Shell Oil Company

EAST BAY MARKETING DISTRICT

P O. Box 4023
Concord. CA 94524
(415) 676-1414

February 16, 1990

Mr. Larry Seto
County of Alameda
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, CA 94621

SUBJECT: FORMER SHELL SERVICE STATION
2800 TELEGRAPH AVENUE
OAKLAND, CA

Dear Mr. Seto:

Enclosed is a copy of the February 12, 1990 Well installation Report prepared for the subject location. The enclosed report documents the installation of one groundwater monitoring well and one recovery well.

If you should have any questions or comments regarding this project, please do not hesitate to call me at (415) 676-1414, Ext. 127.

Very truly yours,

Diane M. Lundquist
District Environmental Engineer

Enclosure

cc: Mr. Tom Callaghan, Regional Water Quality Control Board
Mr. John Werfal, Gettler-Ryan

JM004701

GeoStrategies Inc.

WELL INSTALLATION REPORT

Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

Report No. 7610-4

February 12, 1990

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

February 12, 1990

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

Attn: Mr. John Werfal

Re: WELL INSTALLATION REPORT
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

Gentlemen:

INTRODUCTION

This report describes the results of field activities performed by GeoStrategies Inc. (GSI) at the above referenced location (Plate 1) on October 3, and November 17, 1989. Two exploratory soil borings, one off-site (S-11) and one on-site (SR-1), were drilled in accordance to the scope of work defined in the GSI Report dated September 22, 1989 (Plate 2). Boring S-11 was completed as a ground-water monitoring well on October 3, 1989. Boring SR-1 was reamed to 20 inches on November 17, 1989, and subsequently completed as a product recovery well.

Chemical analytical results for the ground-water sampling performed by Gettler-Ryan Inc. (G-R) on October 3 and 16, 1989 are also included in this report. Field work and laboratory analytical methods were performed in compliance with current State of California Water Resources Control Board (SWRCB) guidelines for conducting environmental investigations related to leaking underground fuel tanks.

FIELD PROCEDURES

Two exploratory soil borings (S-11 and SR-1) were drilled using eight-inch diameter, hollow-stem augers powered by a truck-mounted drill rig according to GSI Field Methods and Procedures (Appendix A). A GSI geologist supervised the drilling, described soil samples using the Unified Soil Classification System and Munsell Soil Color Chart, and prepared lithologic boring logs. Exploratory boring logs are presented in Appendix B.

Soil Sampling

Soil samples were collected at five-foot depth intervals by advancing a modified California split-spoon sampler fitted with brass sample-tube liners through the hollow stem of the augers. The sampler was either pushed into the soil using the hydraulic system of the drill rig, or driven a maximum of eighteen inches, using a 140-pound hammer with a 30-inch drop. The hydraulic pressure, in pounds per square inch (psi) or blow counts required to push or drive the sampler are included on the exploratory boring logs (Appendix B).

One soil sample from each sampled five-foot interval was used to perform field head-space analysis for volatile organic compounds (VOCs). Head-space analysis involved emptying the soil from the brass liner tube into a clean glass jar and immediately sealing the jar with aluminum foil secured under a ring-type threaded lid. After approximately 30 minutes, the foil was pierced and the head-space in the jar was analyzed for total organic vapor, measured in parts per million (ppm), with an OVM photoionization detector. The results of head-space analyses are presented on the exploratory boring logs.

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, placed in a cooler with blue ice, and transported to International Technology (IT) Analytical Services, a State-certified environmental laboratory located in San Jose, California.

Monitoring Well Construction

Exploratory soil boring S-11 was drilled using an 8-inch-diameter hollow-stem auger to a total depth of 30.5 feet below grade. The boring was subsequently backfilled to 19 feet with bentonite pellets and a monitoring well was constructed using 3-inch-diameter Schedule 40 PVC well casing, and 0.020-inch machine-slotted well screen. Lonestar #2/12 graded sand was placed in the annular space across the entire screened interval and extended two feet above the top of the well screen. A two-foot bentonite seal was placed above the sand pack followed by a cement grout seal to approximately one and a half feet below ground surface. A traffic-rated Christy box was placed at ground surface and a locking well cap with lock was placed on the wellhead. Well construction and completion details are presented in Appendix B.

Recovery Well Design

Screen and gravel pack selection was based on sieve analysis results of an aquifer material sample collected from pilot boring SR-1 at the 25.5 feet and 30.5 feet intervals. As shown in the Sieve Analysis Report (Appendix C), approximately 50% to 68% of the aquifer material is fine grain material (silt and clay). The appropriate filter pack and well screen required to match the native aquifer material would restrict recovery well efficiency. Therefore, Lonestar #2/12 graded sand and 0.020-inch slotted screen was selected to optimize well efficiency and also provide a reasonable match with the grain size distribution of the aquifer material.

Recovery Well Construction

Exploratory pilot boring SR-1 was drilled on October 3, 1989, to a total depth of 35.5 feet below grade to collect soil samples for both chemical and physical analyses. On November 17, 1989, Boring SR-1 was reamed to 20 inches in diameter with a truck-mounted bucket-auger rig to a total depth of 35 feet below grade. Six-inch-diameter Schedule 40 0.02 inch slot PVC well screen and blank well casing was placed in the boring from approximately 35 feet below grade to approximately 0.5 feet below ground surface. The well screen was placed from 10 to 35 feet below ground surface. Lonestar #2/12 graded sand was placed in the annular space from total depth extending across the screen interval to approximately 4-1/2 feet above the top of the screen. Approximately one foot of bentonite pellets was placed on top of the sand pack followed by cement-grout to approximately one foot below ground surface. Well construction and completion details are presented in Appendix B. A traffic-rated Christy box was placed from a depth of approximately 1-1/2 feet to ground surface.

HYDROGEOLOGIC CONDITIONS

Based on subsurface data collected from existing and newly drilled borings, the lithology beneath the site appears to consist primarily of interbedded clay, silt, sand and gravel to the total depth explored of 35.5 feet. These lithologies are typical of alluvial deposition. Approximately 4 feet of fill material consisting of clay, silt, sand, and gravel overlies a clayey silt with sand (ML) which extends to approximately 14 feet below grade. The uppermost water bearing zone appears to consist primarily of sand and gravel interbedded with silt to the total depth of 35.5 feet below grade. The gravel and sand layers encountered in Well S-11 appear interbedded with clay and silt. The basal aquitard is comprised of a sandy silt which occurs at approximately 20 feet below ground surface.

Groundwater was first encountered in borings S-11 and SR-1 at approximately 14 and 13 feet below ground surface, respectively. Observed rises in ground-water levels to equilibration suggest the first encountered aquifer exists under semi-confined to confined conditions. A potentiometric map was constructed from recent static ground-water elevation data. The hydraulic gradient was calculated to be 0.02 with ground-water flow in a southerly direction (Plate 3). Depth to ground-water measurements ranged from 8.92 feet to 11.55 below ground surface. Water level data are presented in the G-R Groundwater Sampling Report (Appendix D).

CHEMICAL ANALYTICAL RESULTS

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. All samples were analyzed by IT Analytical Services.

Soil Sampling Analytical Results

Two soil samples from both borings were obtained from the 5.5 and 10.5 feet intervals. The 10.5 foot sample from borings S-11 and SR-1 contained detectable concentrations of TPH-Gasoline (560 ppm and 550 ppm, respectively). Benzene was also detected at the same sample interval in both borings at a concentration of 3.9 ppm and 1.3 ppm, respectively. The soil sample collected at 5.5 feet in boring S-11 was reported as none detected (ND) for the targeted chemical parameters. The soil sample collected from boring SR-1 at 5.5 feet contained 75 ppm TPH-Gasoline and was ND for benzene. IT soils chemical analytical data are summarized in Table 1 and are presented in the Appendix D.

Groundwater Sampling Analytical Results

On October 3 and 16, 1989, ground-water samples were collected by G-R from the monitoring network, except Well S-3. Floating product was observed in Well S-3 at a measured thickness of 0.04 feet using an electronic oil/water interface probe. A product sheen was observed in Well S-2. Target chemical parameters for ground-water samples were TPH-Gasoline and BTEX. TPH-Gasoline concentrations ranged from 0.37 ppm (Well S-2) to 5.9 ppm (Well S-6) and benzene concentrations ranged from 0.012 ppm (Well S-2) to 1.6 ppm (Well S-6). Wells S-1, S-4, S-5, S-9 and S-10 were reported by the laboratory as ND for TPH-Gasoline and benzene. Ground-water analytical results are summarized in Table 2. The G-R Groundwater Sampling Report and the IT certified analytical report are presented in Appendix E.

Chemical analytical data from ground-water samples were used to construct TPH-Gasoline and benzene isoconcentration maps. As shown on Plates 4 and 5, the plume configuration for TPH-Gasoline and benzene beneath the site trends in a southerly direction which appears to be consistent with the shallow ground-water flow direction. The shape of the hydrocarbon plume appears to be elliptical on site and slightly elongated in the down-gradient direction. The plume is elongated to the southeast evidenced by detectable concentrations of TPH-Gasoline (0.65 ppm) and benzene (0.042 ppm), identified in Well S-11.

