GeoStrategies Inc.

QUARTERLY REPORT

JANUARY - MARCH 1990

Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

Report No. 7610-6

April 25, 1990

Shell Oil Company

EAST BAY
MARKETING DISTRICT

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

May 4, 1990

LOP 413

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

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

Dear Mr. Seto:

Enclosed is a of copy of the Quarterly Report, dated April 25, 1990, presenting the results of the groundwater sampling conducted during the first quarter of 1990 at the subject location.

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

DML/jw

enclosure

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

90 MAY -7 AM 11:53

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

April 25, 1990

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

Attn: Mr. John Werfal

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

Gentlemen:

This quarterly report has been prepared for the above referenced site, for the January through March, 1990 quarter.

If you have any questions, please call.

GeoStrategies Inc. by,

Timothy J. Walker
Geologist

for

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

Report No. 7610-6

1.0 INTRODUCTION

This Quarterly Ground-Water Sampling Report has been prepared for the former Shell Service Station located at 2800 Telegraph Avenue in Oakland, California (Plate 1).

This report describes the results of the first quarterly ground-water sampling for 1990 performed by Gettler-Ryan Inc. (G-R), in accordance with the current quarterly sampling plan for the site. G-R Field Methods and Procedures are presented in Appendix A. Field work and laboratory analysis methods were performed in compliance with current State of California Water Resources Control Board (SWRCB) procedures for conducting environmental investigations related to leaking underground fuel tanks. The field and chemical analytical data discussed in this report were collected between January 1, and March 31, 1990.

2.0 SITE HISTORY

In December 1987, one exploratory soil boring (S-A) was drilled adjacent to the waste oil tank, and four exploratory soil borings (S-B through S-E) were drilled adjacent to the underground gasoline storage tanks in order to document soil conditions prior to relinquishment of the property. Gasoline concentrations as high as 4,400 parts per million (ppm) and benzene concentrations ranging from 0.05 ppm to 26 ppm were reported. This work was performed by Pacific Environmental Group (PEG), and is discussed their report dated January 15, 1988.

In April 1988, three ground-water monitoring wells (S-1, S-2, and S-3) were installed. Laboratory analysis of soil samples collected from Wells S-2 and S-3 detected gasoline concentrations ranging from 5 ppm to 4,800 ppm. Ground-water samples contained concentrations of Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) ranging from 1,600 ppm in Well S-2 and 46,000 ppm in Well S-3. Low Boiling Hydrocarbons were not detected in water samples collected from Well S-1. These results are discussed in Woodward-Clyde Consultants (WCC) report dated June 17, 1988.

The underground storage tanks were removed in December 1988. During the tank removal, soil samples were collected by Kaprealian Engineering Inc. (KEI). TPH-Gasoline was noted in all the soil samples taken by KEI, with concentrations ranging from 71 ppm to 2,800 ppm. Benzene was detected in four of the soil samples, with concentrations ranging from 0.098 ppm to 0.85 ppm. This is discussed in a KEI report dated December 16, 1988.

Four additional ground-water monitoring wells (S-4 through S-7) were installed in October 1988, to further assess the lateral and downgradient extent of the hydrocarbon contamination. Laboratory analysis of ground-water samples collected from the wells at the time of installation indicated concentrations of TPH-Gasoline in Wells S-2, S-6, and S-7 ranging from 0.20 ppm to 5.5 ppm. Benzene concentrations in these wells ranged from 0.022 ppm to 1.7 ppm. This is discussed in the WCC report dated March 20, 1989.

Quarterly ground-water monitoring began in May 1988, by Blaine Tech Services, Inc. (Blaine). Quarterly monitoring of this site was taken over by G-R in November 1988. Ground-water sampling for the first quarter of 1989 was completed by G-R on February 22, 1989.

During the second quarter 1989, ground-water samples were collected by G-R from the monitoring well network (Wells S-1 through S-7). TPH-Gasoline concentrations ranged from 0.8 ppm (S-7) to 47 ppm (S-3). Benzene was also detected with concentrations ranging from 0.032 ppm (S-7) to 3.7 ppm (S-6). Wells S-1, S-4, and S-5 were reported as none detected (ND).

During July of the third quarter 1989, three additional monitoring wells (S-8, S-9, and S-10) were installed at the site. TPH-Gasoline was detected in only the 10 foot soil sample from Well S-9 at a concentration of 220 ppm. All other soil samples from Wells S-8 and S-10 were reported as ND. Ground-water samples collected in August from the monitoring well network contained chemical concentrations of TPH-Gasoline ranging from 0.43 ppm (S-2) to 7.1 ppm (S-6) and benzene ranging from 0.073 ppm (S-2) to 2.4 ppm (S-6). Well S-3 contained 0.03 feet of floating product and was not sampled.

During the fourth quarter 1989, one monitoring well (S-11) and one recovery well (SR-1) were installed at the site. Soil samples collected at 10.5 feet from both wells contained TPH-Gasoline concentrations at 560 ppm and 550 ppm, respectively. Ground-water samples were collected from the monitoring well network by G-R in October and contained TPH-Gasoline concentrations ranging from 0.37 ppm to 5.9 ppm. Benzene was also detected with concentrations ranging from 0.012 ppm to 1.6 ppm, respectively.

First quarter sampling results for 1990 are summarized in this report.

No other site history information is available to GSI at this time.

3.0 GROUND-WATER LEVEL MONITORING

3.1 Potentiometric Data

Prior to ground-water sampling, water levels were measured in each monitoring well using an electronic oil-water interface probe. Static water levels were measured from the surveyed top of well box and recorded to the nearest ±0.01 foot (Table 1). Plate 2 presents the location of each well at the site.

Ground-water elevation data for this quarter have been plotted and contoured and are presented on Plate 3. Depth to ground-water in the uppermost water-bearing strata ranged from 7.15 to 10.15 feet. Potentiometric data indicate that shallow groundwater beneath the site flows to the south with an approximate hydraulic gradient of 0.02. Water-level data used to prepare the quarterly potentiometric map were taken from data collected on the same day that ground-water sampling occurred.

Three hydrographs have been prepared using water-level historical data from Wells S-1 through S-6 and S-8 through S-10 (Plates 4-6). Plate 4 presents water-level data from Wells S-1, S-2 and S-3 collected from August 1988 to March 1990. Plate 5 presents water-level data from Wells S-4, S-5 and S-6 collected from November 1988 to March 1990. Plate 6 presents water-level data from Wells S-8, S-9 and S-10 from August 1989 to March 1990. As shown on the three hydrographs, ground-water elevations have historically fluctuated between approximately 21 feet and 27 feet above mean sea level (MSL). These historical ground-water elevations plots indicate slightly higher water elevations during peak winter and spring discharge and recharge of the uppermost water-bearing zone. Lower water elevations are observed during the drier summer and fall seasons. These trends are observed on all three plots. Chemical concentrations do not appear to correlate with water-level fluctuations. Historical monitoring data are presented in Appendix B.

3.2 Floating-Product Measurements

Each well was monitored for floating product using a portable oil-water interface probe and was measured to the nearest ±0.01 foot. Each well was also inspected using a clean, clear acrylic bailer to visually confirm interface probe results. Floating product was observed in well S-3 with a measured thickness of 0.01 feet.

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected by G-R from monitoring wells S-1, S-2, and S-4 through S-11 on January 16, 1990. Because Well S-3 contained 0.01 feet of floating product, it was not sampled. All 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. International Technology Analytical Services (IT), a State-certified analytical laboratory located in San Jose, California performed the analyses. The G-R Groundwater Sampling Report for the first quarter sampling performed in 1990 is presented in Appendix C.

Wells S-2, S-6, S-7, S-8, and S-11 were found to contain benzene at or above the current Regional Water Quality Control Board (RWQCB) Maximum Contaminant Level (MCL). As shown on Table 1, benzene concentrations in these wells were 0.075 ppm, 1.8 ppm, 0.001 ppm, 0.04 ppm and 0.027 ppm, respectively. Toluene concentrations in Wells S-6 (0.15 ppm), and S-8 (0.15 ppm) exceeded the current Department of Health Services (DHS) action level. The plume configuration beneath the site appears elliptical near the source area and elongated in the downgradient direction towards the south.

4.1 Quality Control

Quality Control (QC) samples for this quarter's ground-water sampling included a trip blank (TB), a field blank (SF-1), and a duplicate sample (SD-2). The trip was prepared in the IT Laboratory using organic-free water to evaluate laboratory handling and transport procedures. The field blank was prepared in the field using laboratory supplied organic-free water to evaluate sampling procedures. The duplicate sample was collected as a split (second sample) from Well S-2 to quantitatively evaluate the laboratory handling and analytical precision. The IT Laboratory chemical analytical report, G-R Ground-Water Sampling Forms and Chain-of-Custody Forms for this quarter's ground-water sampling are presented in Appendix C.

Chemical analytical results for the trip blank and field blank (ND) indicate that hydrocarbons were not introduced into samples during collection, transport to the laboratory, or from ambient field conditions. The analytical results from samples S-2 and SD-2 were evaluated for precision using the Relative Percent Difference (RPD) Method. The calculated RPD for TPH-Gasoline and benzene was 12.6% and 17.4%, respectively.

Water-quality data for this quarterly report are summarized in Table 1. TPH and benzene chemical analytical data were used to prepare isoconcentration maps for this quarter (Refer to Plates 7 and 8). Historical chemical analytical data are presented in Appendix D.

5.0 SUMMARY

A summary of activities and findings associated with this quarterly report are presented below:

- Water levels were measured on January 16, 1990, in selected monitoring wells and the data were used to construct a potentiometric map (Plate 3). A calculated hydraulic gradient of 0.02 flows to the south.
- Floating product was found in Well S-3 at 0.01 feet in measured thickness.
- TPH-Gasoline was detected in Wells S-2, S-6, S-7, S-8, and S-11 (Table 1) with concentrations ranging from 0.23 ppm to 5.9 ppm.
- Wells S-1, S-4, S-5, S-9 and S-10 were reported as ND for TPH-Gasoline and benzene.
- Benzene concentrations at or above the current RWQCB MCLs in Wells S-2, S-6, S-7, S-8, and S-11.
- Wells S-6 and S-8 contained Toluene concentrations that were above the current DHS action level.
- The plume configuration is somewhat elliptical beneath the site and elongated in the downgradient direction towards the south.

