Shell Oil Company

EAST BAY MARKETING DISTRICT

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

April 18, 1990

Mr. Rick Mueller
City of Pleasanton
Pleasanton Fire Department
Post Office Box 520
Pleasanton, California 94566-0802

SUBJECT: SHELL SERVICE STATION
5251 HOPYARD ROAD
PLEASANTON, CALIFORNIA

Dear Mr. Mueller:

Enclosed is a copy of the Quarterly Report, dated April 11, 1990, which documents the groundwater sampling and site activities conducted between January - March 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.

GeoStrategies Inc.

QUARTERLY REPORT

JANUARY - MARCH 1990

Shell Service Station
5251 Hopyard Road
Pleasanton, California

Report No. 7633-5

April 11, 1990

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

April 11, 1990

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

Attn: Mr. John Werfal

Re: QUARTERLY REPORT
Shell Service Station
5251 Hopyard Road
Pleasanton, 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,

David A. Ferreira
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

DAF/JLP/kjj

Report No. 7633-5

1.0 INTRODUCTION

This Quarterly Report has been prepared by GeoStrategies Inc. (GSI) for the Shell Service Station located at 5251 Hopyard Road in Pleasanton, California (Plate 1).

This report describes the results of the first quarterly ground-water sampling for 1990 performed by Gettler-Ryan Inc. (G-R), on January 5, 1990, in accordance with the quarterly sampling plan for the site. Sampling protocol are summarized on the G-R Field Methods and Procedures presented in Appendix A. Field work and laboratory analytical 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. This report also includes a half-mile radius well location survey.

2.0 SITE HISTORY

In January 1988 Pacific Environmental Group (PACIFIC) installed one ground-water monitoring well (S-1) and three vadose zone wells (V-1, V-2, and V-3) to assess soil and ground-water quality conditions beneath the site. Soil samples from S-1 were reported as not detected (ND) for Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline), Total Petroleum Hydrocarbons calculated as Diesel (TPH-Diesel), and Total Petroleum Hydrocarbons calculated as Oil (TPH-Oil). Benzene was detected in the soil sample taken from 14 to 15.5 feet in S-1. The findings of this investigation are summarized in the PACIFIC report dated March 9, 1988.

In December 1988, G-R initiated quarterly ground-water sampling for the site. Ground-water samples were collected from monitoring well S-1 and vadose zone wells (V-1, V-2 and V-3), due to a rise in the potentiometric surface. The results of this sampling event are presented in the G-R report dated January 10, 1989.

In March 1989, G-R sampled Well S-1. Water was not present in the vadose zone wells during this sampling event. The results of this sampling event are presented in the G-R report dated May 1, 1989.

On April 7, 1989, Woodward-Clyde Consultants (WCC) issued a work plan proposing the installation of four additional ground-water monitoring wells at the site.

Four ground-water monitoring wells (S-2 through S-5) were installed by GSI on May 4, 1989. TPH-Gasoline was detected in soil samples collected from Boring S-3 at five feet (5 ppm) and ten feet (1,100 ppm). Benzene was detected in the Boring S-3 ten-foot sample (8 ppm). TPH-Diesel was detected in the ten foot sample in Boring S-3 (2,300 ppm). On May 11, 1989, G-R sampled the newly installed wells. The results of this investigation are summarized in the GSI report dated July 13, 1989.

G-R sampled site monitoring wells on July 20, 1989. The results of this sampling, along with a proposal for additional work, are presented in the GSI report dated October 12, 1989.

On October 30, and November 6, 1989, GSI installed three off-site monitoring wells (S-6, S-7, and S-8). Benzene was detected in the soil sample collected from Boring S-6 at five feet (0.035 ppm). All other soil samples analyzed were reported as none detected (ND) for TPH-Gasoline, TPH-Diesel, and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX). The results of this investigation are presented in the GSI report dated January 10, 1990.

On January 5, G-R performed the first quarterly sampling for 1990. The results of this sampling event are presented below.

No additional site history data are available to GSI at this time.

3.0 GROUNDWATER LEVEL MONITORING

3.1 Potentiometric Data

Prior to ground-water sampling on January 5, 1990, water levels were measured in each well using an electronic oil-water interface probe. Static water levels were measured from the surveyed top of the 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 have been plotted and contoured and are presented on Plate 3. Depth to the uppermost water bearing unit ranged from approximately 7.91 to 10.31 feet below existing grade. Potentiometric data indicate that the shallow groundwater beneath the site flows to the northwest with an approximate hydraulic gradient of 0.01.

Water-level elevation data prior to February 13, 1990, have been used to prepare hydrographs for Well S-1 (Plate 4) and Wells S-2, S-3, S-4 and S-5 (Plate 5). These data show increasing water level elevations during the summer months, June to October 1989 and June to November 1988. This increase may be due to increased landscaping irrigation or the delayed effects of recharge from precipitation or water use upgradient from the site.

3.2 Floating Product Measurements

Each well was monitored for separate-phase petroleum hydrocarbons (floating product) using an electronic oil-water interface probe. All wells were inspected with a clean, clear acrylic bailer to visually confirm interface probe results and identify whether a sheen was present. No floating product was detected in any of the monitoring wells during this quarter.

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected by G-R on January 5, 1990. The ground-water samples were analyzed for TPH-Gasoline and TPH-Diesel according to EPA Method 8015 (Modified) and BTEX according to EPA Method 8020. All analyses were performed by International Technology (IT) Analytical Services, a State-certified environmental laboratory located in San Jose, California. The IT Analytical Service certified analytical report is presented in Appendix B.

Detectable concentrations of TPH-Gasoline were reported in Wells S-1 (8.2 ppm) and S-3 (0.86 ppm). Benzene was detected in Wells S-1 (2.3 ppm) and S-3 (0.14 ppm) above the established Maximum Contaminant Level (MCL) set by the Regional Water Quality Control Board (RWQCB). TPH-Diesel was detected in Wells S-1 (6.5 ppm) and S-3 (1.6 ppm). IT Analytical Services stated in their analytical report that the compounds detected and calculated as diesel appear to be the less volatile constituents of gasoline. Samples analyzed for Wells S-2, S-4, S-5, S-7 and S-8 were reported as ND for all constituents. Ground-water chemical data are summarized on Table 1.

A TPH-Gasoline isoconcentration map (Plate 6), a benzene isoconcentration map (Plate 7), and a TPH-Diesel isoconcentration Map (Plate 8) have been prepared utilizing this quarterly ground-water analytical data. These maps show that an ND boundary has been delineated around the extent of the dissolved hydrocarbon plume.

The historical analytical data for the ground-water sampling events have been tabulated and are presented in Appendix C.

4.1 Quality Control

Quality Control (QC) samples for the quarterly ground-water sampling consisted of a field blank, a trip blank, and a duplicate sample. The field blank was prepared in the field using organic-free water, provided by the laboratory, to evaluate field sampling procedures and ambient site conditions. The duplicate sample was submitted to the laboratory to assess laboratory analytical precision. The trip blank was prepared by the laboratory using organic-free water to evaluate field and laboratory handling procedures. The field blank and the trip blank samples were reported as ND. The precision of QC data for the duplicate sample (SD-3) and Well S-3 sample was assessed using the Relative Percent Difference (RPD) Method. The RPD value was calculated to be 23% for TPH-Gasoline and 37% for Benzene.

QC procedures during field sampling are summarized in the G-R Field Methods and Procedures in Appendix A. The G-R Ground-water Sampling Reports, Chain-of-Custody forms, and the IT Analytical Service certified analytical report for this quarter are presented in Appendix B.

5.0 WELL SURVEY DATA

A well survey was performed to identify ground-water wells within a one-half mile radius of the site and assess current ground-water usage. The information was obtained from the California Department of Water Resources (DWR) - Central District. Due to the lack of information available at the DWR, Alameda County Flood Control and Water Conservation District Zone 7 was contacted. Zone 7 was able to identify the locations of some of the wells. Plate 1 identifies seven wells located within one-half mile radius of the site. Table 2 summarizes the available information on the wells known to be within a half-mile of the site.

6.0 SUMMARY

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

- Water levels were measured in selected wells and the data were used to construct a potentiometric map. Potentiometric data indicate the shallow groundwater beneath the site flows to the northwest with an approximate hydraulic gradient of 0.01.