Quality Control (QC) samples for this sampling included a trip blank (TB), a field blank (SF-6), and a duplicate sample (SD-2). The trip blank was prepared in the IT laboratory using organic-free water to evaluate laboratory handling and analytical procedures. The field blank was prepared in the field using organic-free water supplied by the laboratory to evaluate sampling procedures. The duplicate sample was collected as a split (second sample) from Well S-2 to quantitatively evaluate laboratory handling procedures and analytical precision. The field blank and trip blank were reported as ND for all chemical parameters. Therefore, no hydrocarbons were introduced into ground-water samples during sample collection (field ambient conditions) or transport. The Relative Percent Difference (RPD) for ground-water samples collected from Well S-2 (S-2 and SD-2) was calculated to be 5% for TPH-Gasoline and 0% for benzene.

SUMMARY OF FINDINGS

The scope of work performed by GSI and findings are summarized below:

- One 3-inch-diameter Schedule 40 PVC monitoring well, S-11, was installed on October 3, 1989 and one 6-inch-diameter Schedule 40 PVC recovery well, SR-1, was installed on November 17, 1989.

- The lithology beneath the site appears to consist primarily of clay, silt, sand and gravel. The uppermost water-bearing zone consists of gravel and sand with interbeds of silt and clay.

- Four soil samples were submitted for chemical analysis. TPH-Gasoline was detected in the 10.5 foot sample in Boring S-11 and SR-1 at 560 ppm and 550 ppm, respectively. Benzene was also detected in the 10.5 foot sample from both borings at 3.9 ppm and 1.3 ppm, respectively.

- The ground-water monitoring network was sampled by G-R on October 3 and 16, 1989. TPH-Gasoline concentrations ranged from 0.37 ppm (Well S-2) to 5.9 ppm (Well S-6). Benzene concentrations ranged from 0.012 ppm (Well S-2) to 1.6 ppm (Well S-6). NDs were reported in Wells S-1, S-4, S-5, S-9, and S-10 for TPH-Gasoline and benzene.

- Wells S-2, S-6, S-7, S-8, and S-11 contained benzene concentrations above RWQCB MCLs.

- Well S-3 contained 0.04 feet of floating product and therefore, was not sampled. A product sheen was observed in Well S-2.

- Potentiometric data indicate ground-water movement beneath the site is to the south with an approximate hydraulic gradient of 0.02.

- The petroleum hydrocarbon plume appears to have migrated offsite with the plume configuration appearing elliptical and elongated in the direction of the hydraulic gradient.

PROPOSED SCOPE OF WORK

Soil and ground-water analytical results to date indicate that the present ground-water network is not adequate for petroleum hydrocarbon plume delineation. A none detected (ND) boundary has not been identified downgradient of the site. TPH-Gasoline and benzene have been detected in Well S-8 at concentrations of 1.6 and 0.022 ppm and in Well S-11 at concentration of 0.65 and 0.042, respectively. Benzene concentrations in Well S-8 and S-11 are above current RWQCB MCLs.

Based on our review of available data for the site, we recommend that one additional monitoring well be installed downgradient of Well S-8 (Plate 2). The proposed well will be drilled to the base of the first water-bearing zone as identified in recently installed Wells S-4, S-5, S-6, S-8 and S-9. Soil samples from the boring will be collected at five-foot intervals and at significant lithologic changes, as a minimum. Soil samples will be used to describe subsurface lithology, perform head-space analyses for volatile organic presence, and for the selection of samples for chemical analysis.

Chemical analyses of soil and ground-water samples will include TPH-Gasoline according to EPA Method 8015 (Modified), and BTEX according to EPA Method 8020. If chemical analytical results from either soil or ground-water samples exceed present DHS action levels or RWQCB MCLs, additional work will be proposed at that time.

GSI recommends that the proposed monitoring well be installed so that the well screen fully penetrates the uppermost water bearing zone and extends a minimum of three-feet above the upper contact. Under no circumstances will the proposed well be designed and constructed which may permit potential cross-contamination of adjacent aquifers or transmissive sediments.

Due to presence of floating product in Well S-3, a remediation system will be installed at the site. After the installation of the remediation system, system start-up tests will include water-level monitoring before, during and after system start-up and a step-drawdown test. The extent of capture or radius of influence of the recovery well will be observed for a 30 day period following the step test. Water samples will be collected from the influent port and the effluent port to be analyzed for Total Petroleum Hydrocarbons calculated as Gasoline according to EPA method 8015 (Modified) and Benzene, Toluene, Ethylbenzene and Xylenes according to EPA method 8020. The results of the chemical analytical data will be available from the laboratory on a 24-hour turnaround. Discharge of the groundwater will be into the sanitary sewer system depending on the analytical results. After approval from East Bay Municipal Utility District (EBMUD) for sanitary sewer discharge of the groundwater, a constant-rate discharge test will be conducted. Results from constant-rate discharge test will be used to calculate aquifer characteristics and preliminarily evaluate the performance of the recovery well SR-1.

If you have any further questions please call.

GeoStrategies Inc. by,

Timothy J. Walker
Geologist

Jeffrey L. Peterson
Senior Hydrogeologist
R.E.A. 1021

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

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

TJW/JLP/mlg

Illustrations:
Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Potentiometric Map
Plate 4. TPH Isoconcentration Map
Plate 5. Benzene Isoconcentration Map

Appendix A. Field Methods and Procedures
Appendix B. Exploratory Boring Logs and Well Construction Details
Appendix C. Sieve Analysis Data
Appendix D. Chemical Analytical Report
Appendix E. Gettler-Ryan Inc. Groundwater Sampling Report

TABLES

TABLE 1

SOIL CHEMICAL DATA

WELL NO.	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	
S-11-5.5	03-Oct-89	10-Oct-89	<5.0	<0.05	<0.1	<0.1	<0.3	}
S-11-10.5	03-Oct-89	10-Oct-89	560.	3.9	2.1	17.	85.	}
SR-1-5.5	03-Oct-89	10-Oct-89	75.	<0.2	<0.3	0.6	2.	}
SR-1-10.5	03-Oct-89	10-Oct-89	550.	1.3	20.	14.	82.	}

TPH = Total Petroleum Hydrocarbons calculated as Gasoline
PPM = Parts Per Million
ND = None Detected

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

Project No. 7610-4

TABLE 2

GROUND-WATER CHEMICAL DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-1	03-Oct-89	04-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	29.31	19.36	----	9.95
S-2	03-Oct-89	04-Oct-89	0.37	0.012	0.019	0.013	0.078	27.91	17.94	sheen	9.97
S-3	03-Oct-89	----	----	----	----	----	----	27.56	17.51	0.04	10.08
S-4	03-Oct-89	04-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	28.08	17.07	----	11.01
S-5	03-Oct-89	04-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	27.42	16.90	----	10.52
S-6	03-Oct-89	06-Oct-89	5.9	1.6	0.033	0.058	0.1	26.59	16.77	----	9.82
S-7	03-Oct-89	04-Oct-89	0.96	0.11	0.008	0.013	0.046	27.33	15.78	----	11.55
S-8	03-Oct-89	04-Oct-89	1.6	0.022	0.11	0.053	0.24	25.97	15.38	----	10.59
S-9	03-Oct-89	06-Oct-89	<0.050	<0.0005	0.001	<0.001	0.003	25.86	15.08	----	10.78

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS

Benzene 0.001 ppm Xylenes 1.750 ppm Ethylbenzene 0.68 ppm

CURRENT DHS ACTION LEVELS

Toluene 0.100 ppm

TPH = Total Petroleum Hydrocarbons calculated as Gasoline
PPM = Parts per Million SF = Field Sample
SD = Duplicate Sample 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. Well S-3 contained floating product and was not sampled

