Shell Oil Company

EAST BAY MARKETING DISTRICT

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

December 11, 1989

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

SUBJECT: SHELL SERVICE STATION
3790 HOPYARD ROAD
PLEASANTON, CALIFORNIA

Dear Mr. Mueller:

Enclosed is a copy of the Quarterly Report issued by GeoStrategies Inc., dated December 4, 1989, which documents the groundwater sampling and well installations conducted between July - September 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

JULY - SEPTEMBER 1989

Shell Service Station
3790 Hopyard Road
Pleasanton, California

Report No. 7632-3

December 4, 1989

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

December 4, 1989

Gettler-Ryan Inc.
1992 National Avenue
Hayward, California 94545

Attn: Mr. John Werfal

Re: QUARTERLY REPORT
Shell Service Station
3790 Hopyard Road
Pleasanton, California

Gentlemen:

This quarterly report has been prepared for the above referenced site, for the July through September, 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

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

Christopher M. Palmer
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DAF/JLP/kjj

Plate 1. Vicinity Map
Plate 2. Site Plan
Plate 3. Potentiometric Map
Plate 4. TPH Isoconcentration Map
Plate 5. Benzene Isoconcentration Map
Appendix A: Field Methods and Procedures
Appendix B: Groundwater and Soil Analytical Reports
Appendix C: Exploratory Boring Logs

Report No. 7632-3

1.0 INTRODUCTION

This Quarterly Report has been prepared by GeoStrategies Inc. (GSI) for the Shell Service Station located at 3790 Hopyard Road in Pleasanton, California (Plate 1).

This report describes the results of the third quarterly ground-water sampling for 1989 performed by Gettler-Ryan Inc. (G-R), on September 8, 1989, in accordance with the quarterly sampling plan for the site. This report also includes two other ground-water sampling events. The first sampling occurred on August 11, 1989, after the installation of Well S-10, and the second sampling on October 11, 1989, after the installation of recovery wells SR-1, SR-2, and SR-3. In addition, this report summarizes well installation activities performed at the site on August 9, September 19 and September 20, 1989, in accordance with the work plan prepared by GSI dated July 18, 1989, and the addendum to the work plan dated September 19, 1989. The locations of the existing and newly installed wells are shown on Plate 2.

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 alluvium in the valley is composed primarily of sand, gravel, and clay, with confining beds of silty clay (Sorenson, Cascos, & Glass 1985). The Arroyo Mocho Canal, approximately 300 feet east of the site, acts as the primary drainage feature of the uplands surrounding the Valley.

3.0 SITE HISTORY

EMCON Associates (EMCON) drilled five borings (S-A through S-E) in tank backfill prior to tank removal. Laboratory analysis of soil samples ranged from None Detected (ND) to 5,100 parts per million (ppm) for Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline). A temporary monitoring well was installed in boring S-C. The results of this investigation are summarized in the EMCON report dated March 21, 1986.

Pacific Environmental Group (PACIFIC) installed two monitoring wells (S-1 and S-2) and two tank complex monitoring wells (ST-1 and ST-2). This satisfied the requirements of a letter from the City of Pleasanton Fire Department, dated October 15, 1987, requiring an aspirated vapor monitoring system. The results of this investigation are summarized in the PACIFIC report dated December 4, 1987.

PACIFIC installed three additional ground-water monitoring wells (S-3, S-4, and S-5) to further evaluate the extent of hydrocarbons in the subsurface as required by Alameda County Zone 7. Ground-water analytical results ranged from ND to 5.1 ppm for TPH-Gasoline. A half-mile radius well survey was performed and is included in a report dated March 10, 1988. In addition, PACIFIC states that the nearby Arroyo Mocho Canal most likely acts as a hydraulic barrier between the site and a nearby municipal well.

In March and April of 1988, Woodward-Clyde Consultants (WCC) conducted a soil investigation prior to the replacement of the underground storage tanks (UGSTs). Activities and findings of the WCC investigation are summarized in the their report dated April 22, 1988.

In August 1988 the UGSTs and the subsurface piping were replaced, and the contaminated soils were removed. Monitoring well S-1 was destroyed at this time.

In October of 1988, WCC installed two additional ground-water monitoring wells (S-6 and S-7) to further evaluate the extent of hydrocarbons in the soil and groundwater. Ground-water analytical results ranged from ND to 0.56 ppm for TPH-Gasoline. The report agrees with PACIFIC's opinion that the Arroyo Mocho Canal acts as a hydraulic barrier between the site and the nearby municipal well. The results of the investigation are summarized in the WCC report dated January 18, 1989.

In February 1989, WCC installed two additional ground-water monitoring wells (S-8 and S-9) to further assess the extent of hydrocarbons in the soil and groundwater. Ground-water analytical results ranged from ND to 3.8 ppm for TPH-Gasoline. The results of this investigation are summarized in the WCC report dated May 11, 1989.

GSI prepared a work plan, dated July 18, 1989, proposing the installation of one monitoring well and one recovery well to be used for interim recovery. An addendum to the work plan dated September 19, 1989, was issued by GSI proposing additional extraction wells.

4.0 GROUNDWATER LEVEL MONITORING

4.1 Potentiometric Data

Prior to ground-water sampling, on September 8, 1989, water levels were measured in each well using an electronic oil-water interface probe. Static water levels were measured from the surveyed top of the well box and recorded to the nearest $\pm$ 0.01 foot (Table 1). Plate 2 presents the location of each well at the site.

Ground-water elevation data for the September 8, 1989 sampling event have been plotted and contoured and are presented on Plate 3. Potentiometric data indicate that shallow groundwater beneath the site appears to flow in a southerly direction, with an approximate hydraulic gradient of 0.01.

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. 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 August 11, 1989, September 8, 1989, and October 11, 1989. The ground-water samples were analyzed for TPH-Gasoline 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.

The highest TPH-Gasoline concentration was identified in Well S-4 at a concentration of 0.38 ppm. The highest benzene concentration was identified in Well S-2 at a concentration of 0.08 ppm. A total of 6 wells were found to contain aromatic fractions of petroleum hydrocarbon products above established Maximum Contaminant Levels (MCLs) set by the Regional Water Quality Control Board (RWQCB). These data are presented in Table 1. A TPH-Gasoline Isoconcentration Map (Plate 4) and a Benzene Isoconcentration Map (Plate 5) have been prepared utilizing this quarter's chemical analytical data.

5.1 Quality Control

Quality Control (QC) samples for the quarterly ground-water sampling on September 8, 1989 included a field blank, a duplicate sample, and a trip blank. QC samples for the August 11, and October 11, 1989 sampling events consisted of trip blanks. 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 without well designation to assess laboratory analytical procedures. The trip blanks were prepared by the laboratory using organic-free water to evaluate field and laboratory handling procedures. 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 Analytical Service 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

Four borings (S-10, SR-1, SR-2, and SR-3) were drilled with a truck-mounted, hollow-stem auger drilling rig using 8-inch-diameter hollow-stem augers. SR-1, SR-2, and SR-3 were subsequently reamed to a larger diameter using 12-inch augers. Soil samples were collected at 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, and prepared a lithology log for each boring. GSI Field Methods and Procedures are 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 ppm using an OVM photoionization detector. Head-space test results are presented on each exploratory boring log (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. The IT Analytical Services chemical analytical report is presented in Appendix B.