6.0 PLANNED SITE ACTIVITIES

The following activities are planned for the second quarter, April to June, 1990, at the site:

- All scheduled wells will be sampled and 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.

- Water levels will be measured monthly and selected data will be used to prepare a potentiometric map across the site. The local shallow ground-water gradient will also be calculated.

- Chemical data will be used to construct isoconcentration maps for TPH-Gasoline and Benzene.

- Complete the design of the remediation system which will be installed at the site upon the receipt of an East Bay Municipal Utility District (EBMUD) discharge permit. After the installation of the remediation system, aquifer tests (step and constant discharge) will be performed to assess site-specific aquifer characteristics. Remediation will begin concurrently with the aquifer tests.

- Install one additional monitoring well south of Well S-8 on Telegraph Avenue to further assess potential hydrocarbon migration in that direction. The proposed well location is shown on Plate 2.

TABLE 1

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	16-Jan-90	20-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	35.31	27.21	----	8.10
S-2	16-Jan-90	20-Jan-90	0.42	0.075	0.0099	0.032	0.052	33.91	26.65	----	7.26
S-3	16-Jan-90	----	----	----	----	----	----	33.56	26.04	0.01	7.52
S-4	16-Jan-90	20-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	34.08	23.93	----	10.15
S-5	16-Jan-90	20-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	33.42	23.60	----	9.82
S-6	16-Jan-90	22-Jan-90	5.9	1.8	0.15	0.16	0.41	32.59	24.48	----	8.11
S-7	16-Jan-90	20-Jan-90	0.23	0.0010	0.0018	0.0031	0.017	33.33	23.74	----	9.59
S-8	16-Jan-90	20-Jan-90	2.0	0.040	0.15	0.090	0.40	31.97	22.63	----	9.34
S-9	16-Jan-90	20-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	31.86	23.05	----	8.81
S-10	16-Jan-90	20-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	32.95	25.80	----	7.15

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

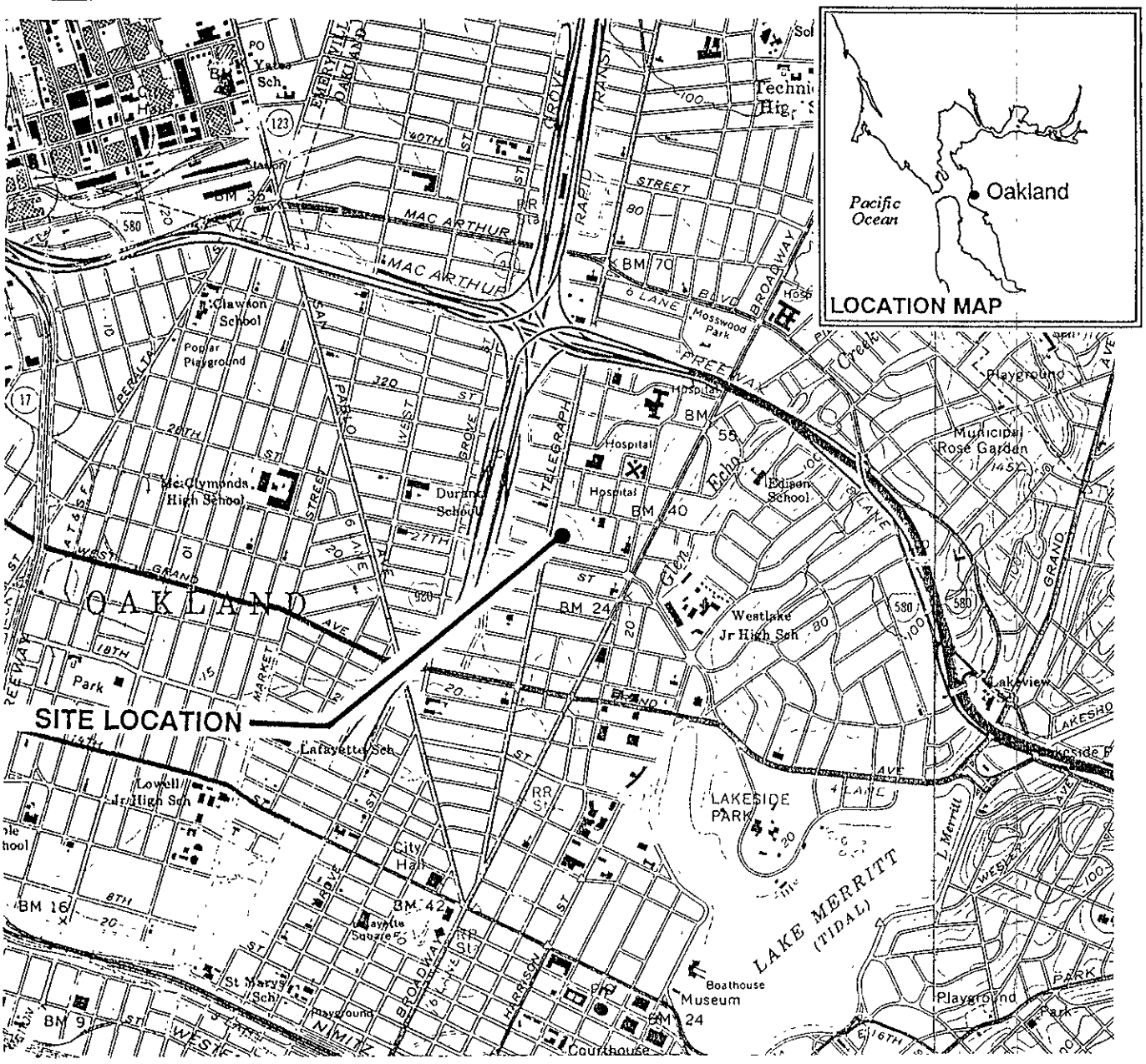
Project No. 7610-6

TABLE 1

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-11	16-Jan-90	22-Jan-90	0.35	0.027	0.035	0.020	0.11	30.78	22.53	----	8.25
SD-2	16-Jan-90	22-Jan-90	0.37	0.063	0.0089	0.026	0.042	----	----	----	----
SF-1	16-Jan-90	22-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	----	----	----	----
TB	16-Jan-90	22-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	----	----	----	----

ILLUSTRATIONS



Base Map: USGS Topographic Map

Approx. Scale: 1" = 2000'

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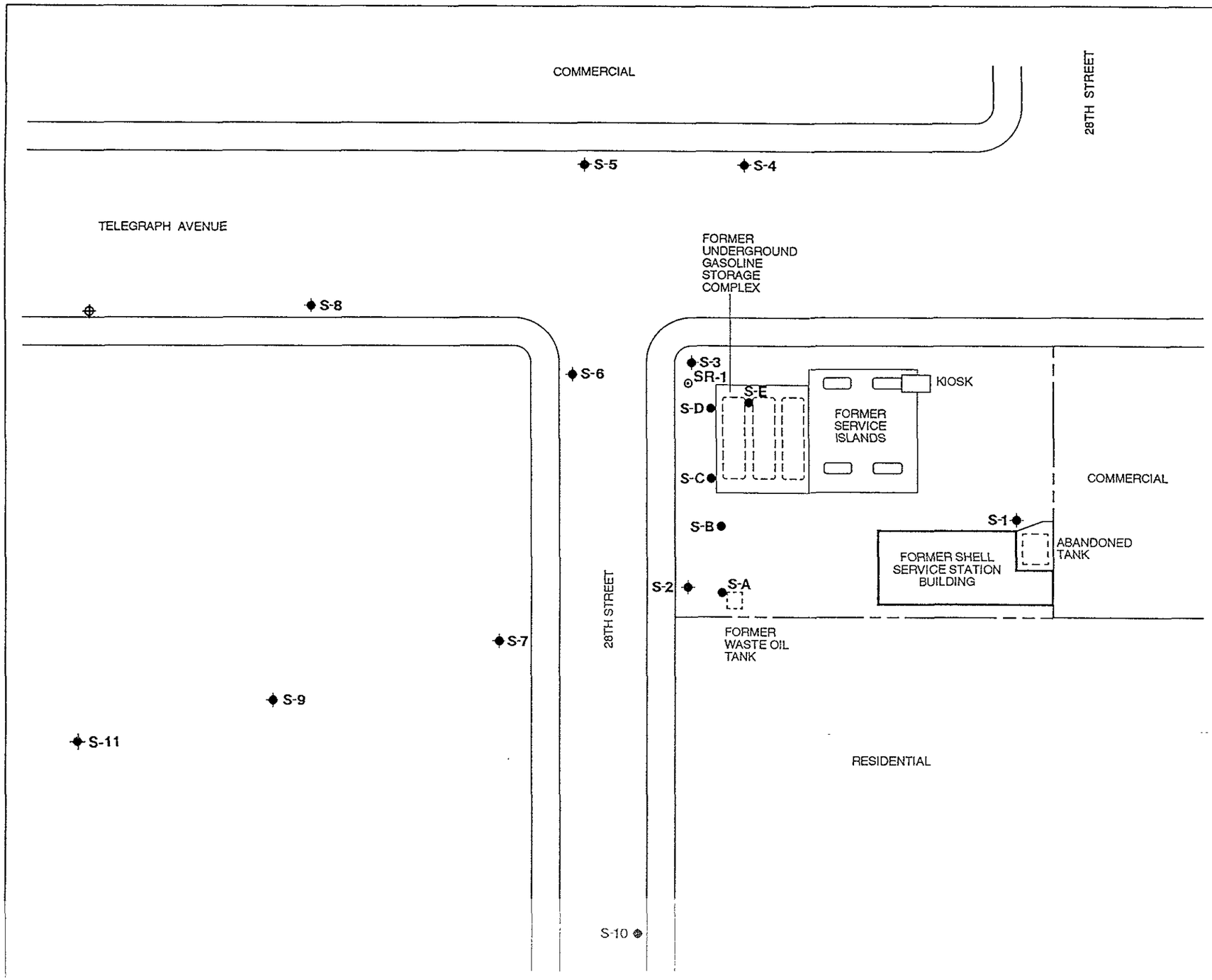
Vicinity Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE **1**