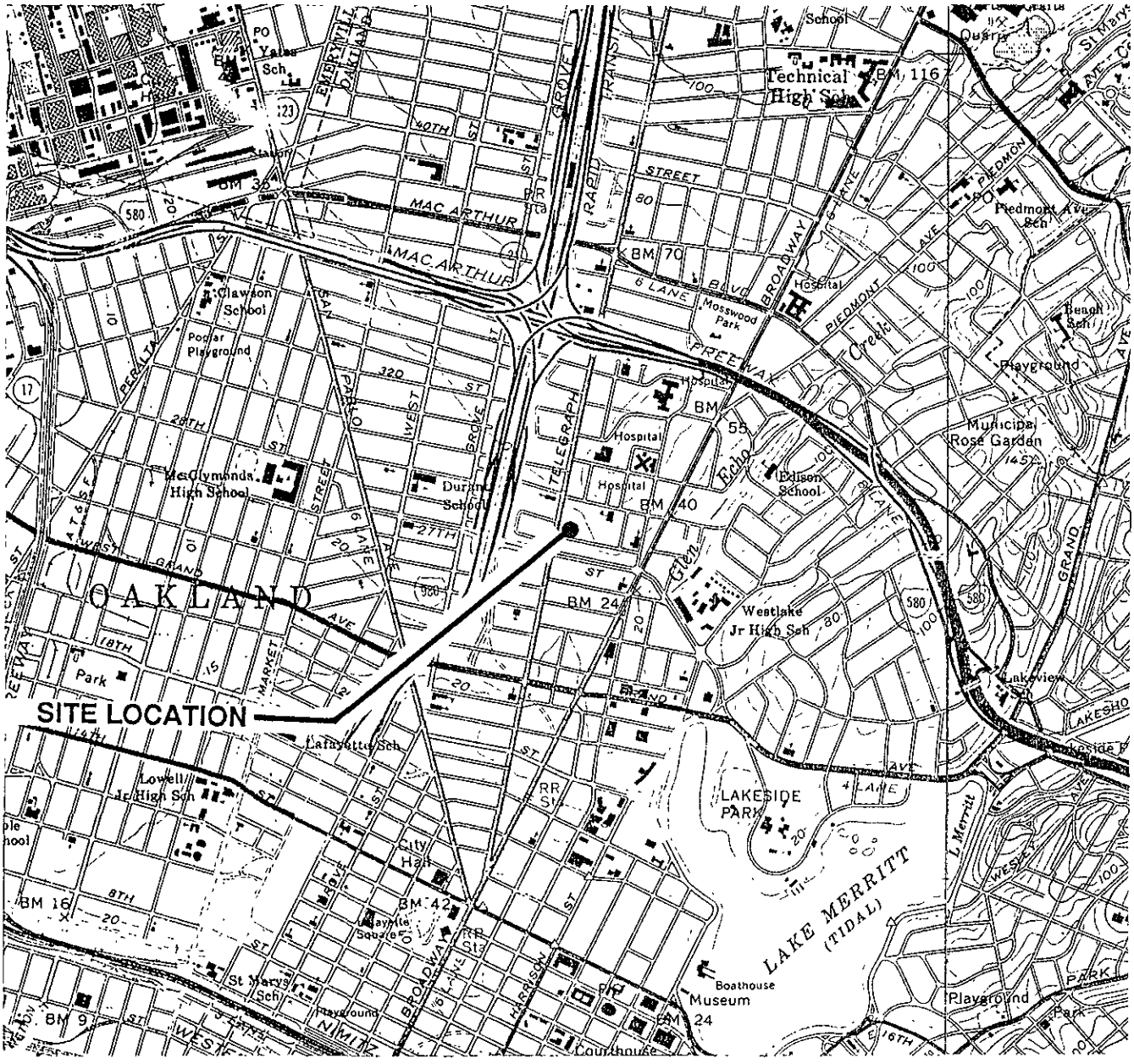
Project No. 7610-4

TABLE 2

GROUND-WATER CHEMICAL DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-10	03-Oct-89	05-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	26.95	18.03	----	8.92
S-11	16-Oct-89	18-Oct-89	0.65	0.042	0.047	0.024	0.16	24.78	14.51	----	10.27
SD-2	03-Oct-89	04-Oct-89	0.39	0.012	0.019	0.013	0.079	----	----	----	----
SF-6	03-Oct-89	05-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	----	----	----	----
TB	03-Oct-89	05-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	----	----	----	----
TB	16-Oct-89	18-Oct-89	<0.050	<0.0005	<0.001	<0.001	<0.003	----	----	----	----

ILLUSTRATIONS



Base Map: USGS Topographic Map

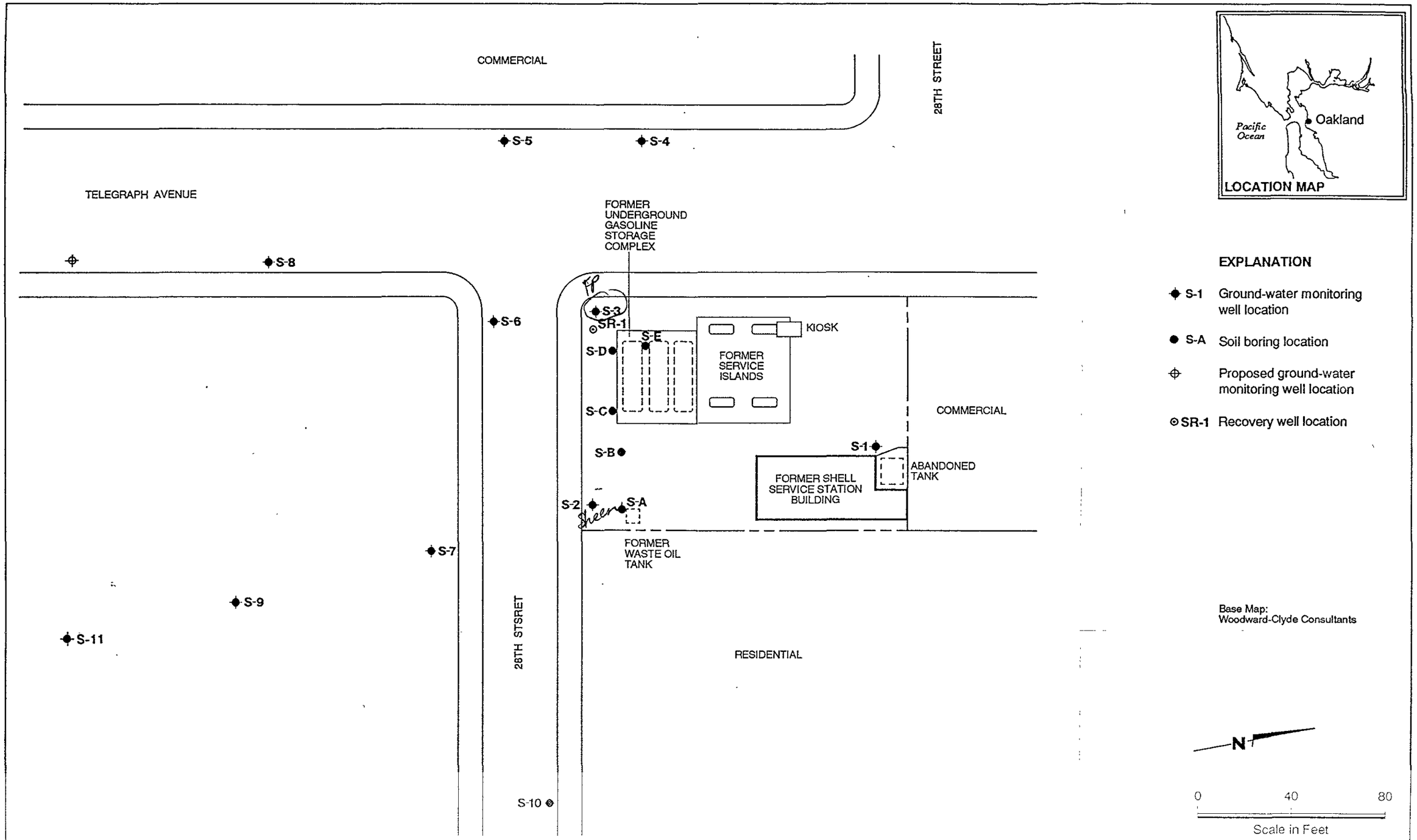
Approx. Scale: 1" = 2000'

GeoStrategies Inc.

Vicinity Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE **1**

JOBNUMBER	REVIEWEDBYRG/CEG	DATE	REVISEDDATE	REVISEDDATE
7610		12/89		

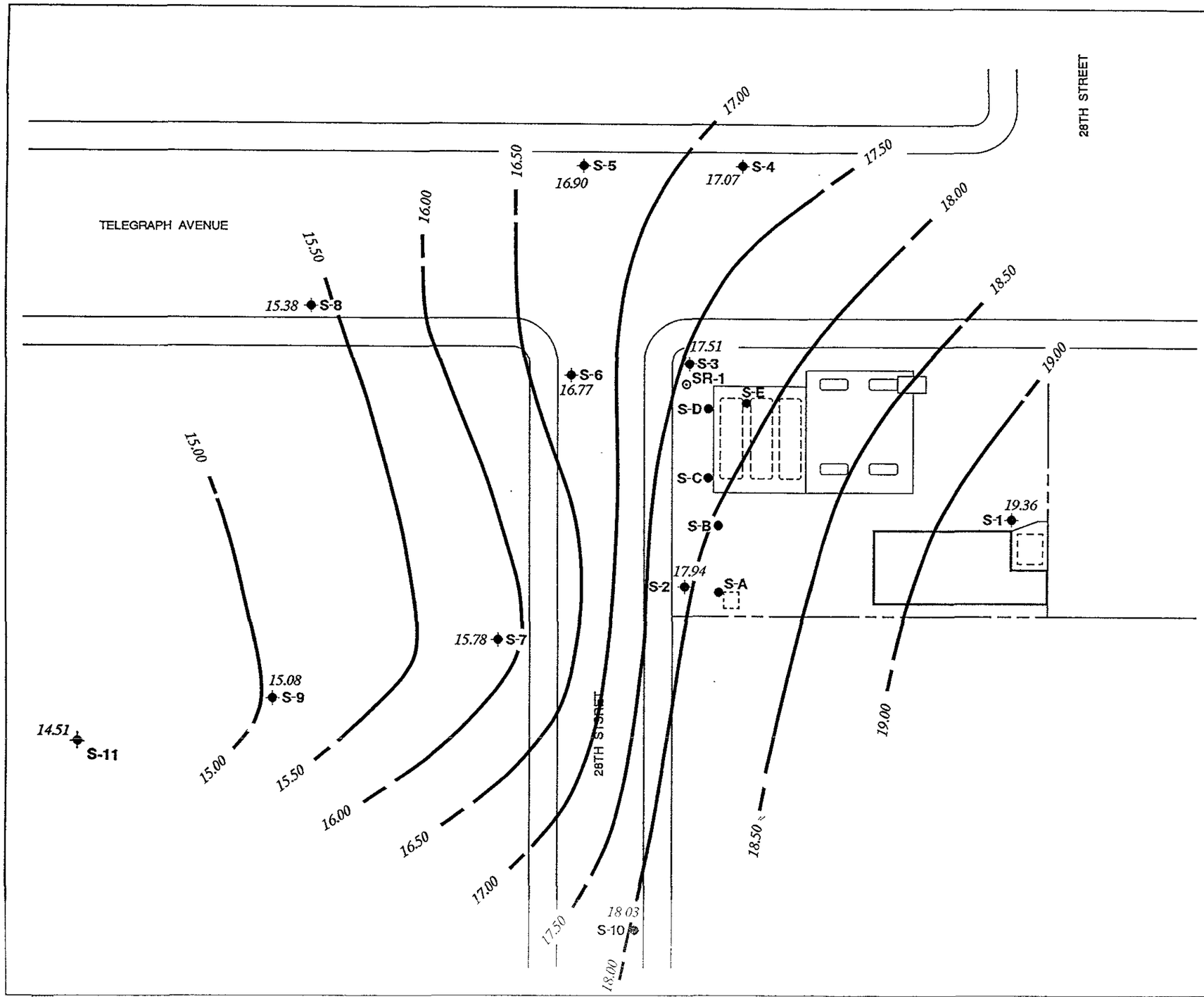


GeoStrategies Inc.