6.3 Recovery Well Design

Three recovery wells (SR-1, SR-2, and SR-3) were installed during the last quarter. An eight-inch-diameter pilot boring for SR-1 was drilled on August 9, 1989, and a sample of the aquifer material was collected for grain-size analysis for proper recovery well design. The grain-size analysis identified the aquifer material to be composed of very fine grained sediments, indicating a sand pack size of 0.0002-inches in diameter. The required sand pack was too fine grained to allow significant water entry for use as a ground-water extraction well; therefore, standard design criteria failed. It was decided to install three recovery wells utilizing Schedule 40 PVC well casing and 0.020-inch factory slotted screen and use a graded sandpack (Lonestar #2/12 sand) to affect a larger zone of capture and optimize well efficiency. Recovery well construction details are presented in Appendix C. Recovery wells SR-1 through SR-3 were constructed from 4-inch-diameter PVC casing with the screened interval placed from 10 to 35 feet below grade.

6.4 Monitoring Well Design

Monitoring well S-10 was installed with 8-inch-diameter augers to a depth of 35.5 feet below grade. Well S-10 was constructed using 3-inch-diameter, Schedule 40 PVC well casing and 0.020-inch factory slotted well screen. The well screen was placed from 15 to 35 feet below grade. Well construction details for Well S-10 is presented in Appendix C.

7.0 RESULTS

7.1 Subsurface Conditions

The lithology beneath the site appears to consist primarily of clay of low to high plasticity, with some silty clay, and interspersed sandy clay. High plasticity clays appear to be laterally continuous beneath the site from a depth of approximately 28 feet to 35.5 feet below grade. Weak hydrogen sulfide odors were detected in several of the borings during drilling activities. Copies of the exploratory boring logs are included in Appendix C.

First encountered groundwater was observed at a depth of approximately 19 feet below ground surface in SR-1, SR-2, and SR-3, and 24 feet in S-10. The water-bearing strata appears to be comprised primarily of low-permeability clay and sandy clay. Equilibrated ground-water levels occur at approximately 12 to 17 feet below grade, indicating semi-confined to confined conditions.

7.2 Analytical Results

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

TPH-Gasoline was detected in soil samples from SR-1, SR-2, and SR-3 at concentrations ranging from 8.4 ppm in SR-2 at 20 feet (SR-2-20) to 67 ppm in SR-2 at 15 feet. Benzene was detected in soil samples from SR-1, SR-2, and SR-3 at concentrations ranging from 0.05 ppm in SR-2 at 10 feet to 5.4 ppm in SR-1 at 20 feet below grade. Soil samples from S-10 were ND for all constituents analyzed. Soil analytical results are summarized in Table 2, and the IT Analytical Services report is included in Appendix B.

8.0 SUMMARY

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

- Three ground-water extraction wells (SR-1, SR-2, and SR-3) and one ground-water monitoring well (S-10) were installed.
- Water levels were measured in selected wells and the data were used to construct a potentiometric map and calculate the hydraulic gradient.
- No separate-phase product was detected in any of the wells.
- TPH-Gasoline concentrations in ground-water samples ranged from ND in Wells S-3, S-7, S-8, S-9, and S-10 to 0.38 ppm in Well S-4.
- Benzene concentrations in groundwater ranged from ND in Wells S-3, S-7, S-8, and S-10 to 0.08 ppm in Well S-2.
- TPH-Gasoline concentrations in soils ranged from ND in samples S-10 at 15 feet, S-10 at 20 feet, SR-1 at 15 feet, SR-2 at 10 feet, SR-3 at 10 feet, and SR-3 at 20 feet, to 67 ppm in SR-2 at 15 feet.

- Benzene concentrations ranged from ND in samples S-10 at 15 feet, S-10 at 20 feet, SR-1 at 15 feet, SR-2 at 20 feet, and SR-3 at 20 feet, to 5.4 ppm in SR-1-20.

9.0 PLANNED SITE ACTIVITIES

The following activities are planned for the fourth quarter, October 1 to December 31, 1989:

- All scheduled wells will be sampled and analyzed for TPH-Gasoline 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 and benzene.

References

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 #	SAMPLE DATE	ANALYZED DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-2	08-Sep-89	14-Sep-89	0.23	0.08	0.001	0.03	0.015	329.21	315.22	----	13.99
S-3	08-Sep-89	12-Sep-89	ND	ND	ND	ND	ND	327.67	315.65	----	12.02
S-4	08-Sep-89	12-Sep-89	0.38	0.032	ND	0.036	0.026	328.53	314.74	----	13.79
S-5	08-Sep-89	14-Sep-89	0.11	0.025	0.002	0.002	0.012	329.66	313.86	----	15.80
S-6	08-Sep-89	12-Sep-89	0.27	0.0013	0.001	0.007	ND	327.62	313.99	----	13.63
S-7	08-Sep-89	12-Sep-89	ND	ND	ND	ND	ND	328.67	312.50	----	16.17
S-8	08-Sep-89	12-Sep-89	ND	ND	ND	ND	ND	327.00	312.37	----	14.63
S-9	08-Sep-89	12-Sep-89	ND	0.0017	0.002	ND	ND	328.24	310.84	----	17.40
S-10	11-Aug-89	17-Aug-89	ND	ND	ND	ND	ND	326.55	313.62	----	12.93 *
S-10	08-Sep-89	14-Sep-89	ND	ND	ND	ND	ND	326.55	313.52	----	13.03

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS

Benzene 0.001 ppm Xylenes 1.750 ppm Ethylbenzene 0.68 ppm

CURRENT DHS ACTION LEVELS

Toluene 0.100 ppm

TPH = Total Petroleum Hydrocarbons as Gasoline
PPM = Parts per million SR = Recovery Well SF = Field Blank
ND = None Detected SD = Duplicate Sample TB = Trip Blank

* Not used for potentiometric map

Note: 1. For chemical parameter detection limits, refer to I.T. Laboratory reports
2. Water Level elevations referenced to mean sea level (MSL)
3. DHS Action Levels and MCL are subject to change pending State review

Project No. 7632-3

TABLE 1

GROUND-WATER ANALYSIS DATA

WELL #	SAMPLE DATE	ANALYZED DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
SR-1	11-Oct-89	16-Oct-89	0.20	0.10	ND	0.01	0.01	329.78	313.94	----	15.84 *
SR-2	11-Oct-89	16-Oct-89	0.88	ND	0.001	0.029	0.033	328.35	314.67	----	13.68 *
SR-3	11-Oct-89	16-Oct-89	0.50	0.092	0.01	0.043	0.10	329.11	315.11	----	14.00 *
SD-2	08-Sep-89	14-Sep-89	0.22	0.088	0.001	0.03	0.012	----	----	----	----
SF-4	08-Sep-89	12-Sep-89	ND	ND	ND	ND	ND	----	----	----	----
TB	11-Aug-89	17-Aug-89	ND	ND	ND	ND	ND	----	----	----	----
TB	08-Sep-89	12-Sep-89	ND	ND	ND	ND	ND	----	----	----	----
TB	11-Oct-89	13-Oct-89	ND	ND	ND	ND	ND	----	----	----	----