JOBNUMBER	REVIEWEDBYRG/CEG	DATE	REVISEDDATE	REVISEDDATE
7610		12/89		



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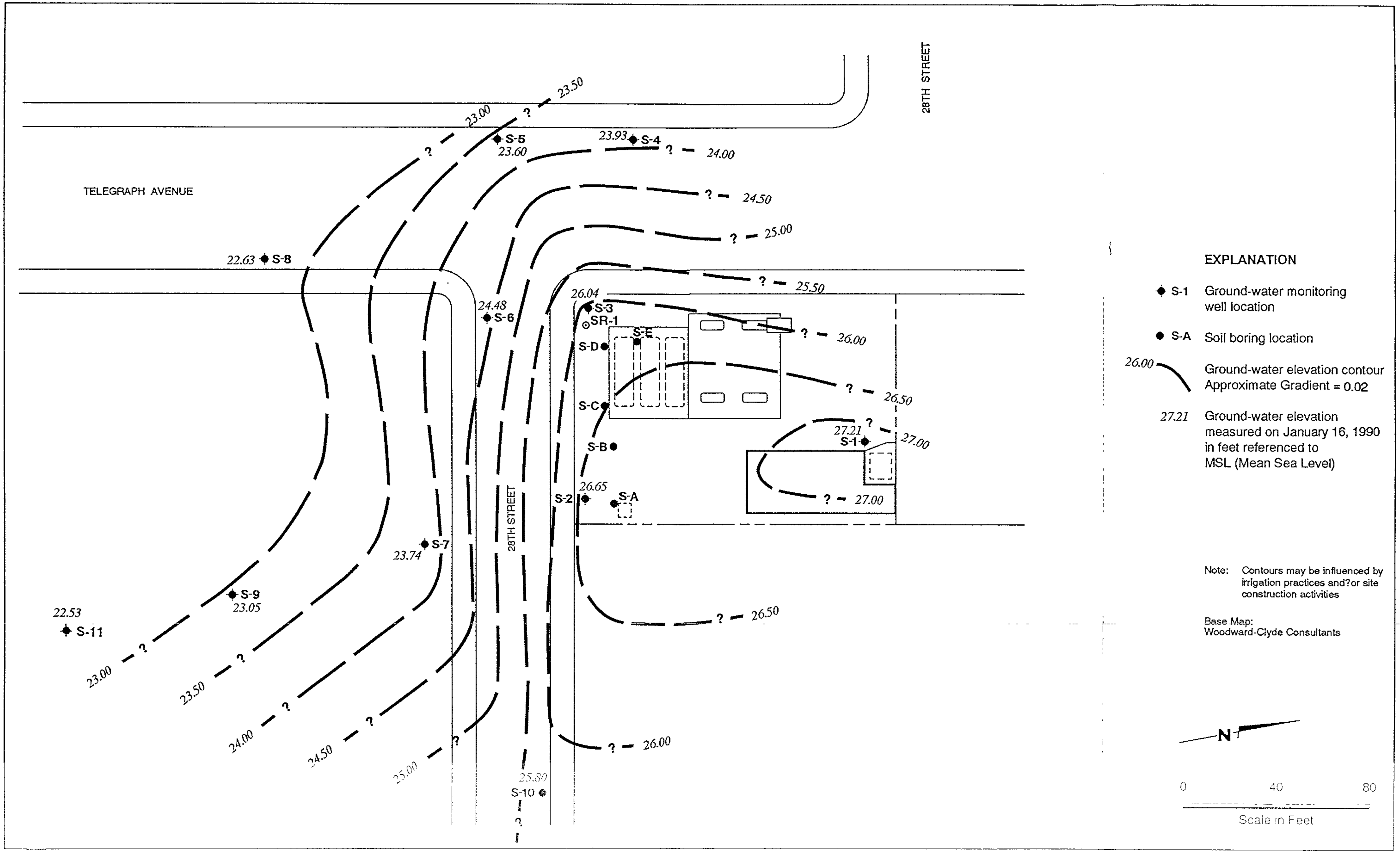
Site Plan
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE
2

JOB NUMBER
7610

DRAWING NO.
QUPCEE1262

DATE
3/90



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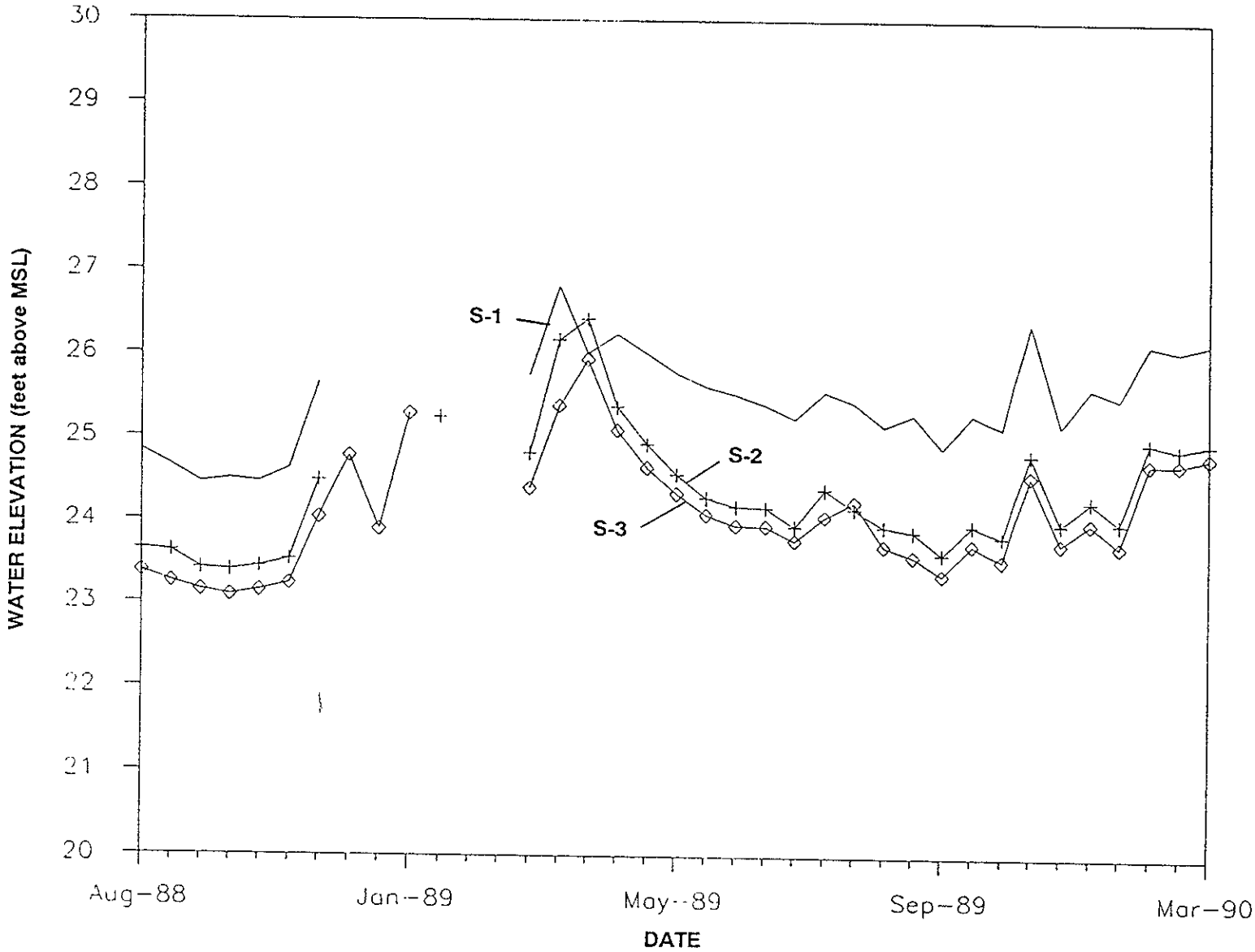
Potentiometric Map
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

