YR 4/3), dense, saturated; 60% sand; 30% silt; 10% gravel; no chemical odor.
0	27	S&H						
	29							
				21				
	16			22				SAND (SP) - dark brown (10YR 4/3), medium dense, saturated; 100% fine sand; no chemical odor.
0	17	SPT						Increase to medium to coarse sand at 22.0 feet.
				23				SILTY SAND (SW-SM) - yellow brown (10YR 5/6), medium dense, damp; 65% medium to coarse sand; 25% silt; 10% gravel; no chemical odor.
	9			24				
0	15	S&H	C-5-	25				SAND (SP) - dark greenish gray (5BG 4/1), dense, saturated; 95% sand; 5% silt; no chemical odor.
	16		25.5					
				26				
				27				
				28				
				29				
	18		C-5-					Increasing gravel to 30% at 29.0 feet.
0	59	S&H	30	30				
								Bottom of sample at 30.0 feet.
				31				Bottom of boring at 30.0 feet.
								08/27/90
-				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

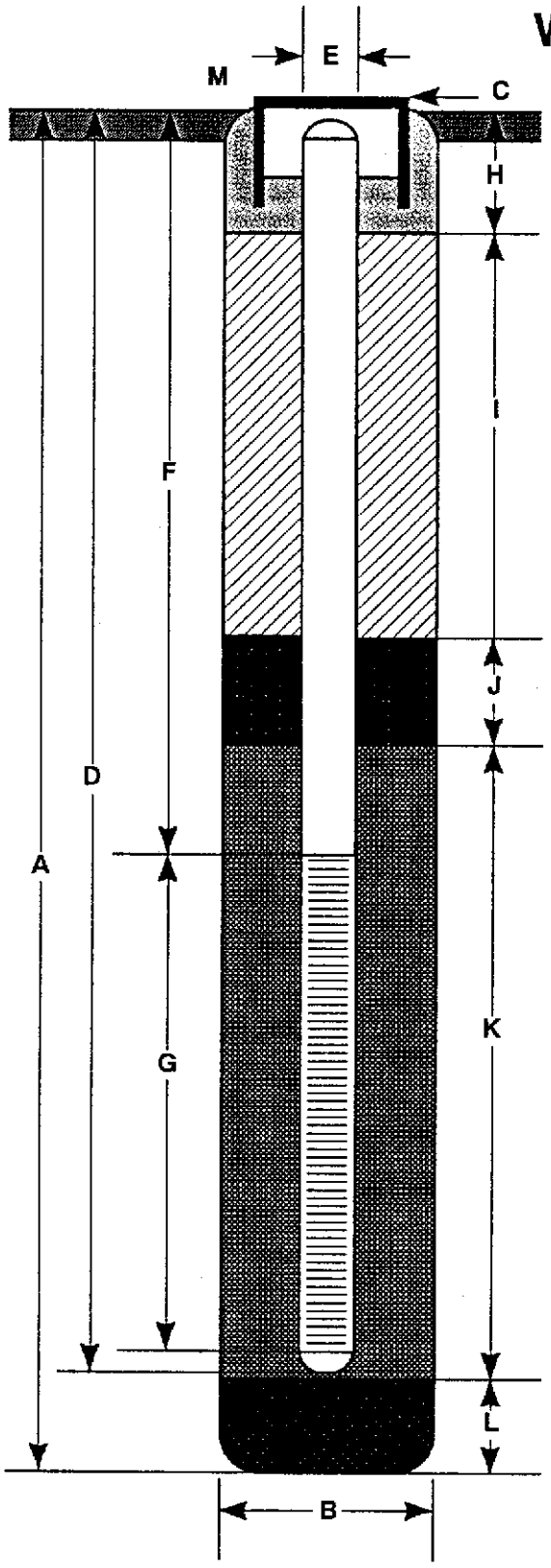
GeoStrategies Inc.

Log of Boring

BORING NO. C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RMP CEG 12/92	08/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 30 ft.

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

C Top of Box Elevation: 153.38 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

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

E Casing Diameter: 2 in.

F Depth to Top Perforations: 15 ft.

G Perforated Length: 15 ft.
Perforated Interval from 15 to 30 ft.
Perforation Type: Factory Slot
Perforation Size: 0.020 in.

H Surface Seal from 0 to 1.5 ft.
Seal Material: Concrete

I Backfill from 1.5 to 11 ft.
Backfill Material: Concrete

J Seal from 11 to 13 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 13 to 30 ft.
Pack Material: Lonestar #2/12 Sand

L Bottom Seal: N/A ft.
Seal Material:

M Underground vault with locking cap and cover

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	Cmp 9EG 1282	8/90		

Field location of boring: (See Plate 2)	Project No.: 7170	Date: 08/27/90	Boring No: C-6
	Client: Chevron Service Station		
	Location: 2416 Grove Way		
	City: Castro Valley, California		Sheet 1 of 2
	Logged by: RCM	Driller: Bayland	
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	20.0'	17.75'
Time	13:30	18:00
Date	08/27/90	08/27/90