Site Plan
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE 2

JOB NUMBER	PREPARED BY	DATE	REVISED DATE	REVISED DATE
7610	DWP CEG 1262	12/89		



EXPLANATION

- S-1 Ground-water monitoring well location
- S-A Soil boring location
- 16.50 Ground-water elevation contour Approximate Gradient = 0.02
- 17.51 Ground-water elevation measured on October 3, 1989 in feet referenced to MSL (Mean Sea Level)

Note: Well S-11 measured October 16, 1989

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

Base Map:
Woodward-Clyde Consultants

N

0 40 80

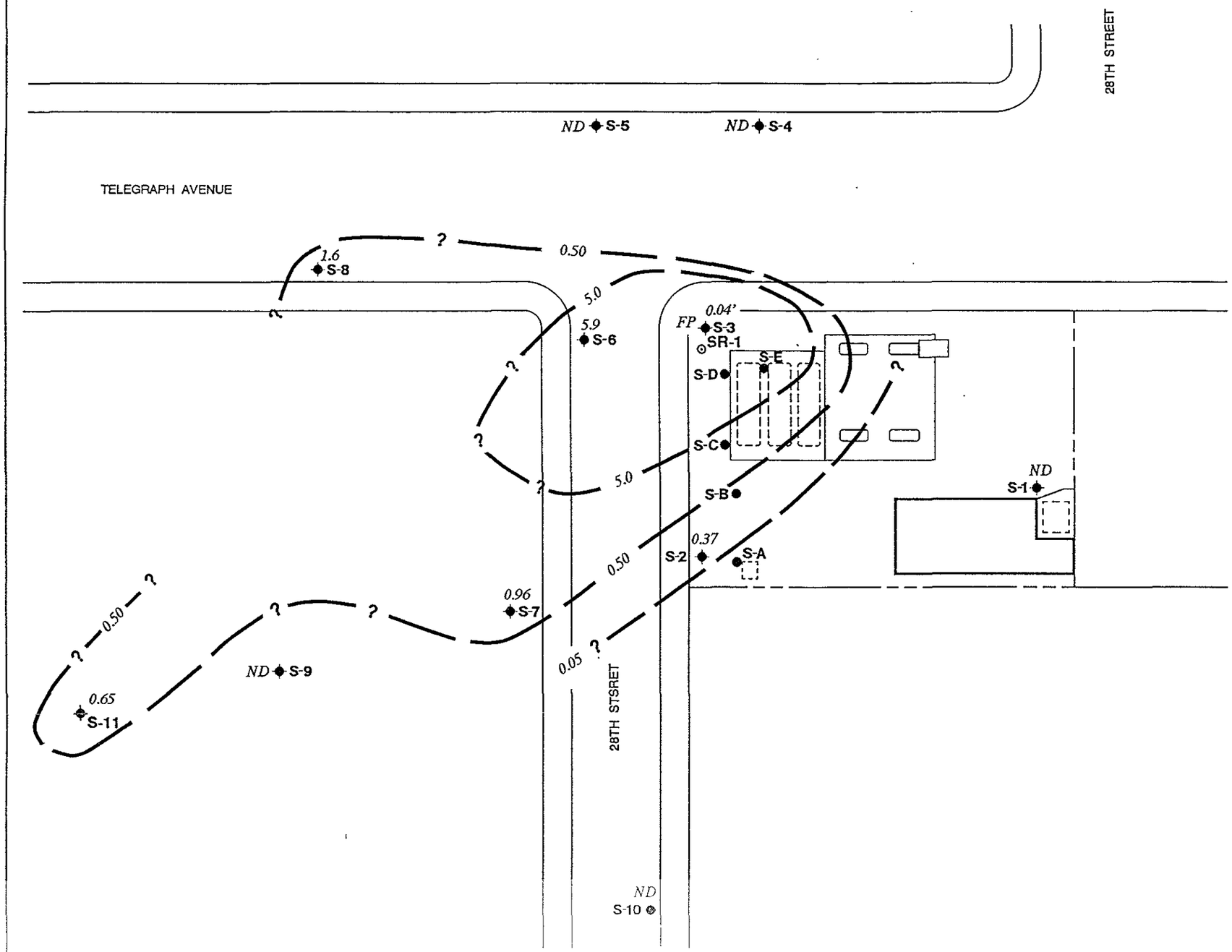
Scale in Feet

GSI GeoStrategies Inc.

Potentiometric Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

FIGURE
3

JOB NUMBER	REVIEWED BY	DATE	APPROVED	REVISED DATE
7610	[illegible] 1262	12/89		



EXPLANATION

- S-1 Ground-water monitoring well location
- S-A Soil boring location
- *5.9* TPH (Total Petroleum Hydrocarbon) concentration in ppm sampled October 3, 1989
- 0.50 TPH isoconcentration contour
- *ND* Not Detected (see laboratory reports for detection limits)
- *0.04'* Thickness of Floating Product in feet

Note: Well S-11 sampled October 16, 1989

Base Map: Woodward-Clyde Consultants

N

0 40 80

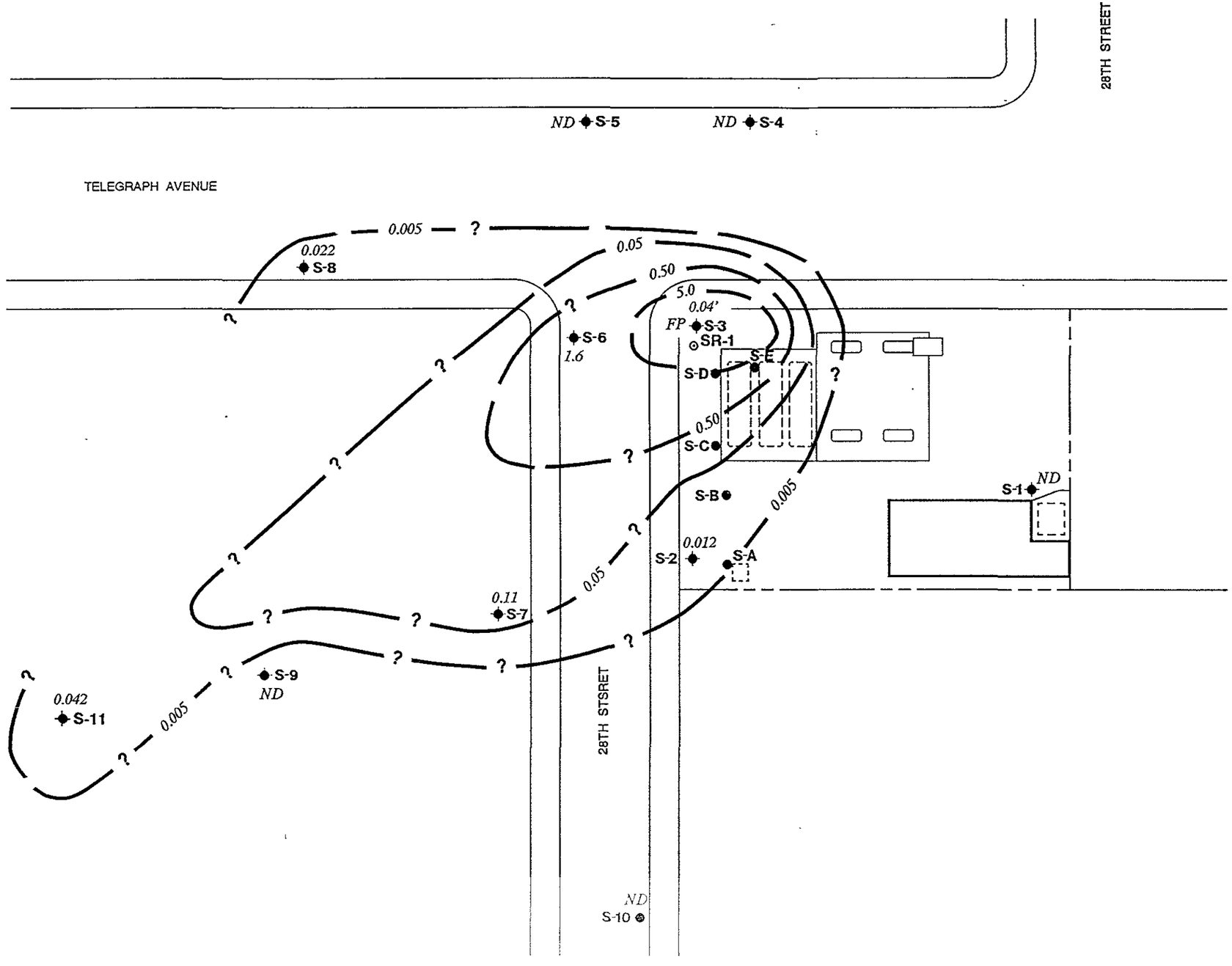
Scale in Feet

GeoStrategies Inc.