3

7610

3/90



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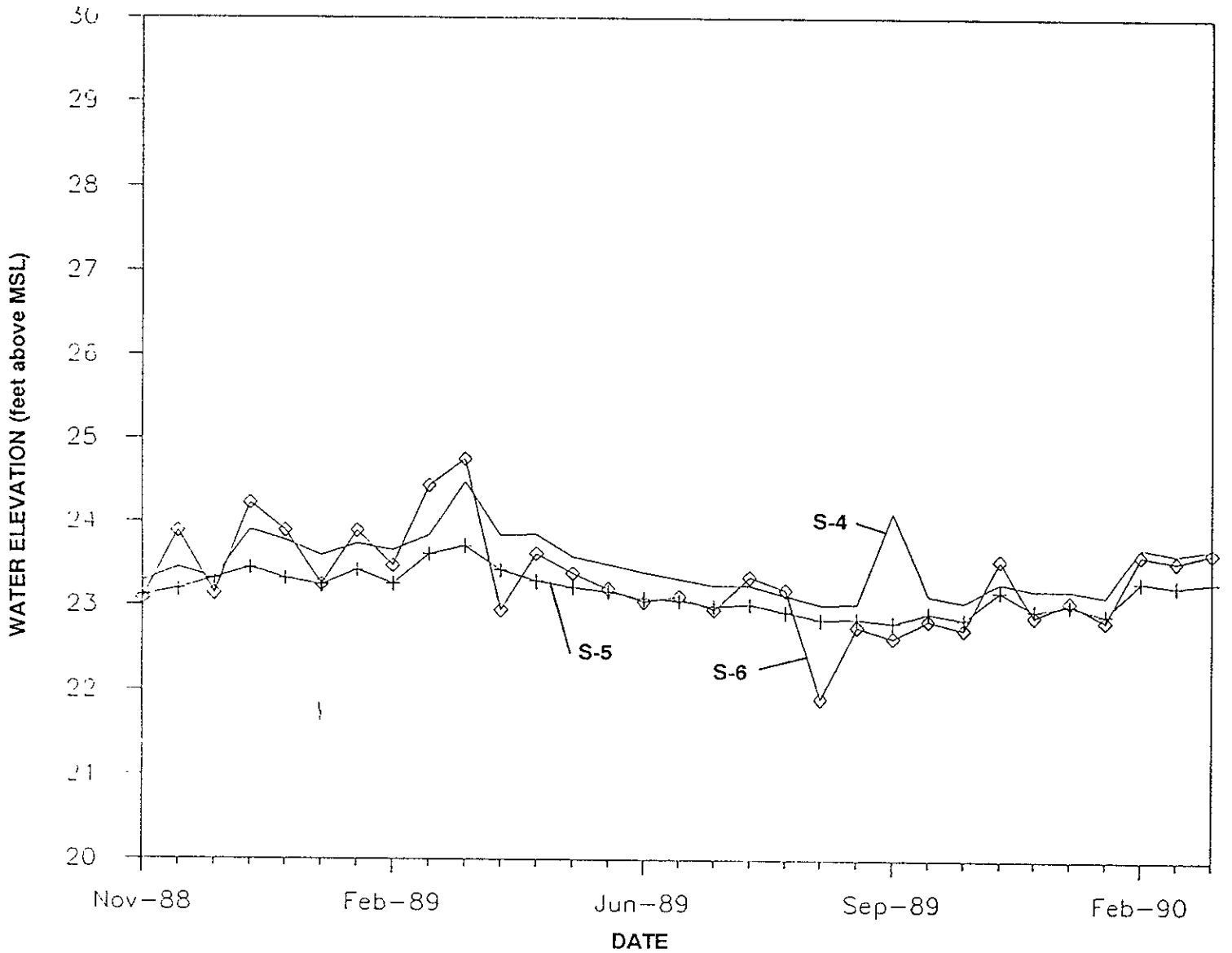
Hydrograph
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE
4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	CWP CEG 1262	3/90		

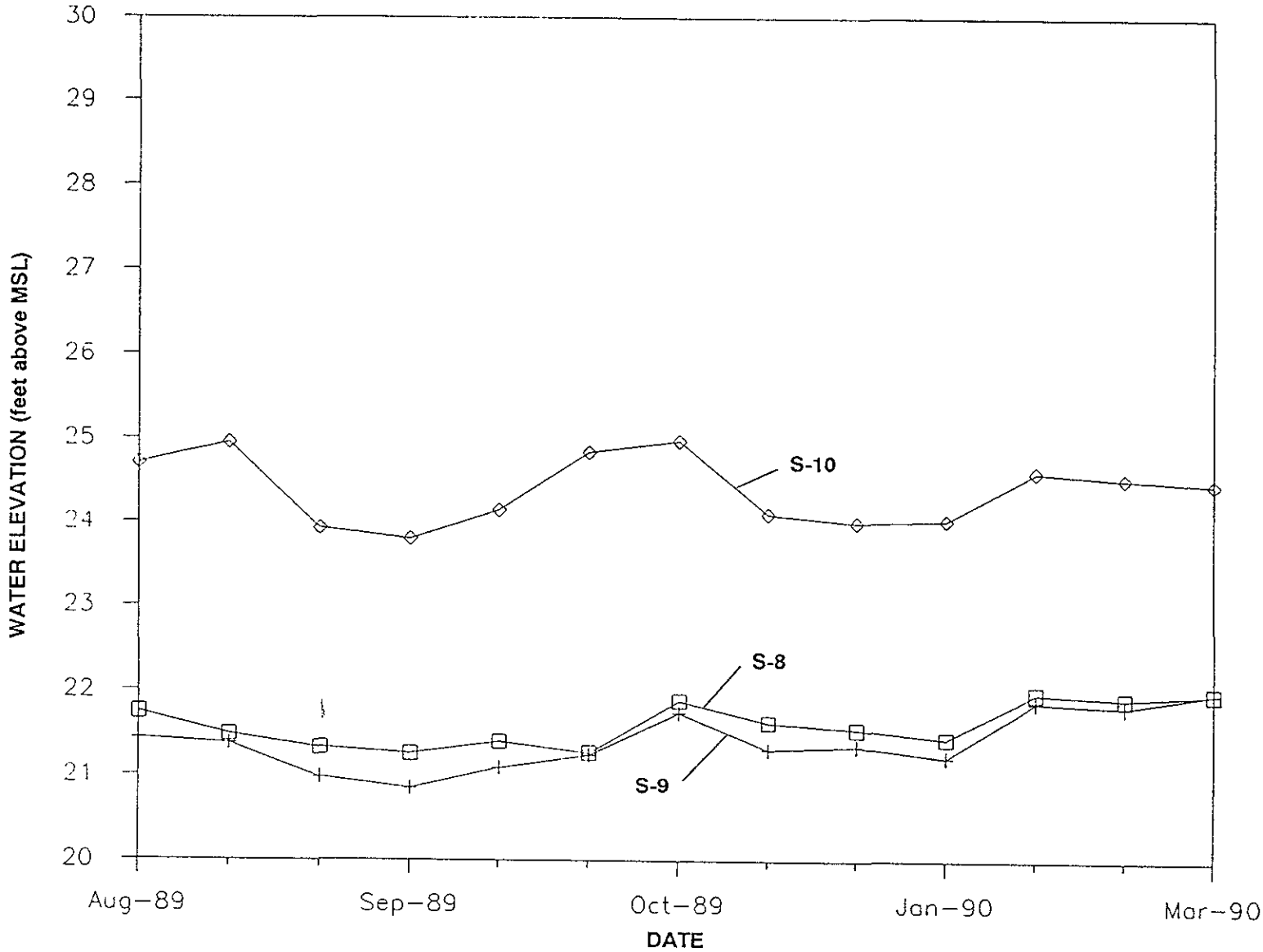


GeoStrategies Inc.

Hydrograph
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	3/90		

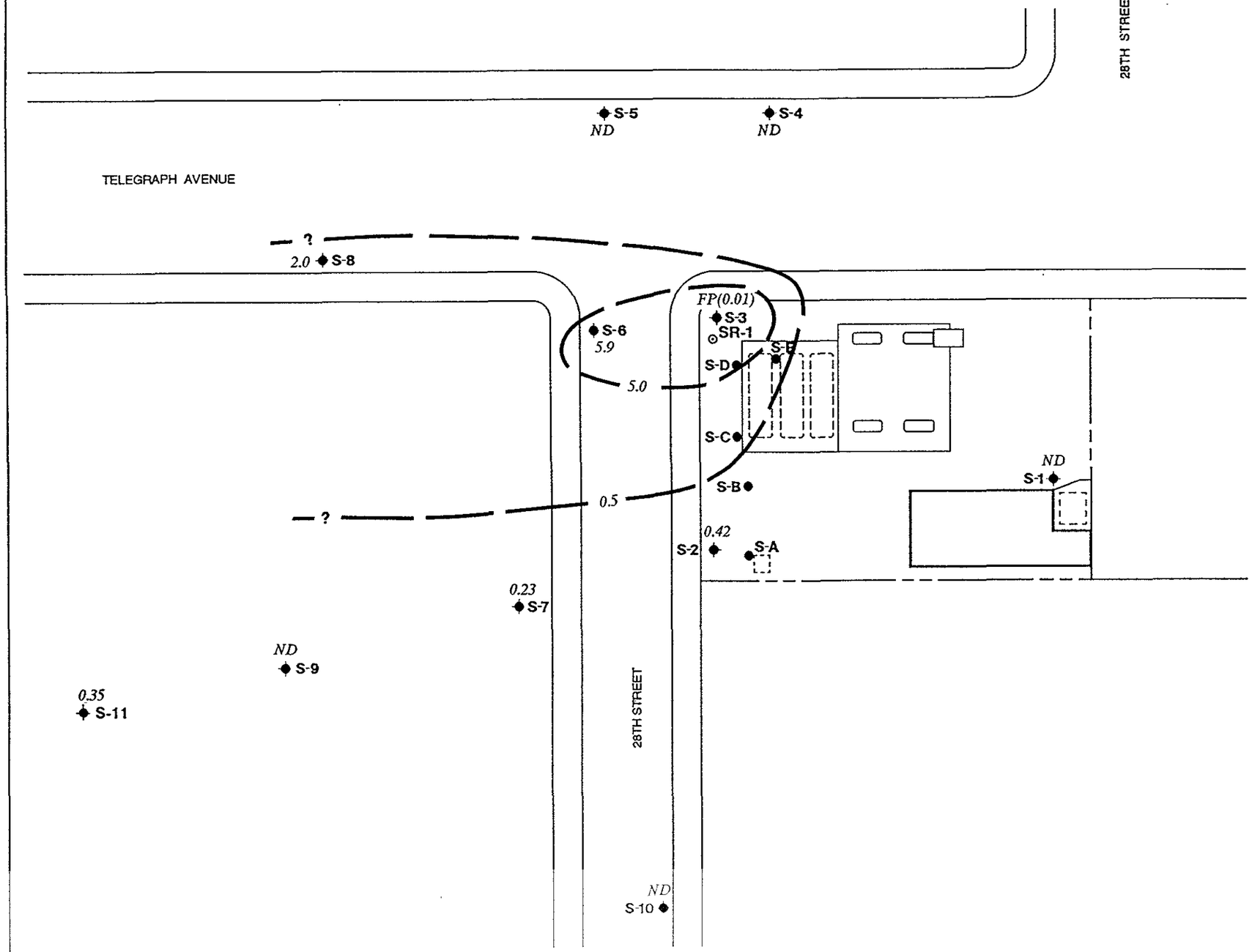


GeoStrategies Inc.