PID (ppm)	Blows/ft or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 1.0 foot
				2				SILTY CLAY (CL/ML) - very dark grayish brown (10YR 3/2), medium stiff, damp; 60% clay; 40% silt; trace fine sand; no chemical odor.
				3				
				4				
	500/3"	S&H		5				CLAYEY SILT (ML/CL) - yellowish brown (10YR 5/4), stiff, damp, low plasticity; 60% silt; 40% clay; slightly indurated; no chemical odor.
				6				
				7				
				8				
				9				
	13			10				SAND with CLAY (SP-SC) - dark yellowish brown (10YR 4/6), medium dense, damp; 90% medium to fine sand; 5% silt; 5% clay; no chemical odor.
0	16	S&H	C-6-10.5					
	12			11				SAND (SP) - light olive brown (2.5Y 5/4), medium dense, damp; 95% fine sand; 5% silt; no chemical odor.
				12				Hard drilling at 13.5 feet.
				13				
				14				
	9							GRAVEL with CLAY and SAND (GP-GC) - dark yellowish brown (10YR 4/6), dense, damp; 65% gravel; 25% sand; 5% clay; no chemical odor.
0	14	S&H	C-6-15.0	15				
	21			16				
				17				
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	CEG 12/92	08/90		

Field location of boring:	Project No.: 7170	Date: 08/27/90	Boring No:
(See Plate 2)	Client: Chevron Service Station		C-6
	Location: 2416 Grove Way		
	City: Castro Valley, California		Sheet 2 of 2
	Logged by: RCM	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
	12							
0	22	S&H	C-6-	20		▽		Increasing sand to 35% at 20.5 feet; no chemical odor; saturated at 20.0 feet.
	16		20.5					
				21				
				22				
				23				
				24				
	3							SILT (ML) - dark greenish gray (5GY 4/1), stiff, saturated,
0	5	S&H	C-6-	25				non-plastic; 60% silt; 40% fine sand; no chemical odor.
	11		25.5					
				26				
				27				
				28				
				29				
	9							SAND (SP) - dark greenish gray (5G 4/1), dense,
0	15	S&H	C-6-	30				saturated; 95% sand; 5% silt; trace gravel; no chemical
	16		30.0					odor.
				31				
				32				
				33				
								Sand heaved 3 feet in auger; sample refusal at 34.0 feet.
				34				
								Bottom of sample at 30.5 feet.
				35				Bottom of boring at 34.0 feet.
								08/27/90
				36				
				37				
				38				
				39				

Remarks:

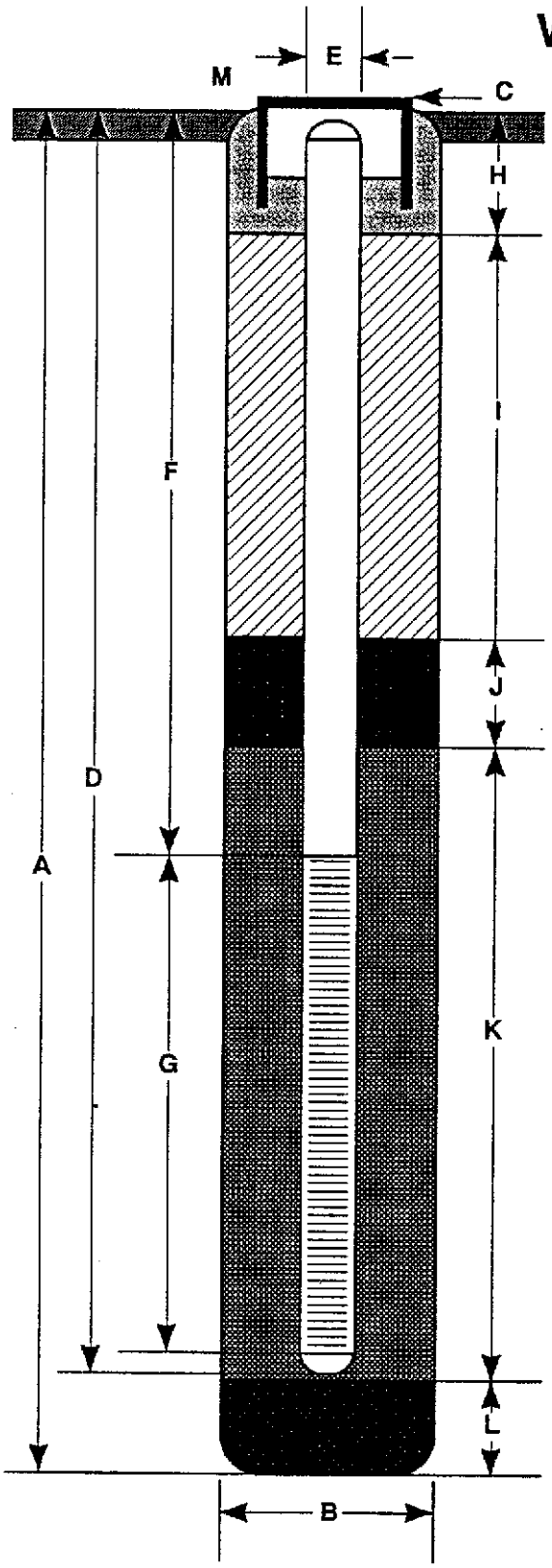
GeoStrategies Inc.

