Shell Oil Company

EAST BAY MARKETING DISTRICT

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

January 16, 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 January 10, 1990, which documents the groundwater sampling and well installations conducted between October - December 1989 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
Environmental Engineer

DML/jw

enclosure

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

GeoStrategies Inc.

QUARTERLY REPORT

OCTOBER - DECEMBER 1989

Shell Service Station
5251 Hopyard Road
Pleasanton, California

Report No. 7633-4

January 10, 1990

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

January 10, 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:

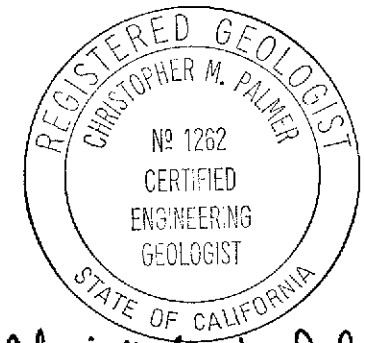
This quarterly report has been prepared for the above referenced site, for the October through December, 1989 quarter.

If you have any questions, please call.

GeoStrategies Inc. by,

David A. Ferreira
Geologist

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



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

DAF/JLP/mlg

Report No. 7633-4

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 fourth quarterly groundwater sampling for 1989 performed by Gettler-Ryan Inc. (G-R), on October 16, 1989, in accordance with the quarterly sampling plan for the site. This report also documents the installation and sampling of Wells S-6, S-7 and S-8 in accordance with the work plan prepared by GSI dated October 12, 1989. Field Methods and Procedures used to perform this work are presented in Appendix A.

2.0 REGIONAL SETTING

The site is located in an area known as the Livermore-Amador Valley, approximately 25 miles east of San Francisco, California. The Valley acts as a ground-water basin and is composed primarily of alluvial deposits. The water-bearing strata in the deposited alluvium is composed primarily of sand, gravel, and clay, with confining beds composed primarily of silty clay (Sorenson, Cascos, & Glass 1985). The Arroyo Mocho Canal, approximately 6,500 feet south of the site, acts as the primary surface drainage feature of the basin.

3.0 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 ground-water sample collected from monitoring well S-1 contained TPH-Gasoline and benzene concentrations of 0.6 parts per million (ppm) and 0.22 ppm, respectively. The ground-water sample collected from monitoring well S-1 was reported as none detected (ND) for TPH-Diesel and TPH-Oil. 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. TPH-Gasoline was detected in Well S-1 and the three vadose wells at concentrations ranging from 0.14 to 17 ppm. Benzene was detected in these wells at concentrations ranging from 0.0038 to 5.1 ppm. The results of this sampling event are presented in the G-R report dated January 10, 1989.

In March 1989, TPH-Gasoline (8.2 ppm), benzene (2.9 ppm), and TPH-Diesel (3.6 ppm) were detected in Well S-1. No water was 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). TPH-Gasoline was detected in ground-water samples collected from Wells S-1 (8.2 ppm), S-3 (2.6 ppm), and S-5 (0.05 ppm). Benzene was detected in Wells S-1 (2.9 ppm) and S-3 (0.33 ppm). TPH-Diesel was detected in Wells S-1 (3.6 ppm) and S-3 (1.4 ppm). 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. TPH-Gasoline was detected in Wells S-1 (21 ppm) and S-3 (9.7 ppm). Benzene was detected in Wells S-1 (6.2 ppm), S-3 (2.3 ppm), and S-5 (0.010 ppm). TPH-Diesel was detected in Wells S-1 (8.5 ppm) and S-3 (2.2 ppm). Potentiometric data indicated that shallow groundwater beneath the site flows to the west. The results of the sampling, along with a proposal for additional work, were 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). The results of this investigation are discussed below.

4.0 GROUNDWATER LEVEL MONITORING

4.1 Potentiometric Data

Depth to groundwater measurements in each well were made by G-R on December 12, 1989. Static water levels were measured from the surveyed top of the well box and recorded to the nearest ±0.01 foot (See Table 1) using an electronic oil/water interface probe. Plate 2 presents the location of each well at the site.

Ground-water elevation data for the December 12, 1989 monitoring event have been plotted and contoured and are presented on Plate 3. Monitoring data was used to create the potentiometric map because this data was taken after well development procedures for the newly installed wells and included all site wells. Potentiometric data indicate that shallow groundwater beneath the site flows to the northwest with an approximate hydraulic gradient of 0.003.

4.2 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.

5.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected by G-R on October 16, 1989 and November 15, 1989. The November 15, 1989 sampling event consisted of only the newly installed monitoring wells. The ground-water samples were analyzed for TPH-Gasoline and TPH-Diesel according to EPA Method 8015 (Modified) and Benzene, Toluene, Ethylbenzene, and Xylenes (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.

Detectable concentrations of TPH-Gasoline were reported in Wells S-1 (16 ppm) and S-3 (3.4 ppm). Benzene was detected in Wells S-1 (3.9 ppm) and S-3 (0.70 ppm) above established Maximum Contaminant Levels (MCLs) set by the Regional Water Quality Control Board (RWQCB). TPH-Diesel was detected in Wells S-1 (11 ppm) and S-3 (2.8 ppm). IT Analytical Services stated in the certified analytical report that the compounds detected and calculated as diesel appear to be the less volatile constituents of gasoline. Wells S-2, S-4, S-5, S-6, S-7 and S-8 were reported as ND for all constituents analyzed. Ground-water chemical data are summarized and presented on Table 1. A TPH-Gasoline isoconcentration map (Plate 4), a benzene isoconcentration map (Plate 5), and a TPH-Diesel isoconcentration Map (Plate 6) have been prepared utilizing the October 16, 1989 quarterly ground-water analytical data. The November 15, 1989 sampling data were not used to create the isoconcentration maps, due to the time difference between the sampling events.

5.1 Quality Control

Quality Control (QC) samples for the quarterly ground-water sampling on October 16, 1989 consisted of a field blank, a trip blank, and a duplicate sample. The QC sample for the November 15, 1989 sampling event was a trip blank. 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 procedures. The trip blanks were prepared by the laboratory using organic-free water to evaluate field and laboratory handling procedures. All duplicate, field blank, and trip blank samples were reported as ND for all sampling events during this quarter. The precision of QC data was assessed by calculating the Relative Percent Difference (RPD) for the duplicate sample (SD-5). The RPD value was calculated to be 0%.

QC procedures during field sampling are summarized in the G-R Sampling Protocol in Appendix A. The G-R Ground-water Sampling Reports, Chain-of-Custody forms, and the IT Laboratory chemical analytical reports for all ground-water sampling events during this quarter are presented in Appendix B.

6.0 EXPLORATORY SOIL BORING AND WELL INSTALLATION PROCEDURES

6.1 Field Procedures

Three well borings (S-6, S-7, and S-8) were drilled with a truck-mounted, hollow-stem auger drilling rig using 8-inch-diameter hollow-stem augers. Soil samples were collected at a minimum of five-foot depth intervals using a modified California split-spoon sampler fitted with brass tube liners. A GSI geologist supervised the drilling, described soil samples using the Unified Soils Classification System (ASTM D-2488-84), and prepared a lithology log for each boring. All field work was performed in accordance with the GSI Field Methods and Procedures presented in Appendix A.

6.2 Soil Sampling

One 4-inch brass sample tube of soil from each sampled interval was used to perform head-space analysis in the field for the presence of Volatile Organic Compounds (VOCs). The field-test procedure involved immediately removing the soil from the brass liner, placing it into a clean glass jar, and covering the jar with aluminum foil secured under a ring-type threaded lid. After approximately twenty minutes, the foil was pierced and the head-space within the jar was tested for total organic vapor, measured in parts per million (ppm) using an OVM photoionization detector. Head-space test results are presented on the exploratory boring logs presented in Appendix C.

Selected soil samples retained for chemical analysis were collected in clean brass liners, covered on both ends with aluminum foil and sealed with plastic end caps. The samples were labeled, entered on a Chain-of-Custody form, and transported on blue ice in a cooler to IT Analytical Services for analyses.

6.3 Monitoring Well Installation

Three monitoring wells (S-6, S-7, and S-8) were installed October 30, and November 6, 1989. Wells S-6, S-7, and S-8 were installed to depths of 26, 27.5, and 26 feet below grade, respectively. The wells were constructed using 3-inch-diameter Schedule 40 PVC well casing and 0.020-inch factory slotted well screen. Twenty feet of well screen was placed in each of the boreholes, and Lonestar 2/12 sand was placed in the annular space across the entire screened interval including one foot above the top of the screen. A one-foot bentonite seal followed by a cement grout seal was placed above the sand to just below ground surface. The well construction details are presented with the boring logs in Appendix C.

7.0 RESULTS

7.1 Subsurface Conditions

The lithology beneath the site appears to consist primarily of highly plastic clay, interbedded with clay of low to medium plasticity, sandy clay, silt, silty clay, and silty sand. (Refer to the exploratory boring logs in Appendix C).

The upper-most water-bearing strata appear to be comprised primarily of lower permeability silty sand and sandy clay. Equilibrated ground-water levels occur at approximately 9 feet below grade, which appears to correspond to the top of the upper-most water-bearing unit. It is difficult to ascertain whether this aquifer is unconfined or semi-confined because of current drought conditions.

7.2 Soil Analytical Results

Soil samples were analyzed by IT Analytical Services for TPH-Gasoline according to EPA Method 8015 (Modified) and BTEX according to EPA Method 8020.

Benzene was detected at a concentration of 0.035 ppm in the soil sample collected from S-6 at five feet. All other soil samples analyzed were reported as ND for all constituents. Soil analytical data are summarized in Table 2, and the IT Analytical Services certified analytical report is included in Appendix B.

8.0 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 0.005.

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

- 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 (16 ppm) and S-3 (3.4 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 (3.9 ppm) and S-3 (0.70 ppm).

- 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 (11 ppm) and S-3 (2.8 ppm).

- Three ground-water monitoring wells (S-6, S-7, and S-8) were installed during this quarter.

- TPH-Gasoline and TPH-Diesel concentration were reported as ND for all soil samples analyzed.

- Benzene concentrations were reported as ND for all soil samples analyzed except S-6 at 5 feet (0.035 ppm).

- The three ground-water monitoring wells (S-6, S-7, and S-8) installed this quarter appear to have defined an ND boundary around the site.

9.0 PLANNED SITE ACTIVITIES

The following activities are planned for the first quarter, January 1 to March 31, 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.
- The findings of a half mile radius well survey and beneficial water use survey will be presented in the next quarterly report.

References Cited:

Published and Unpublished Reports

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.

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

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

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

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.

Sorenson, S.K., Cascos, P.V., Glass, R. L., 1985, Water-Quality Conditions and an Evaluation of Ground- and Surface-Water Sampling in the Livermore-Amador Valley, California, U.S. Geological Survey Water-Resources Investigations Report 84-4352, pp 2-4.