TABLE 2

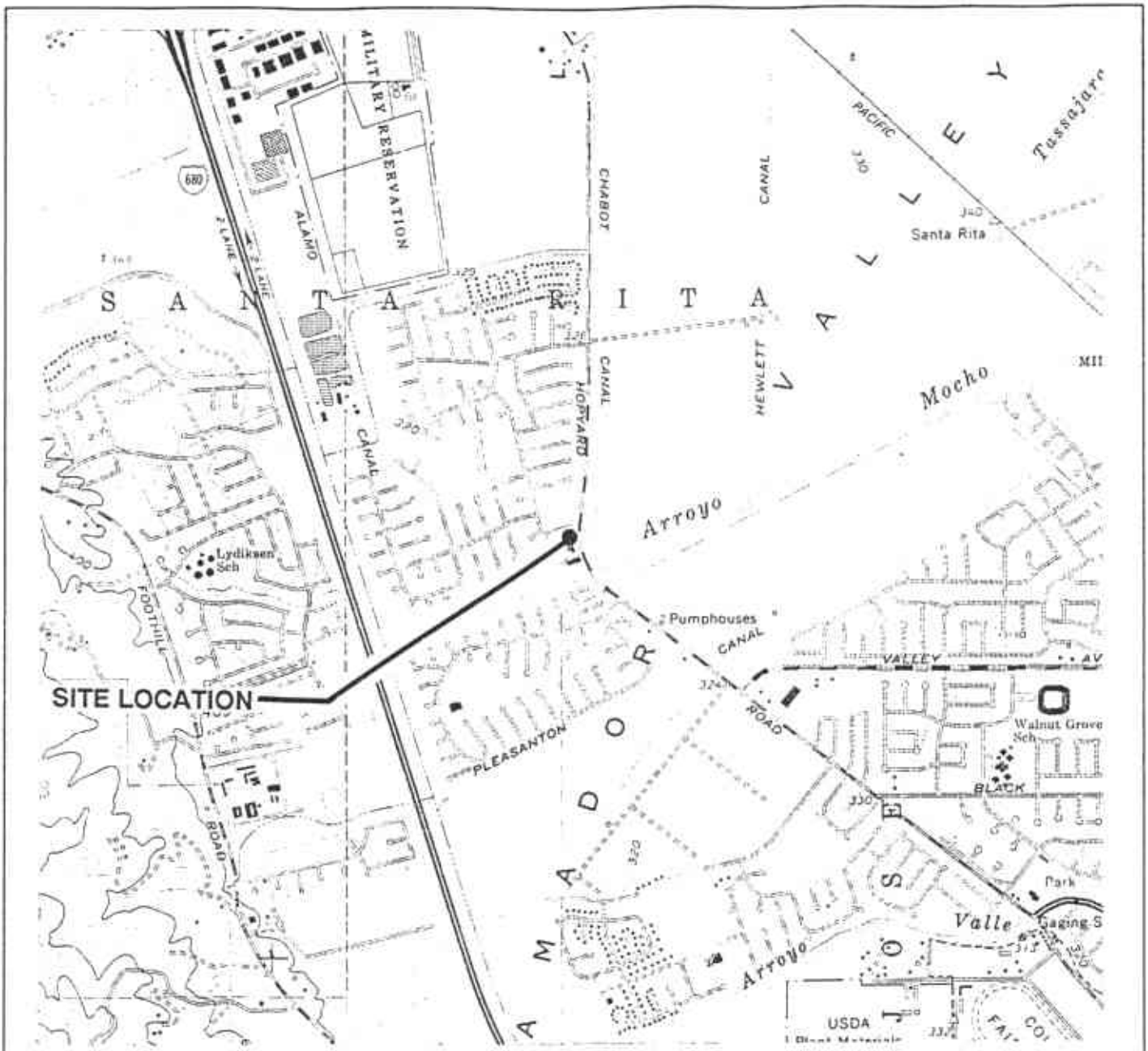
SOIL ANALYSES DATA

SAMPLE #	SAMPLE DATE	ANALYZED DATE	TPH (PPM)	BENZENE (PPM)	ETHYLBENZE (PPM)	TOLUENE (PPM)	XYLENES (PPM)
S-10-15	09-Aug-89	15-Aug-89	ND	ND	ND	ND	ND
S-10-20	09-Aug-89	15-Aug-89	ND	ND	ND	ND	ND
SR-1-15	09-Aug-89	18-Aug-89	ND	ND	ND	ND	ND
SR-1-20	09-Aug-89	15-Aug-89	40.	5.4	ND	2.5	2.7
SR-2-10	20-Sep-89	26-Sep-89	ND	0.05	ND	ND	ND
SR-2-15	20-Sep-89	26-Sep-89	67.	0.11	0.1	0.1	ND
SR-2-20	20-Sep-89	26-Sep-89	8.4	ND	ND	1.0	ND
SR-3-10	19-Sep-89	26-Sep-89	ND	0.98	ND	ND	ND
SR-3-15	19-Sep-89	26-Sep-89	54.	3.9	ND	4.2	2.7
SR-3-20	19-Sep-89	26-Sep-89	ND	ND	ND	0.2	ND

TPH = Total Petroleum Hydrocarbons as Gasoline
PPM = Parts per million
ND = None Detected

Note:
(1) For chemical parameter detection limits, refer to I.T. Laboratory reports

Project No. 7632-3



Base Map: USGS Topographic Map

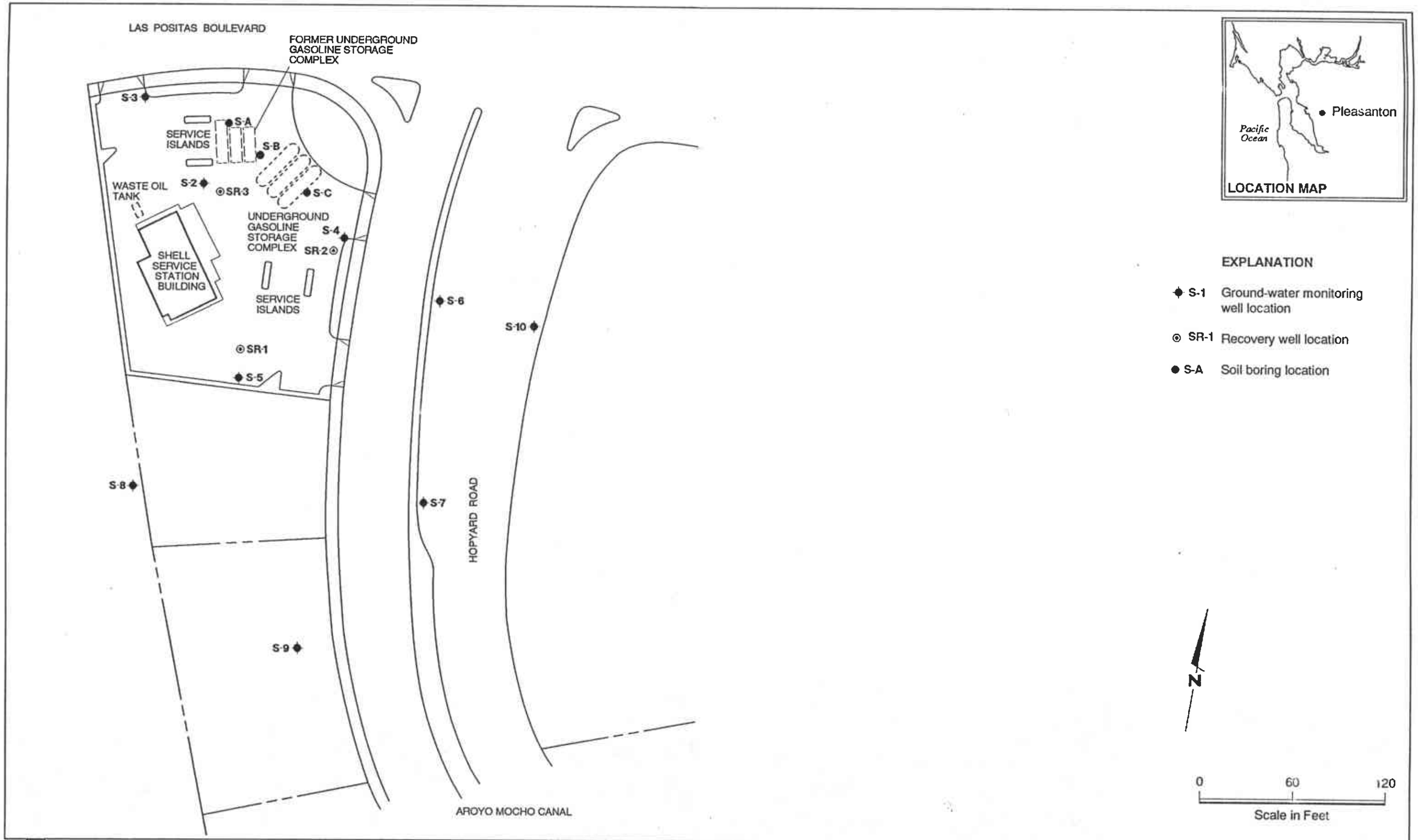
Approx. Scale: 1" = 2000'