- No floating product was detected in any of the wells.

- TPH-Gasoline concentrations were reported as ND for ground-water samples analyzed from Wells S-2, S-4, S-5, S-6, S-7, and S-8. Detectable concentrations of TPH-Gasoline were reported in Wells S-1 (8.2 ppm) and S-3 (0.86 ppm).

- Benzene concentrations were reported as ND for ground-water samples analyzed from Wells S-2, S-4, S-5, S-6, S-7, and S-8. Detectable concentrations of benzene were reported in Wells S-1 (2.3 ppm) and S-3 (0.14 ppm). These concentrations in Wells S-1 and S-3 are above the current RWQCB MCL for benzene.

- TPH-Diesel concentrations were reported as ND for ground-water samples analyzed from Wells S-2, S-4, S-5, S-6, S-7, and S-8. Detectable concentrations of TPH-Diesel were reported in Wells S-1 (6.5 ppm) and S-3 (1.6 ppm).

- An ND boundary around the site has been delineated.

7.0 PLANNED SITE ACTIVITIES

The following activities are planned for the first quarter, April 1, to June 30, 1990:

- All scheduled wells will be sampled and analyzed for TPH-Gasoline and TPH-Diesel according to EPA Method 8015 (Modified) and 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 be calculated.

- Chemical data will be used to construct isoconcentration maps for TPH-Gasoline, benzene, and TPH-Diesel.

REFERENCES CITED

GeoStrategies Inc., 1989, Quarterly Groundwater Sampling Report: Report No. 7633-2, dated July 13, 1989.

GeoStrategies Inc., 1989, Quarterly Report and Work Plan: Report No. 7633-3, dated October 12, 1989.

GeoStrategies Inc., 1990, Quarterly Report: Report No. 7633-4, dated January 10, 1990.

Gettler-Ryan Inc., 1989, Groundwater Sampling Report: Report 83197-1, dated January 10, 1989.

Gettler-Ryan Inc., 1989, Quarterly Groundwater Sampling Report: Report No. 3633-1, dated May 1, 1989.

Pacific Environmental Group Inc., 1988 letter to Gettler-Ryan Inc., Re: Shell Service Station, Hopyard Road at Owens Drive, Pleasanton, California; Project No. 101-09.01, dated March 9, 1988.

Woodward-Clyde Consultants, 1989, Proposed Work Plan: Project No. 8820011A/0127, dated April 7, 1989.

TABLE 1

GROUND-WATER ANALYSIS DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	TPH-D * (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-1	05-Jan-90	11-Jan-90	8.2	2.3	0.10	0.66	0.32	6.5	326.73	317.53	----	9.20
S-2	05-Jan-90	10-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	326.59	317.38	----	9.21
S-3	05-Jan-90	12-Jan-90	0.86	0.14	0.0016	0.078	0.002	1.6	327.38	317.31	----	10.07
S-4	05-Jan-90	10-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	327.38	317.97	----	9.41
S-5	05-Jan-90	10-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	327.76	317.45	----	10.31
S-6	05-Jan-90	12-Jan-90	<0.050	<0.0005	0.0005	<0.0005	<0.001	<0.1	326.56	317.26	----	9.30
S-7	05-Jan-90	12-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	326.49	317.17	----	9.32
S-8	05-Jan-90	12-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	325.32	317.41	----	7.91
SD-3	05-Jan-90	12-Jan-90	0.68	0.096	0.0013	0.054	0.001	2.2	----	----	----	----

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-G = Total Petroleum Hydrocarbons as Gasoline PPM = Parts Per Million SF = Field Blank
TPH-D = Total Petroleum Hydrocarbons as Diesel SD = Duplicate Sample TB = Trip Blank

* Analysis dates: 11-Jan-90 12-Jan-90 15-Jan-90

Note: 1. All data shown as <x are reported as ND (none detected).
2. Static Water Elevations referenced to mean sea level (MSL).
3. Compounds detected and calculated as Diesel appear to be the less volatile constituents of gasoline.
4. DHS Action Levels and MCLs are subject to change pending State review.

Project No. 7633-5

TABLE 1

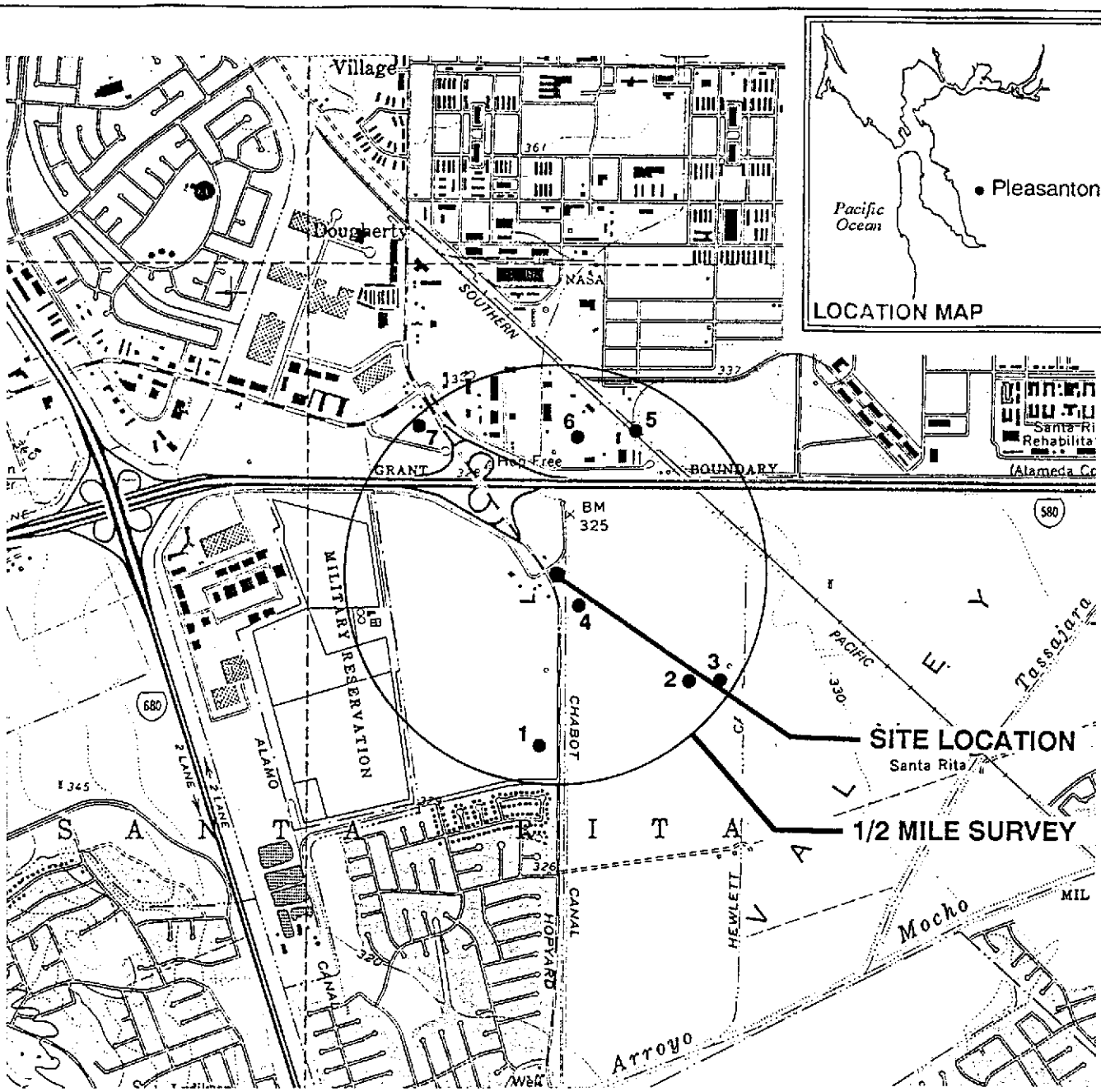
GROUND-WATER ANALYSIS DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	TPH-D * (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
SF-2	05-Jan-90	09-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	N/A	----	----	----	----
TB	05-Jan-90	10-Jan-90	<0.050	<0.0005	<0.0005	<0.0005	<0.001	N/A	----	----	----	----