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	16-Oct-89	20-Oct-89	16.	3.9	0.89	1.2	0.9	** 11.	326.73	317.53	----	9.20
S-2	16-Oct-89	20-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	326.59	317.40	----	9.19
S-3	16-Oct-89	20-Oct-89	3.4	0.70	0.008	0.36	0.06	** 2.8	327.38	317.36	----	10.02
S-4	16-Oct-89	20-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	327.38	318.15	----	9.23
S-5	16-Oct-89	20-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	<0.1	327.76	317.55	----	10.21
S-6	15-Nov-89	20-Nov-89	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	326.56	317.26	----	9.30
S-7	15-Nov-89	20-Nov-89	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	326.49	317.21	----	9.28
S-8	15-Nov-89	20-Nov-89	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	325.32	317.39	----	7.93

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
TPH-D = Total Petroleum Hydrocarbons as Diesel
PPM = Parts Per Million SF = Field Blank TB = Trip Blank
SD = Duplicate Sample ND = None Detected

* See Analytical reports for analyses dates

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

Note: 1. All data shown as <x is reported as ND (none detected)
2. Depth to Water measured on 12-Dec-89
3. Water level elevations referenced to MSL
4. DHS Action Levels and MCLs are subject to change pending State review

Project No. 7633-4

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-1	16-Oct-89	19-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	----	----	----	----
SD-5	16-Oct-89	20-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	----	----	----	----
TB	16-Oct-89	19-Oct-89	<0.05	<0.0005	<0.001	<0.001	<0.003	N/A	----	----	----	----
TB	15-Nov-89	17-Nov-89	<0.05	<0.0005	<0.0005	<0.0005	<0.0005	<0.1	----	----	----	----

Project No. 7633-4

TABLE 2

SOIL ANALYSIS DATA

SAMPLE NO	SAMPLE DATE	ANALYSIS DATE	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	TPH-D * (PPM)
S-6-5	30-Oct-89	05-Nov-89	<2.5	0.035	<0.025	<0.025	<0.05	<5.
S-6-10	30-Oct-89	06-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-6-16	30-Oct-89	06-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-7-5	30-Oct-89	06-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-7-10	30-Oct-89	06-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-7-15	30-Oct-89	06-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-8-5.5	06-Nov-89	14-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-8-10.5	06-Nov-89	14-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.
S-8-15.5	06-Nov-89	15-Nov-89	<2.5	<0.025	<0.025	<0.025	<0.05	<5.

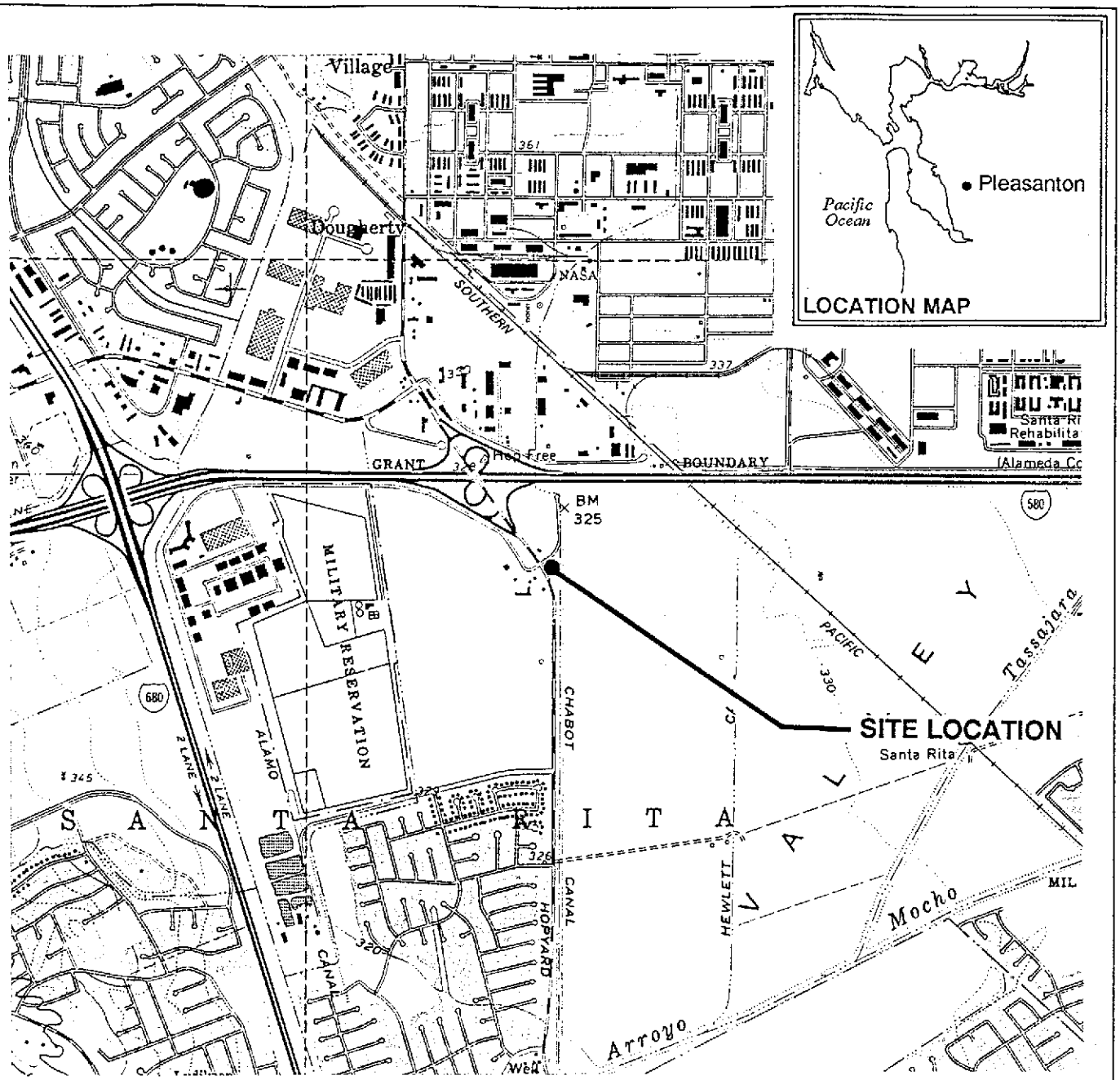
TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel

* See analytical reports for dates analyzed (Appendix B)

PPM = parts per million

Notes: 1. All data shown as <x is reported as ND (none detected)

Project No. 7633-4



Base Map: USGS Topographic Map

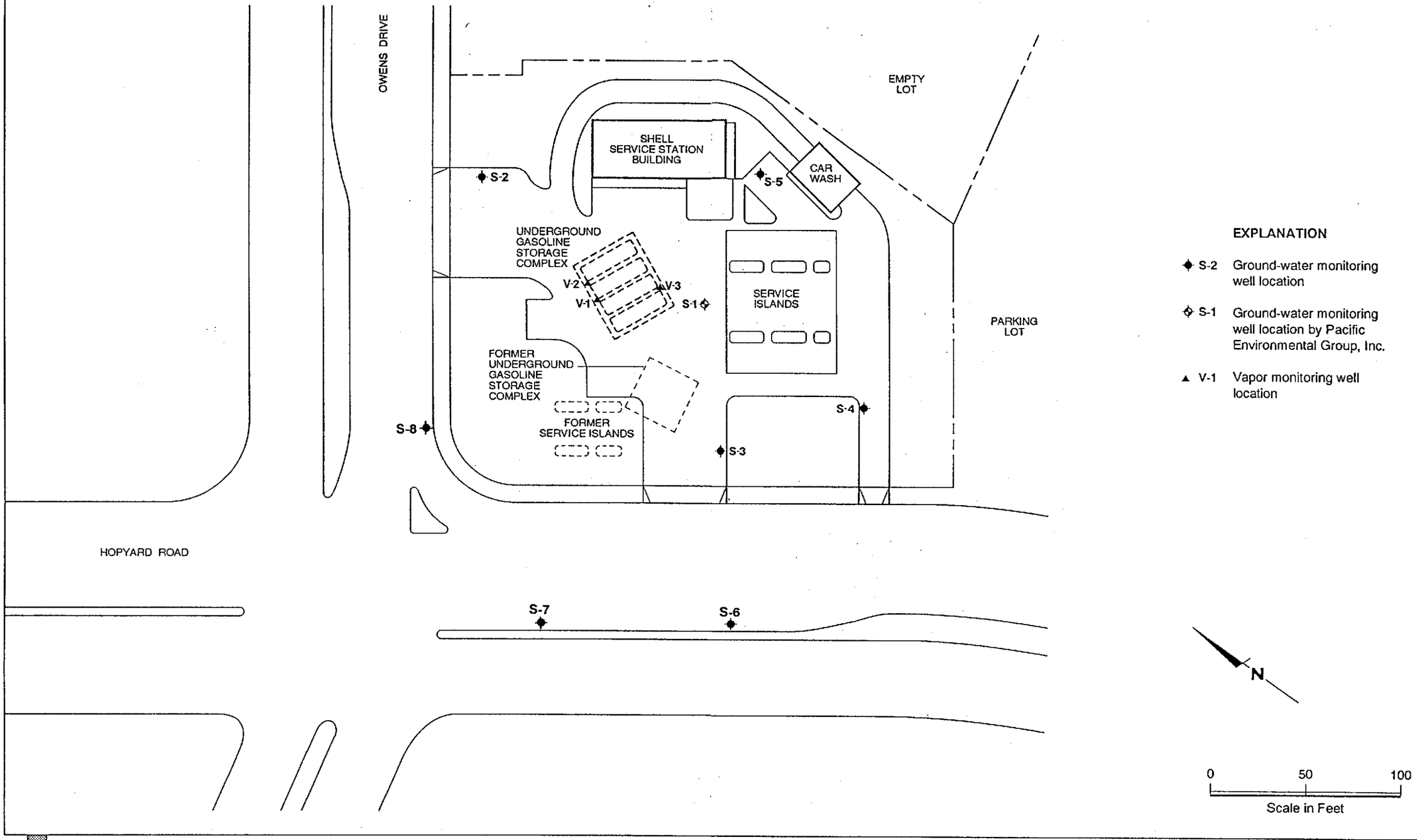
Approximate Scale : 1" = 2000'

GeoStrategies Inc.