TPH Isoconcentration Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE 4

JOB NUMBER	REVISED BY TO GSI	DATE	REVISED DATE	REVISED DATE
7610	DWP CEG 1262	12/89		



EXPLANATION

- S-1 — Ground-water monitoring well location
- S-A — Soil boring location
- *1.6* — Benzene concentration in ppm sampled October 3, 1989
- 0.50 — Benzene isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)
- *0.04'* — Thickness of Floating Product in feet

Note: Well S-11 sampled October 16, 1989

Base Map: Woodward-Clyde Consultants

N

0 40 80

Scale in Feet

GSI GeoStrategies Inc.

Benzene Isoconcentration Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE 5

JOB NUMBER	REVIEWED by RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CEG 1262	12/89		

APPENDIX A
FIELD METHODS AND PROCEDURES

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.

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)

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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.

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.

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.

TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

Parameter	Analytical Method	Reporting Units	Container	Preservation	Maximum Holding Time
Total Petroleum Hydrocarbons (gasoline)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon	cool, 4 C HC1 to pH<2	14 days (maximum)
Benzene Toluene Ethylbenzene Xylenes (BTEX)	EPA 8020	mg/l ug/l mg/l	50 ml. vial glass, Teflon lined septum 1 l glass, Teflon	cool, 4 C HC1 to pH<2	7 days (w/o preservative) 14 days (w preservative)
Oil & Grease	SM 503E	ug/l	lined septum	H2SO4 to pH<2	28 days (maximum)
Total Petroleum Hydrocarbons (Diesel)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Halogented Volatile Organics (chlorinated solvents)	8010	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Non chlorinated solvents	8020	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	14 days (maximum)
Volatile Organics	8240	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Semi-Volatile Organics	8270	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool , 4 C	14 days (maximum)
Specific Conductance (Field test)		umhos/cm			
pH (Field test)		pH units			
Temperature (Field test)		Deg F			

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FIELD EXPLORATORY BORING LOG

Field location of boring:

Project No.:	Date:	Boring No:
Client:		
Location:		
City:		Sheet of
Logged by:	Driller:	
Casing installation data:		
Top of Box Elevation:	Datum:	

Drilling method:

Hole diameter:

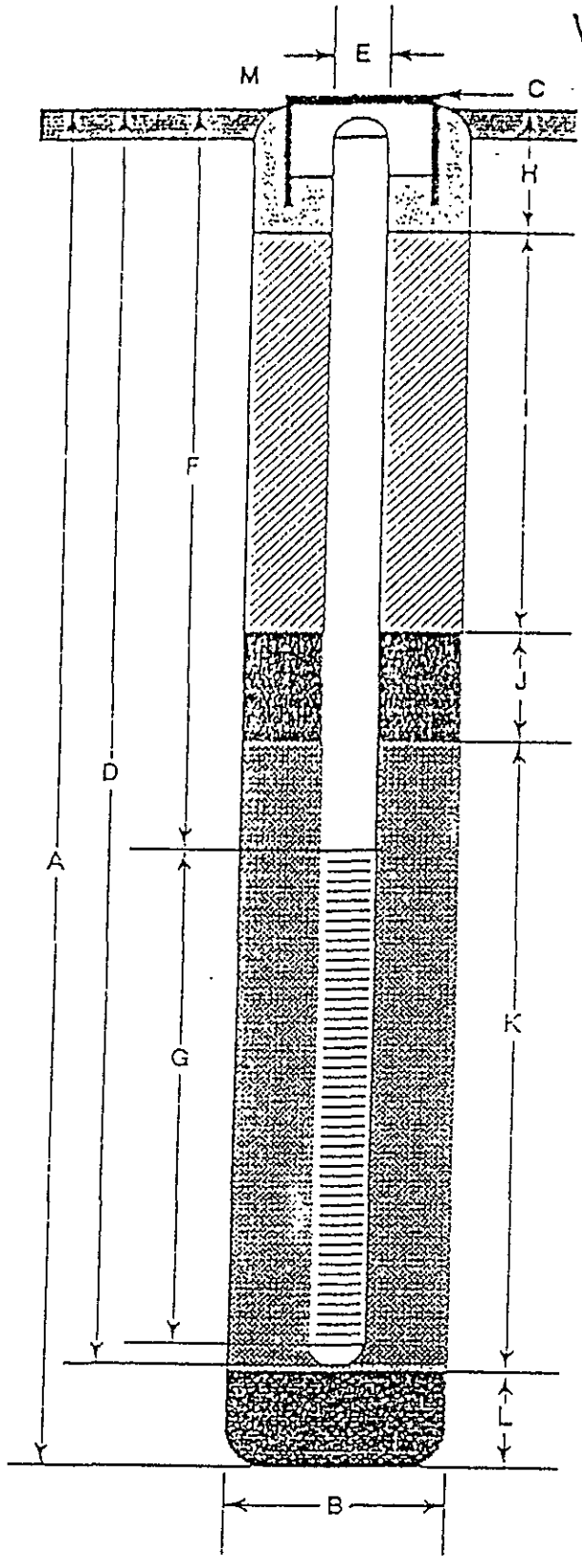
Water Level				
Time				
Date				

FID (ppm)	Blowcnt. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Visit 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 _____

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Well Construction Detail

WELL NO.

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

FIGURE 2

CUTTLER-RYAN INC.
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WELL SAMPLING FIELD DATA SHEET

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ 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		

Depth to Liquid- _____ ft.

(# 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

$V = \pi(r/12)^2 h(\_\_\_\ \text{\# vol})(7.48) = \_\_\_\_\_$ /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 Initials Measured Water Column 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%
Temperature:	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

APPENDIX B
EXPLORATORY BORING LOGS
WELL CONSTRUCTION DETAILS

Field location of boring: (See Plate 2)	Project No.: 7610	Date: 10/03/89	Boring No: S-11
	Client: Shell Oil Company		
	Location: 2800 Telegraph Avenue		
	City: Oakland, California		Sheet 1 of 2
	Logged by: T.J.W.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data: (See Well Completion Detail)		
Hole diameter: 8-Inch	Top of Box Elevation: 24.78	Datum: MSL	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Water Level / Time / Date	Description
									PAVEMENT SECTION - 3 inches
				1					FILL - Clay with Silt (CL) - very dark brown (10YR 2/2); no chemical odor.
				2					
				3					
				4					CLAYEY SAND (SC) - very dark grayish brown (2.5Y 3/2), medium dense, damp , 45% clay; no chemical odor
	100	S&H							
7	150	push	S-11-	5					
	200		5.5						
				6					
				7					
				8					weak chemical odor at 7.0 feet.
				9					
	100	S&H							
400	150	push	S-11-	10					COLOR CHANGE to light olive brown (2.5Y 5/4); strong chemical odor.
	150		10.5						
				11					
				12					
				13					
				14		▽			
	12	S&H							
70	22		S-11-	15					SAND with GRAVEL (SW) - olive yellow (2.5Y 6/6), dense, saturated; 50-60% fine to coarse sand; 20-25% subangular fine gravel; weak chemical odor.
	13		15.5						
				16					
				17					CLAYEY SAND (SC) - yellowish brown (10YR 5/6), dense, saturated; 20% clay; no chemical odor.
				18					
				19					

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. S-11

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CWP CEG 1262	10/89		

Field location of boring: (See Plate 2)	Project No.: 7610	Date: 10/03/89	Boring No: S-11
	Client: Shell Oil Company		
	Location: 2800 Telegraph Avenue		
	City: Oakland, California		Sheet 2 of 2
	Logged by: T.J.W.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data: (See Well Completion Detail)		
Hole diameter: 8-Inch	Top of Box Elevation: 24.78	Datum: MSL	
	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
	4	S&H						SANDY SILT (ML) - dark yellowish brown (10YR 4/6),
N/A	8		S-11-	20				mottled with light brownish gray (10YR 6/2), medium stiff,
	14		20.5					saturated; 65-75% silt; 25-30% very fine sand; no
				21				chemical odor.
								interbedded saturated lens of silty sand; 40-60% fine
				22				sand; 40-50% silt.
								GRAVEL with SAND (GW) - yellowish brown (10YR 5/8),
				23				loose, saturated; 70-75% fine gravel; 20-25% coarse to
								fine sand; no chemical odor.
				24				SILTY SAND (SM) - yellowish brown (10YR 5/8), loose,
	5	S&H						saturated; 60-70% medium to fine sand.
N/A	5		S-11-	25				SANDY SILT (ML) - yellowish brown (10YR 5/8), medium
	6		25					stiff saturated; 30% fine sand; no chemical odor.
				26				SILTY SAND (SM) - brownish yellow (10YR 6/8), medium
								dense, saturated; 60-70% very fine sand; 20-30% silt;
				27				trace clay; no chemical odor.
				28				
				29				SILT with CLAY (ML) - grayish brown (10YR 5/2), stiff,
	6	S&H						damp; 70-80% silt; 10-20% clay; low plasticity; trace
N/A	10		S-11-	30				sand; no chemical odor.
	17		30.5					
				31				Bottom of boring at 30.5 feet.
								Bottom of sample at 30.5 feet.
				32				10/03/89
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