Log of Boring

BORING NO. C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	CEG 12/92	08/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 34.0 ft.

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

C Top of Box Elevation: 152.84 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 29.5 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 16 ft.

G Perforated Length: 13.5 ft.
Perforated Interval from 16 to 29.5 ft.
Perforation Type: Factory Slot
Perforation Size: 0.020 in.

H Surface Seal from 0 to 1.5 ft.
Seal Material: Concrete

I Backfill from 1.5 to 12 ft.
Backfill Material: Concrete

J Seal from 12 to 14 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 14 to 27.0 ft.
Pack Material: Lonestar #2/12 sand

L Bottom Seal: N/A ft.
Seal Material:

M Underground vault with locking cap and cover

Note: Borehole caved from 27.0 to 34.0 feet.

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RGP CEG 12/92	8/90		

Field location of boring:	Project No.: 7170	Date: 08/27/90	Boring No:
(See Plate 2)	Client: Chevron Service Station		C-7
	Location: 2416 Grove Way		
	City: Castro Valley, California		Sheet 1
	Logged by: RCM	Driller: Bayland	of 2
Drilling method: Hollow Stem Auger	Casing installation data:		
Hole diameter: 8-Inches	Top of Box Elevation:		Datum:

Water Level	21.0'	21.75'	
Time	10:30	18:05	
Date	08/27/90	08/27/90	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 1.0 feet
				2				SILTY CLAY (CL/ML) - very dark gray (10YR 3/1), medium stiff, damp, medium plasticity; 70% clay; 30% silt; trace fine sand; no chemical odor.
				3				
	250			4				
0	250	S&H	C-7-					COLOR CHANGE to brown (10YR 5/3) at 4.0 feet;
	250	push	5.5	5				increasing silt content to 45%; fine sand to 10%; no chemical odor.
				6				
				7				
				8				
				9				
				10				sample refusal at 9.0 feet.
				11				
				12				CLAYEY GRAVEL (GC) - olive brown (2.5Y 4/4), dense, moist; 80% gravel; 20% clay; no chemical odor.
	500	S&H		13				
	15							SAND (SP) - light olive brown (2.5Y 5/4), dense, moist;
0	17	S&H	C-7-	14				95% fine to medium sand; 5% silt; trace fine gravel; no
	17		14.5					chemical odor.
				15				
				16				
				17				
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. C-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RG CEG 12/92	08/90		

Field location of boring:

(See Plate 2)

Project No.:	7170	Date: 08/27/90	Boring No: C-7
Client:	Chevron Service Station		
Location:	2416 Grove Way		
City:	Castro Valley, California		Sheet 2 of 2
Logged by:	RCM	Driller: Bayland	

Drilling method: Hollow Stem Auger

Hole diameter: 8-Inches

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
	14			20				No sample recovery; saturated gravel in shoe.
	23	S&H						
	26							
	11			21				SILTY SAND (SM) - light olive brown (2.5Y 5/4), medium
	13	SPT						dense, damp; 75% sand; 20% silt; 5% gravel; no
	11			22				chemical odor.
				23				SANDY GRAVEL (GP) - grayish brown (2.5Y 5/2),
								saturated, medium dense; 80% gravel; 20% fine sand;
				24				interbedded fine sand at 21.0 feet; no chemical odor.
	18							
0	15	S&H	C-7-	25				
	11		25.5					Increasing sand at 25.0 feet.
				26				SILTY SAND (SM) - olive brown (2.5Y 4/4), medium
								dense, wet; 60% sand; 40% silt; Fe-oxide stains; no
				27				chemical odor.
								Softer at 27.0 feet.
				28				
				29				
	4							SAND (SP) - dark greenish gray (5BG 4/1), medium
	10	S&H	C-7-AQ	30				dense, saturated; 95% sand; 5% silt; no chemical odor.
	19							
				31				
				32				
	14			33				Increasing gravel to 20% at 34.0 feet; fluctuation in gravel
	20	S&H						content throughout sample interval.
	15			34				
				35				Bottom of sample at 34.0 feet.
								Bottom of boring at 34.0 feet.
				36				08/27/90
				37				
				38				
				39				

Remarks:

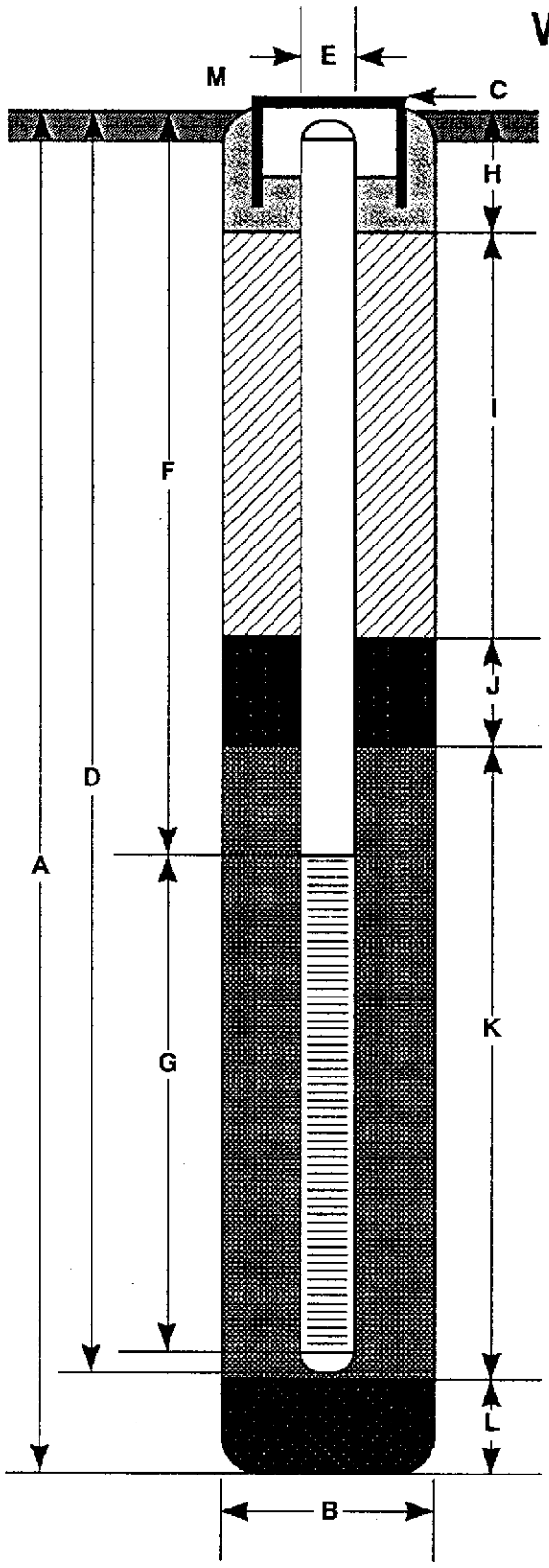
GeoStrategies Inc.

Log of Boring

BORING NO. C-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RGP CEG 12 92	08/90		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 34.0 ft.

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

C Top of Box Elevation: 155.34 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length: 34 ft.
Material: Schedule 40 PVC

E Casing Diameter: 2 in.

F Depth to Top Perforations: 16 ft.

G Perforated Length: 18 ft.
Perforated Interval from 16 to 34 ft.
Perforation Type: Factory slot
Perforation Size: 0.020 in.

H Surface Seal from 0 to 1.5 ft.
Seal Material: Concrete

I Backfill from 1.5 to 12 ft.
Backfill Material: Concrete

J Seal from 1.2 to 12 ft.
Seal Material: Bentonite Pellets

K Gravel Pack from 14 to 30 ft.
Pack Material: Lonestar #2/12 sand

L Bottom Seal: N/A ft.
Seal Material:

M Underground vault with locking cap and cover

Note: Borehole caved from 30.0 to 34.0 feet.

GeoStrategies Inc.

Well Construction Detail

WELL NO. C-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7170	RG CEG 12/62	8/90		

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

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 10954
CLIENT: Geo Strategies Inc.
CLIENT JOB NO.: 7170

DATE RECEIVED: 08/30/90
DATE REPORTED: 09/06/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
10954- 1	C-5-9.5	08/27/90	09/05/90
10954- 2	C-6-15.0	08/27/90	09/05/90
10954- 3	C-6-20.5	08/27/90	09/05/90
10954- 4	C-7-14.5	08/27/90	09/05/90

Laboratory Number:	10954 1	10954 2	10954 3	10954 4
ANALYTE LIST	Amounts/Quantitation Limits (mg/Kg)			
OIL AND GREASE:	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	ND<1	ND<1	ND<1
TPH/DIESEL RANGE:	NA	NA	NA	NA
BENZENE:	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
ETHYL BENZENE:	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

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: 10954

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

Mg/Kg = part per million (ppm)

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

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

8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg
Daily Standard run at 2mg/L; %Diff Gasoline = <15
MS/MSD Average Recovery = 93%: Duplicate RPD = 0

8020/BTXE
Minimum Quantitation Limit in Soil: 0.05mg/kg
Daily Standard run at 20ug/L; %Diff = <15%
MS/MSD Average Recovery = 94%: Duplicate RPD = <6

Richard Srna, Ph.D.
Cecilia G. Joaquin (for)
Laboratory Director

SF # 10954

Chain-of-Custody Record

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

Chevron Facility Number: 2960
Consultant Release Number:
Consultant Project Number: 7170
Consultant Name: GEOSTRATEGIES INC.
Address: 2140 WEST WINTON AVE., HAYWARD
Fax Number: 783-1089
Project Contact (Name): MELISSA MANN
(Phone): 352-4800 EXT. 265