Vicinity Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
1

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

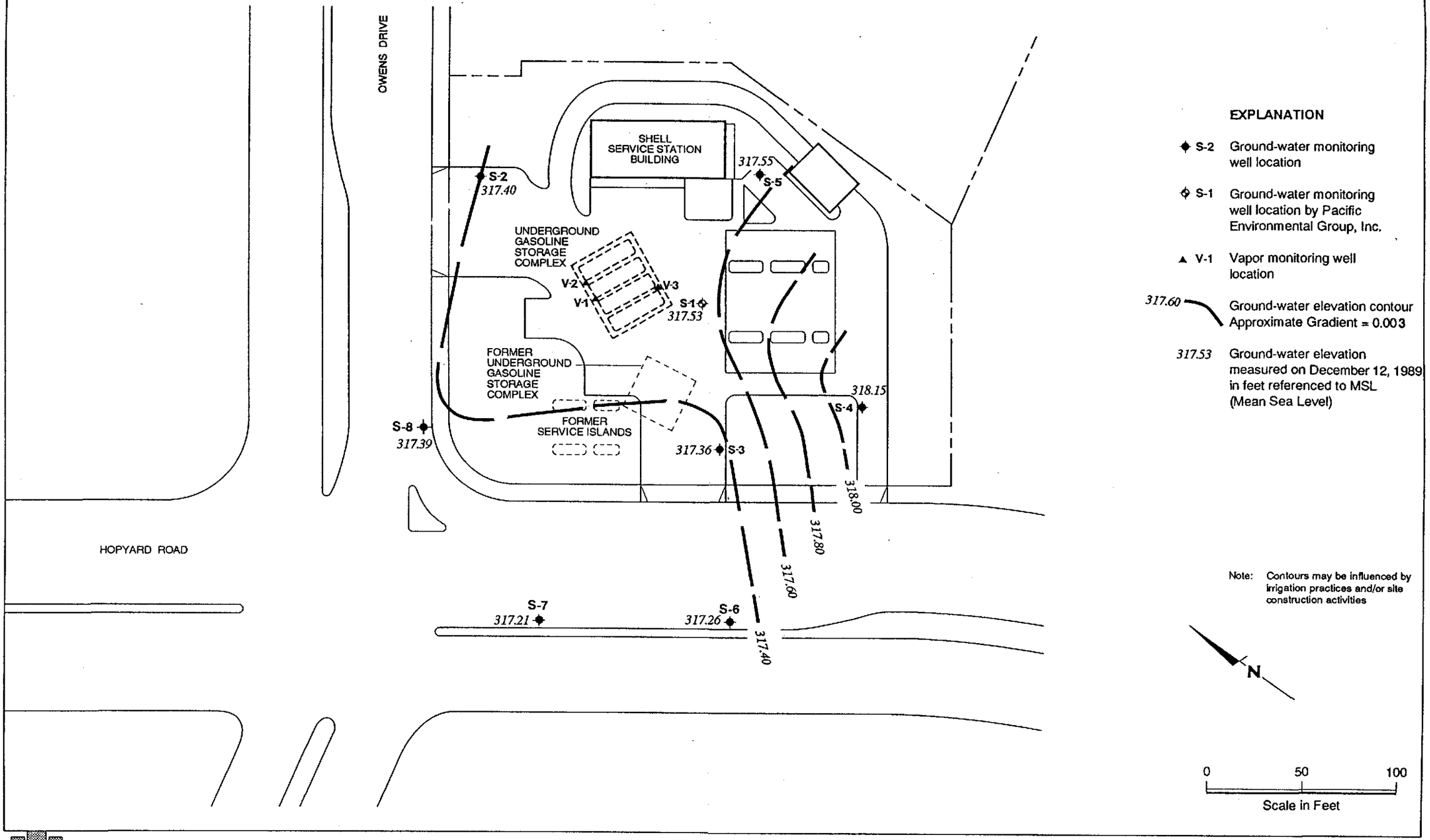


GeoStrategies Inc.

Site Plan
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE **2**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CEG 12/02	1/90		

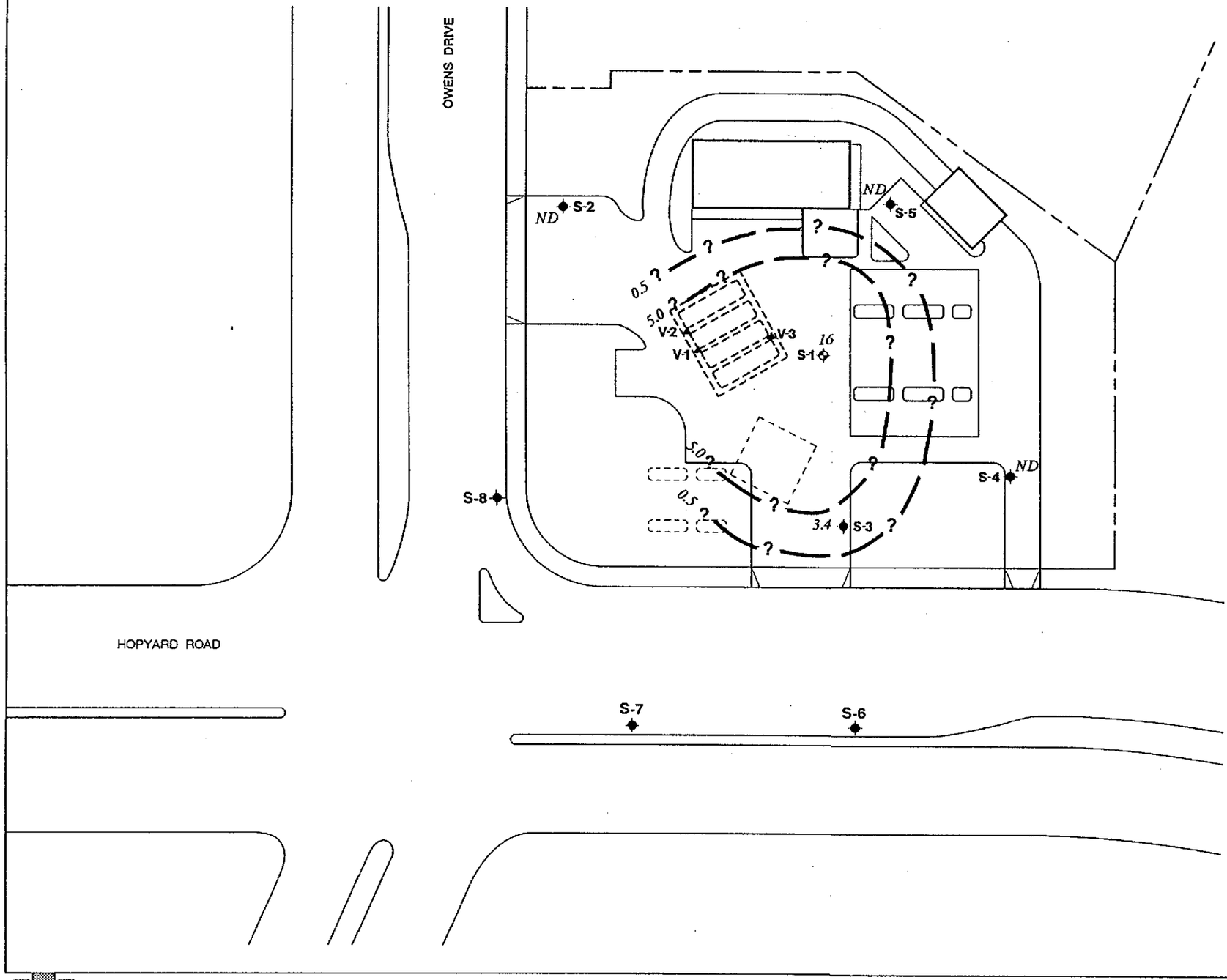


GeoStrategies Inc.

Potentiometric Map
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CEG 1262	1/90		



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
- *16* — TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline) concentration in ppm sampled October 16, 1989
- *0.5* — TPH-G isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

Note: Wells S-6, S-7 and S-8 were installed after quarterly sampling

N

0 50 100

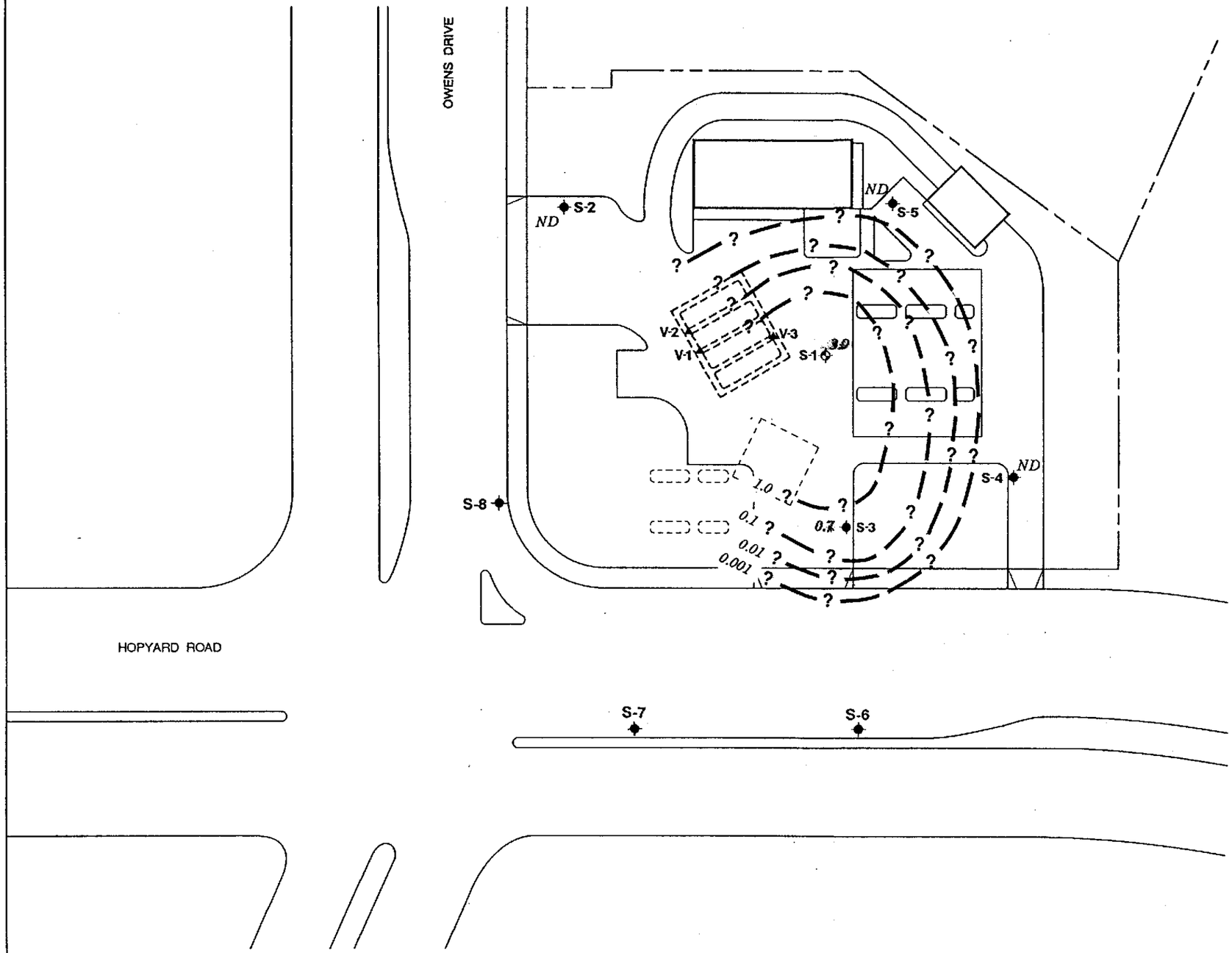
Scale in Feet

GeoStrategies Inc.