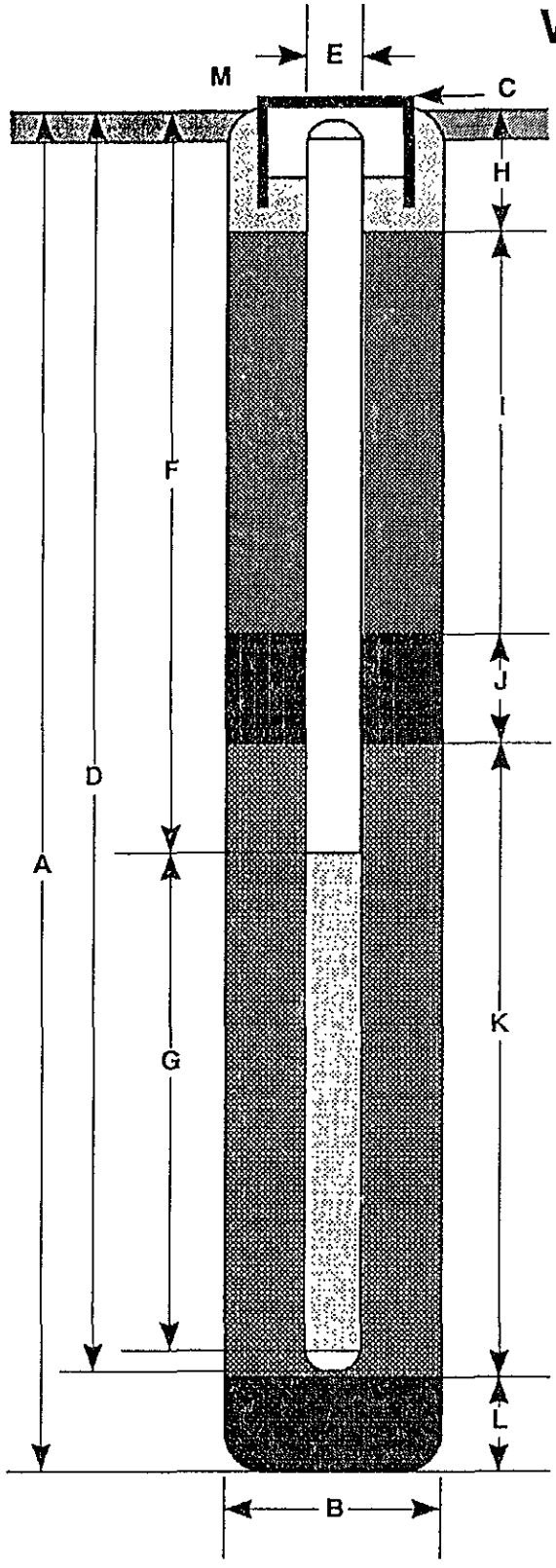
GeoStrategies Inc.

Log of Boring

BORING NO. S-11

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CMP CEG 1262	10/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 30.5 ft.

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

C Top of Box Elevation 24.78 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 19.0 ft.
Material Schedule 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 9 ft.

G Perforated Length 10 ft.
Perforated Interval from 9 to 19 ft.
Perforation Type Machine Slot
Perforation Size 0.020 in.

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

I Backfill from 1.5 to 5 ft.
Backfill Material Cement Grout

J Seal from 5 to 7 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 7 to 19 ft.
Pack Material Lonestar 2/12 Sand

L Bottom Seal 11.5 ft.
Seal Material Bentonite Pellets

M

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO. S-11

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CMP CEG 1262	10/89		

Field location of boring: (See Plate 2)	Project No.: 7610	Date: 10/03/89	Boring No.: SR-1
	Client: Shell Oil Company		
	Location: 2800 Telegraph Avenue		
	City: Oakland, California		Sheet 1 of 2
	Logged by: T.J.W.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data: (See Well Completion Detail)		
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
				1				FILL - Gravels, Sands, Silts, Clays (GM) - very dark brown (10YR 2/2), stiff, damp; no chemical odor.
96								
				2				
				3				Pea Gravel
				4				
	100	S&H						CLAYEY SILT with SAND (ML) - very dark grayish brown (10YR 3/2), medium stiff, damp; moderate chemical odor.
130	100	push	SR-1-	5				
	150		5.5					
				6				
				7				
				8				
				9				
	100	S&H						
295	100	push	SR-1-	10				COLOR CHANGE to olive (2.5 4/4), medium stiff, damp; mottled with gray; moderate to strong chemical odor.
	100		10.5					
				11				
				12				
				13				
						▽		
				14				SAND (SP) - very dark grayish brown (2.5Y 3/2), medium dense, saturated; medium sand; trace silt; no chemical odor.
	5	S&H						
19.0	10		SR-1-	15				
	19		15.5					
				16				
				17				
								SAND with GRAVEL (SW) - brown (10YR 5/3), medium dense, saturated; 25-30% fine gravel.
				18				
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CMP CEG 1262	10/89		

Field location of boring:	Project No.: 7610	Date: 10/03/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		SR-1
	Location: 2800 Telegraph Avenue		
	City: Oakland, California		Sheet 2 of 2
	Logged by: T.J.W.	Driller: Bayland	

Casing installation data: (See Well Completion Detail)

Drilling method: Hollow-Stem Auger

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
	7	S&H						
N/A	7		SR-1-	20				
	9		20.5					
				21				
				22				
				23				
				24				
	2	S&H						COLOR CHANGE to yellowish brown (10YR 5/6); 15-25% fine gravel; no chemical odor.
N/A	7		SR-1-	25				
	8		25.5					
				26				
				27				
				28				
				29				
	3	S&H						SILTY SAND (SM) - yellowish brown (10YR 5/4), loose, saturated; very fine sand; 20-30% silt; no chemical odor.
N/A	5		SR-1-	30				
	19		30.5					
				31				GRAVEL with SAND (GW) - yellowish brown (10YR 5/6), medium dense, saturated; fine gravel; 20-30% fine to coarse sand; no chemical odor.
				32				
				33				
				34				
	8	S&H						SAND with SILT and GRAVEL (SW) - brown (10YR 5/3), dense, saturated; 50-60% very fine sand; 15% fine gravel; 15% silt; rootholes contained moisture; trace clay; no chemical odor.
N/A	14		SR-1-	35				
	20		35.5					
				36				
				37				Bottom of boring at 35.5 feet.
				38				Bottom of sample at 35.5 feet. 10/03/89
				39				

Remarks:

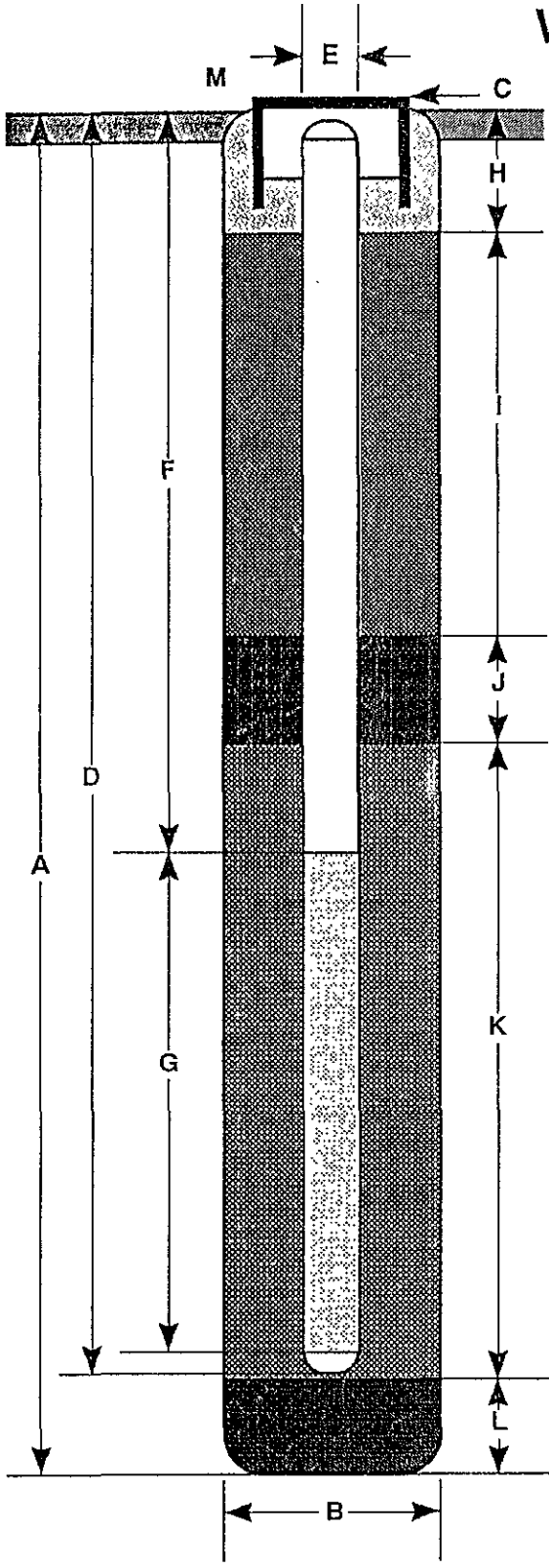
GeoStrategies Inc.

Log of Boring

BORING NO. SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CWP CEG 1262	10/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 35 ft.

B Diameter of Boring: 20 in.
Drilling Method: Bucket Auger

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

D Casing Length: 35 ft.
Material: Schedule 40 PVC

E Casing Diameter: 6 in.

F Depth to Top Perforations: 10 ft.

G Perforated Length: 25 ft.
Perforated Interval from 10 to 35 ft.
Perforation Type: Machine Slot
Perforation Size: 0.020 in.