TABLE 2

SUMMARY OF 1/2 MILE RADIUS WELL SURVEY
SHELL SERVICE STATION
5251 HOPYARD ROAD, PLEASANTON, CA

MAP ID	STATE NUMBER	YEAR DRILLED	USAGE STATUS
1	351E7B5	1982	Abandoned
2	351E6R2	?	Abandoned
3	351E6R1	?	Abandoned
4	351E6Q2	?	Abandoned
5	351E6G5	?	Industrial ?
6	351E6G4	?	Industrial ?
7	351E6E1	?	Abandoned



EXPLANATION

● 1 Well location

Base Map: USGS Topographic Map

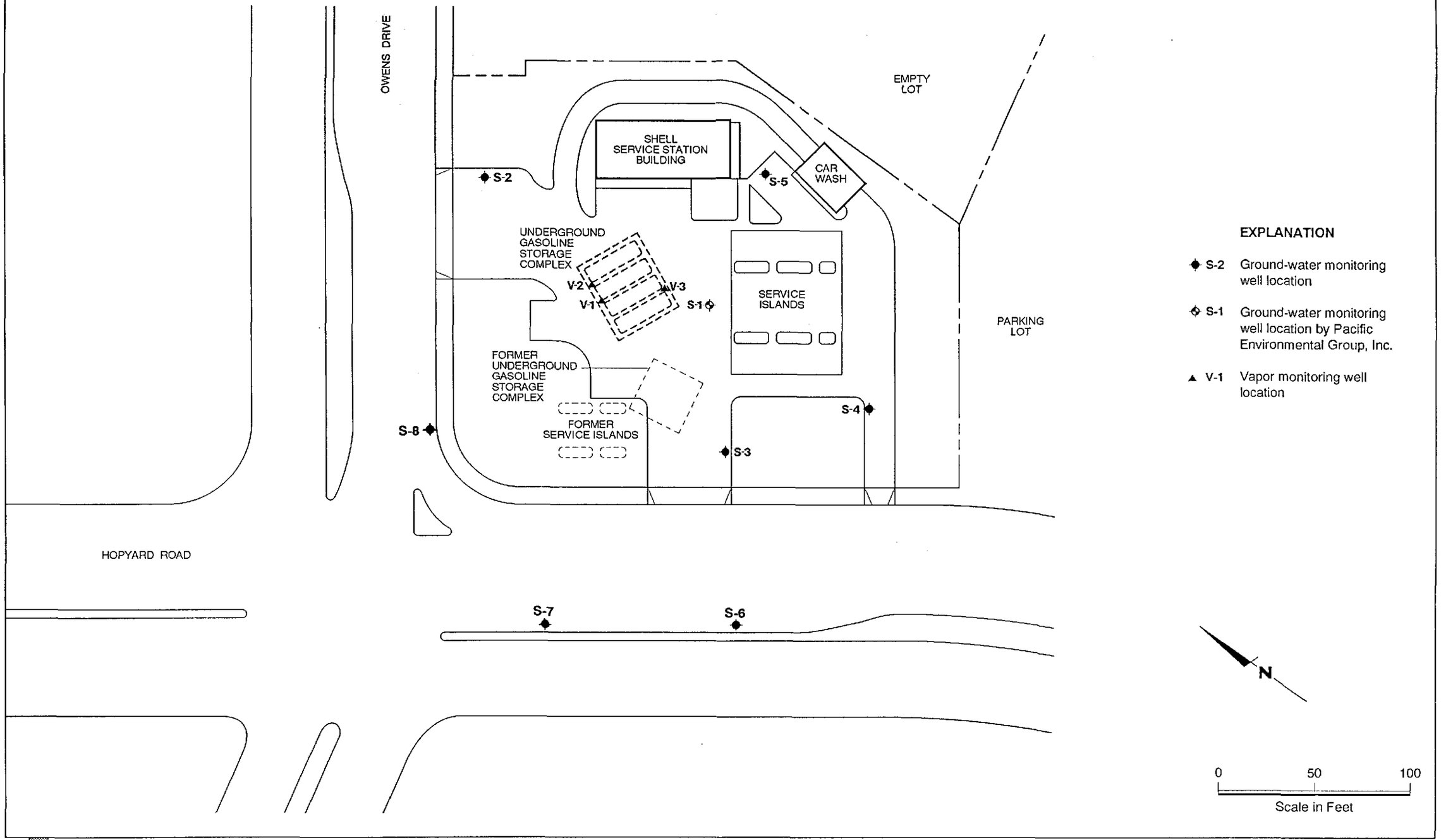
Approximate Scale : 1" = 2000'

GeoStrategies Inc.

Vicinity Map with Half-Mile Well Survey
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE **1**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RG/CEG 1202	12/89		

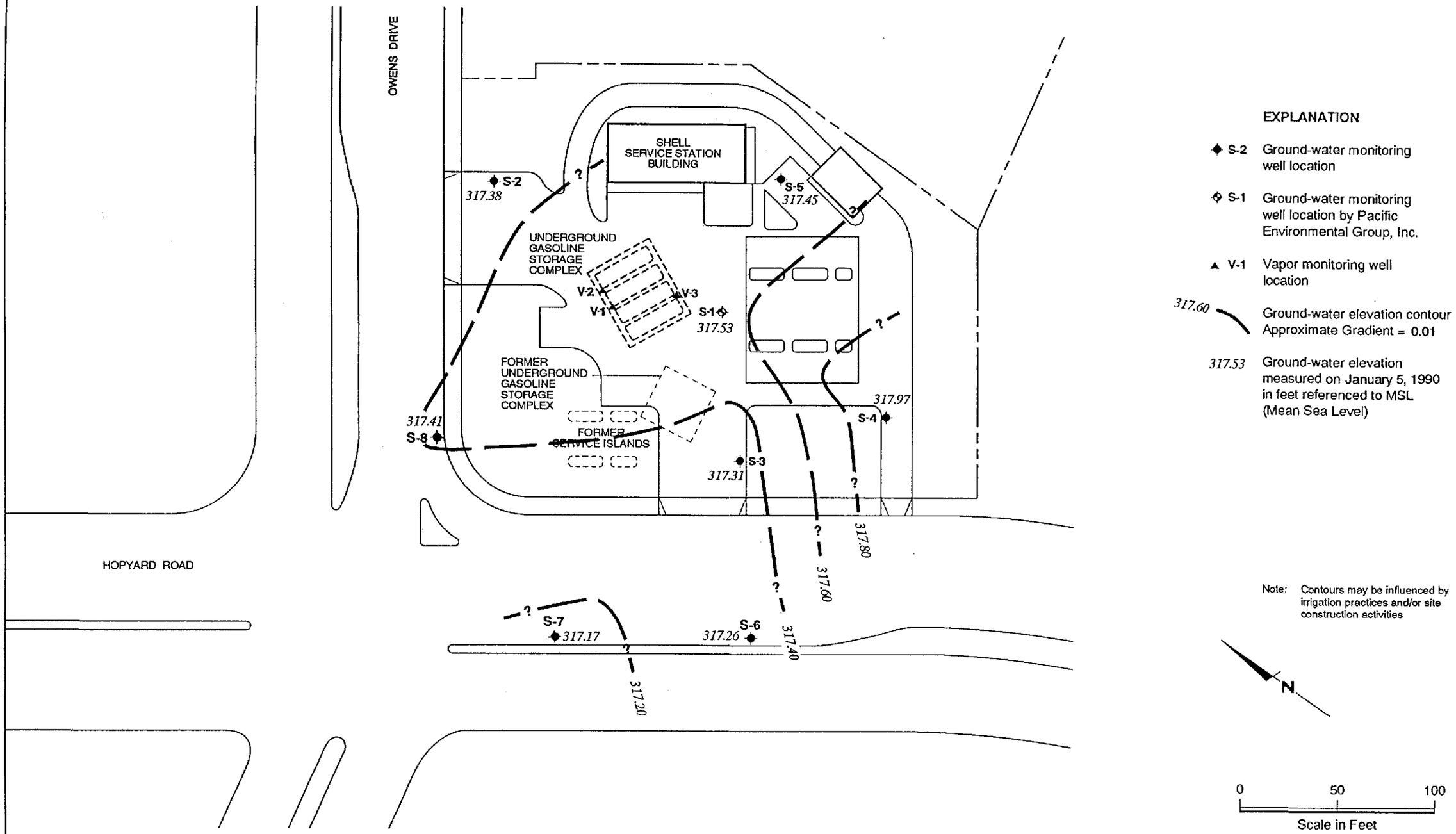


GeoStrategies Inc.