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

PLATE **4**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RGP CEG 1262	1/90		



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
- *3.9* — Benzene concentration in ppm sampled on October 16, 1989
- *0.01* — Benzene isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

Note: Wells S-6, S-7 and S-8 were installed after quarterly sampling

N

0 50 100

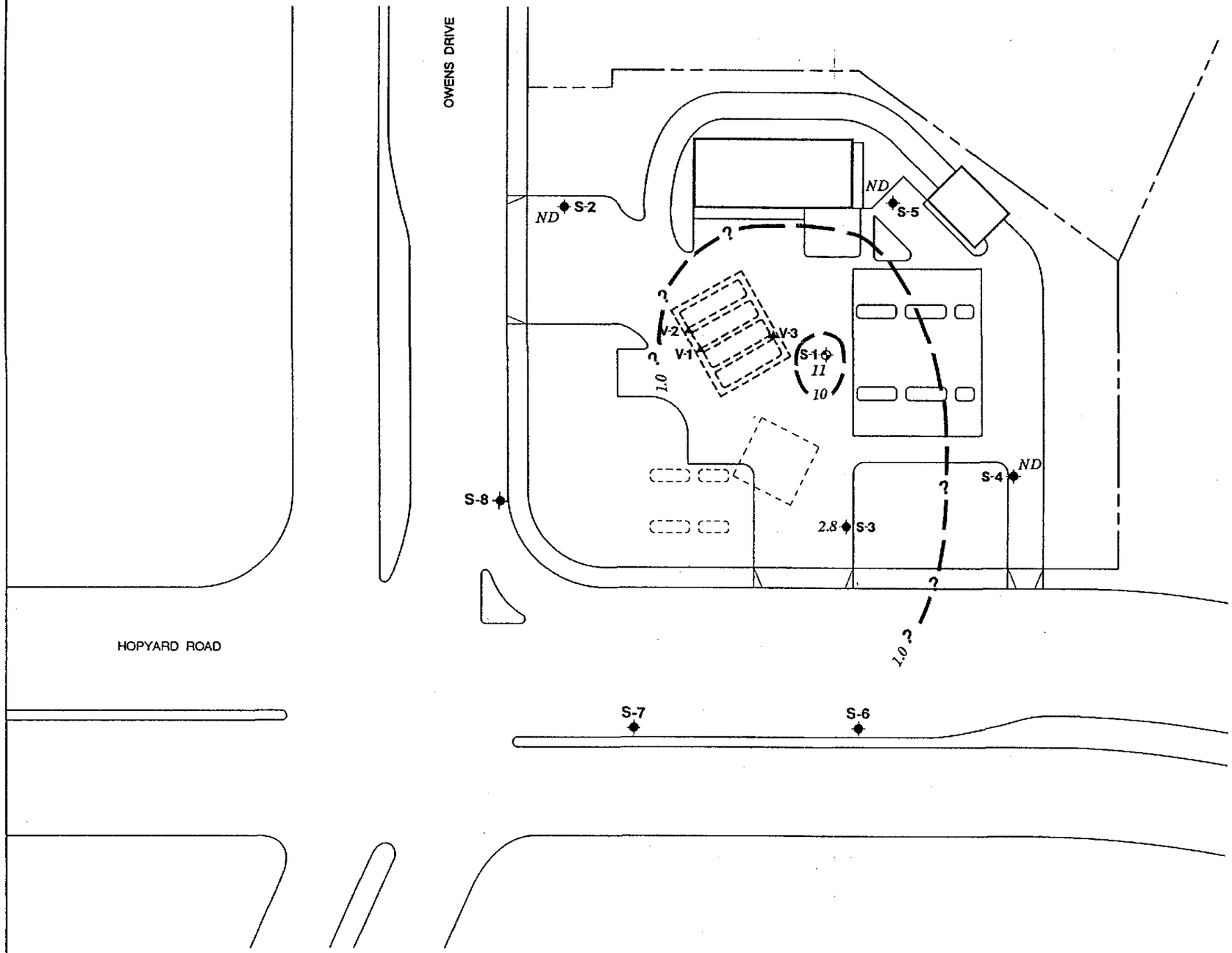
Scale in Feet

GeoStrategies Inc.

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

PLATE **5**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	amp CEG 1262	1/90		



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
- *11* — TPH-D (Total Petroleum Hydrocarbons calculated as Diesel) concentration in ppm sampled October 16, 1989
- *1.0* — TPH-D isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

Note: Wells S-6, S-7 and S-8 were installed after quarterly sampling

N

0 50 100

Scale in Feet

GeoStrategies Inc.

TPH-D 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 2/6/90	1/90		

FIELD METHODS AND PROCEDURES

EXPLORATION DRILLING

Mobilization

Prior to any drilling activities, GSI will verify that necessary drilling permits have been secured.

Utility locations will be located and drilling will be conducted so as not to disrupt activities at a project site. GSI will obtain and review available public data on subsurface geology and if warranted, the location of wells within a half-mile of the project site will be identified. Drillers will be notified in advance so that drilling equipment can be inspected prior to performing work.

Drilling

The subsurface investigations are typically performed to assess the lateral and vertical extent of petroleum hydrocarbons present in soils and ground water. Drilling methods will be selected to optimize field data requirements as well as be compatible with known or suspected subsurface geologic conditions.

Monitoring wells are installed using a truck-mounted hollow-stem auger drill rig or mud-rotary drill rig. Typically, the hollow-stem rig is used for wells up to 100 feet, if subsurface conditions are favorable. Wells greater than 100-feet deep are typically drilled using mud-rotary techniques. When mud rotary drilling is used, an electric log will be performed for additional lithological information. Also during mud rotary drilling, precautions will be taken to prevent mud from circulating contaminants by using a conductor casing to seal off contaminated zones. Samples will be collected for lithologic logging by continuous chip, and where needed by drive sample or core as specified by the supervising geologist.

Soil Sampling

Shallow soil borings will be drilled using a truck-mounted hollow-stem auger drilling rig, unless site conditions favor a different drilling method. Drilling and sampling methods will be consistent with ASTM Method D-1452-80. The auger size will be a minimum 6-inch nominal outside-diameter (O.D). No drilling fluids will be used during this drilling method. The augers and other tools used in the bore hole will be steam cleaned before use and between borings to minimize the possibilities of cross-contamination between borings.

Soil samples are typically collected at 5-foot intervals as a minimum from ground surface to total depth of boring. Additional soil samples will be collected based on significant lithologic changes and/or potential chemical content. Soil samples from each sampling interval will be lithologically described by a GSI geologist (Figure 1). Soil colors will be described using the Munsell Color Chart. Rock units will be logged using appropriate lithologic terms, and colors described by the G.S.A. Rock Color Chart.

Head-space analyses will be performed to check for the evidence of volatile organic compounds. Head-space analyses will be performed using an organic vapor analyzer; either an OVA, HNU, or OVM. Organic vapor concentrations will be recorded on the GSI field log of boring (Figure 1). The selection of soil samples for chemical analysis are typically based on the following criteria:

1) Soil discoloration
2) Soil odors
3) Visual confirmation of chemical in soil
4) Depth with respect to underground tanks (or existing grade)
5) Depth with respect to ground water
6) OVA reading

Soil samples (full brass liners) selected for chemical analysis are immediately covered with aluminum foil and the liner ends are capped to prevent volatilization. The samples are labeled and entered onto a Chain-of-Custody form, and placed in a cooler on blue ice for transport to a State-certified analytical laboratory.

Soil cuttings are stockpiled on-site. Soils are sampled and analyzed for site-specific chemical parameters. Disposition of soils is dependent of chemical analytical results of the samples.

Soil Sampling - cont.

Soil borings not converted to monitoring wells will be backfilled (sealed) to ground surface using either a neat cement or cement-bentonite grout mixture. Backfilling will be tremied by continuously pumping grout from the bottom to the top of the boring where depth exceeds 20' or as required by local permit requirements.

All field and office work, including exploratory boring logs, are prepared under the direction of a registered geologist.

Monitoring Well Installation

Monitoring well casing and screen will be constructed of Schedule 40, flush-joint threaded polyvinylchloride (PVC). The well screen will be factory mill-slotted unless additional open area is required (eg. conversion to an extraction well in a low-yield aquifer). The screen length will be placed adjacent to the aquifer material to a minimum of 2-feet above encountered water. No screen shall be placed in a borehole that potentially creates hydraulic interconnection of two or more aquifer units. Screen slot size and well sand pack will be compatible with encountered aquifer materials, as confirmed by sieve analysis.

Monitoring wells will be completed below grade (Figure 2) unless special conditions exist that require above-grade completion design. In the event a monitoring well is required in an aquifer unit beneath an existing aquifer, the upper aquifer will be sealed off by installing a steel conductor casing with an annular neat cement or cement-bentonite grout seal. This seal will be continuously tremied pumped from the bottom of the annulus to ground surface.

The monitoring well sand pack will be placed adjacent to the entire screened interval and will extend a recommended minimum distance of 2-feet above the top of the screen. No sand pack will be placed that interconnects two or more aquifer units. A minimum 2-foot bentonite pellet or bentonite slurry seal will be placed above the sand pack. Sand pack, bentonite, and cement seal levels will be confirmed by sounding the annulus with a calibrated weighted tape. The remaining annular space above the bentonite seal will be grouted with a bentonite-cement mixture and will be tremie-pumped from the bottom of the annular space to the ground surface. The bentonite content of the grout will not exceed 5 percent by weight. A field log of boring and a field well completion form will be prepared by GSI for each well installed.

Decontamination of drilling equipment before drilling and between wells will consist of steam cleaning, and/or Alconox wash.

Well Development

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

Well Surveying

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

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

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

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

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

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

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

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

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

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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.

Because ground-water samples collected by G-R are analyzed to the parts per billion (ppb) range for many compounds, extreme care is exercised to prevent contamination of samples. When volatile or semi-volatile organic compounds are included for analysis, G-R sampling crew members will adhere to the following precautions in the field:

1. A clean pair of new, disposable gloves are worn for each well being sampled.

2. When possible, samples are collected from known or suspected wells that are least contaminated (i.e. background) followed by wells in increasing order of contamination.

When known or potential organic compounds are being sampled for, the following additional precautions are taken:

1. All sample bottles and equipment are kept away from fuels and solvents. When possible, gasoline (used in generators) is stored away from bailers, sample bottles, purging pumps, etc.

2. Bailers are made of Teflon or Stainless Steel. Other materials such as plastic may contaminate samples with phthalate esters which interfere with many Gas Chromatography (GC) analyses.

3. Volatile organic ground-water samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples): sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the neck of the bottle; the Teflon side of the septum (in cap) is positioned against the meniscus, and the cap screwed on tightly; the sample is inverted and the bottle lightly tapped. The absence of an air bubble indicates a successful seal; if a bubble is evident, the cap is removed, more sample is added, and the bottle is resealed.

4. Extra Teflon seals are brought into the field in case seals are difficult to handle and/or are dropped. Dropped seals are considered contaminated and are not used. When replacing seals or if seals become flipped, care is taken to assure that the Teflon seal faces down.

Sample analysis methods, containers, preservatives and holding times are shown on Table 1.

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

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

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

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

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

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

A. Up to 2 wells - Trip Blank Only

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

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

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

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

SAMPLE COLLECTION

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

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

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

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

Decontamination Procedures

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

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

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

Water-Level Measurements

Prior to purging and sampling a well, the static-water levels are measured in all wells at a project site using an electric sounder and/or calibrated portable oil-water interface probe (Figure 3). Both static water-level and separate-phase product thickness are measured to the nearest ±0.01 foot. The presence of separate-phase product is confirmed using a clean, acrylic or polyvinylchloride (PVC) bailer, measured to the nearest ±0.01 foot with a decimal scale tape.

Water-Level Measurements (continued)

The monofilament line used to lower the bailer is replaced between wells with new line to preclude the possibility of cross-contamination. Field observations (e.g. well integrity, product color, turbidity, water color, odors, etc.) are noted on the G-R Well Sampling Field Data Sheet shown in Figure 3. Before and after each use, the electric sounder, interface probe and bailer are decontaminated by washing with Alconox or equivalent detergent followed by rinsing with deionized water to prevent cross-contamination.

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

Well Purging

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

DOCUMENTATION

Sample Container Labels

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

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

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

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

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

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

Calculated and actual purge volumes

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Chain-of-Custody

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

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

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

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TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

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

GeoStrategies Inc.