Chevron Contact (Name): NANCY VURELLICH
(Phone): (415)-842-9581
Laboratory Name: SUPERIOR
Contract Number: 251210
Samples Collected by (Name): ROBERT MALLORY
Collection Date: 8/27/90
Signature: Robert C. Mallory

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
Analyses To Be Performed																		
C-5-9.5		1	S		15:54	NONE	✓	✓			✓							
C-6-15.0		1	S		13:38	↓	✓	✓			✓							
C-6-20.5		1	S		13:43		✓	✓			✓							
C-7-14.5		1	S		10:32	↓	✓	✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
Robert C. Mallory	GSI	8/30/90 16:40	(Sealed) #603	EXPRESS T	8/31/90 1840	24 Hrs
#603	EXPRESS T	8/30/90 17:35				48 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	5 Days
			Onyx A Nwoye		8/30/90	10 Days

Printed in U.S.A.

MS 5136 (6-89)

gettler — ryan inc.

October 16, 1990

GROUNDWATER SAMPLING REPORT

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

Referenced Site: Former Chevron Service Station #2960
2416 Grove Way/Redwood Road
Castro Valley, California

Sampling Date: October 3, 1990

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 3, 1990 at the referenced location. The site, located on the northeast corner of Grove Way and Redwood Road, is no longer an operating service station. The former station had underground storage tanks which contained petroleum products.

There are currently five groundwater monitoring wells on site and two wells off site at the locations shown on the attached site map. Newly installed wells C-5, C-6 and C-7 were developed on October 3, 1990. Prior to sampling, all wells were inspected for total well depth, water levels, and presence of separate phase hydrocarbons. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase hydrocarbons. Groundwater depths ranged from 17.78 to 20.82 feet below grade. Separate phase hydrocarbons were observed in monitoring well C-1.

Wells which did not contain separate phase product were then purged and sampled. The purge water was drummed 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.

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

The samples were analyzed by Superior Analytical Laboratory 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

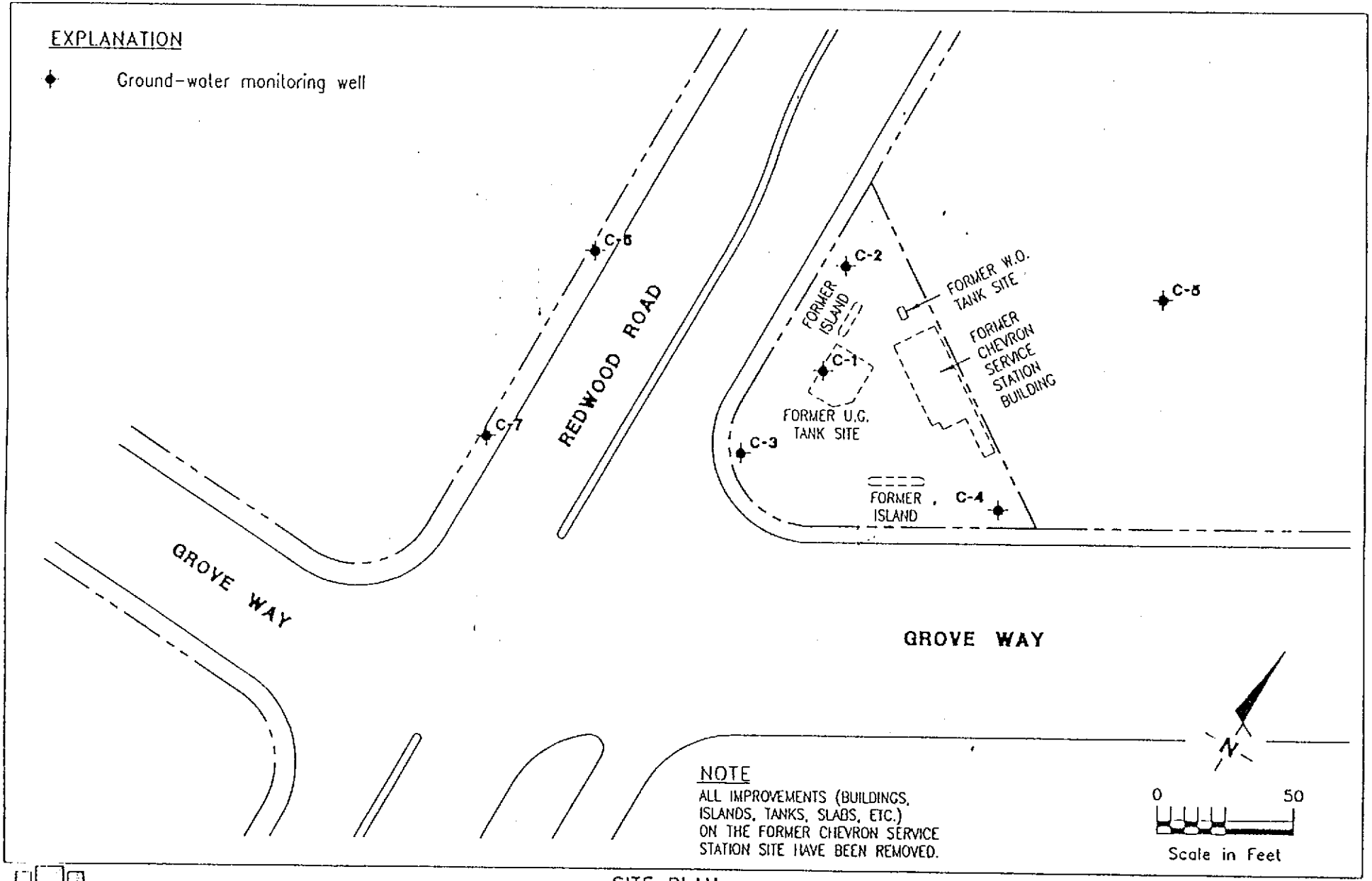
WELL I.D.	C-1	C-2	C-3	C-4	C-5	C-6
Casing Diameter (inches)	3	3	3	3	2	2
Total Well Depth (feet)	----	----	----	----	29.8	28.6
Depth to Water (feet)	18.67	----	19.16	----	17.78	18.14
Free Hydrocarbons (feet)	0.65	none	none	none	none	none
Reason Not Sampled	monitored	inaccessible	monitored	inaccessible	----	----
Calculated 4 Case Vol.(gal.)	----	----	----	----	8.2	7.1
Did Well Dewater?	----	----	----	----	no	no
Volume Evacuated (gal.)	----	----	----	----	10.5	9.0
Purging Device	----	----	----	----	Bailer	Bailer
Sampling Device	----	----	----	----	Bailer	Bailer
Time	----	----	----	----	08:21	09:59
Temperature (F)*	----	----	----	----	67.9	67.1
pH*	----	----	----	----	6.83	6.70
Conductivity (umhos/cm)*	----	----	----	----	1719	1686