Hydrograph
Former Shell Service Station
2800 Telegraph Avenue
Oakland, California

PLATE
6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7610	RG CEG 12/92	3/90		



EXPLANATION

- S-1 Ground-water monitoring well location
- S-A Soil boring location
- 5.9 TPH (Total Petroleum Hydrocarbon) concentration in ppm sampled January 16, 1990
- 0.5 TPH isoconcentration contour
- ND Not Detected (see laboratory reports for detection limits)
- FP(0.01) Floating Product (thickness in feet)

Base Map:
Woodward-Clyde Consultants

N

0 40 80

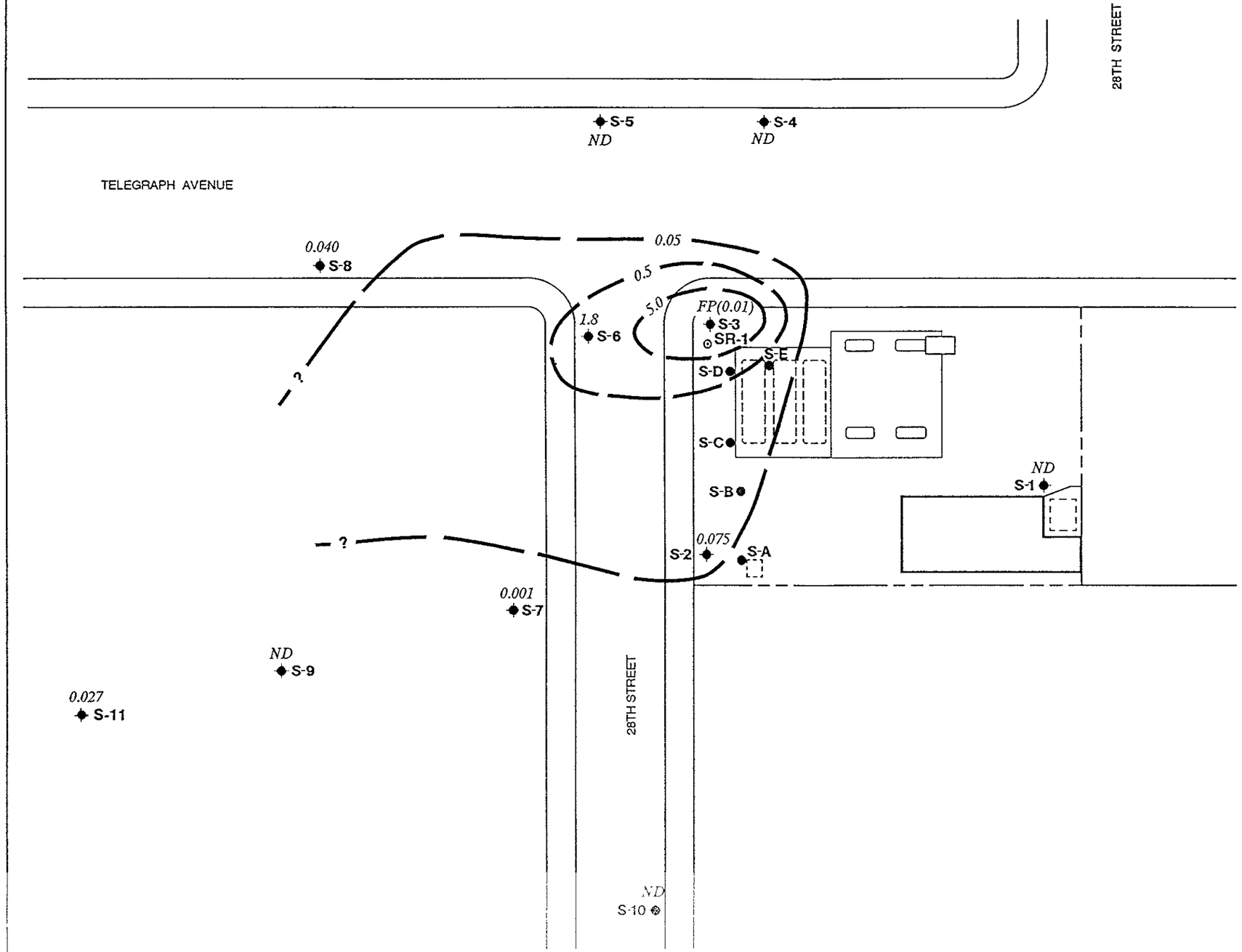
Scale in Feet

GSI GeoStrategies Inc.

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

FIGURE
7

JOB NUMBER	REVIEWED BY/DATE	DATE	REVISED DATE	REVISED DATE
7610	CWP 6/6/20	3/90		



EXPLANATION

- S-1 Ground-water monitoring well location
- S-A Soil boring location
- *1.8* Benzene concentration in ppm sampled January 16, 1990
- 0.5 Benzene isoconcentration contour
- *ND* Not Detected (see laboratory reports for detection limits)
- *FP(0.01)* Floating Product (thickness in feet)

Base Map:
Woodward-Clyde Consultants

N

0 40 80

Scale in Feet

GeoStrategies Inc.

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

8

JOB NUMBER
7610

DATE
3/90

APPENDIX A
FIELD METHODS AND PROCEDURES

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.

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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.

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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.

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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 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.

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DOCUMENTATION

Sample Container Labels

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

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

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

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

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

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

Calculated and actual purge volumes

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Chain-of-Custody

A Chain-of-Custody record (Figure 5) shall be completed and accompany every sample and every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from time of collections. The record will contain the following information:

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

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

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TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

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

GSI GeoStrategies Inc.

FIELD EXPLORATORY BORING LOG

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

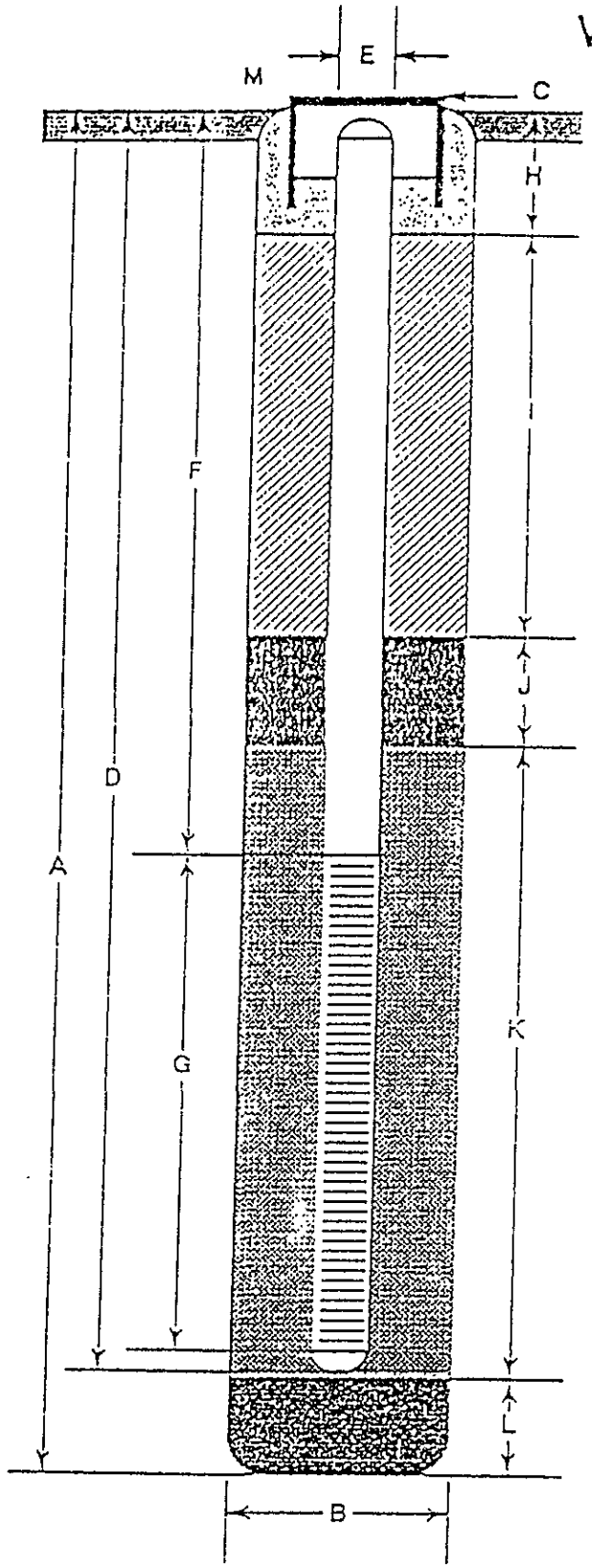
Water Level								
Time								
Date								

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

Remarks:

FIGURE 1

WELL CONSTRUCTION DETAIL



A Total Depth of Boring _____ ft.

B Diameter of Boring _____ _____ _____ in.
Drilling Method _____

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

D Casing Length _____ ft.
Material _____

E Casing Diameter _____ in.

F Depth to Top Perforations _____ ft.

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

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

I Backfill from _____ to _____ ft.
Backfill Material _____

J Seal from _____ to _____ ft.
Seal Material _____

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

L Bottom Seal _____ ft.
Seal Material _____

M _____
_____

GeoStrategies Inc.

Well Construction Detail

WELL NO.