GeoStrategies Inc.

Vicinity Map
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE
1

JOBNUMBER	REVIEWEDBYRG/CEG	DATE	REVISEDDATE	REVISEDDATE
7632		11/89		

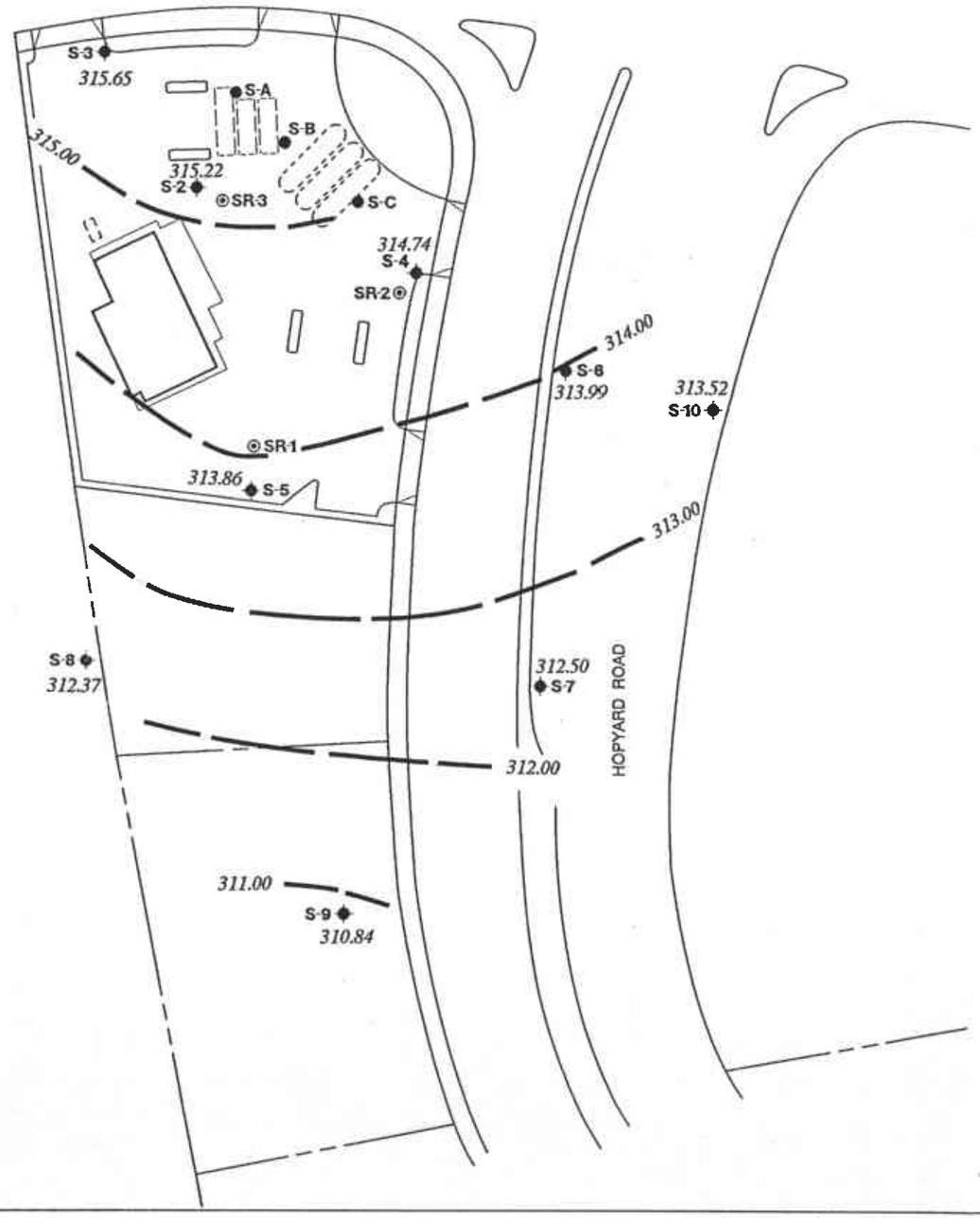


GeoStrategies Inc.

Site Plan
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	11/89		



EXPLANATION

- S-1 — Ground-water monitoring well location
- SR-1 — Recovery well location
- S-A — Soil boring location
- 312.00 — Ground-water elevation contour Approximate Gradient = 0.01
- 313.99 — Ground-water elevation measured on September 8, 1989 in feet referenced to mean sea level (MSL)