* Indicates Stabilized Value

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	C-7
Casing Diameter (inches)	2
Total Well Depth (feet)	33.0
Depth to Water (feet)	20.82
Free Hydrocarbons (feet)	none
Reason Not Sampled	----
Calculated 4 Case Vol.(gal.)	8.3
Did Well Dewater?	no
Volume Evacuated (gal.)	10.5
Purging Device	Bailer
Sampling Device	Bailer
Time	09:25
Temperature (F)*	66.2
pH*	7.0
Conductivity (umhos/cm)*	1678

* Indicates Stabilized Value



GeoStrategies Inc.

SITE PLAN
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE
2

JOB NUMBER
7170

REVIEWED BY RG/CEG

DATE
10/90

REVISED DATE

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

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 11054
CLIENT: Chevron USA
CLIENT JOB NO.: 3170

DATE RECEIVED: 10/05/90
DATE REPORTED: 10/10/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11054- 1	C-5	10/03/90	10/09/90
11054- 2	C-6	10/03/90	10/09/90
11054- 3	C-7	10/03/90	10/09/90
11054- 4	Trip Blank	10/03/90	10/09/90

Laboratory Number:	11054 1	11054 2	11054 3	11054 4
ANALYTE LIST	Amounts/Quantitation Limits (ug/l)			
OIL AND GREASE:	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<50	ND<50	ND<50	ND<50
TPH/DIESEL RANGE:	NA	NA	NA	NA
BENZENE:	ND<0.5	ND<0.5	ND<0.5	ND<0.5
TOLUENE:	ND<0.5	ND<0.5	ND<0.5	ND<0.5
ETHYL BENZENE:	ND<0.5	ND<0.5	ND<0.5	ND<0.5
XYLENES:	ND<0.5	ND<0.5	ND<0.5	ND<0.5

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

CERTIFICATE OF ANALYSIS

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

QA/QC INFORMATION
SET: 11054

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 = <4%

8020/BTXE
Minimum Quantitation Limit in Water: 0.50ug/L
Daily Standard run at 20ug/L; %Diff = <15%
MS/MSD Average Recovery = 98%: Duplicate RPD = <2%

Richard Srna, Ph.D.
Laboratory Director

SA#11059

Chain-of-Custody Record

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

Chevron Facility Number 2960
Consultant Release Number
Consultant Project Number 3170
Consultant Name Gettler-Ryan
Address 2150 W. Winton Hayward
Fax Number 415 783-1089
Project Contact (Name) Tom Paulson
(Phone) (415) 783-7500

Chevron Contact (Name)
(Phone)
Laboratory Name Superior
Contract Number 2512110
Samples Collected by (Name) John P. Zwierzyski
Collection Date 10-3-90
Signature John P Zwierzyski

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-5		3	W		8:21	HCl	Yes	✓			✓							THC(gas) BTXE
C-6		3	↓		9:59	↓	↓	✓			✓							↓
C-7		3			9:25			✓			✓							
Trip		1	V		—	↓	↓	✓			✓							

From Retrg #1

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	Turn Around Time (Circle Choice)
John P Zwierzyski	Gettler-Ryan	10/3/90/14:46		Gettler Ryan	10-5-90 07:3	24 Hrs
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time	48 Hrs
	Gettler Ryan	10-5-90 10:0				5 Days
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time	10 Days
					10/5/90	

Printed in U.S.A.