FIELD EXPLORATORY BORING LOG

Field location of boring:

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

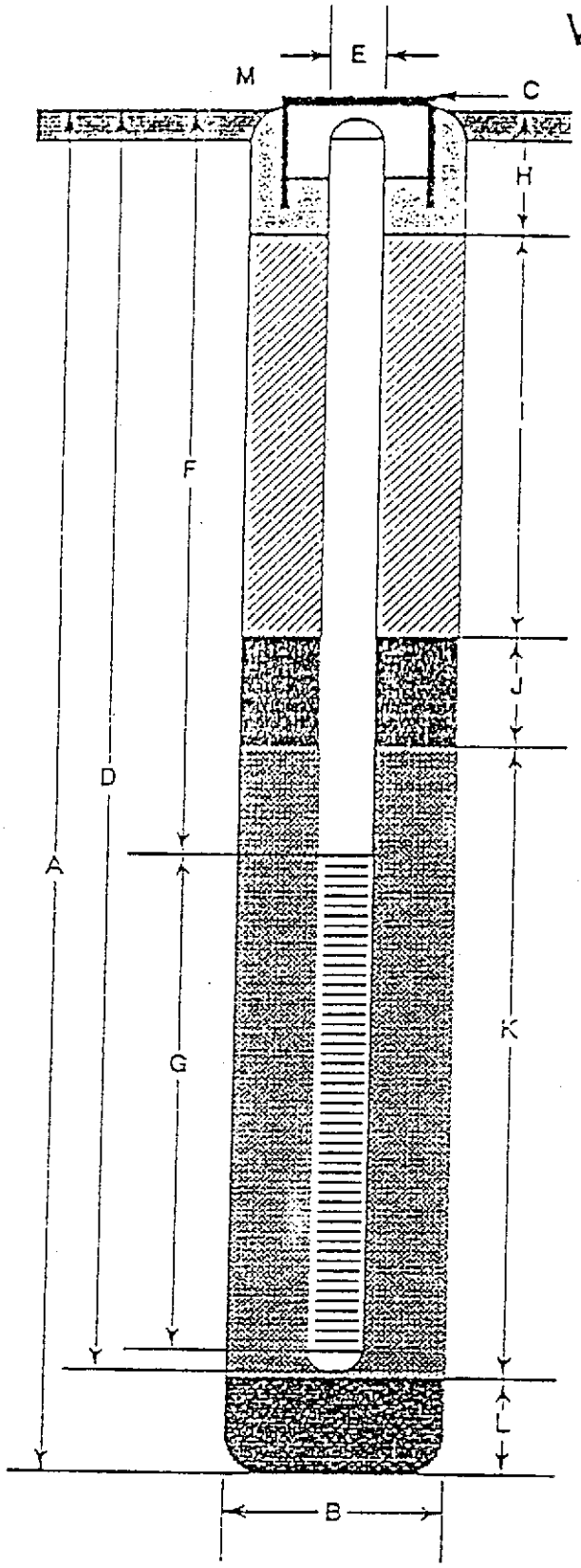
Water Level			
Time			
Date			

FID (ppm)	Blowsft. 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

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FIELD 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

$V = (r/12)^2 h(\_\_\_\_ \text{ F vol})(7.48) = \_\_\_\_\_ \text{/gallons}$

V = Purge volume (gallons)
= 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%
Tempertaure:	1.0 degree F

Groundwater Stability Achieved

Collect Sample and Complete Chain-of-Custody

Preserve Sample According to Required Chemical Analysis

Transport to Analytical Laboratory

Groundwater Stability Not Achieved

Continue Purging Until Stability is Achieved

Collect Sample and Complete Chain-of-Custody

Preserve Sample According to Required Chemical Analysis

Transport to Analytical Laboratory

FIGURE 4

Gettler - Ryan Inc.
ENVIRONMENTAL DIVISION

Chain of Custody

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

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

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

FIGURE 5

gettler — ryan inc.

November 9, 1989

GROUNDWATER SAMPLING REPORT

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

Sampling Date: October 16, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 16, 1989 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 vadose zone monitoring wells and five groundwater monitoring wells on site at the locations shown on the attached site map. Prior to sampling, all monitoring wells were inspected for total well depth, water 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 8.53 to 9.77 feet below grade. Separate phase product was not observed in any monitoring wells.

The wells were then purged and sampled. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. Each well was purged while pH, temperature, and conductivity measurements were monitored for stability. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. The purge water was contained in drums for proper disposal. Details of the final well purging results are presented on the attached Table of Monitoring Data.

Samples were collected, using Teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A field blank (SF-1) and a trip blank, supplied by the laboratory, were included and analyzed to assess quality control. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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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.

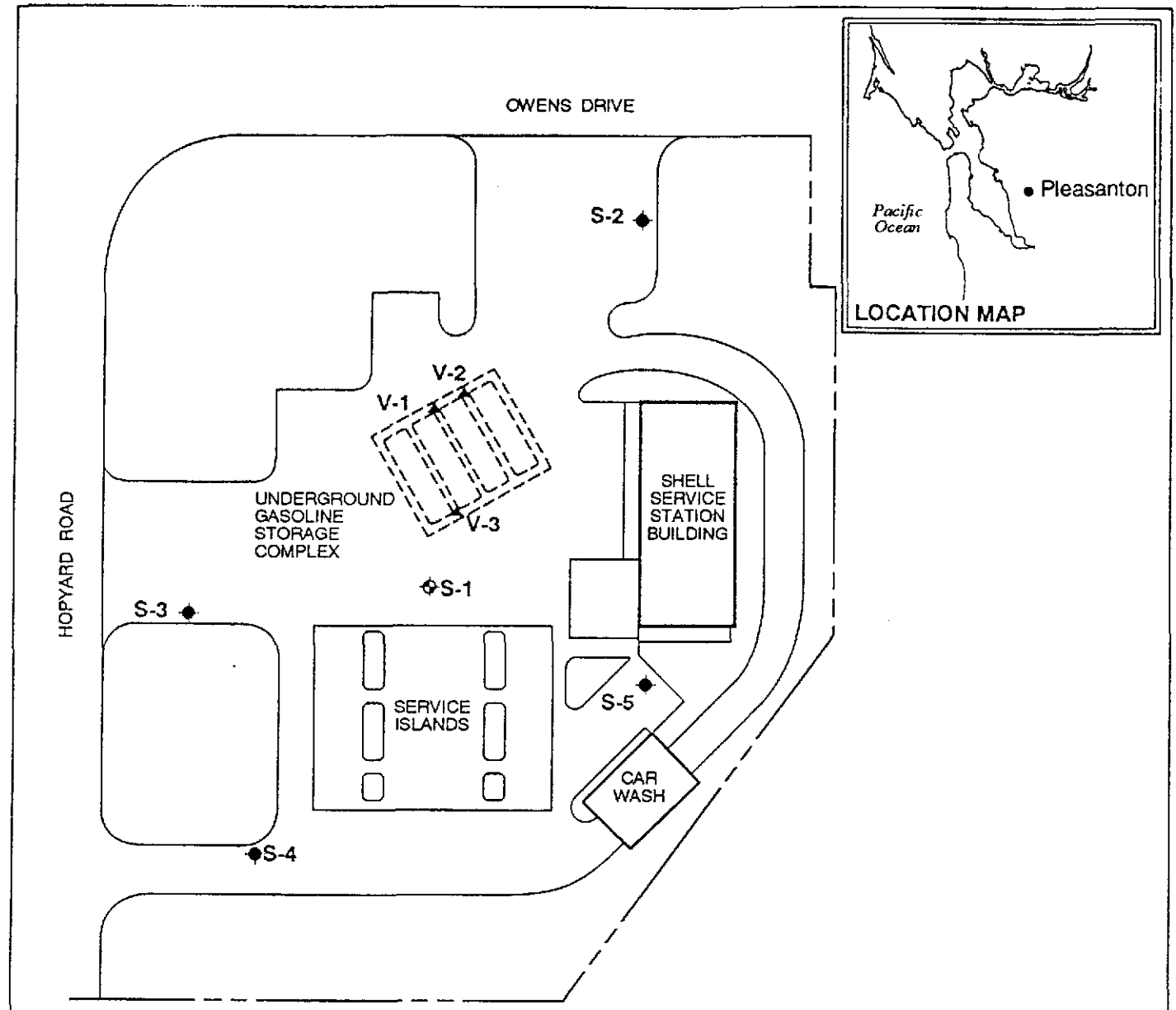
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-1	S-2	S-3	S-4	S-5
Casing Diameter (inches)	3	3	3	3	3
Total Well Depth (feet)	28.7	24.6	25.8	24.4	24.7
Depth to Water (feet)	8.79	8.88	9.65	8.53	9.77
Free Product (feet)	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	30.4	23.9	24.6	24.1	22.7
Did Well Dewater?	yes	no	yes	yes	no
Volume Evacuated (gal.)	17	31	16	16	25
Purging Device	Suction	Suction	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	Bailer
Time	14:11	13:29	12:30	11:47	14:42
Temperature (F)*	70.6	67.2	66.5	70.8	67.3
pH*	7.28	7.23	7.04	7.81	7.19
Conductivity (umhos/cm)*	2460	5130	3750	1296	1656

* Indicates Stabilized Value



EXPLANATION

- ◆ S-2 Groundwater monitoring well location
- ◈ S-1 Groundwater monitoring well location by Woodward-Clyde Consultants
- ▲ V-1 Vapor monitoring well location

Base Map: Woodward-Clyde Consultants

N

0 50 100

Scale in Feet

GeoStrategies Inc.

Site Plan
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
633		5/89		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: October 27, 1989

Work Order Number: S9-10-192

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
Date Received by Lab:	10/17/89
Number of Samples:	8
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.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/an
6 Pages Following - Tables of Results

Date: October 27, 1989
Client Project ID: GR #3633, Shell,
5251 Hopyard/Owen, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Client Sample ID: S-1
Sample Date: 10/16/89
Lab Sample ID: S9-10-192-01
Receipt Condition: Cool, pH ≤2

Low Boiling Hydrocarbons Analysis Date: 10/20/89

High Boiling Hydrocarbons Extraction Date: 10/23/89
High Boiling Hydrocarbons Analysis Date: 10/23/89

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	16.
Benzene	0.02	3.9
Toluene	0.05	0.89
Ethyl Benzene	0.05	1.2
Xylenes (total)	0.2	0.9
High Boiling Hydrocarbons, calculated as Diesel	1.	11.*

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

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Client Sample ID: S-2
Sample Date: 10/16/89
Lab Sample ID: S9-10-192-02
Receipt Condition: Cool, pH ≤2

Low Boiling Hydrocarbons Analysis Date: 10/20/89

High Boiling Hydrocarbons Extraction Date: 10/23/89
High Boiling Hydrocarbons Analysis Date: 10/23/89

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	0.001	None
Ethyl Benzene	0.001	None
Xylenes (total)	0.003	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: October 27, 1989
Client Project ID: GR #3633, Shell,
5251 Hopyard/Owen, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Client Sample ID: S-3
Sample Date: 10/16/89
Lab Sample ID: S9-10-192-03
Receipt Condition: Cool, pH ≤2

Low Boiling Hydrocarbons Analysis Date: 10/20/89

High Boiling Hydrocarbons Extraction Date: 10/23/89
High Boiling Hydrocarbons Analysis Date: 10/24/89

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

Results - Milligrams per Liter

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	0.25	3.4
Benzene	0.002	0.70
Toluene	0.005	0.008
Ethyl Benzene	0.005	0.36
Xylenes (total)	0.02	0.06
High Boiling Hydrocarbons, calculated as Diesel	0.1	2.8*

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

Date: October 27, 1989
Client Project ID: GR #3633, Shell,
5251 Hopyard/Owen, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Client Sample ID: S-4
Sample Date: 10/16/89
Lab Sample ID: S9-10-192-04
Receipt Condition: Cool, pH ≤2

Low Boiling Hydrocarbons Analysis Date: 10/20/89

High Boiling Hydrocarbons Extraction Date: 10/23/89
High Boiling Hydrocarbons Analysis Date: 10/23/89

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	0.001	None
Ethyl Benzene	0.001	None
Xylenes (total)	0.003	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: October 27, 1989
Client Project ID: GR #3633, Shell,
5251 Hopyard/Owen, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Client Sample ID: S-5
Sample Date: 10/16/89
Lab Sample ID: S9-10-192-05
Receipt Condition: Cool, pH ≤2

Low Boiling Hydrocarbons Analysis Date: 10/20/89

High Boiling Hydrocarbons Extraction Date: 10/23/89
High Boiling Hydrocarbons Analysis Date: 10/23/89

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	0.001	None
Ethyl Benzene	0.001	None
Xylenes (total)	0.003	None
High Boiling Hydrocarbons, calculated as Diesel	0.1	None

Date: October 27, 1989
Client Project ID: GR #3633, Shell,
5251 Hopyard/Owen, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-192

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-192-06	SF-1	10/16/89	10/19/89	cool pH ≤2
S9-10-192-07	SD-5	10/16/89	10/20/89	cool pH ≤2
S9-10-192-08	Trip Blank		10/19/89	cool pH ≤2

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

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-10-192-06	SF-1	ND	ND	ND	ND	ND
S9-10-192-07	SD-5	ND	ND	ND	ND	ND
S9-10-192-08	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003

Gettler - Ryan Inc. 59-10-192
ENVIRONMENTAL DIVISION

0783 Chain of Custody

COMPANY Shell Oil Co JOB NO.