H Surface Seal from 0 to 1 ft.
Seal Material: Concrete

I Backfill from 1 to 51/2 ft.
Backfill Material: Cement Grout

J Seal from 51/2 to 61/2 ft.
Seal Material: Bentonite pellets

K Gravel Pack from 61/2 to 35 ft.
Pack Material: Lonestar #2/12 sand

L Bottom Seal: ____ ft.
Seal Material: ____

M Christy Box

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

WELL NO.
SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	RG CEG 12/92	10/89		

APPENDIX C
SIEVE ANALYSIS

Kaldveer Associates
Geoscience Consultants

RECEIVED
OCT 20 1989

GeoStrategies Inc.

TRANSMITTAL

TO Geostrategies
2140 West Winton Ave
Hayward, CA 94545

DATE 10-17-89
VIA Mail
JOB NO. L136-4

ATTENTION Mr John Werfal

PROJECT 7610

DESCRIPTION Combined Sieve Analysis & Hydrometer on 2 Samples submitted on 10/11/89

ACTION
- ☐ As requested
- ☐ For your review and comment
- ☒ For your use
- ☐ For your use: please return when finished
- ☐ Other

Note: Finer grained portions of the samples were used for above tests in accordance with your request

cc:

KALDVEER ASSOCIATES

By

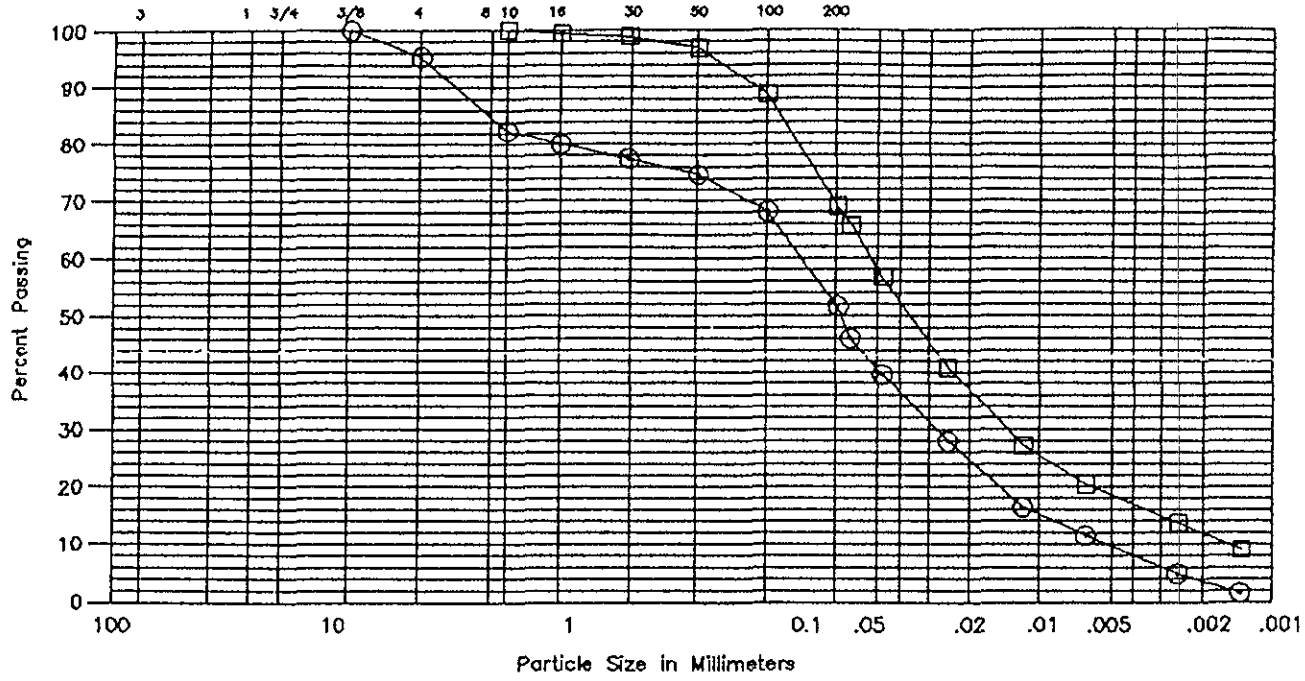
If enclosures are not as noted, kindly notify us at once.

425 Roland Way • Oakland, California 94621 • (415) 568-4001

UNIFIED SOIL CLASSIFICATION SYSTEM

(ASTM D 422-72)

U S STANDARD SIEVE SIZES



gravel		sand			silt and clay
coarse	fine	coarse	medium	fine	

KEY SYMBOL	BORING NO.	SAMPLE DEPTH (feet)	ELEV. (feet)	UNIFIED SOIL CLASSIFICATION SYMBOL	SAMPLE DESCRIPTION
○	1	25.5		CL/SC	Tan Brown Sandy Silty Clay
□	1	30.5		CL	Tan Brown Silty Clay w/ Sand

Kaldveer Associates
Geoscience Consultants
A California Corporation

GRADATION TEST DATA

GSI # 7610

PROJECT NO.	DATE	Figure
L 136-4		

APPENDIX D
CHEMICAL ANALYTICAL REPORT

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545
ATTN: John Werfal

Date: October 27, 1989

Work Order Number: S9-10-056

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7610, Shell #1074, Telegraph/ 28th, Oakland, CA
Date Received by Lab:	10/05/89
Number of Samples:	4
Sample Type:	Soil

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
1 Page Following - Table of Results

Date: October 27, 1989
Client Project ID: GR #7610, Shell #1074, Telegraph/ 28th, Oakland, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-056

Lab Sample ID	Client Sample ID	Sample Date	Extraction Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-056-01	S-11-5.5	10/03/89	10/09/89	10/10/89	Cool
S9-10-056-02	S-11-10.5	10/03/89	10/09/89	10/10/89	Cool
S9-10-056-03	SR-1-5.5	10/03/89	10/09/89	10/10/89	Cool
S9-10-056-04	SR-1-10.5	10/03/89	10/09/89	10/10/89	Cool

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Kilogram

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-10-056-01	S-11-5.5	ND	ND	ND	ND	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-10-056-02	S-11-10.5	560.	3.9	2.1	17.	85.
Detection Limit		53.	0.5	1.	1.	3.
S9-10-056-03	SR-1-5.5	75.	ND	ND	0.6	2.
Detection Limit		17.	0.2	0.3	0.3	1.
S9-10-056-04	SR-1-10.5	550.	1.3	20.	14.	82.
Detection Limit		50.	0.5	1.	1.	3.

APPENDIX E
GETTLER-RYAN GROUNDWATER SAMPLING REPORT

gettler — ryan inc.

October 30, 1989

GROUNDWATER SAMPLING REPORT

Referenced Site: Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

Sampling Date: October 3 & 16, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 3 and 16, 1989 at the referenced location. The site, located on the northeast corner of Telegraph and 28th Avenue, is no longer an operating service station. The former station had underground storage tanks which contained petroleum products.

There are currently three groundwater monitoring wells on site and eight off site at the locations shown on the attached site map. The recently installed well, S-11 was monitored and sampled on October 16, 1989. Prior to sampling, the wells were inspected for total well depth, water levels, and presence of separate phase product using an electronic interface probe. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase product. Groundwater depths ranged from 8.92 to 11.55 feet below grade. Separate phase product was observed in monitoring well S-3.

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 contained in drums 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. A field blank (SF-6), and trip blank, supplied by the laboratory, were included and analyzed to assess quality control. A duplicate sample (SD-2), was submitted without well designation, to assess laboratory performance. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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

The samples were analyzed at International Technology Corporation - Santa Clara Valley Laboratory located at 2055 Junction Avenue, San Jose, California. The laboratory is assigned a California DHS-HMTL Certification number of 137. 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