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

FIGURE 2

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

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

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

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

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

Time	pH	Conductivity	Temperature	Volume

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

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 3

Monitoring Well Sampling Protocol Schematic

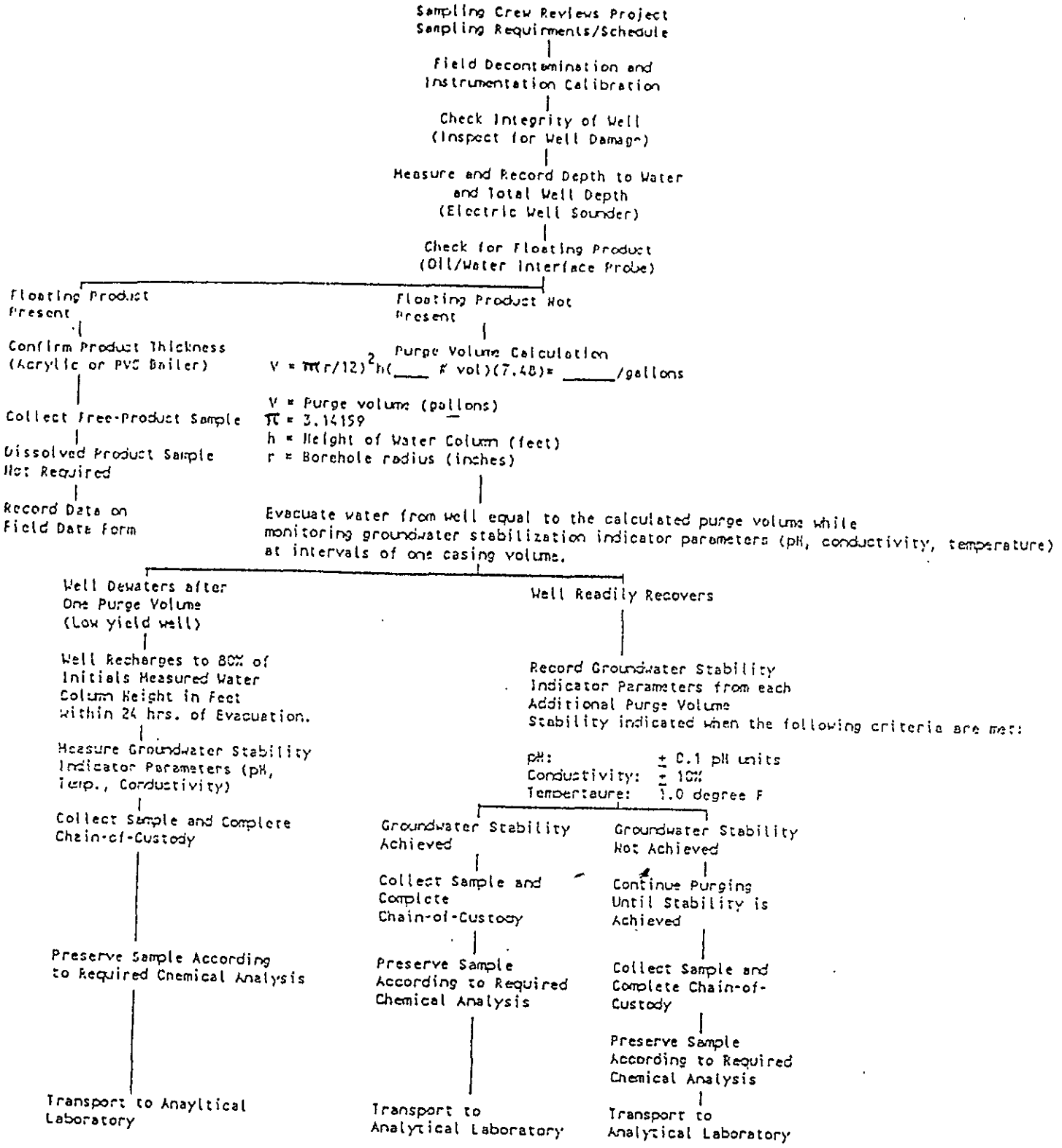


FIGURE 4

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
HISTORICAL MONITORING DATA

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
09-Nov-89	R/W		10.02	0.00						
07-Dec-89	R/W		N/A							
21-Dec-89	R/W		10.03	0.00						
04-Jan-90	R/W		10.27	0.00						
01-Feb-90	R/W		8.28	0.00						
15-Feb-90	R/W		8.32	0.00						
01-Mar-90	R/W		7.42	0.00						
16-Aug-88	S1		14.33	0.00						
30-Aug-88	S1		10.48	0.00						
13-Sep-88	S1		10.66	0.00						
27-Sep-88	S1		10.86	0.00						
11-Oct-88	S1		10.82	0.00						
25-Oct-88	S1		10.85	0.00						
08-Nov-88	S1		10.69	0.00						
22-Nov-88	S1		9.65	0.00						
06-Dec-88	S1		N/A							
20-Dec-88	S1		N/A							
03-Jan-89	S1		N/A							
17-Jan-89	S1		9.10	0.00						
31-Jan-89	S1		N/A							
14-Feb-89	S1		N/A							
28-Feb-89	S1		9.56	0.00						
16-Mar-89	S1		8.49	0.00						
30-Mar-89	S1		9.30	0.00						
13-Apr-89	S1		9.07	0.00						
27-Apr-89	S1		9.30	0.00						
11-May-89	S1		9.53	0.00						
25-May-89	S1		9.69	0.00						
08-Jun-89	S1		9.79	0.00						
22-Jun-89	S1		9.91	0.00						
06-Jul-89	S1		10.07	0.00						
20-Jul-89	S1		9.75	0.00						
03-Aug-89	S1		9.88	0.00						
17-Aug-89	S1		10.16	0.00						
31-Aug-89	S1		10.02	0.00						
14-Sep-89	S1		10.42	0.00						
28-Sep-89	S1		10.02	0.00						
12-Oct-89	S1		10.18	0.00						
26-Oct-89	S1		8.93	0.00						
09-Nov-89	S1		10.15	0.00						
07-Dec-89	S1		9.70	0.00						
21-Dec-89	S1		10.44	0.00						
04-Jan-90	S1		9.82	0.00						
01-Feb-90	S1		9.17	0.00						
15-Feb-90	S1		9.25	0.00						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H20	EMP	C.ELEV
01-Mar-90	S1	9.16	(1.00)	.00						
16-Aug-88	S2		14.18	0.00						
30-Aug-88	S2		10.27	0.00						
13-Sep-88	S2		10.29	0.00						
27-Sep-88	S2		10.50	0.00						
11-Oct-88	S2		10.52	0.00						
25-Oct-88	S2		10.48	0.00						
08-Nov-88	S2		10.39	0.00						
22-Nov-88	S2		9.43	0.00						
06-Dec-88	S2		N/A							
20-Dec-88	S2		N/A							
03-Jan-89	S2		N/A							
17-Jan-89	S2	8.65	(1.00)	0.02						
31-Jan-89	S2		N/A							
14-Feb-89	S2		N/A							
28-Feb-89	S2		9.10	0.00						
16-Mar-89	S2		7.74	0.00						
30-Mar-89	S2		7.49	0.00						
13-Apr-89	S2		8.54	0.00						
27-Apr-89	S2		8.99	0.00						
11-May-89	S2		9.35	0.00						
25-May-89	S2		9.63	0.00						
08-Jun-89	S2		9.73	0.00						
22-Jun-89	S2		9.74	0.00						
06-Jul-89	S2		9.97	0.00						
20-Jul-89	S2		9.52	0.00						
03-Aug-89	S2		9.75	0.00						
17-Aug-89	S2		9.97	0.00						
31-Aug-89	S2		10.03	0.00						
14-Sep-89	S2		10.30	0.00						
28-Sep-89	S2		9.95	0.00						
12-Oct-89	S2		10.09	0.00						
26-Oct-89	S2		9.10	0.00						
09-Nov-89	S2		9.93	0.00						
07-Dec-89	S2		9.65	0.00						
21-Dec-89	S2		10.24	0.00						
04-Jan-90	S2		9.92	0.00						
01-Feb-90	S2		8.95	0.00						
15-Feb-90	S2		9.03	0.00						
01-Mar-90	S2		8.96	0.00						
16-Aug-88	S3		14.04	0.00						
30-Aug-88	S3		10.19	0.00						
13-Sep-88	S3	10.28	(1.00)	0.04						
27-Sep-88	S3	10.35	(1.00)	0.08						
11-Oct-88	S3	10.39	(1.00)	0.10						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
25-Oct-88	S3	10.32	(1.00)	0.12						
08-Nov-88	S3	10.33	(1.00)	.00						
22-Nov-88	S3	9.50	(1.00)	0.03						
06-Dec-88	S3	8.79	(1.00)	.00						
20-Dec-88	S3	9.65	(1.00)	0.03						
03-Jan-89	S3	8.27	(1.00)	0.01						
17-Jan-89	S3		N/A							
31-Jan-89	S3		N/A							
14-Feb-89	S3		N/A							
28-Feb-89	S3	9.17	(1.00)	.00						
16-Mar-89	S3	8.18	(1.00)	.00						
30-Mar-89	S3		7.62	0.00						
13-Apr-89	S3	8.47	(1.00)	.00						
27-Apr-89	S3	8.92	(1.00)	.00						
11-May-89	S3	9.22	(1.00)	0.01						
25-May-89	S3	9.48	(1.00)	.00						
08-Jun-89	S3	9.60	(1.00)	0.01						
22-Jun-89	S3	9.61	(1.00)	0.01						
06-Jul-89	S3		9.79	0.00						
20-Jul-89	S3		9.50	0.00						
03-Aug-89	S3	9.30	(1.00)	0.03						
17-Aug-89	S3	9.83	(1.00)	0.03						
31-Aug-89	S3	9.88	(1.00)	0.12						
14-Sep-89	S3	10.05	(1.00)	0.18						
28-Sep-89	S3	9.77	(1.00)	0.08						
12-Oct-89	S3	9.94	10.04	0.10						
26-Oct-89	S3	8.99	9.01	0.02						
09-Nov-89	S3	9.76	9.83	0.07						
07-Dec-89	S3	9.55	9.58	0.03	2.00					
21-Dec-89	S3	10.06	10.08	0.02						
04-Jan-90	S3		9.83	0.00						
01-Feb-90	S3	8.85	(1.00)	.00						
15-Feb-90	S3	8.85	(1.00)	.00						
01-Mar-90	S3		8.77	0.00						
22-Nov-88	S4		10.80	0.00						
06-Dec-88	S4		10.63	0.00						
20-Dec-88	S4		10.76	0.00						
03-Jan-89	S4		10.18	0.00						
17-Jan-89	S4		10.31	0.00						
31-Jan-89	S4		10.49	0.00						
14-Feb-89	S4		10.35	0.00						
28-Feb-89	S4		10.42	0.00						
16-Mar-89	S4		10.25	0.00						
30-Mar-89	S4		9.60	0.00						
13-Apr-89	S4		10.25	0.00						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
27-Apr-89	S4		10.23	0.00						
11-May-89	S4		10.50	0.00						
25-May-89	S4		10.59	0.00						
08-Jun-89	S4		10.68	0.00						
22-Jun-89	S4		10.76	0.00						
06-Jul-89	S4		10.84	0.00						
20-Jul-89	S4		10.84	0.00						
03-Aug-89	S4		10.95	0.00						
17-Aug-89	S4		11.06	0.00						
31-Aug-89	S4		11.05	0.00						