MS 5136 (6-89)

gettler — ryan inc.

November 6, 1990

GROUNDWATER SAMPLING REPORT

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

Referenced Site: Former Chevron Service Station #2960
2416 Grove Way/Redwood Road
Castro Valley, California

Sampling Date: October 25, 1990

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 25, 1990 at the referenced location. The site, located on the northeast corner of Grove Way and Redwood Road, is no longer an operating service station. The former station had underground storage tanks which contained petroleum products.

There are currently five groundwater monitoring wells on site and two wells off site at the locations shown on the attached site map. Prior to sampling, all wells were inspected for total well depth, water levels, and presence of separate phase hydrocarbons. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase hydrocarbons. Groundwater depths ranged from 16.60 to 20.91 feet below grade. Separate phase hydrocarbons were observed in monitoring well C-1.

Wells which did not contain separate phase product were then purged and sampled. The purge water was drummed 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 or bladder pumps, 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 and a field blank (CF-3), supplied by the laboratory, were included and analyzed to assess quality control. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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

The samples were analyzed by Superior Analytical Laboratory 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	C-5	C-6
Casing Diameter (inches)	3	3	3	3	2	2
Total Well Depth (feet)	----	28.5	30.4	29.0	29.4	28.6
Depth to Water (feet)	18.71 **	16.60	19.28	20.43	17.92	18.29
Free Hydrocarbons (feet)	0.71	none	none	none	none	none
Reason Not Sampled	free product	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	----	18.0	16.9	13.2	8.0	7.0
Did Well Dewater?	----	no	yes	no	no	no
Volume Evacuated (gal.)	----	23.1	6.5	18.0	10.0	7.0
Purging Device	----	Bladder	Bailer	Bladder	Bailer	Bailer
Sampling Device	----	Bladder	Bailer	Bladder	Bailer	Bailer
Time	----	16:08	16:42	15:45	13:35	14:50
Temperature (F)*	----	68.3	68.9	71.6	70.1	69.4
pH*	----	7.03	6.63	6.90	6.82	6.95
Conductivity (umhos/cm)*	----	1682	1847	1069	1639	1453