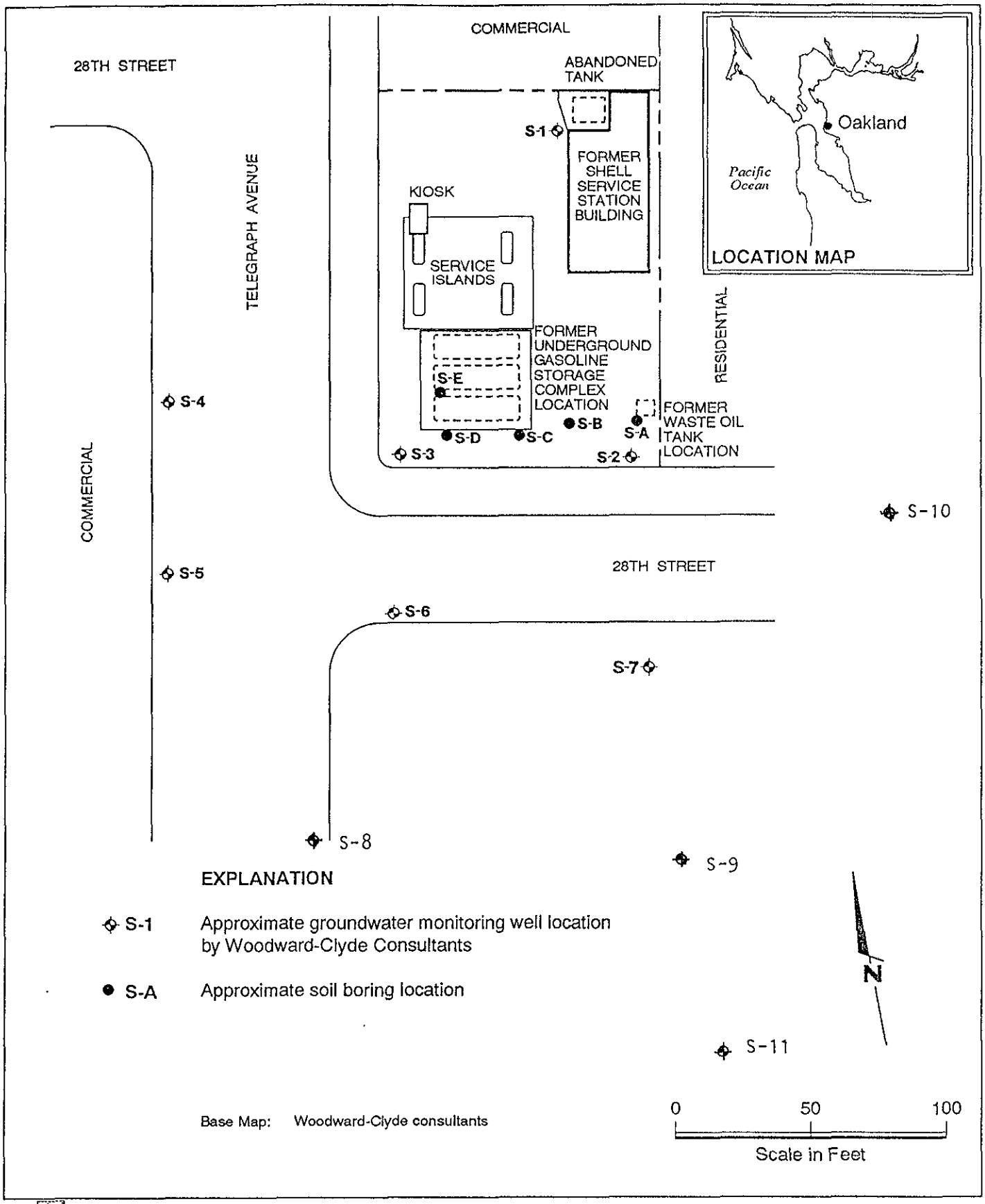
WELL I.D.	S-1	S-2 SD-2	S-3	S-4	S-5	S-6
	10-3-89	10-3-89	10-3-89	10-3-89	10-3-89	10-3-89
Casing Diameter (inches)	3	3	3	3	3	3
Total Well Depth (feet)	28.0	25.6	----	29.1	30.6	22.2
Depth to Water (feet)	9.95	9.97	10.08	11.01	10.52	9.82
Free Product (feet)	none	sheen	0.04	none	none	none
Reason Not Sampled	----	----	free product	----	----	----
Calculated 4 Case Vol.(gal.)	27.4	24.0	----	29.0	30.4	18.8
Did Well Dewater?	no	yes	----	yes	no	yes
Volume Evacuated (gal.)	36	15	----	13	39	12
Purging Device	Suction	Suction	----	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	----	Bailer	Bailer	Bailer
Time	13:09	13:27	----	11:59	12:21	11:36
Temperature (F)*	66.3	68.0	----	70.2	70.6	72.9
pH*	6.19	6.40	----	6.71	6.58	6.54
Conductivity (umhos/cm)*	468	631	----	436	139	846

* Indicates Stabilized Value

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-7	S-8	S-9	S-10	S-11
	10-3-89	10-3-89	10-3-89	10-3-89	10-16-89
Casing Diameter (inches)	3	3	3	3	3
Total Well Depth (feet)	30.8	19.3	30.1	24.3	19.2
Depth to Water (feet)	11.55	10.59	10.78	8.92	10.27
Free Product (feet)	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	29.2	13.2	29.4	23.2	17.0
Did Well Dewater?	no	no	no	yes	yes
Volume Evacuated (gal.)	38	17	37	11	18
Purging Device	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer
Time	10:08	11:15	10:25	10:49	09:18
Temperature (F)*	71.0	74.3	71.1	69.4	69.3
pH*	6.33	6.42	6.63	6.82	7.05
Conductivity (umhos/cm)*	750	626	703	213	524

* Indicates Stabilized Value



GeoStrategies Inc.

Site Plan
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
610		6/89		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545
ATTN: John Werfal

Date: October 16, 1989

Work Order Number: S9-10-023

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3610, Shell, 2800 Telegraph Ave/ 28th St., Oakland, CA
Date Received by Lab:	10/03/89
Number of Samples:	12
Sample Type:	Water

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
2 Pages Following - Tables of Results

Date: October 16, 1989
Client Project I: GR #3610, Shell, 2800 Telegraph Ave/ 28th St., Oakland, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-023

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-023-01	S-1	10/03/89	10/04/89	Cool, pH≤2
S9-10-023-02	S-2	10/03/89	10/04/89	Cool, pH≤2
S9-10-023-03	S-4	10/03/89	10/04/89	Cool, pH≤2
S9-10-023-04	S-5	10/03/89	10/04/89	Cool, pH≤2
S9-10-023-05	S-6	10/03/89	10/06/89	Cool, pH≤2
S9-10-023-06	S-7	10/03/89	10/04/89	Cool, pH≤2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-10-023-01	S-1	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-023-02	S-2	0.37	0.012	0.019	0.013	0.078
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-023-03	S-4	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-023-04	S-5	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-023-05	S-6	5.9	1.6	0.033	0.058	0.10
Detection Limit		0.25	0.02	0.005	0.005	0.02
S9-10-023-06	S-7	0.96	0.11	0.008	0.013	0.046
Detection Limit		0.050	0.0005	0.001	0.001	0.003

Date: October 16, 1989
Client Project ID: GR #3610, Shell, 2800 Telegraph Ave/ 28th St., Oakland, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-023

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-023-07	S-8	10/03/89	10/04/89	Cool, pH<2
S9-10-023-08	S-9	10/03/89	10/06/89	Cool, pH<2
S9-10-023-09	S-10	10/03/89	10/05/89	Cool, pH<2
S9-10-023-10	SD-2	10/03/89	10/04/89	Cool, pH<2
S9-10-023-11	SF-6	10/03/89	10/05/89	Cool, pH<2
S9-10-023-12	TRIP BLANK		10/05/89	Cool, pH<2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-10-023-07	S-8	1.6	0.022	0.11	0.053	0.24
S9-10-023-08	S-9	ND	ND	0.001	ND	0.003
S9-10-023-09	S-10	ND	ND	ND	ND	ND
S9-10-023-10	SD-2	0.39	0.012	0.019	0.013	0.079
S9-10-023-11	SF-6	ND	ND	ND	ND	ND
S9-10-023-12	TRIP BLANK	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545
ATTN: John Werfal

Date: October 23, 1989

Work Order Number: S9-10-191

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3610-2, Shell, 2800 Telegraph/28th Oakland, CA
Date Received by Lab:	10/17/89
Number of Samples:	2
Sample Type:	Water

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
1 Page Following - Table of Results

Date: October 23, 1989
Client Project ID: GR #3610-2, Shell, 2800 Telegraph/ 28th, Oakland, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-191

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-191-01	S-11	10/16/89	10/18/89	Cool, pH≤2
S9-10-191-02	TRIP BLANK	10/16/89	10/18/89	Cool, pH≤2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-10-191-01	S-11	0.65	0.042	0.047	0.024	0.16
S9-10-191-02	TRIP BLANK	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003

Gettler - Ryan Inc. ENVIRONMENTAL DIVISION 1215 Chain of Custody

COMPANY Shell Oil Co. JOB NO.

JOB LOCATION 2800 Telegraph Ave / 28th St.

CITY Oakland, Ca PHONE NO. (415) 783-7500

AUTHORIZED John Werfal DATE 10-3-89 P.O. NO. 3610

SAMPLE ID	NO OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-1	3	liquid	10-3-89 / 13:09	THC (gas) BTXE	
S-2	3		13:20		
S-4	3		11:59		
S-5	3		12:21		
S-6	3		11:36		
S-7	3		10:08		
S-8	3		11:15		
S-9	3		10:25		
S-10	3		10:49		
SD-2	3		/ —		
SF-6	3		/ —		
Trip Blank	2		10-3-89 / —		

RELINQUISHED BY: John P. Zuccarello

Kelly J Rye 10/3/89 1556

RECEIVED BY:

RELINQUISHED BY.

RECEIVED BY:

RELINQUISHED BY.

RECEIVED BY LAB: 10/3/89 1600

DESIGNATED LABORATORY: IT (SCV) DHS #: 137

REMARKS: Results Due 10-10-89

Normal TAT

DATE COMPLETED 10-3-89 FOREMAN Kelly J Rye

ORIGINAL

Gettler - Ryan Inc. ENVIRONMENTAL DIVISION — 1245 Chain of Custody

COMPANY Shell Oil Co. JOB NO.

JOB LOCATION ~~5251 Hopyard/Owen~~ 2800 Telegraph / 28th

CITY Oakland, CA PHONE NO. 738-7500

AUTHORIZED John Werfal DATE 10-16-89 P.O. NO. 3610-2

SAMPLE ID	NO OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-11	3	liquid	10-16-89/9:18	THC (g,as) BTXE	OK/cool
TripBlank	1	liquid	10-16-89	↓	↓

WIC # 204-5508-2303

AFE 986630

Expense 5440

Diane Lundquist

RELINQUISHED BY: John J. Zwerzyski

RELINQUISHED BY: 10/17/89 11:05

RELINQUISHED BY:

RECEIVED BY: 10/17/89 0735

RECEIVED BY:

RECEIVED BY LAB: 10/17/89 1105

DESIGNATED LABORATORY: IT (SCV) DHS #: 137

REMARKS: Normal TAT

DATE COMPLETED 10-16-89 FOREMAN John J. Zwerzyski

ORIGINAL