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

N

0 60 120

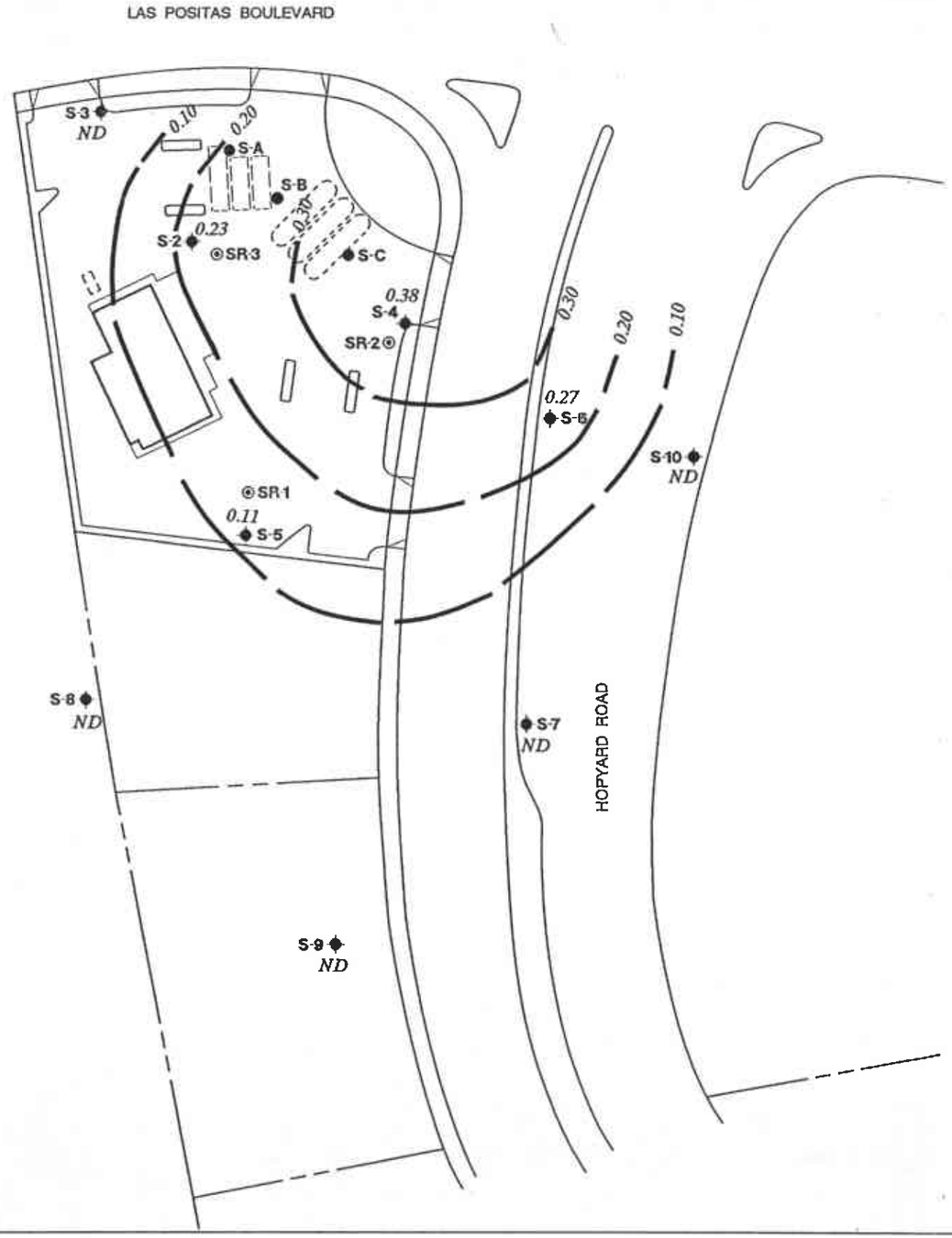
Scale in Feet

GeoStrategies Inc.

Potentiometric Map
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE **3**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	RMP CEG 1262	11/89		



EXPLANATION

- S-1 — Ground-water monitoring well location
- SR-1 — Recovery well location
- S-A — Soil boring location
- *0.27* — TPH (Total Petroleum Hydrocarbon) concentration in ppm sampled on September 8, 1989
- *0.20* — TPH isoconcentration contour
- *ND* — Not Detected (see laboratory reports for detection limits)

N

0 60 120

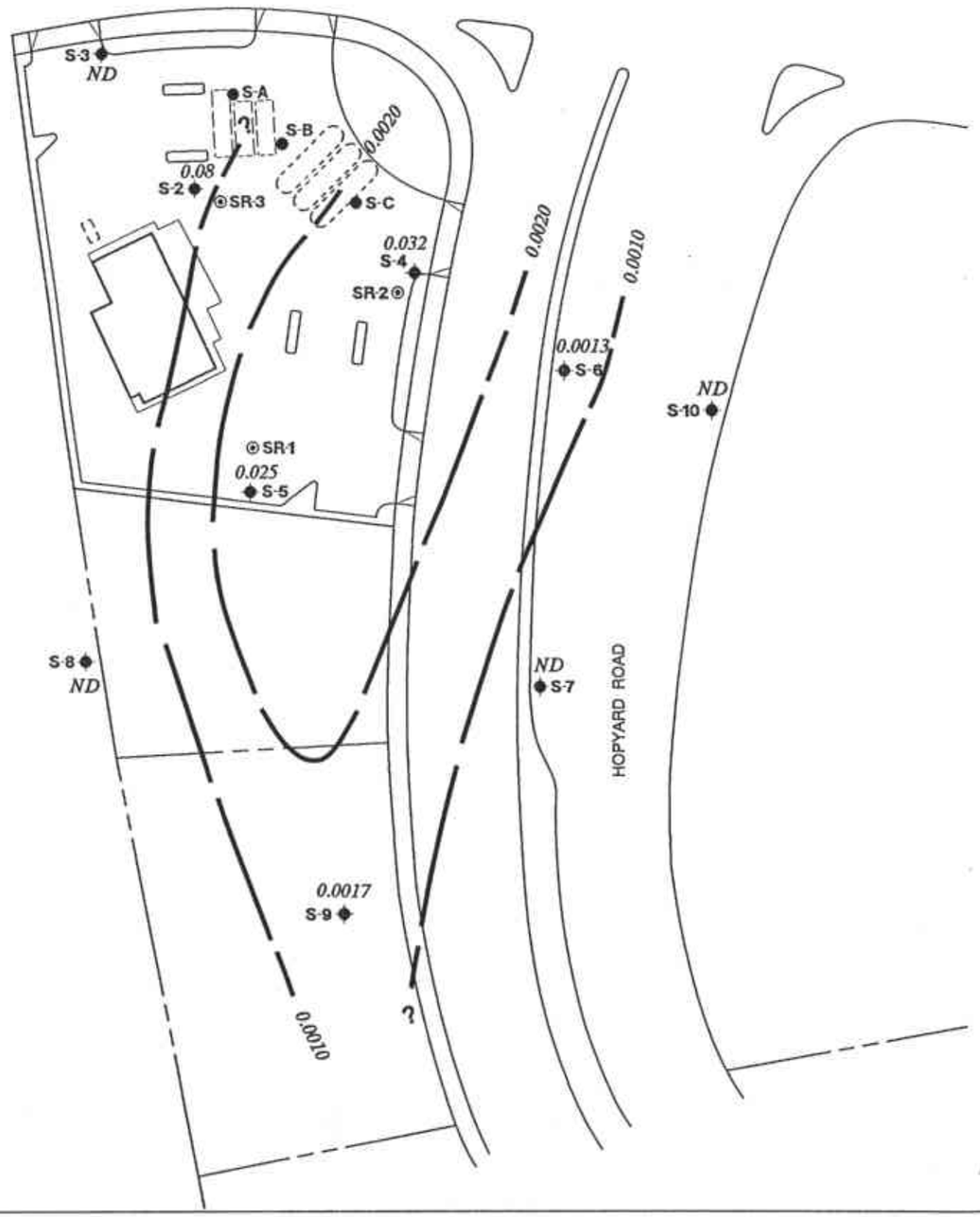
Scale in Feet

GeoStrategies Inc.

TPH Isoconcentration Map
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE **4**

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CEG 1262	11/89		



EXPLANATION

- S-1 Ground-water monitoring well location
- SR-1 Recovery well location
- S-A Soil boring location
- 0.025 Benzene concentration in ppm sampled on September 8, 1989
- 0.0010 Benzene isoconcentration contour
- ND Not Detected (see laboratory reports for detection limits)

N

0 60 120

Scale in Feet

GeoStrategies Inc.