14-Sep-89	S4		9.96	0.00						
28-Sep-89	S4		10.95	0.00						
12-Oct-89	S4		11.03	0.00						
26-Oct-89	S4		10.80	0.00						
09-Nov-89	S4		10.88	0.00						
07-Dec-89	S4		10.88	0.00						
21-Dec-89	S4		11.02	0.00						
04-Jan-90	S4		10.95	0.00						
01-Feb-90	S4		10.37	0.00						
15-Feb-90	S4		10.45	0.00						
01-Mar-90	S4		10.39	0.00						
22-Nov-88	S5		10.30	0.00						
06-Dec-88	S5		10.23	0.00						
20-Dec-88	S5		10.10	0.00						
03-Jan-89	S5		9.97	0.00						
17-Jan-89	S5		10.10	0.00						
31-Jan-89	S5		10.18	0.00						
14-Feb-89	S5		10.00	0.00						
28-Feb-89	S5		10.16	0.00						
16-Mar-89	S5		9.81	0.00						
30-Mar-89	S5		9.71	0.00						
13-Apr-89	S5		10.00	0.00						
27-Apr-89	S5		10.13	0.00						
11-May-89	S5		10.20	0.00						
25-May-89	S5		10.25	0.00						
08-Jun-89	S5		10.33	0.00						
22-Jun-89	S5		10.35	0.00						
06-Jul-89	S5		10.42	0.00						
20-Jul-89	S5		10.40	0.00						
03-Aug-89	S5		10.49	0.00						
17-Aug-89	S5		10.58	0.00						
31-Aug-89	S5		10.57	0.00						
14-Sep-89	S5		10.61	0.00						
28-Sep-89	S5		10.50	0.00						
12-Oct-89	S5		10.57	0.00						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
26-Oct-89	S5		10.24	0.00						
09-Nov-89	S5		10.46	0.00						
07-Dec-89	S5		10.40	0.00						
21-Dec-89	S5		10.58	0.00						
04-Jan-90	S5		10.51	0.00						
01-Feb-90	S5		10.12	0.00						
15-Feb-90	S5		10.17	0.00						
01-Mar-90	S5		10.13	0.00						
22-Nov-88	S6		9.51	0.00						
06-Dec-88	S6		8.71	0.00						
20-Dec-88	S6		9.45	0.00						
03-Jan-89	S6		8.37	0.00						
17-Jan-89	S6		8.70	0.00						
31-Jan-89	S6		9.34	0.00						
14-Feb-89	S6		8.70	0.00						
28-Feb-89	S6		9.12	0.00						
16-Mar-89	S6		8.16	0.00						
30-Mar-89	S6		7.84	0.00						
13-Apr-89	S6		9.64	0.00						
27-Apr-89	S6		8.97	0.00						
11-May-89	S6		9.21	0.00						
25-May-89	S6		9.39	0.00						
08-Jun-89	S6		9.54	0.00						
22-Jun-89	S6		9.47	0.00						
06-Jul-89	S6		9.63	0.00						
20-Jul-89	S6		9.25	0.00						
03-Aug-89	S6		9.40	0.00						
17-Aug-89	S6		10.68	0.00						
31-Aug-89	S6		9.83	0.00						
14-Sep-89	S6		9.96	0.00						
28-Sep-89	S6		9.76	0.00						
12-Oct-89	S6		9.86	0.00						
26-Oct-89	S6		9.04	0.00						
09-Nov-89	S6		9.70	0.00						
07-Dec-89	S6		9.53	0.00						
21-Dec-89	S6		9.89	0.00						
04-Jan-90	S6		9.76	0.00						
01-Feb-90	S6		8.98	0.00						
15-Feb-90	S6		9.05	0.00						
01-Mar-90	S6		8.95	0.00						
22-Nov-88	S7		11.20	0.00						
06-Dec-88	S7		10.56	0.00						
20-Dec-88	S7		11.00	0.00						
03-Jan-89	S7		9.90	0.00						
17-Jan-89	S7		10.40	0.00						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
31-Jan-89	S7		10.84	0.00						
14-Feb-89	S7		10.21	0.00						
28-Feb-89	S7		10.83	0.00						
16-Mar-89	S7		9.64	0.00						
30-Mar-89	S7		9.07	0.00						
13-Apr-89	S7		10.24	0.00						
27-Apr-89	S7		10.68	0.00						
11-May-89	S7		10.97	0.00						
25-May-89	S7		11.19	0.00						
08-Jun-89	S7		11.29	0.00						
22-Jun-89	S7		11.15	0.00						
06-Jul-89	S7		11.47	0.00						
20-Jul-89	S7		10.77	0.00						
03-Aug-89	S7		11.04	0.00						
17-Aug-89	S7		11.22	0.00						
31-Aug-89	S7		11.65	0.00						
14-Sep-89	S7		11.81	0.00						
28-Sep-89	S7		11.54	0.00						
12-Oct-89	S7		11.49	0.00						
26-Oct-89	S7		10.75	0.00						
09-Nov-89	S7		11.41	0.00						
07-Dec-89	S7		N/A							
21-Dec-89	S7		11.48	0.00						
04-Jan-90	S7		N/A							
01-Feb-90	S7		10.71	0.00						
15-Feb-90	S7		10.69	0.00						
01-Mar-90	S7		10.60	0.00						
03-Aug-89	S8		10.22	0.00						
17-Aug-89	S8		10.48	0.00						
31-Aug-89	S8		10.64	0.00						
14-Sep-89	S8		10.71	0.00						
28-Sep-89	S8		10.57	0.00						
12-Oct-89	S8		10.70	0.00						
26-Oct-89	S8		10.09	0.00						
09-Nov-89	S8		10.34	0.00						
07-Dec-89	S8		10.42	0.00						
21-Dec-89	S8		10.59	0.00						
04-Jan-90	S8		10.53	0.00						
01-Feb-90	S8		10.00	0.00						
15-Feb-90	S8		10.06	0.00						
01-Mar-90	S8		10.00	0.00						
03-Aug-89	S9		10.42	0.00						
17-Aug-89	S9		10.48	0.00						
31-Aug-89	S9		10.88	0.00						
14-Sep-89	S9		11.01	0.00						

SHELL OIL COMPANY OAKLAND - 2800 TELEGRAPH/28TH JOB 5610

DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
28-Sep-89	S9		10.77	0.00						
12-Oct-89	S9		10.62	0.00						
26-Oct-89	S9		10.12	0.00						
09-Nov-89	S9		10.55	0.00						
07-Dec-89	S9		10.51	0.00						
21-Dec-89	S9		10.68	0.00						
04-Jan-90	S9		10.64	0.00						
01-Feb-90	S9		9.99	0.00						
15-Feb-90	S9		10.04	0.00						
01-Mar-90	S9		9.88	0.00						
03-Aug-89	S10		8.25	0.00						
17-Aug-89	S10		8.00	0.00						
31-Aug-89	S10		9.03	0.00						
14-Sep-89	S10		9.15	0.00						
28-Sep-89	S10		8.81	0.00						
12-Oct-89	S10		8.12	0.00						
26-Oct-89	S10		7.98	0.00						
09-Nov-89	S10		8.85	0.00						
07-Dec-89	S10		8.95	0.00						
21-Dec-89	S10		9.43	0.00						
04-Jan-90	S10		8.93	0.00						
01-Feb-90	S10		8.35	0.00						
15-Feb-90	S10		8.43	0.00						
01-Mar-90	S10		8.49	0.00						
09-Nov-89	S11		10.02	0.00						
01-Feb-90	S11		9.29	0.00						
15-Feb-90	S11		9.47	0.00						
01-Mar-90	S11		9.42	0.00						

APPENDIX C
G-R GROUNDWATER SAMPLING REPORT

gettler — ryan inc.

February 5, 1990

GROUNDWATER SAMPLING REPORT

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

Sampling Date: January 16, 1990

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on January 16, 1990 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. 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 7.15 to 10.15 feet below grade. Separate phase product was observed in monitoring well S-3.