Site Plan
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1242			

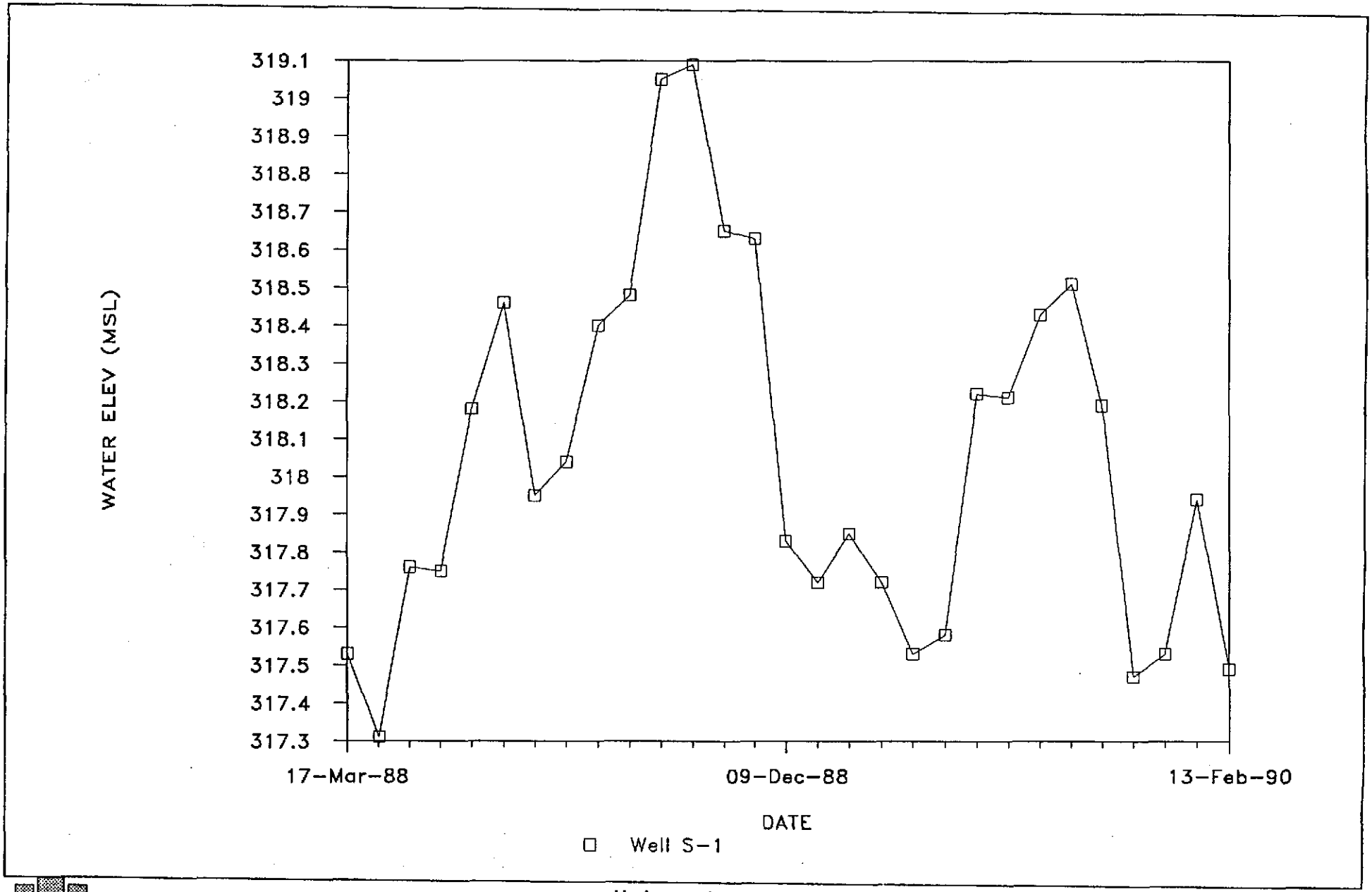


GeoStrategies Inc.

Potentiometric Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1262	2/90		

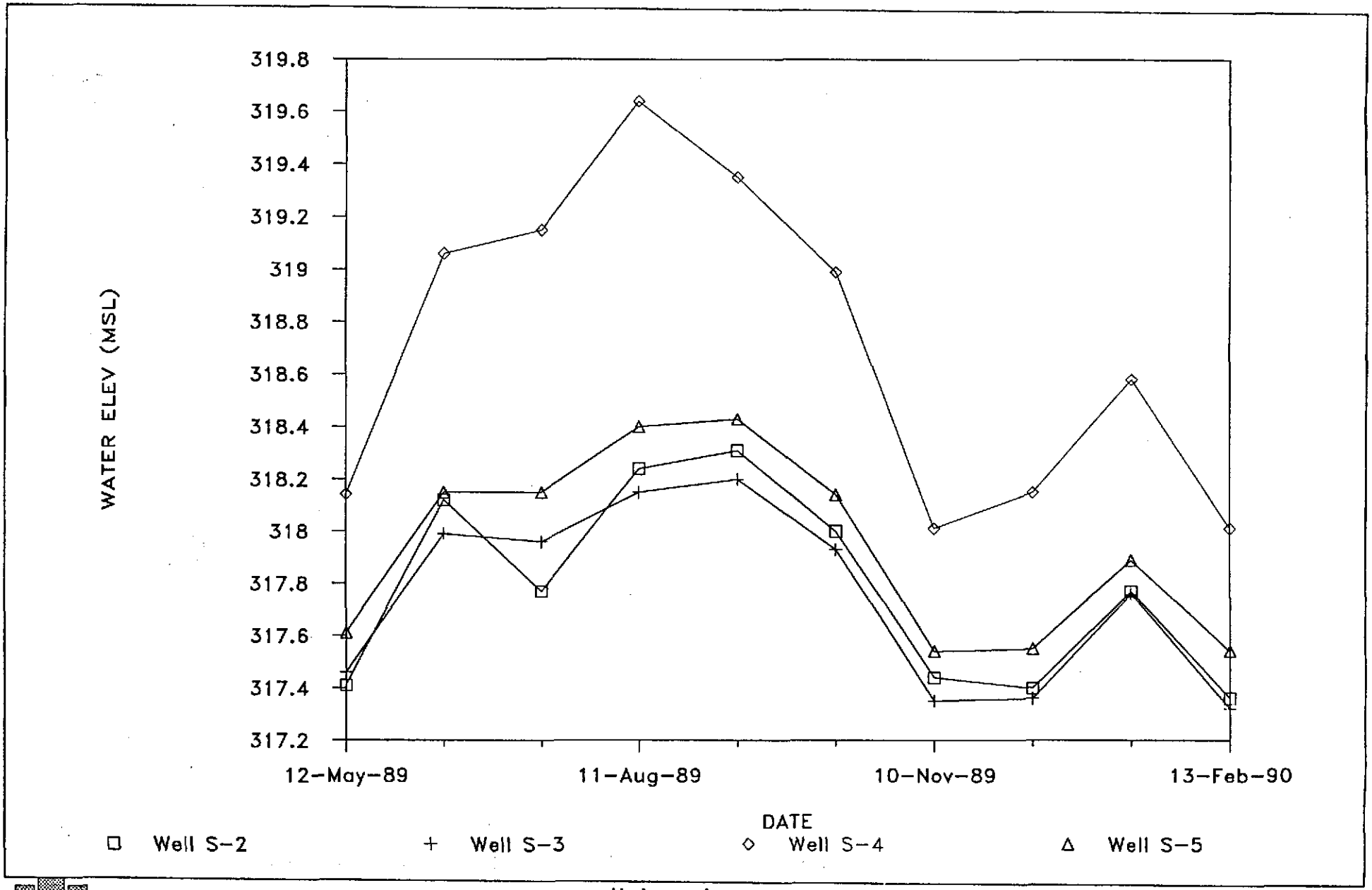


GeoStrategies Inc.