Benzene Isoconcentration Map
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE
5

JOB NUMBER
7632

REVIEWED BY RG/CEG

DATE
11/89

REVISED DATE

REVISED DATE

APPENDIX A
FIELD METHODS AND PROCEDURES

FIELD METHODS AND PROCEDURES

EXPLORATION DRILLING

Mobilization

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

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

Drilling

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

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

Soil Sampling

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

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

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

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

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

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

Soil Sampling - cont.

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

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

Monitoring Well Installation

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

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

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

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

Well Development

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

Well Surveying

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

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

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

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

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

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

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

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

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

Guidance and Reference Documents Used to Collect Groundwater Samples

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A. Up to 2 wells - Trip Blank Only

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

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

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

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

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SAMPLE COLLECTION

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

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

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

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

Decontamination Procedures

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

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

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

Water-Level Measurements

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

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Water-Level Measurements (continued)

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

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

Well Purging

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

DOCUMENTATION

Sample Container Labels

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

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

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

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

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

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

Calculated and actual purge volumes

Chain-of-Custody

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

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

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

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TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

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

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FIELD EXPLORATORY BORING LOG

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

Boring No:

Sheet of

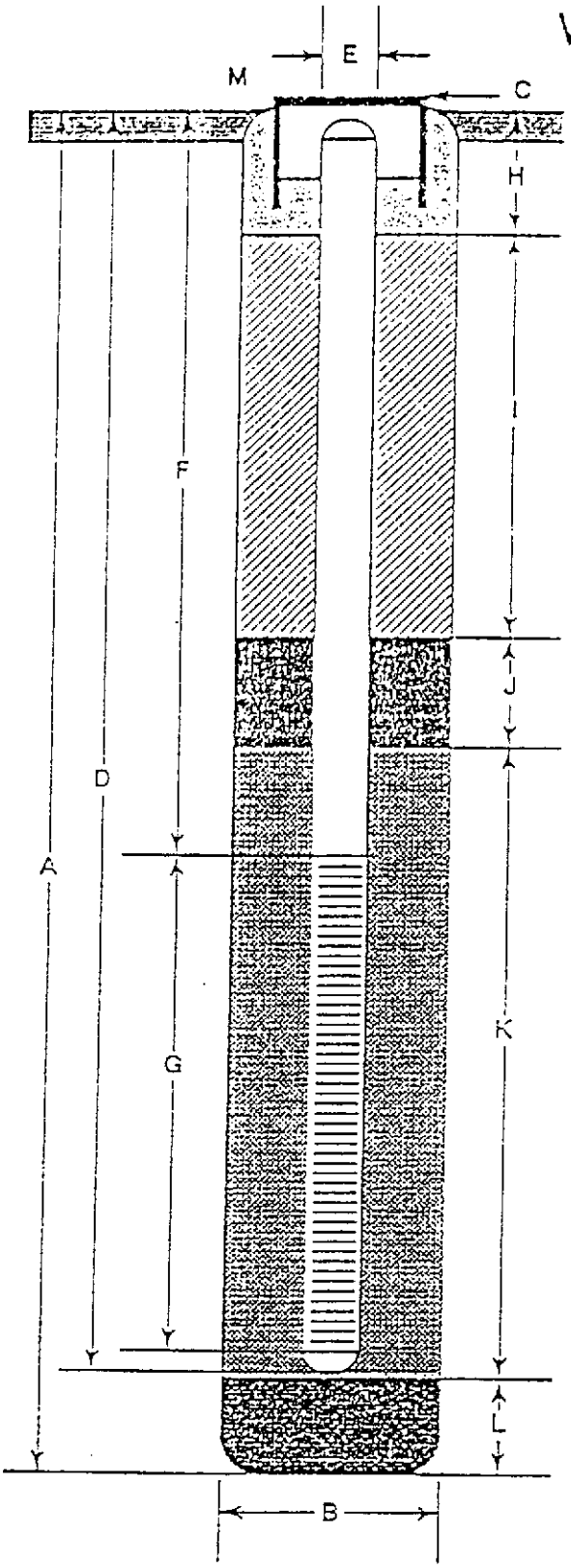
Water Level			
Time			
Date			

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

Remarks:

FIGURE 1

WELL CONSTRUCTION DETAIL



A Total Depth of Boring _____ ft.

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

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

D Casing Length _____ ft.
Material _____

E Casing Diameter _____ in.

F Depth to Top Perforations _____ ft.

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

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

I Backfill from _____ to _____ ft.
Backfill Material _____

J Seal from _____ to _____ ft.
Seal Material _____

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

L Bottom Seal _____ ft.
Seal Material _____

M _____

Well Construction Detail

GeoStrategies Inc.

WELL NO.