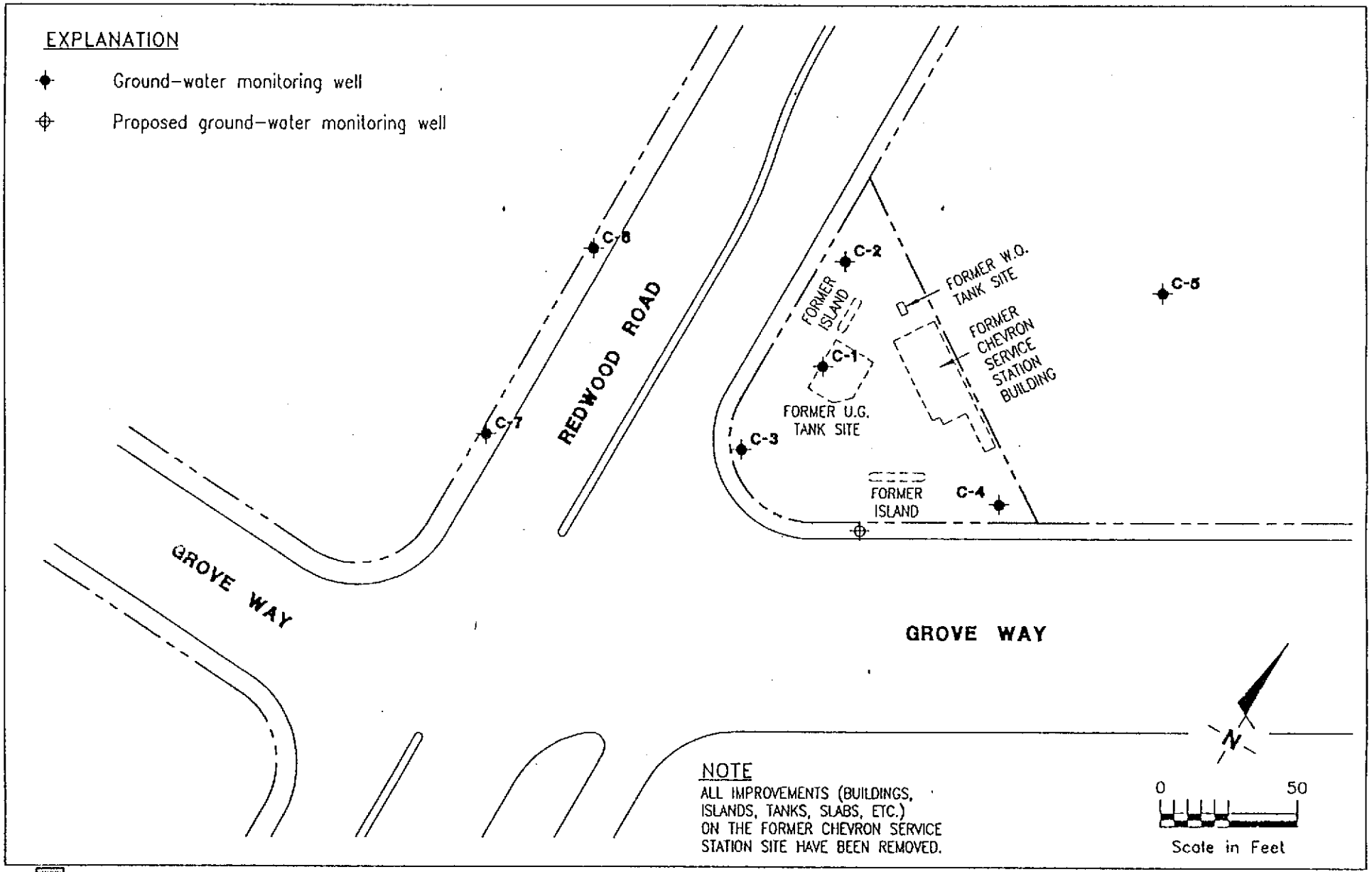
* Indicates Stabilized Value

** Not corrected for presence of free product

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	C-7
Casing Diameter (inches)	2
Total Well Depth (feet)	32.9
Depth to Water (feet)	20.91
Free Hydrocarbons (feet)	none
Reason Not Sampled	----
Calculated 4 Case Vol.(gal.)	8.2
Did Well Dewater?	no
Volume Evacuated (gal.)	10.0
Purging Device	Bailer
Sampling Device	Bailer
Time	14:17
Temperature (F)*	69.2
pH*	7.02
Conductivity (umhos/cm)*	1443

* Indicates Stabilized Value



GeoStrategies Inc.

SITE PLAN
Former Chevron Service Station #2960
2416 Grove Way
Castro Valley, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7170		10/90	

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

LABORATORY NO.: 11123
CLIENT: Chevron USA
CLIENT JOB NO.: 3170

DATE RECEIVED: 10/26/90
DATE REPORTED: 11/02/90

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
11123- 1	C-2	10/25/90	11/01/90
11123- 2	C-3	10/25/90	10/30/90
11123- 3	C-4	10/25/90	10/30/90
11123- 4	C-5	10/25/90	10/30/90
11123- 5	C-6	10/25/90	10/30/90
11123- 6	C-7	10/25/90	10/30/90
11123- 7	CF-3	10/25/90	10/30/90
11123- 8	TRIP BLANK	10/25/90	10/30/90

Laboratory Number:	11123 1	11123 2	11123 3	11123 4	11123 5
ANALYTE LIST	Amounts/Quantitation Limits (ug/l)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	1300	750	ND<50	ND<50	ND<50
TPH/DIESEL RANGE:	NA	NA	NA	NA	NA
BENZENE:	390	510	2	ND<0.5	ND<0.5
TOLUENE:	17	2	ND<0.5	ND<0.5	1
ETHYL BENZENE:	9	6	ND<0.5	ND<0.5	ND<0.5
XYLENES:	58	5	ND<0.5	ND<0.5	ND<0.5

Laboratory Number:	11123 6	11123 7	11123 8
ANALYTE LIST	Amounts/Quantitation Limits (ug/l)		
OIL AND GREASE:	NA	NA	NA
TPH/GASOLINE RANGE:	ND<50	ND<50	ND<50
TPH/DIESEL RANGE:	NA	NA	NA
BENZENE:	ND<0.5	ND<0.5	ND<0.5
TOLUENE:	1	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.
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: 11123

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 = 76%: Duplicate RPD = 3%

8020/BTXE
Minimum Quantitation Limit in Water: 0.50ug/L
Daily Standard run at 20ug/L; %Diff = <15%
MS/MSD Average Recovery = 103%: Duplicate RPD = <5%

Richard Srna, Ph.D.
Cecilia G. Joaquin (for)
Laboratory Director

S# # 11123

Chain-of-Custody Record

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

Chevron Facility Number 2960
Consultant Release Number
Consultant Project Number 3170
Consultant Name Gettler - Ryan
Address 2150 W. Winton
Fax Number
Project Contact (Name) Tom Paulson
(Phone) (415) 783-7500

Chevron Contact (Name)
(Phone)
Laboratory Name Superior
Contract Number 24277 10
Samples Collected by (Name) John P Zwierzycki
Collection Date 10-25-90
Signature John P. Zwierzycki

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803				Remarks
C-2		3	W		16:08	HCl	Yes	✓			✓							
C-3					16:48			✓			✓							
C-4					15:45			✓			✓							
C-5					13:35			✓			✓							
C-6					14:50			✓			✓							
C-7					14:17			✓			✓							
CF-3					16:42			✓			✓							
Trip		1						✓			✓							

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
John P. Zwierzycki	Gettler-Ryan	10-25-90/17:42			
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	Gettler Ryan	10-26-90 12:20			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)	Date/Time	
			M. Hollenberg	10/26/90 17:27	

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