JOB LOCATION 5251 Hopyard / Owens

CITY Pleasanton. PHONE NO. 463-7500

AUTHORIZED [redacted] John Wurfel DATE 10-16-89 P.O. NO. 3633

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-1	5	Liquid	10-16-89 14:11	THC (gas) BTXE TPH (Diesel)	OK/cool
S-2	5		13:29		
S-3	5		12:30		
S-4	5		11:47		
S-5	5		14:42		
SF-1	3		14:11		
SD-5	3				
Trip	1				

RELINQUISHED BY: [signature] RECEIVED BY: [signature] 10/17/89 07:35

RELINQUISHED BY: [signature] 10/17/89 11:05 RECEIVED BY:

RELINQUISHED BY: RECEIVED BY LAB: [signature] 10/17/89 11:15

DESIGNATED LABORATORY: FT (SCV) DHS #: 137

REMARKS: "Big" trip blank, I Broke.
WIC No. 204-6138-0907 EXP. Code 5441
AFE: 98 6707 Normal TAT
Shell Engineer: Diane Lundquist.

DATE COMPLETED 10-16-89 FOREMAN [signature]

ORIGINAL

gettler — ryan inc.

December 15, 1989

GROUNDWATER SAMPLING REPORT

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

Sampling Date: November 15, 1989

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on November 15, 1989 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. Newly installed wells S-6, S-7, and S-8 were developed, monitored and sampled at this time. 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 8.03 to 9.40 feet below grade. Separate phase product was not observed in any monitoring wells.

The wells were then purged and sampled. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. Each well was purged while pH, temperature, and conductivity measurements were monitored for stability. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. The purge water was contained in drums for proper disposal. Details of the final well purging results are presented on the attached Table of Monitoring Data.

Samples were collected, using Teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A trip blank, supplied by the laboratory, was included and analyzed to assess quality control. Analytical results for the trip blank are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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.

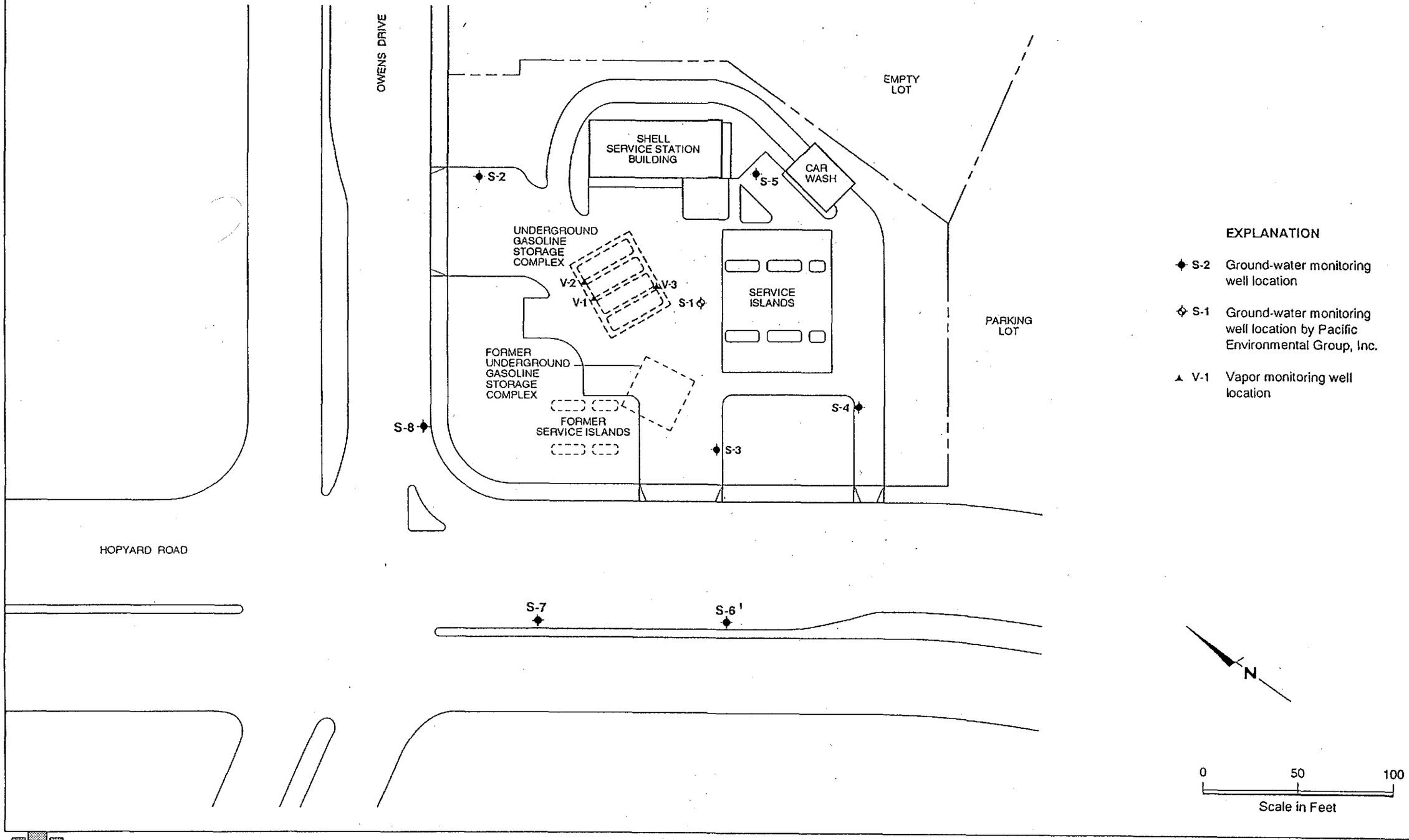
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-6	S-7	S-8
Casing Diameter (inches)	3	3	3
Total Well Depth (feet)	24.8	25.0	25.2
Depth to Water (feet)	9.37	9.40	8.03
Free Product (feet)	none	none	none
Reason Not Sampled	----	----	----
Calculated 4 Case Vol.(gal.)	23.5	23.7	26.1
Did Well Dewater?	yes	no	no
Volume Evacuated (gal.)	17	40	27
Purging Device	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer
Time	10:16	11:04	12:15
Temperature (F)*	68.5	69.7	66.7
pH*	7.24	7.10	7.06
Conductivity (umhos/cm)*	6980	6080	7490

* Indicates Stabilized Value



GeoStrategies Inc.

Site Plan
Shell Service Station
5251 Hopyard Road
Pleasanton, California

PLATE

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633		1/90		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: December 11, 1989

Work Order Number: S9-11-216

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:	11/16/89
Number of Samples:	4
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.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
4 Pages Following - Tables of Results

Date: December 11, 1989
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-216

Client Sample ID: S-6

Sample Date: 11/15/89
Lab Sample ID: S9-11-216-01
Receipt Condition: Cool
High Boiling Extraction Date: 11/22/89
Low Boiling Analysis Date: 11/20/89
High Boiling Analysis Date: 11/27/89

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: December 11, 1989
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-216

Client Sample ID: S-7

Sample Date: 11/15/89
Lab Sample ID: S9-11-216-02
Receipt Condition: Cool
High Boiling Extraction Date: 11/22/89
Low Boiling Analysis Date: 11/20/89
High Boiling Analysis Date: 11/27/89

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: December 11, 1989
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-216

Client Sample ID: S-8

Sample Date: 11/15/89
Lab Sample ID: S9-11-216-03
Receipt Condition: Cool
High Boiling Extraction Date: 11/22/89
Low Boiling Analysis Date: 11/20/89
High Boiling Analysis Date: 11/27/89

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: December 11, 1989
Client Project ID: GR #3633, Shell, 5251 Hopyard/Owen, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-216

Client Sample ID: Trip Blank

Sample Date: ----
Lab Sample ID: S9-11-216-04
Receipt Condition: Cool
High Boiling Extraction Date: 11/22/89
Low Boiling Analysis Date: 11/17/89
High Boiling Analysis Date: 11/27/89

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

Gettler - Ryan Inc. 59-11-126 ENVIRONMENTAL DIVISION 1111 **Chain of Custody**

COMPANY Shell oil Co JOB NO.

JOB LOCATION 5251 Hopyard Rd.

CITY Pleasonton, CA PHONE NO. 783-7500

AUTHORIZED John Werfal DATE 11-15-89 P.O. NO. 3633

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-6	5	Liquid	11-15-89 10:46	THC (gas) BTXE TPH as Diesel	OK/cool
S-7	5		11:04		
S-8	~~8~~ 4		12:15		
Trip Blank	2		11-14-89 11-13-89		

RELINQUISHED BY: John P. Zwerneff 11-15-89 14:20

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 11/16/89 11:15

DESIGNATED LABORATORY: IT (SCV) DHS #: 137

REMARKS: WIC # 204-6138- Exp Code 5441

AFE 98670 Engineer Diane Lundquist

DATE COMPLETED 11-15-89 FOREMAN John P. Zwerneff

ORIGINAL

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: November 9, 1989

Work Order Number: S9-11-012

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7633, Shell, 5152 Hopyard Rd., Pleasanton, CA
Date Received by Lab:	11/1/89
Number of Samples:	6
Sample Type:	Soil

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

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.

Reviewed and Approved

for Michael E. Dean
Project Manager

MED/an
6 Pages Following - Tables of Results

Date: November 9, 1989
Client Project ID: GR #7633, Shell,
5152 Hopyard Rd., Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-6-5
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-01
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/5/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/5/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	0.035
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

Date: November 9, 1989
Client Project ID: GR #7633, Shell,
5152 Hopyard Rd., Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-6-10
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-02
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/6/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/5/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-6-16
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-03
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/6/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/5/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-7-5
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-04
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/6/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/6/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-7-10
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-05
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/6/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/5/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

Date: November 9, 1989
Client Project ID: GR #7633, Shell,
5152 Hopyard Rd., Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-012

Client Sample ID: S-7-15
Sample Date: 10/30/89
Lab Sample ID: S9-11-012-06
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 11/2/89
Low Boiling Hydocarbons Analysis Date: 11/6/89

High Boiling Hydrocarbons Extraction Date: 11/3/89
High Boiling Hydocarbons Analysis Date: 11/5/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

Getter - Ryan Inc. 59-11-012
ENVIRONMENTAL DIVISION

Chain of Custody

COMPANY SHELL OIL JOB NO. 7633

JOB LOCATION 5251 Hopyard Rd.