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

FIGURE 2

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY _____ JOB # _____

LOCATION _____ DATE _____

CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

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

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

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

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

Time	pH	Conductivity	Temperature	Volume

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

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 3

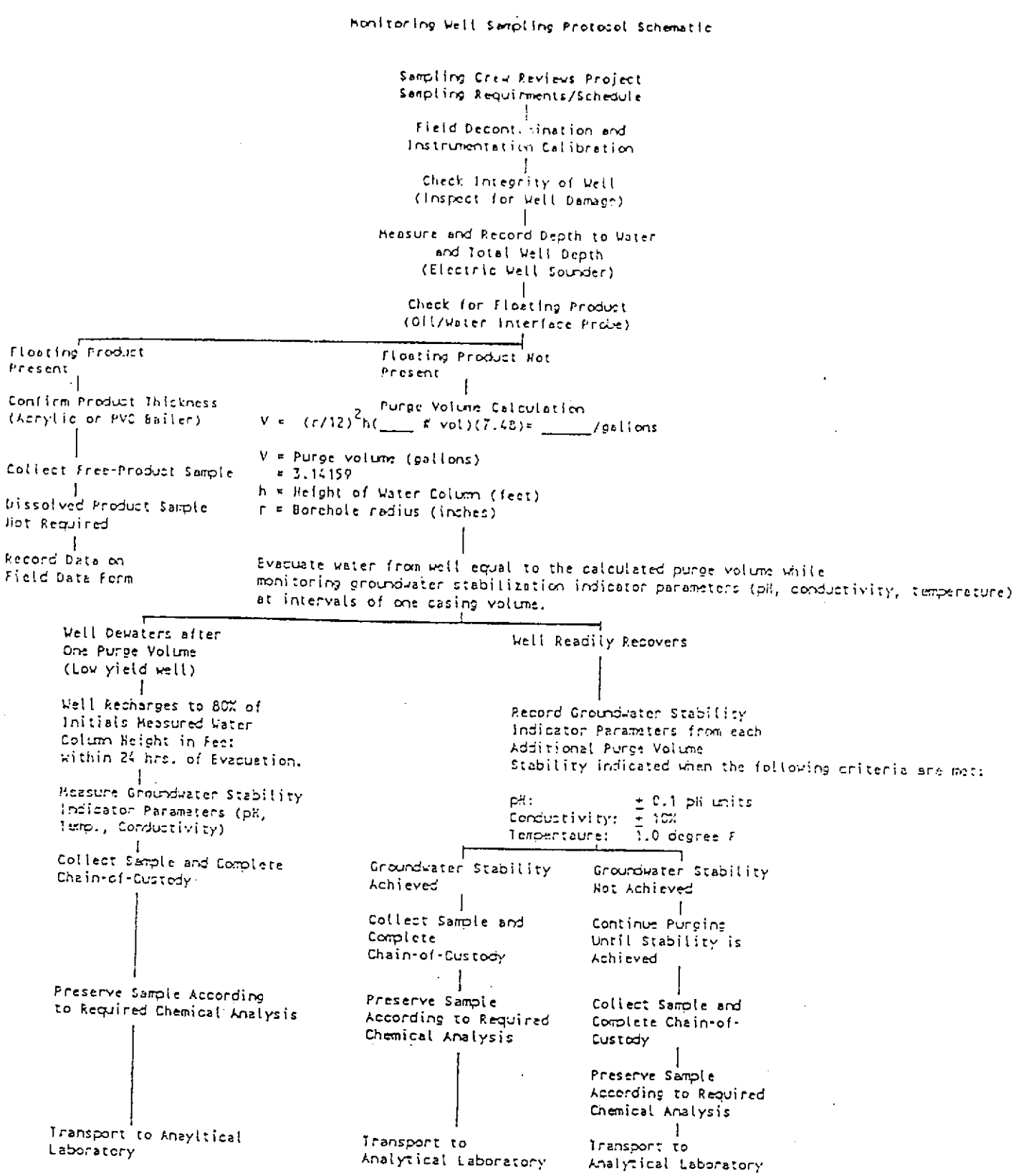

Monitoring Well Sampling Protocol Schematic
Sampling Crew Reviews Project Sampling Requirments/Schedule
Field Decontamination and Instrumentation Calibration
Check Integrity of Well (Inspect for Well Damage)
Measure and Record Depth to Water and Total Well Depth (Electric Well Sounder)
Check for Floating Product (Oil/Water Interface Probe)
Floating Product Present
Confirm Product Thickness (Acrylic or PVC Bailer)
Collect Free-Product Sample
Dissolved Product Sample Not Required
Record Data on Field Data Form
Floating Product Not Present
Purge Volume Calculation
V = (r/12)2h(____ # vol)(7.48)= _____/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 Anaytical Laboratory
Well Readily Recovers
Record Groundwater Stability Indicator Parameters from each Additional Purge Volume
Stability indicated when the following criteria are met:
pH: ± 0.1 pH units
Conductivity: ± 10%
Temperature: 1.0 degree F
Groundwater Stability Achieved
Collect Sample and Complete Chain-of-Custody
Preserve Sample According to Required Chemical Analysis
Transport to Analytical Laboratory
Groundwater Stability Not Achieved
Continue Purging Until Stability is Achieved
Collect Sample and Complete Chain-of-Custody
Preserve Sample According to Required Chemical Analysis
Transport to Analytical Laboratory

FIGURE 4

Gettler - Ryan Inc.
ENVIRONMENTAL DIVISION

Chain of Custod

COMPANY _____ JOB NO. _____

JOB LOCATION _____

CITY _____ PHONE NO. _____

AUTHORIZED _____ DATE _____ P.O. NO. _____

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

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: _____

DESIGNATED LABORATORY: _____ DHS #: _____

REMARKS: _____

DATE COMPLETED _____ FOREMAN _____

FIGURE 5

APPENDIX B
CHEMICAL ANALYTICAL REPORTS
GETTLER-RYAN GROUNDWATER SAMPLING REPORTS

GROUNDWATER ANALYTICAL REPORTS

gettler — ryan inc.

September 25, 1989

GROUNDWATER SAMPLING REPORT

Referenced Site: Shell Service Station
3790 Hopyard Road/Las Positas Boulevard
Pleasanton, California

Sampling Date: September 8, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on September 8, 1989 at the referenced location. The site is occupied by an operating service station located on the southwest corner of Hopyard Road and Los Positas Boulevard. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products and waste oil.

There are currently four groundwater monitoring wells on site and five off site at the locations shown on the attached site map. Prior to sampling, all wells were inspected for total well depth, water levels, and presence of separate phase 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 12.02 to 17.40 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 bladder pumps, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A field blank (SF-4) and trip blank, supplied by the laboratory, were included and analyzed to assess quality control. A duplicate sample (SD-2), was submitted without well designations, to assess laboratory performance. Analytical results for 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

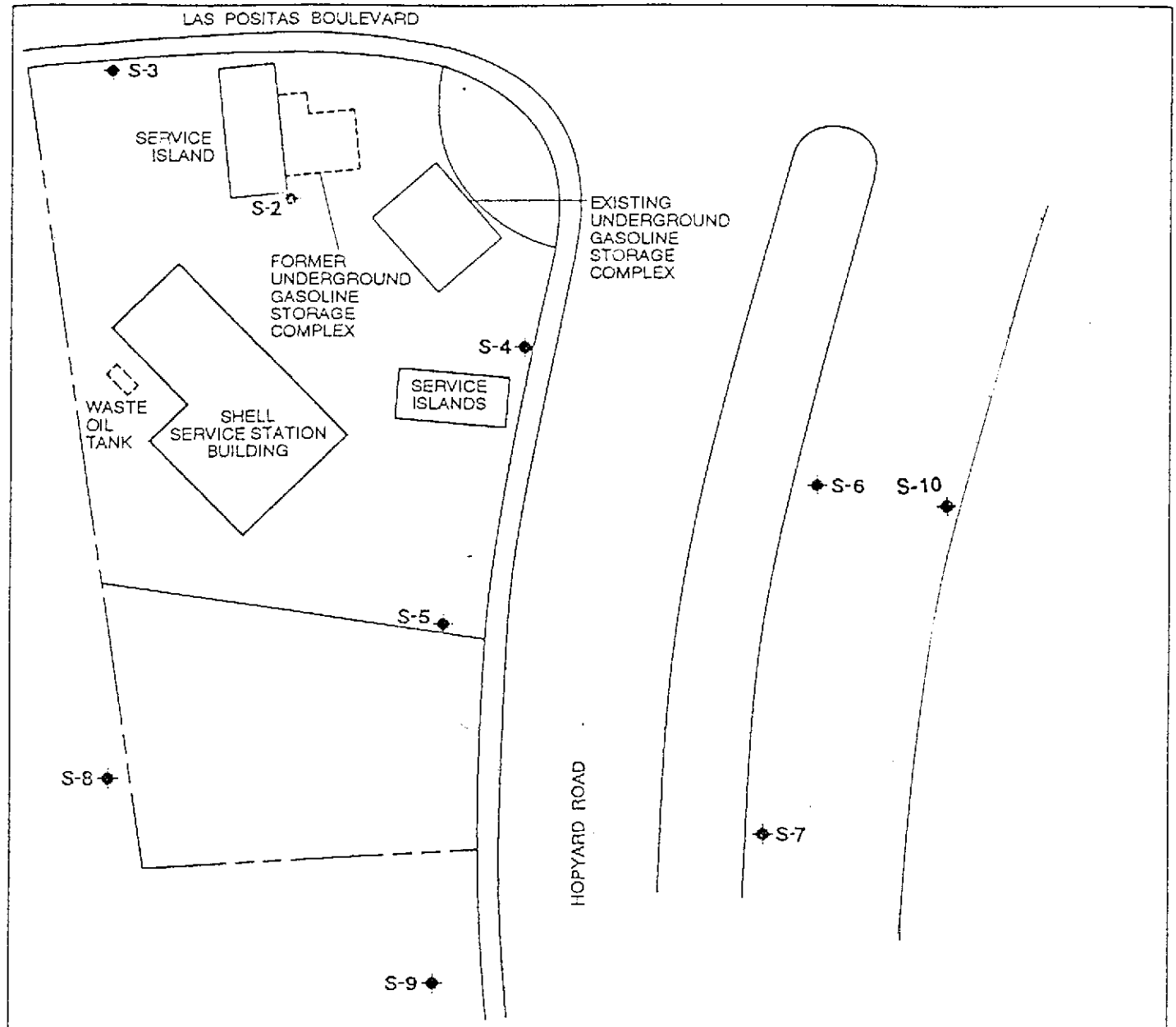
WELL I.D.	S-2 SD-2	S-3	S-4	S-5	S-6	S-7
Casing Diameter (inches)	3	3	3	3	3	3
Total Well Depth (feet)	33.9	34.8	35.0	34.3	34.1	34.7
Depth to Water (feet)	13.99	12.02	13.79	15.80	13.63	16.17
Free Product (feet)	none	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----	----
Calculated 4 Case Vol.(gal.)	30.2	34.6	32.2	28.0	31.1	28.2
Did Well Dewater?	no	no	no	yes	no	no
Volume Evacuated (gal.)	38.5	42.9	40.3	16.0	39.0	35.0
Purging Device	Bladder	Bladder	Bladder	Bladder	Bladder	Bladder
Sampling Device	Bladder	Bladder	Bladder	Bladder	Bladder	Bladder
Time	12:13	13:04	12:41	10:54	11:09	10:22
Temperature (F)*	67.1	66.2	68.3	66.7	66.5	66.3
pH*	6.60	6.75	6.65	6.74	6.83	6.64
Conductivity (umhos/cm)*	5190	5150	3450	1784	2780	4680