Hydrograph
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
4

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RG CEG 12/6/90	4/90		

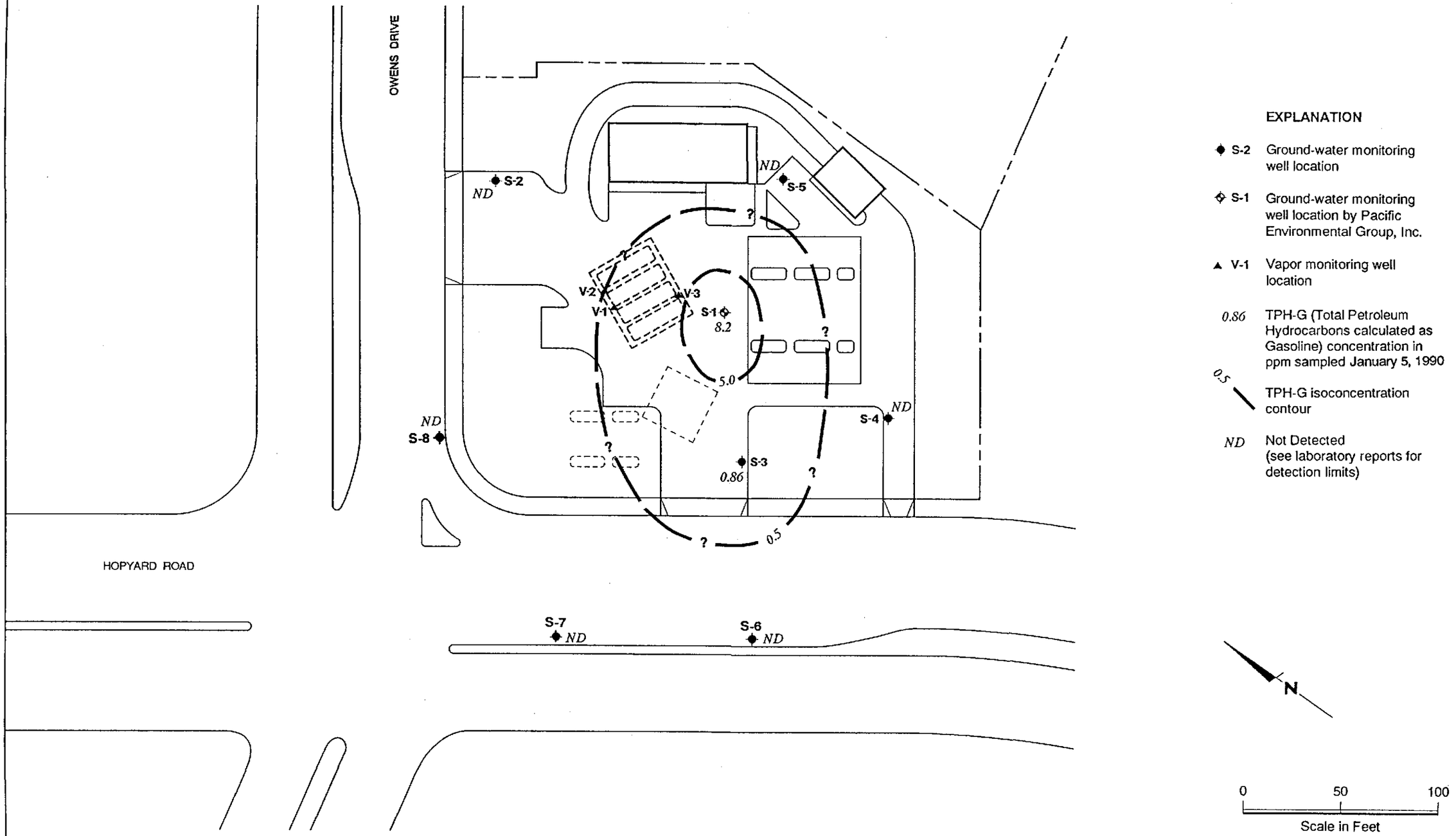


GeoStrategies Inc.

Hydrograph
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
5

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 12/90	4/90		

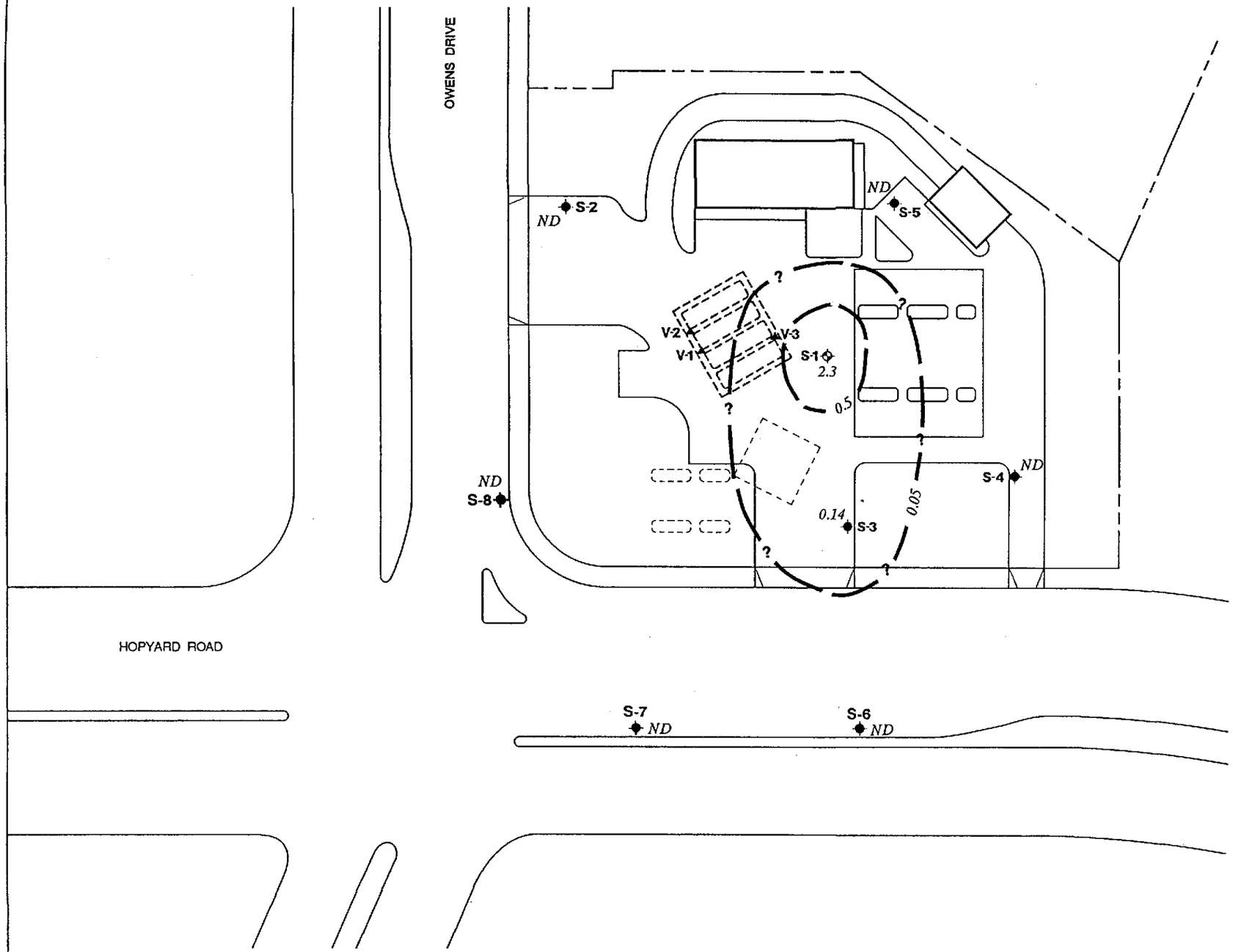


GeoStrategies Inc.