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

Samples were collected, using Teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A field blank (SF-1), 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
Casing Diameter (inches)	3	3	3	3	3	3
Total Well Depth (feet)	28.0	25.1	----	28.9	30.6	22.2
Depth to Water (feet)	8.10	7.26	7.53 **	10.15	9.82	8.11
Free Product (feet)	none	none	0.01	none	none	none
Reason Not Sampled	----	----	free product	----	----	----
Calculated 4 Case Vol.(gal.)	30.2	27.0	----	28.3	31.5	21.4
Did Well Dewater?	no	no	----	yes	no	yes
Volume Evacuated (gal.)	39.5	33.0	----	17.0	41.0	16.0
Purging Device	Suction	Suction	----	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	----	Bailer	Bailer	Bailer
Time	13:42	13:07	----	14:50	14:27	11:00
Temperature (F)*	62.4	63.5	----	65.6	67.5	69.0
pH*	3.60	4.04	----	4.40	4.48	5.08
Conductivity (umhos/cm)*	491	617	----	453	156	860

* Indicates Stabilized Value

** Not corrected for presence of free product

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-7	S-8	S-9	S-10	S-11
Casing Diameter (inches)	3	3	3	3	3
Total Well Depth (feet)	30.8	19.2	30.0	24.3	19.3
Depth to Water (feet)	9.59	9.34	8.81	7.15	8.25
Free Product (feet)	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	32.1	15.0	32.2	25.6	16.8
Did Well Dewater?	no	yes	no	yes	yes
Volume Evacuated (gal.)	43.0	7.0	43.0	19.0	10.0
Purging Device	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer
Time	10:33	11:30	10:03	11:59	09:32
Temperature (F)*	68.9	69.9	68.8	67.5	65.0
pH*	5.07	5.20	5.20	5.11	4.71
Conductivity (umhos/cm)*	738	523	579	221	1260

* Indicates Stabilized Value

TELEGRAPH AVENUE

S-8

S-9

S-11

EXPLANATION

- S-1 Ground-water monitoring well location
- S-A Soil boring location
- Proposed ground-water monitoring well location
- SR-1 Recovery well location

Base Map:
Woodward-Clyde Consultants

N

0 40 80

Scale in Feet

PLATE

GeoStrategies Inc.

tation
e

REVISED DATE REVISED DATE

JOB NUMBER 7610

REVIEWED BY RG/CEG

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Gettler-Ryan
2150 West Winton
Hayward, CA 94545
ATTN: Tom Paulson

Date: February 13, 1990

Work Order Number: TO-01-132

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

CORRECTED REPORT

Client Project ID:	GR #3610, Shell, 2800 Telegraph
Date Received by Lab:	01/17/90
Number of Samples:	13
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: February 13, 1990 CORRECTED REPORT
Client Project ID: GR #3610, Shell, 2800 Telegraph
Work Order Number: TO-01-132

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
TO-01-132-01	S-1	01/16/90	01/20/90	Cool,pH<2
TO-01-132-02	S-2	01/16/90	01/20/90	Cool,pH<2
TO-01-132-03	S-4	01/16/90	01/20/90	Cool,pH<2
TO-01-132-04	S-5	01/16/90	01/20/90	Cool,pH<2
TO-01-132-05	S-6	01/16/90	01/22/90	Cool,pH<2
TO-01-132-06	S-7	01/16/90	01/20/90	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)
TO-01-132-01	S-1	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001
TO-01-132-02	S-2	0.42	0.075	0.0099	0.032	0.052
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001
TO-01-132-03	S-4	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001
TO-01-132-04	S-5	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001
TO-01-132-05	S-6	5.9	1.8	0.15	0.16	0.41
Detection Limit		1.0	0.01	0.01	0.01	0.02
TO-01-132-06	S-7	0.23	0.0010	0.0018	0.0031	0.017
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001

Date: February 13,1990 CORRECTED REPORT
Client Project ID: GR #3610, Shell, 2800 Telegraph
Work Order Number: TO-01-132

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
TO-01-132-07	S-8	01/16/90	01/20/90	Cool,pH≤2
TO-01-132-08	S-9	01/16/90	01/20/90	Cool,pH≤2
TO-01-132-09	S-10	01/16/90	01/20/90	Cool,pH≤2
TO-01-132-10	S-11	01/16/90	01/22/90	Cool,pH≤2
TO-01-132-11	SD-2	01/16/90	01/22/90	Cool,pH≤2
TO-01-132-12	SF-1	01/16/90	01/22/90	Cool,pH≤2
TO-01-132-13	Trip Blank	----	01/22/90	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)
TO-01-132-07	S-8	2.0	0.040	0.15	0.090	0.40
TO-01-132-08	S-9	ND	ND	ND	ND	ND
TO-01-132-09	S-10	ND	ND	ND	ND	ND
TO-01-132-10	S-11	0.35	0.027	0.035	0.020	0.11
TO-01-132-11	SD-2	0.37	0.063	0.0089	0.026	0.042
TO-01-132-12	SF-1	ND	ND	ND	ND	ND
TO-01-132-13	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.0005	0.0005	0.001

Gettler - Ryan Inc. TO-01-132 ENVIRONMENTAL DIVISION 0932 **Chain of Custody**

COMPANY Shell Oil Co. JOB NO. [redacted]

JOB LOCATION 2800 Telegraph / 28th St.

CITY Oakland, CA PHONE NO. 783-7500

AUTHORIZED John Werfal DATE 1-16-90 P.O. NO. 3610

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-1	3	liquid	1-16-90 13:42	THC(gas) BTXE	OK/cool
S-2	3		13:07		
S-4	3		14:50		
S-5	3		14:27		
S-6	3		11:00		
S-7	3		10:33		
S-8	3		11:30		
S-9	3		10:03		
S-10	3		11:59		
S-11	3		9:32		
SD-2	3		—		
SF-1	3		13:42		
Trip blank	2		1-15-90		

RELINQUISHED BY: John P. Zwerneyer

RECEIVED BY: ah 1/17/90 07:30

RELINQUISHED BY: ah 1/17/90 11:38

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 1/17/90 1140

DESIGNATED LABORATORY: ET(SCV) DHS #: 137

REMARKS:

W2C204-5508-2205 AFE 786630 EXP 5440 BNG Diana Lundquist

DATE COMPLETED 1-16-90 FOREMAN John P. Zwerneyer

ORIGINAL

APPENDIX D
HISTORICAL CHEMICAL ANALYTICAL DATA

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	E.B. (PPM)	XYLENES (PPM)	DIESEL (PPM)	OIL (PPM)
02-May-88	S-1	<0.05	0.5	<0.001	----	<0.004	<1.	<5.
08-Nov-88	S-1	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
02-May-89	S-1	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Aug-89	S-1	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Oct-89	S-1	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
16-Jan-90	S-1	<0.050	<0.0005	<0.0005	<0.0005	<0.001	N/A	N/A
02-May-88	S-2	1.6	0.079	0.089	----	0.048	N/A	N/A
08-Nov-88	S-2	0.2	0.022	0.001	0.016	0.008	N/A	N/A
02-May-89	S-2	2.2	0.5	0.052	0.12	0.18	N/A	N/A
03-Aug-89	S-2	0.43	0.073	0.001	0.014	0.007	N/A	N/A
03-Oct-89	S-2	0.37	0.012	0.019	0.013	0.078	N/A	N/A
16-Jan-90	S-2	0.42	0.075	0.0099	0.032	0.052	N/A	N/A
02-May-88	S-3	46.	2.7	10.	----	10.	N/A	N/A
02-May-89	S-3	47.	2.0	6.0	1.7	7.2	N/A	N/A
08-Nov-88	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
22-Feb-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
02-May-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Aug-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Oct-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
16-Jan-90	S-4	<0.050	<0.0005	<0.0005	<0.0005	0.001	N/A	N/A
08-Nov-88	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
22-Feb-89	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
02-May-89	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Aug-89	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Oct-89	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
16-Jan-90	S-5	<0.050	<0.0005	<0.0005	<0.0005	0.001	N/A	N/A
08-Nov-88	S-6	5.5	1.7	0.02	0.02	0.12	N/A	N/A
22-Feb-89	S-6	6.0	2.4	0.05	0.11	0.3	N/A	N/A
02-May-89	S-6	9.1	3.7	0.12	0.28	0.3	N/A	N/A
03-Aug-89	S-6	7.1	2.4	<0.05	0.07	<0.2	N/A	N/A
03-Oct-89	S-6	5.9	1.6	0.033	0.058	0.10	N/A	N/A
16-Jan-90	S-6	5.9	1.8	0.15	0.16	0.41	N/A	N/A
08-Nov-88	S-7	2.6	0.088	0.43	0.086	0.43	N/A	N/A
22-Feb-89	S-7	0.8	0.025	0.027	0.029	0.17	N/A	N/A
02-May-89	S-7	0.8	0.032	0.014	0.021	0.11	N/A	N/A
03-Aug-89	S-7	5.0	0.66	0.38	0.23	0.71	N/A	N/A
03-Oct-89	S-7	0.96	0.11	0.008	0.013	0.046	N/A	N/A
16-Jan-90	S-7	0.23	0.0010	0.0018	0.0031	0.017	N/A	N/A
03-Aug-89	S-8	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Oct-89	S-8	1.6	0.022	0.11	0.053	0.24	N/A	N/A

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	E.B. (PPM)	XYLENES (PPM)	DIESEL (PPM)	OIL (PPM)
16-Jan-90	S-8	2.0	0.040	0.15	0.090	0.40	N/A	N/A
03-Aug-89	S-9	1.6	0.032	0.12	0.052	0.25	N/A	N/A
03-Oct-89	S-9	<0.05	<0.0005	0.001	<0.001	0.003	N/A	N/A
16-Jan-90	S-9	<0.050	<0.0005	<0.0005	<0.0005	0.001	N/A	N/A
03-Aug-89	S-10	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
03-Oct-89	S-10	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	N/A
16-Jan-90	S-10	<0.050	<0.0005	<0.0005	<0.0005	0.001	N/A	N/A
16-Oct-89	S-11	0.65	0.042	0.047	0.024	0.16	N/A	N/A
16-Jan-90	S-11	0.35	0.027	0.035	0.020	0.11	N/A	N/A

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

ETHYLBENZENE & XYLENES COMBINED PRIOR TO MAY 1989