CITY Pleasanton PHONE NO.

AUTHORIZED John Wright DATE 10/30/89 P.O. NO. 7633

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-6-5	1	soil	10/30 9:30	BTEX TPH-Diesel, TPH-Gas	cool/ 4° cool/ice
S-6-10	1	soil	10/30 9:40		
S-6-16	1	soil	10/30 10:00		
S-7-5	1	soil	10/30 11:30		
S-7-10	1	soil	10/30 11:45		
S-7-15	1	soil	10/30 12:00		
WIC #	204-6138-0907				
AFE #	986707				
DP Code	5441				

RELINQUISHED BY: Robert Young 10/30 16:00
RECEIVED BY: 10/30/89 16:00

RELINQUISHED BY:
RECEIVED BY:

RELINQUISHED BY: 11/1/89 14:40
RECEIVED BY LAB: 11/1/89 14:40

DESIGNATED LABORATORY: IT SANTA CLARA DHS #:

REMARKS: Normal TAT

DATE COMPLETED FOREMAN

ORIGINAL

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: November 20, 1989

Work Order Number: S9-11-129

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7633, Shell, 5251 Hopyard Rd., Pleasanton, CA
Date Received by Lab:	11/09/89
Number of Samples:	3
Sample Type:	Soil

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

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.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
3 Pages Following - Tables of Results

Date: November 20, 1989
Client Project ID: GR #7633, Shell, 5251 Hopyard Rd., Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number:
S9-11-129

Client Sample ID: S-8-5.5

Sample Date: 11/06/89
Lab Sample ID: S9-11-129-01
Receipt Condition: Cool
Low Boiling Extraction Date: 11/13/89
High Boiling Extraction Date: 11/14/89
Low Boling Analysis Date: 11/14/89
High Boiling Analysis Date: 11/15/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

Date: November 20, 1989
Client Project ID: GR #7633, Shell, 5251 Hopyard Rd., Plesanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number:
S9-11-129

Client Sample ID: S-8-10.5

Sample Date: 11/06/89
Lab Sample ID: S9-11-129-02
Receipt Condition: Cool
Low Boiling Extraction Date: 11/13/89
High Boiling Extraction Date: 11/14/89
Low Boiling Analysis Date: 11/14/89
High Boiling Analysis Date: 11/15/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-11-129

Client Sample ID: S-8-15.5

Sample Date: 11/06/89
Lab Sample ID: S9-11-129-03
Receipt Condition: Cool
Low Boiling Extraction Date: 11/13/89
High Boiling Extraction Date: 11/14/89
Low Boiling Analysis Date: 11/15/89
High Boiling Analysis Date: 11/15/89

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

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	2.5	None
Benzene	0.025	None
Toluene	0.025	None
Ethyl Benzene	0.025	None
Xylenes (total)	0.05	None
High Boiling Hydrocarbons, calculated as Diesel	5.	None

Gettler - Ryan Inc. 59-11-129 ENVIRONMENTAL DIVISION

Chain of Custody

COMPANY SHELL OIL JOB NO. 7633

JOB LOCATION 5251 Hopyard Rd.

CITY Pleasanton, Ca PHONE NO.

AUTHORIZED John Wanfal DATE 11/7/89 P.O. NO. 7633

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-8-5.5	1	soil	11/6 10:00	BTEX TPH-Gas, Diesel	cool/ Y
S-8-10.5	1	soil	11/6 10:15	BTEX TPH-Gas, Diesel	2
S-8-15.5	1	soil	11/6 10:20	BTEX TPH-Gas, Diesel	2

RELINQUISHED BY: Randy Young 0830 11-7-89

RECEIVED BY: 08:00 11-8-89

RELINQUISHED BY: 11-9-89 15:6

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 11/9/89 15:00

DESIGNATED LABORATORY: IT - SANTA CLARA DHS #: 137

REMARKS: Normal TAT

WBS 204.6.136.0307

AFE 896707

Expcode 5441 project Eng. DMS

DATE COMPLETED FOREMAN

ORIGINAL

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

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

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

GeoStrategies Inc.

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

Field location of boring:	Project No.: 7633	Date: 10/30/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		S-6
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 1
	Logged by: R.S.Y.	Driller: Bayland	of 2
	Casing installation data:		
Drilling method: Hollow-Stem Auger			
Hole diameter: 8-Inch	Top of Box Elevation: 326.56		Datum: MSL

PID (ppm)	Blows/ft or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Water Level / Time / Date	Description
									PAVEMENT SECTION - 2.5 feet
				1					
				2					
				3					
0	4	S&H							CLAY (CH) - black (7.5YR 2/0), very stiff, damp, trace fine
	12		S-6	4					sand, high plasticity; rootlets; no chemical odor.
	13		4.5						
				5					
				6					
				7					
				8					
									soft drilling at 8.0 feet.
				9					
									SANDY CLAY (CL) - dark grayish brown (10YR 4/2), very
0	350	S&H		10					stiff, damp, low plasticity; 35% very fine sand; trace
	350	push	S-6						gravels; no chemical odor.
	350		11.0	11					
				12					
0	4	S&H		13					
	7		S-6						same as above; rootholes; voids.
	7		14.0	14					
	3								
	4		S-6	15					sand lense at 15.0 feet - 2.0 inches thick; no chemical
	5		15.5						odor.
				16					
				17					
				18					
						▽			Sample rods wet at 18.5 feet
				19					

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. S-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1262	11/89		

Field location of boring:	Project No.: 7633	Date: 10/30/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		S-6
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 2
	Logged by: R.S.Y.	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation:		Datum:

								Water Level				
								Time				
								Date				
PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description				
0	4	S&H		20								
	5		S-6					same as above; trace well rounded gravel.				
	6		21.0	21								
				22								
				23								
				24								
								CLAY (CH) - black (7.5YR 2/0), medium stiff, saturated,				
0	4	S&H		25				high plasticity; trace fine gravel; no chemical odor.				
	3		S-6									
	2		26.0	26								
								Bottom of boring at 26.0 feet.				
				27				Bottom of sample at 26.0 feet.				
				28								
				29								
				30								
				31								
				32								
				33								
				34								
				35								
				36								
				37								
				38								
				39								

Remarks:

GeoStrategies Inc.

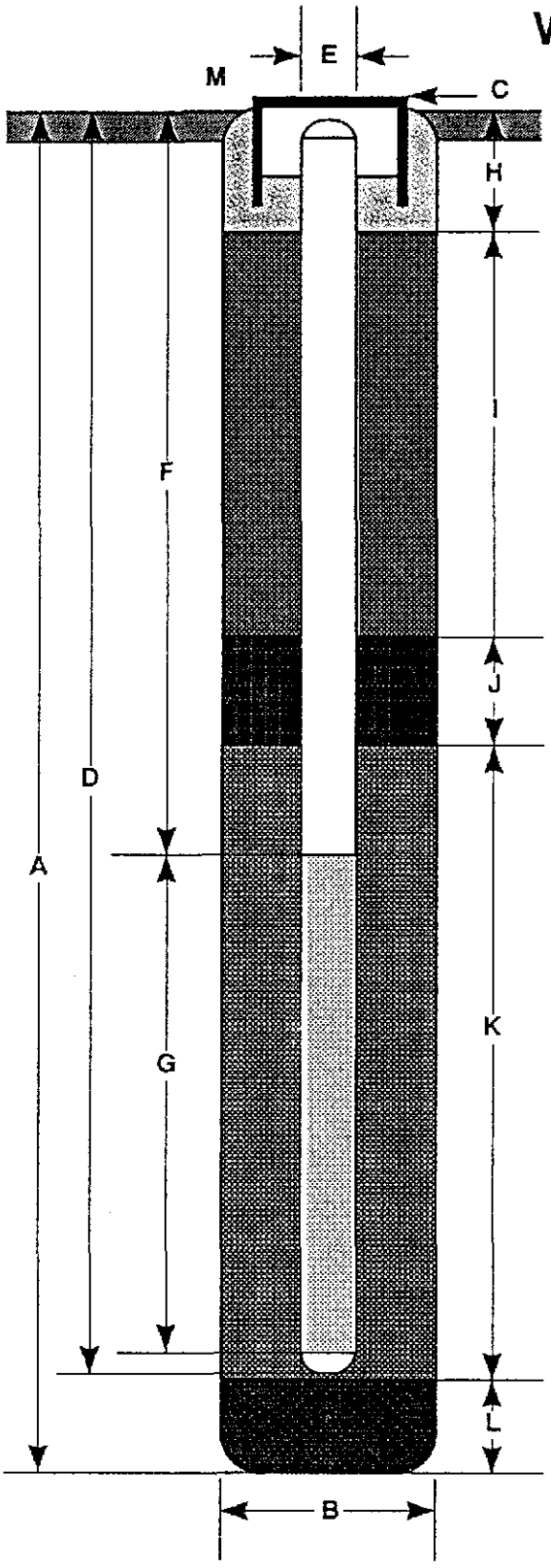
Log of Boring

BORING NO.

S-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CMP CEG 1262	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 26.0 ft.

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

C Top of Box Elevation 326.56 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 25.5 ft.
Material Schedule 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 6.0 ft.

G Perforated Length 20 ft.
Perforated Interval from 6 to 26 ft.
Perforation Type Schedule 40 PVC
Perforation Size 0.020 in.

H Surface Seal from 0 to 1.5 ft.
Seal Material concrete grout

I Backfill from 1.5 to 4.0 ft.
Backfill Material cement grout

J Seal from 4.0 to 5.0 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 5.0 to 26.0 ft.
Pack Material Lonestar #2/12 sand

L Bottom Seal ft.
Seal Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO. S-6

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CMP CEG 1262	11/89		

Field location of boring: (See Plate 2)	Project No.: 7633	Date: 10/30/89	Boring No: S-7
	Client: Shell Oil Company		
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 1 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation: 326.49	Datum: MSL	

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Water Level / Time / Date	Description
									PAVEMENT SECTION - 2.5 feet
				1					
				2					
				3					
				4					CLAY with SAND (CH) - black (2.5Y 2/0), very stiff, moist, high plasticity; 20% very fine sand; trace well rounded fine gravel; 30% peat from 4.5 to 6.0 feet; no chemical odor.
0	450	S&H		5					
	450	push	S-7						
	450		6.0	6					
				7					
				8					
				9					soft at 8.5 feet
0	200	S&H		10					
	200	push	S-7						SANDY CLAY (CL) - very dark grayish brown (7.5YR 3/2), stiff, mosit, low plasticity; 35% very fine sand; no chemical odor.
	200		11.0	11					
				12					
				13					
				14					
0	4	S&H		15					
	5		S-7						CLAY (CH) - very dark gray (7.5YR 3/0), medium stiff, very moist, open voids, high plasticity; calcareous stringers; no chemical odor.
	6		16.0	16					
				17					
				18					
						▽			Sample rods wet at 18.5 feet
				19					

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. S-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	RG CEG 12/92	11/89		

Field location of boring:	Project No.: 7633	Date: 10/30/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		S-7
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 2 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation:	Datum:	