TPH-G Isoconcentration Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 12/92	2/90		



EXPLANATION

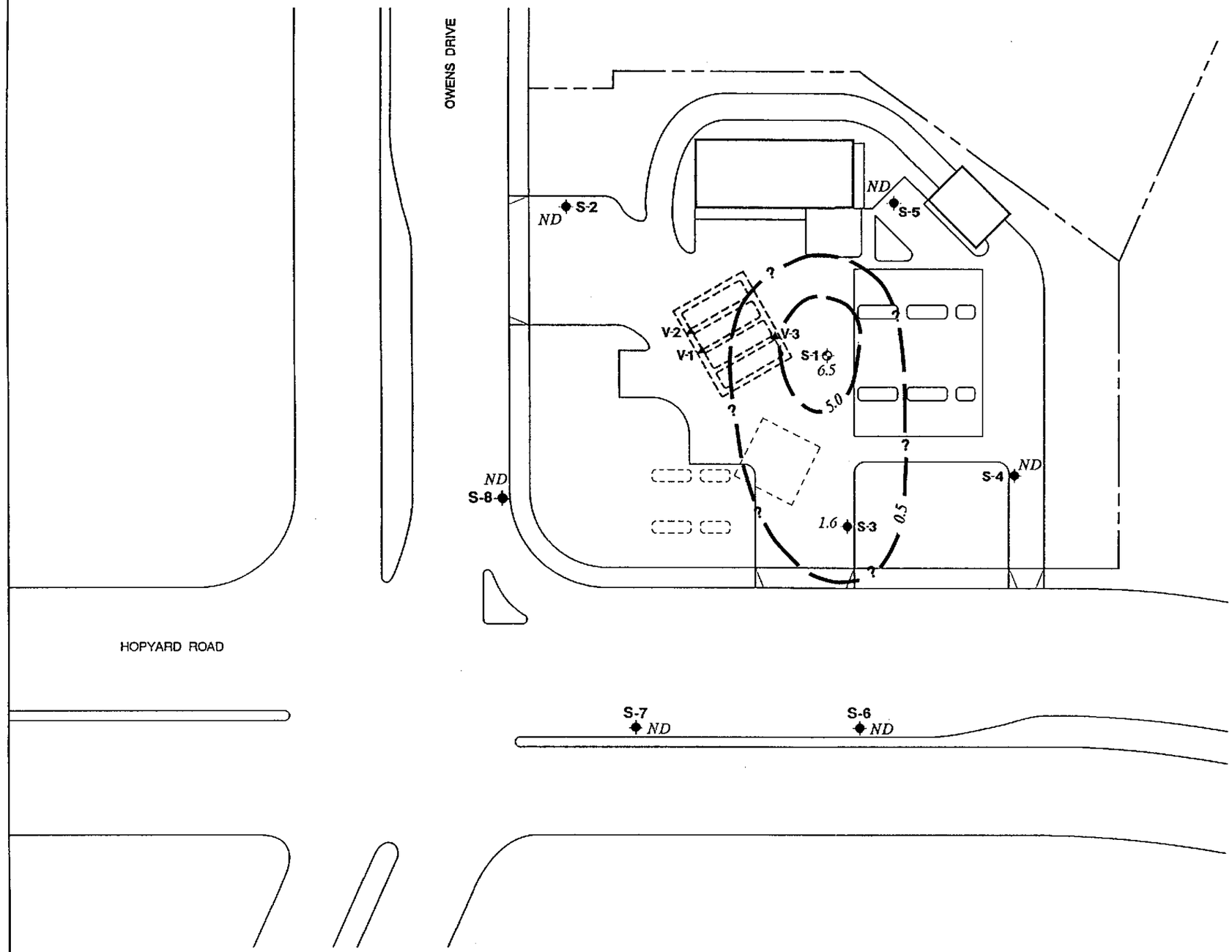
- S-2 — Ground-water monitoring well location
- S-1 — Ground-water monitoring well location by Pacific Environmental Group, Inc.
- V-1 — Vapor monitoring well location
- *0.14* — Benzene concentration in ppm sampled on January 5, 1990
- *0.05* — Benzene isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

GeoStrategies Inc.

Benzene Isoconcentration Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE **7**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RWP CEG 12/92	2/90		



EXPLANATION

- ◆ S-2 — Ground-water monitoring well location
- ◇ S-1 — Ground-water monitoring well location by Pacific Environmental Group, Inc.
- ▲ V-1 — Vapor monitoring well location
- *6.5* — TPH-D (Total Petroleum Hydrocarbons calculated as Diesel) concentration in ppm sampled January 5, 1990
- *0.5* — TPH-D isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

Note: Compounds detected and calculated as Diesel appear to be the less volatile constituents of gasoline

N

0 50 100

Scale in Feet

GSI GeoStrategies Inc.

TPH-D Isoconcentration Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE **8**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RMP CEG 12/92	2/90		

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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general and environmental contractors

Guidance and Reference Documents Used to Collect Groundwater Samples

These documents are used to verify Gettler-Ryan Inc. sampling procedures and consistent with current regulatory guidance. If site specific work and sampling plans are required, those plans will be developed from these documents.

U.S.E.P.A. - 330/9-51-002	NEIC Manual for Groundwater/Subsurface Investigation at Hazardous Waste Sites
U.S.E.P.A. - 530/SW611	Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities (August, 1977)
U.S.E.P.A. - 600/4-79-020	Methods for Chemical Analysis of Water and Wastes (1983)
U.S.E.P.A. - 600/4-82-029	Handbook for Sampling and Sample Preservation of Water and Wastewater (1982)
U.S.E.P.A. - 600/4-82-057	Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (July, 1982)
U.S.E.P.A. - SW-846#, 3rd Edition	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (November, 1986)
40 CFR 136.3e,Table II (Code of Federal Regulations)	Required Containers, Preservation Techniques, and Holding Times
Resources Conservation and Recover Act (OSWER 9950.1)	Groundwater Monitoring Technical Enforcement Guidance Document (September, 1986)
California Regional Water Quality Control Board (Central Valley Region)	A Compilation of Water Quality Goals (September, 1988); Updates (October, 1988)
California Regional Water Quality Control Board (North Coast, San Francisco Bay, and Central Valley)	Regional Board Staff Recommendations for Initial Evaluations and Investigation of Underground Tanks: Tri-Regional Recommendations (June, 1988)

Guidance and Reference Documents Used to Collect Groundwater Samples (cont.)

Regional Water Quality Control Board (Central Valley Region)	Memorandum: Disposal, Treatment, and Refuse of Soils Contaminated with Petroleum Fractions (August, 1986)
State of California Department of Health Services	Hazardous Waste Testing Laboratory Certification List (March, 1987)
State of California Water Resources Control Board	Leaking Underground Fuel Tank (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)
State of California Water Resources Control Board	Title 23, (Register #85.#33-8-17-85), Subchapter 16: Underground Tank Regulations; Article 3, Sections 2632 and 2634; Article 4, Section 2647 (October, 1986)
Alameda County Water District	Groundwater Protection Program: Guidelines for Groundwater and Soil Investigations at Leaking Underground Fuel Tank Sites (November, 1988)
American Public Health Association	Standard Methods for the Examination of Water and Wastewaters, 16th Edition
Analytical Chemistry (journal)	Principles of Environmental Analysis, Volume 55, Pages 2212-2218 (December, 1983)
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)
Santa Clara Valley Water District	Investigation and Remediation at Fuel Leak sites: Guidelines for Investigation and Technical Report Preparation (March 1989)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983
Site Specific (as needed)	General and specific regulatory documents as required.

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general and environmental contractors

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.

DOCUMENTATION

Sample Container Labels

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

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

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

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

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

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

Calculated and actual purge volumes

Chain-of-Custody

A Chain-of-Custody record (Figure 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 HCl 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 HCl 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

Logged by: | Driller: | of

Casing installation data:

Drilling method:

Hole diameter:

Top of Box Elevation: | Datum:

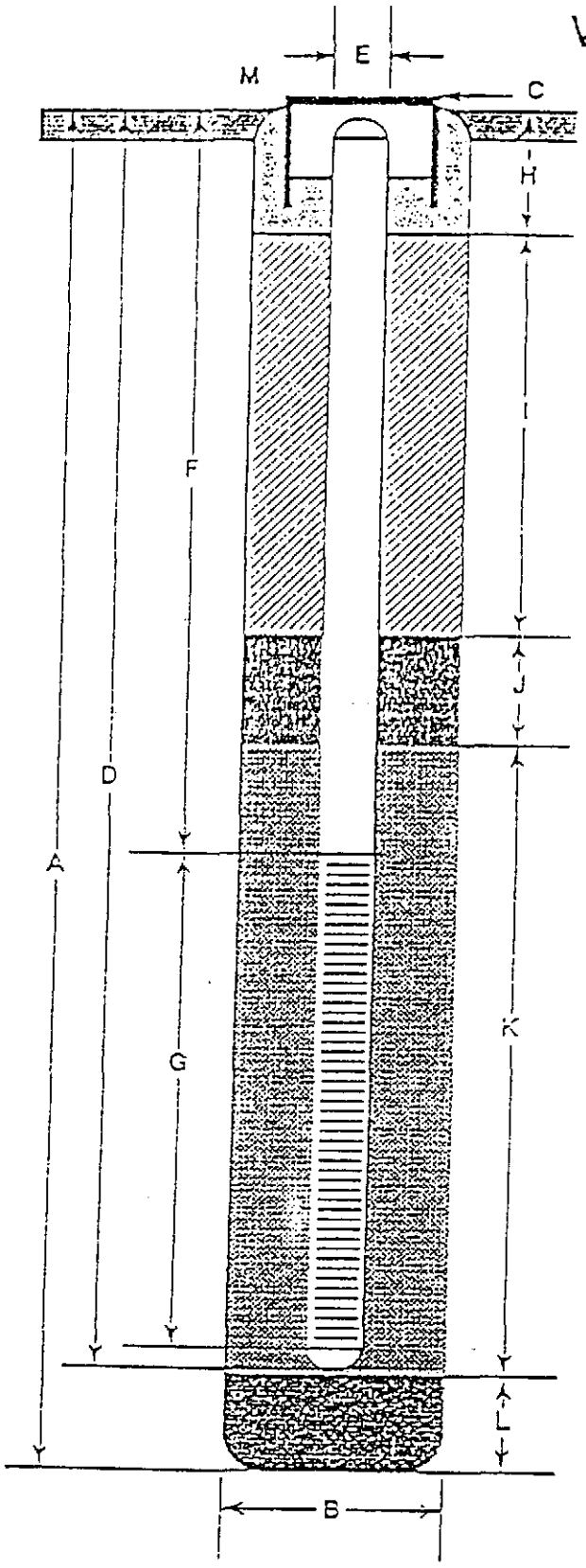
Water Level				
Time				
Date				

PID (ppm)	Blowct. 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 _____

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

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

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

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

ELINQUISHED BY: _____ RECEIVED BY: _____

ELINQUISHED BY: _____ RECEIVED BY: _____

ELINQUISHED BY: _____ RECEIVED BY LAB: _____

ESIGNATED LABORATORY: _____ DHS #: _____

EMARKS: _____

TE COMPLETED _____ FOREMAN _____

FIGURE 5

gettler — ryan inc.

February 5, 1990

GROUNDWATER SAMPLING REPORT

Referenced Site: Shell Service Station
5251 Hopyard Road
Pleasanton, California

Sampling Date: January 5, 1990

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on January 5, 1990 at the referenced location. The site is occupied by an operating service station located on the southeast corner of Hopyard Road and Owens Drive. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products and diesel.

There are currently three vapor monitoring wells and eight groundwater monitoring wells on site at the locations shown on the attached site map. Prior to sampling, the monitoring wells were inspected for total well depth, water level, 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 7.91 to 10.31 feet below grade. Separate phase product was not observed in any monitoring wells.

The wells 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 in 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-2) and a trip blank, supplied by the laboratory, were included and analyzed to assess quality control. A duplicate sample (SD-3), 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

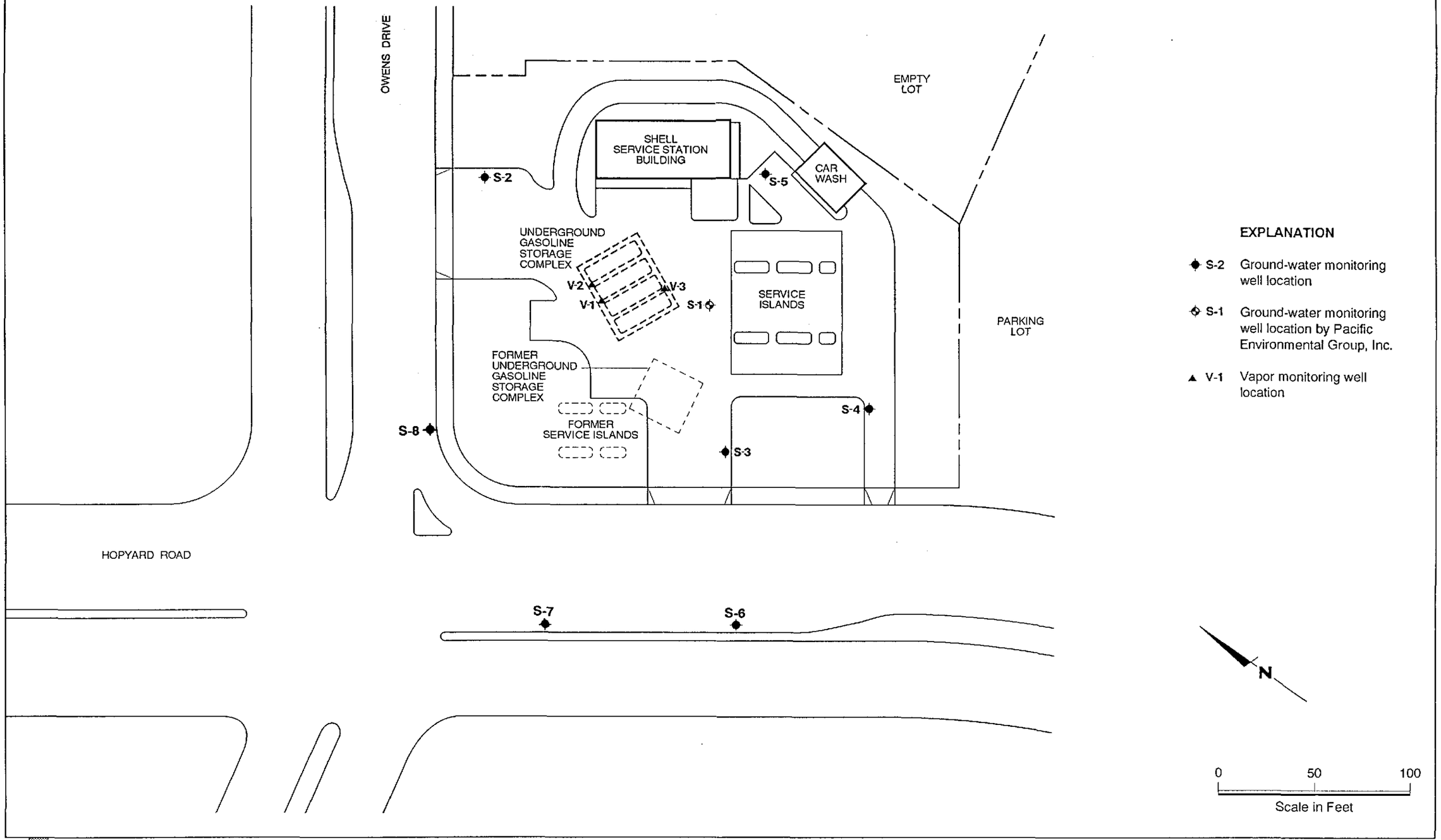
WELL I.D.	S-1	S-2	S-3 SD-3	S-4	S-5	S-6
Casing Diameter (inches)	3	3	3	3	3	3
Total Well Depth (feet)	28.7	24.6	24.9	24.4	24.8	25.6
Depth to Water (feet)	9.20	9.21	10.07	9.41	10.31	9.30
Free Product (feet)	none	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	29.7	23.4	22.6	22.8	22.0	24.3
Did Well Dewater?	yes	no	yes	yes	no	yes
Volume Evacuated (gal.)	15	28	16	14	22	14
Purging Device	Suction	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer	Bailer
Time	09:51	10:58	09:39	10:36	10:15	08:15
Temperature (F)*	67.1	65.8	63.7	67.2	64.1	66.3
pH*	7.14	6.97	6.80	7.84	7.09	7.47
Conductivity (umhos/cm)*	2790	5500	3980	1532	1559	3560

* Indicates Stabilized Value

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-7	S-8
Casing Diameter (inches)	3	3
Total Well Depth (feet)	25.2	25.0
Depth to Water (feet)	9.32	7.91
Free Product (feet)	none	none
Reason Not Sampled	----	----
Calculated 4 Case Vol.(gal.)	24.2	26.0
Did Well Dewater?	yes	yes
Volume Evacuated (gal.)	14	18
Purging Device	Suction	Suction
Sampling Device	Bailer	Bailer
Time	08:35	09:08
Temperature (F)*	68.6	66.2
pH*	6.89	7.00
Conductivity (umhos/cm)*	9690	7740

* Indicates Stabilized Value



GeoStrategies Inc.