								Water Level				
								Time				
								Date				
PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description				
0	4	S&H		20								
	5		S-7					COLOR CHANGE to gray (2.5Y 5/0); 10% very fine sand;				
	6		21.0	21				no chemical odor.				
				22								
				23								
				24								
0	3	S&H		25								
	4		S-7									
	5		26.0	26				CLAYEY SAND (SC) - olive gray (5Y 4/2), loose,				
	2	S&H						saturated; 70% very fine sand; 30% clay; no chemical				
	3			27				odor.				
	4							CLAY (CL) - dark gray (2.5Y 4/0), medium stiff, moist, low				
				28				plasticity; no chemical odor.				
				29								
								Bottom of boring at 27.5 feet.				
				30				Bottom of sample at 27.5 feet.				
				31								
				32								
				33								
				34								
				35								
				36								
				37								
				38								
				39								

Remarks:

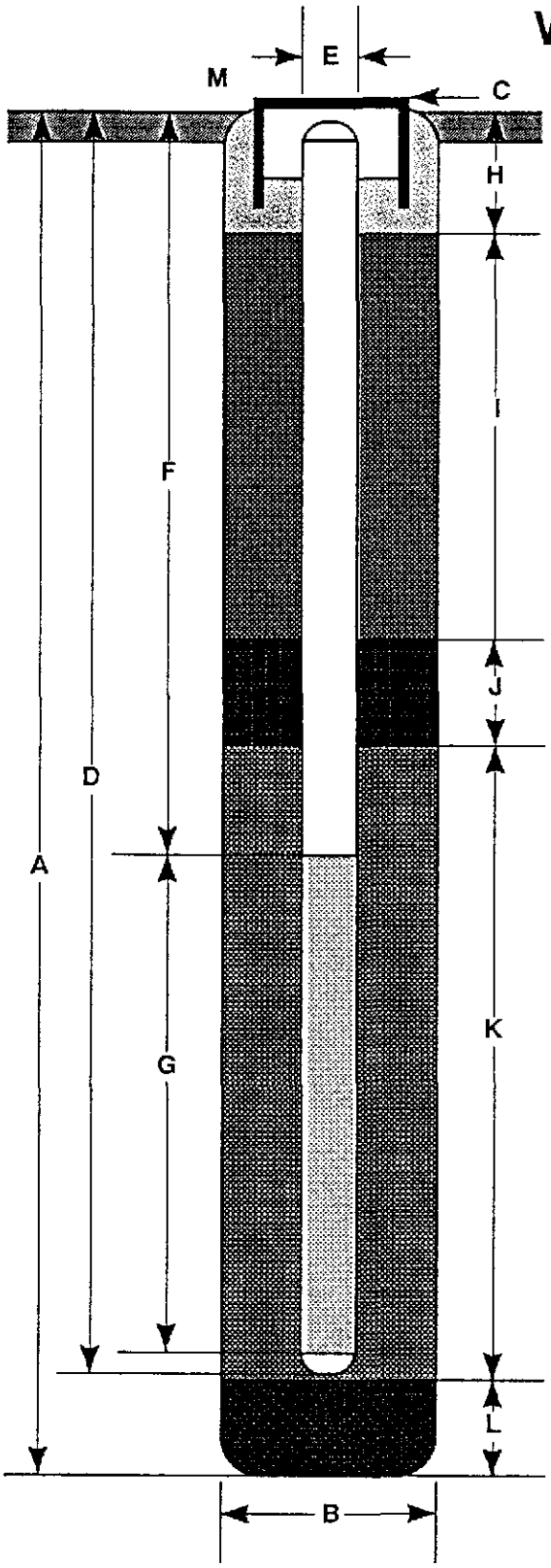
GeoStrategies Inc.

Log of Boring

BORING NO. S-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CEG 1262	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 27.5 ft.

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

C Top of Box Elevation 326.49 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 25.5 ft.
Material Schedule 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 4.5 ft.

G Perforated Length 20 ft.
Perforated Interval from 5.5 to 25.5 ft.
Perforation Type Schdule 40 PVC
Perforation Size 0.020 in.

H Surface Seal from 0 to 1.5 ft.
Seal Material concrete grout

I Backfill from 1.5 to 3.5 ft.
Backfill Material cement grout

J Seal from 3.5 to 4.5 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 4.5 to 27.5 ft.
Pack Material Lonestar #2/12 sand

L Bottom Seal ft.
Seal Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO.
S-7

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1262	11/89		

Field location of boring: (See Plate 2)	Project No.: 7633	Date: 11/06/89	Boring No: S-8
	Client: Shell Oil Company		
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 1 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation: 325.32	Datum: MSL	

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.5 feet
				1				
				2				
				3				
								CLAY (CL) - black (2.5YR 5/6), medium stiff, damp,
				4				medium plasticity; trace coarse sand; no chemical odor.
0	100	S&H						
	100	push	S-8	5				
	100		5.5					
				6				SILT (ML) - dark gray (7.5YR 4/0), medium stiff, moist;
								20% very fine sand; voids; no chemical odor.
				7				
				8				
				9				
0	100	S&H						
	100	push	S-8	10				SILTY SAND (SM) - brown (10YR 5/3), loose, very damp;
	100		10.5					70% very fine sand; 30% silt; no chemical odor.
				11				
				12				
				13				
				14				
0	2	S&H						SILTY CLAY (CL) - dark brownish gray (2.5Y 4/2),
	2		S-8	15				medium stiff, moist; 60% clay; 40% silt; no chemical odor.
	5		15.5					
				16				
				17				
				18				
						▽		Sample rods wet at 18.5 feet
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. S-8

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	Dump CEG 1262	11/89		

Field location of boring: (See Plate 2)	Project No.: 7633	Date: 11/06/89	Boring No: S-8
	Client: Shell Oil Company		
	Location: 5251 Hopyard Road		
	City: Pleasanton, California		Sheet 1 of 2
	Logged by: R.S.Y.	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data:		
Hole diameter: 8-Inch	Top of Box Elevation: 325.32		Datum: MSL

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
								PAVEMENT SECTION - 2.5 feet
				1				
				2				
				3				
				4				CLAY (CL) - black (2.5YR 5/6), medium stiff, damp, medium plasticity; trace coarse sand; no chemical odor.
0	100	S&H		5				
	100	push	S-8					
	100		5.5	6				SILT (ML) - dark gray (7.5YR 4/0), medium stiff, moist; 20% very fine sand; voids; no chemical odor.
				7				
				8				
				9				
0	100	S&H						
	100	push	S-8	10				SILTY SAND (SM) - brown (10YR 5/3), loose, very damp; 70% very fine sand; 30% silt; no chemical odor.
	100		10.5	11				
				12				
				13				
				14				
0	2	S&H						SILTY CLAY (CL) - dark brownish gray (2.5Y 4/2), medium stiff, moist; 60% clay; 40% silt; no chemical odor.
	2		S-8	15				
	5		15.5					
				16				
				17				
				18				
						▽		Sample rods wet at 18.5 feet
				19				

Remarks:

GeoStrategies Inc.

Log of Boring

BORING NO. S-8

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CMP CEG 1262	11/89		

Field location of boring:

(See Plate 2)

Project No.:	7633	Date:	11/06/89
Client:	Shell Oil Company		
Location:	5251 Hopyard Road		
City:	Pleasanton, California		
Logged by:	R.S.Y.	Driller:	Bayland

Boring No: S-8

Sheet 2 of 2

Casing installation data:

Drilling method: Hollow-Stem Auger

Hole diameter: 8-Inch

Top of Box Elevation: Datum:

Water Level								
Time								
Date								

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
0	2	S&H		20				
	2		S-8					
	5		20.5					same as above; caliche nodules.
				21				
				22				
				23				
				24				
	4	S&H		25				COLOR CHANGE to olive gray (5Y 4/2), increasing density.
	5		S-8					
	6		26.0	26				
				27				Bottom of boring at 26.0 feet.
								Bottom of sample at 26.0 feet.
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				

Remarks:

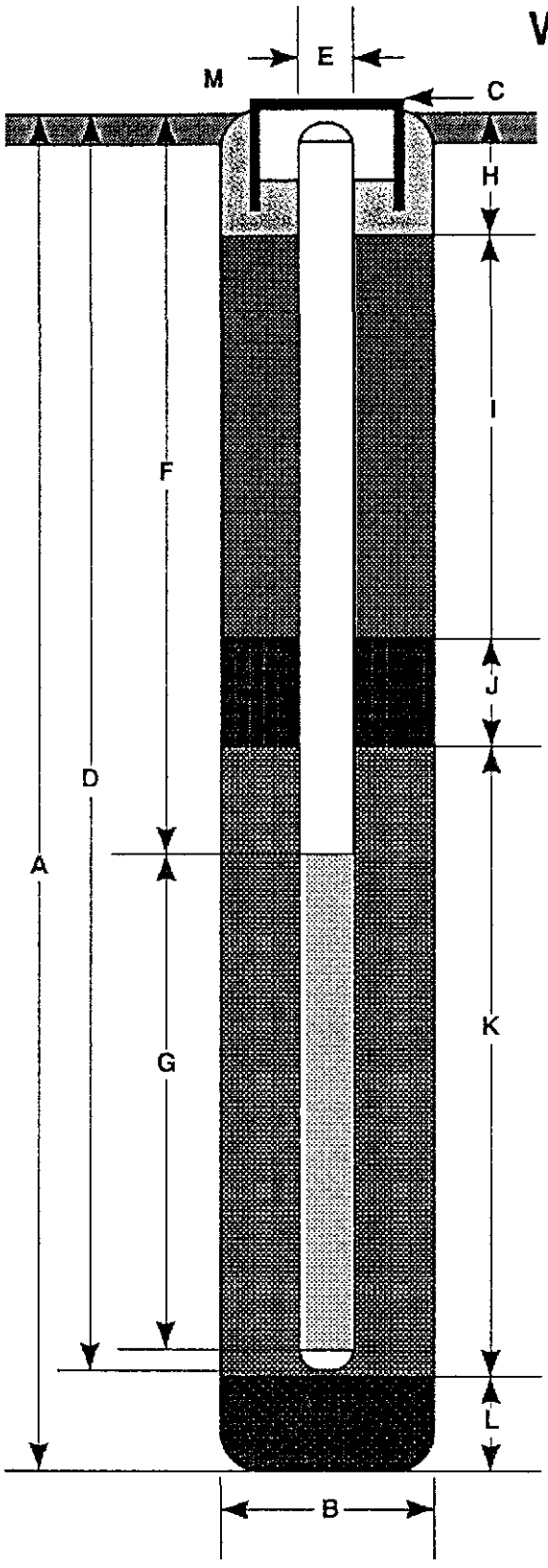
GSI GeoStrategies Inc.

Log of Boring

BORING NO. S-8

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CWP CEG 1262	11/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 26 ft.

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

C Top of Box Elevation 325.32 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 25 ft.
Material Schedule 40 PVC

E Casing Diameter 3 in.

F Depth to Top Perforations 5 ft.

G Perforated Length 20 ft.
Perforated Interval from 5 to 25 ft.
Perforation Type Schedule 40 PVC
Perforation Size 0.020 in.

H Surface Seal from 0.0 to 1.5 ft.
Seal Material concrete grout

I Backfill from 1.5 to 3.0 ft.
Backfill Material cement grout

J Seal from 3 to 4 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 4 to 26 ft.
Pack Material Lonestar #2/12 sand

L Bottom Seal ft.
Seal Material

M

GeoStrategies Inc.

Well Construction Detail

WELL NO.
S-8

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7633	CMP CEG 1262	11/89		