Site Plan
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1242			

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: January 25, 1990

Work Order Number: TO-01-059, TO-01-060 P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Date Received by Lab:	01/08/90
Number of Samples:	11
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.

The method of analysis for high boiling hydrocarbons involves extracting the samples with solvent and examining the extracts by gas chromatography using a flame ionization detector.

Samples TO-01-059-03 and TO-01-060-01 were identified as duplicate samples on the C.O.C. Results for Diesel varied:

TO-01-059-03 = 0.417 mg/L
TO-01-060-01 = 2.216 mg/L

Both samples were re-analyzed, and results again varied from the initial analysis and between samples:

TO-01-059-03 = 1.562 mg/L
TO-01-060-01 = 0.589 mg/L

The Laboratory has reported the higher level of the results for each sample. The discrepancy is possibly due to sampling error.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
11 Pages Following - Tables of Results

IT ANALYTICAL SERVICES
SAN JOSE, CA

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

Client Sample ID: S-1

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-01
Receipt Condition: Cool
Low Boiling Analysis Date: 01/11/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/12/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	8.2
Benzene	0.02	2.3
Toluene	0.02	0.10
Ethyl Benzene	0.02	0.66
Xylenes (total)	0.05	0.32
High Boiling Hydrocarbons, calculated as Diesel	0.4	6.5*

*Compounds detected and calculated as diesel appear to be the less volatile constituents of gasoline.

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-2

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-02
Receipt Condition: Cool
Low Boiling Analysis Date: 01/10/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-3

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-03
Receipt Condition: Cool
Low Boiling Analysis Date: 01/12/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/15/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	0.86
Benzene	0.0005	0.14
Toluene	0.0005	0.0016
Ethyl Benzene	0.0005	0.078
Xylenes (total)	0.001	0.002
High Boiling Hydrocarbons, calculated as Diesel	0.1	1.6*

*Compounds detected and calculated as diesel appear to be the less volatile constituents of gasoline.

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-4

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-04
Receipt Condition: Cool
Low Boiling Analysis Date: 01/10/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: T0-01-059, T0-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-5

Sample Date: 01/05/90
Lab Sample ID: T0-01-059-05
Receipt Condition: Cool
Low Boiling Analysis Date: 01/10/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-6

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-06
Receipt Condition: Cool
Low Boiling Analysis Date: 01/12/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	0.0005
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-7

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-07
Receipt Condition: Cool
Low Boiling Analysis Date: 01/12/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: S-8

Sample Date: 01/05/90
Lab Sample ID: TO-01-059-08
Receipt Condition: Cool
Low Boiling Analysis Date: 01/12/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/11/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: SD-3

Sample Date: 01/05/90
Lab Sample ID: TO-01-060-01
Receipt Condition: Cool
Low Boiling Analysis Date: 01/12/90
High Boiling Extraction Date: 01/10/90
High Boiling Analysis Date: 01/12/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	0.68
Benzene	0.0005	0.096
Toluene	0.0005	0.0013
Ethyl Benzene	0.0005	0.054
Xylenes (total)	0.001	0.001
High Boiling Hydrocarbons, calculated as Diesel	0.1	2.2*

*Compounds detected and calculated as diesel appear to be the less volatile constituents of gasoline.

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: TO-01-059, TO-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: SF-2

Sample Date: 01/05/90
Lab Sample ID: TO-01-060-02
Receipt Condition: Cool
Low Boiling Analysis Date: 01/09/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None

Date: January 25, 1990
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA
Work Order Number: T0-01-059, T0-01-060

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Sample ID: Trip Blank

Sample Date: ----
Lab Sample ID: T0-01-060-03
Receipt Condition: Cool
Low Boiling Analysis Date: 01/10/90

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.050	None
Benzene	0.0005	None
Toluene	0.0005	None
Ethyl Benzene	0.0005	None
Xylenes (total)	0.001	None

Getler - Ryan Inc. TO-01-059/060 ENVIRONMENTAL DIVISION 0930 **Chain of Custody**

COMPANY Shell Oil Company JOB NO. _____

JOB LOCATION 5251 Hopyard Rd. / Owens Dr.

CITY Pleasanton, CA PHONE NO. 783-7500

AUTHORIZED John Werfel DATE 1/5/90 P.O. NO. 3633

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-1	5	Liquid	1-5 19:51	(THC(GC) BTXE; TPH HBF as Diesel	Good/ok
S-2			1-5 10:58		
S-3			19:39		
S-4			10:36		
S-5			10:15		
S-6			18:15		
S-7			18:35		
S-8			19:08		
SD-3			1 —		
SF-2	3		1 —	THC (GC) BTXE	
Trip blank	2		1 —	THC (GC) BTXE	
				TPH HBF as Diesel	

RELINQUISHED BY: Philly J Pye 1/5/90

RECEIVED BY: [signature] 1/8/90 0930

RELINQUISHED BY: [signature] 1/8/90 17:18

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: [signature] 1/8/90 17:18

DESIGNATED LABORATORY: IT SCN DHS #: 137

REMARKS: Normal TAT (2 week)

WIC #: 204-6138-0907

AFE #: 986707

Eng code: 5441

Engineer: Diane Lundquist

DATE COMPLETED January 5, 1990 FOREMAN Philly J. Pye

ORIGINAL

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	E.B. (PPM)	XYLENES (PPM)	DIESEL (PPM)	OIL (PPM)
02-Mar-88	S-1	0.6	0.22	<0.005	----	<0.02	<0.05	<0.2
14-Dec-88	S-1	17.	5.1	0.04	0.57	0.20	8.	N/A
30-Mar-89	S-1	8.2	2.9	<0.02	0.33	0.16	3.6	N/A
20-Jul-89	S-1	21.	6.2	1.5	1.1	0.7	8.5	N/A
16-Oct-89	S-1	16.	3.9	0.89	1.2	0.9	11.	N/A
05-Jan-90	S-1	8.2	2.3	0.10	0.66	0.32	6.5	N/A
11-May-89	S-2	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
20-Jul-89	S-2	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
16-Oct-89	S-2	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
05-Jan-90	S-2	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
11-May-89	S-3	2.6	0.33	0.014	0.22	0.20	1.4	N/A
20-Jul-89	S-3	9.7	2.3	0.03	0.88	0.16	2.2	N/A
16-Oct-89	S-3	3.4	0.70	0.008	0.36	0.06	2.8	N/A
05-Jan-90	S-3	0.86	0.14	0.0016	0.078	0.002	1.6	N/A
11-May-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
20-Jul-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
16-Oct-89	S-4	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
05-Jan-90	S-4	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
11-May-89	S-5	0.05	<0.0005	<0.001	0.001	0.003	<0.1	N/A
20-Jul-89	S-5	<0.05	0.01	<0.001	<0.001	<0.003	<0.1	N/A
16-Oct-89	S-5	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	N/A
05-Jan-90	S-5	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
15-Nov-89	S-6	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
05-Jan-90	S-6	<0.050	<0.0005	0.0005	<0.0005	<0.001	<0.1	N/A
15-Nov-89	S-7	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
05-Jan-90	S-7	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
								N/A
15-Nov-89	S-8	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
05-Jan-90	S-8	<0.050	<0.0005	<0.0005	<0.0005	<0.001	<0.1	N/A
14-Dec-88	V-1	0.77	0.0064	0.021	0.009	0.087	4.5	N/A
14-Dec-88	V-2	0.16	0.0038	<0.001	<0.001	0.004	1.0	N/A
14-Dec-88	V-3	0.14	0.0087	<0.001	<0.001	0.003	0.8	N/A

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

ETHYLBENZENE & XYLENES COMBINED IN MARCH 1988 IN WELL S-1