* Indicates Stabilized Value

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-8	S-9	S-10
Casing Diameter (inches)	3	3	3
Total Well Depth (feet)	33.5	34.5	34.7
Depth to Water (feet)	14.63	17.40	13.03
Free Product (feet)	none	none	none
Reason Not Sampled	----	----	----
Calculated 4 Case Vol.(gal.)	28.8	26.0	32.9
Did Well Dewater?	no	no	no
Volume Evacuated (gal.)	36.0	33.0	40.8
Purging Device	Bladder	Bladder	Bladder
Sampling Device	Bladder	Bladder	Bladder
Time	09:48	08:40	09:15
Temperature (F)*	65.6	66.1	66.0
pH*	6.65	6.83	6.79
Conductivity (umhos/cm)*	4070	3370	2790

* Indicates Stabilized Value



Base Map: Woodward-Clyde Consultants

GeoStrategies Inc.

Site Plan
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE 1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
632		7/89		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: September 25, 1989

Work Order Number: S9-09-071

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3632, Shell, 3790 Hopyard Rd./ Las Positas, Pleasanton, CA, CORRECTED REPORT
Date Received by Lab:	9/8/89
Number of Samples:	12
Sample Type:	Water

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

Reviewed and Approved

CAHorn

Christine Horn
Operations Manager

CH/an
2 Pages Following - Tables of Results

Date: September 25, 1989
Client Project ID: GR #3632, Shell, 3790 Hopyard Rd./
Las Positas, Pleasanton, CA, CORRECTED REPORT Work Order Number: S9-09-071

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-09-071-01	S-2	9/8/89	9/14/89	cool pH ≤2
S9-09-071-02	S-3	9/8/89	9/12/89	cool pH ≤2
S9-09-071-03	S-4	9/8/89	9/12/89	cool pH ≤2
S9-09-071-04	S-5	9/8/89	9/14/89	cool pH ≤2
S9-09-071-05	S-6	9/8/89	9/12/89	cool pH ≤2
S9-09-071-06	S-7	9/8/89	9/12/89	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)
S9-09-071-01	S-2	0.23	0.08	0.001	0.030	0.015
S9-09-071-02	S-3	ND	ND	ND	ND	ND
S9-09-071-03	S-4	0.38	0.032	ND	0.036	0.026
S9-09-071-04	S-5	0.11	0.025	0.002	0.002	0.012
S9-09-071-05	S-6	0.27	0.0013	0.001	0.007	ND
S9-09-071-06	S-7	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

Date: September 25, 1989
Client Project ID: GR #3632, Shell, 3790 Hopyard Rd./
Las Positas, Pleasanton, CA, CORRECTED REPORT Work Order Number: S9-09-071

IT ANALYTICAL SERVICES
SAN JOSE, CA

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-09-071-07	S-8	9/8/89	9/12/89	cool pH ≤2
S9-09-071-08	S-9	9/8/89	9/12/89	cool pH ≤2
S9-09-071-09	S-10	9/8/89	9/14/89	cool pH ≤2
S9-09-071-10	SD-2	9/8/89	9/14/89	cool pH ≤2
S9-09-071-11	SF-4	9/8/89	9/12/89	cool pH ≤2
S9-09-071-12	Trip Blank	9/8/89	9/12/89	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)
S9-09-071-07	S-8	ND	ND	ND	ND	ND
S9-09-071-08	S-9	ND	0.0017	0.002	ND	ND
S9-09-071-09	S-10	ND	ND	ND	ND	ND
S9-09-071-10	SD-2	0.22	0.088	0.001	0.030	0.012
S9-09-071-11	SF-4	ND	ND	ND	ND	ND
S9-09-071-12	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

Geffler - Ryan Inc. SG-09-071 ENVIRONMENTAL DIVISION 0779 Chain of Custody

COMPANY Shell Oil Company JOB NO. 11494

JOB LOCATION 3790 Hopyard Rd. / W. Las Positas Blvd.

CITY Pleasanton, CA PHONE NO. (415) 783-7500

AUTHORIZED John Werfal DATE 9/8/89 P.O. NO. 3632

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-2	3	Liquid	9-8/1213	THC(GC) BTXE	OK/COOL
S-3			/1304		
S-4			/1244		
S-5			/1059		
S-6			/1109		
S-7			/1022		
S-8			/0950		
S-9			/0940		
S-10			/0915		
SD-2			/—		
SF-4			/—		
Trip blank	2		9-6/—		

RELINQUISHED BY: Phillip J. Frye 9/8/89 1557

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 9-8-89 1557

DESIGNATED LABORATORY: IT SCV DHS #: 157

REMARKS: Normal TAT Results due 9/22/89

DATE COMPLETED Sept. 8, 1989 FOREMAN Phillip J. Frye

ORIGINAL

gettler — ryan inc.

September 26, 1989

GROUNDWATER SAMPLING REPORT

Referenced Site: Shell Service Station
3790 Hopyard Road/Los Positas Boulevard
Pleasanton, California

Sampling Date: August 11, 1989

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on August 11, 1989 at the referenced location. The site is occupied by an operating service station located on the southwest corner of Hopyard Road and Los Positas Boulevard. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products and waste oil.

There are currently four groundwater monitoring wells on site and five off site at the locations shown on the attached site map. Prior to sampling, the recently installed Well S-10, was 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 depth was 12.93 feet below grade. Separate phase product was not observed in the monitoring well.

Well S-10 was then purged and sampled. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. The well was purged while pH, temperature, and conductivity measurements were monitored for stability. 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 bladder pumps, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A trip blank, supplied by the laboratory, was included and analyzed to assess quality control. Analytical results for blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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

The samples were analyzed at International Technology Corporation - Santa Clara Valley Laboratory located at 2055 Junction Avenue, San Jose, California. The laboratory is assigned a California DHS-HMTL Certification number of 137. The results are presented as a Certified Analytical Report, a copy of which is attached to this report.

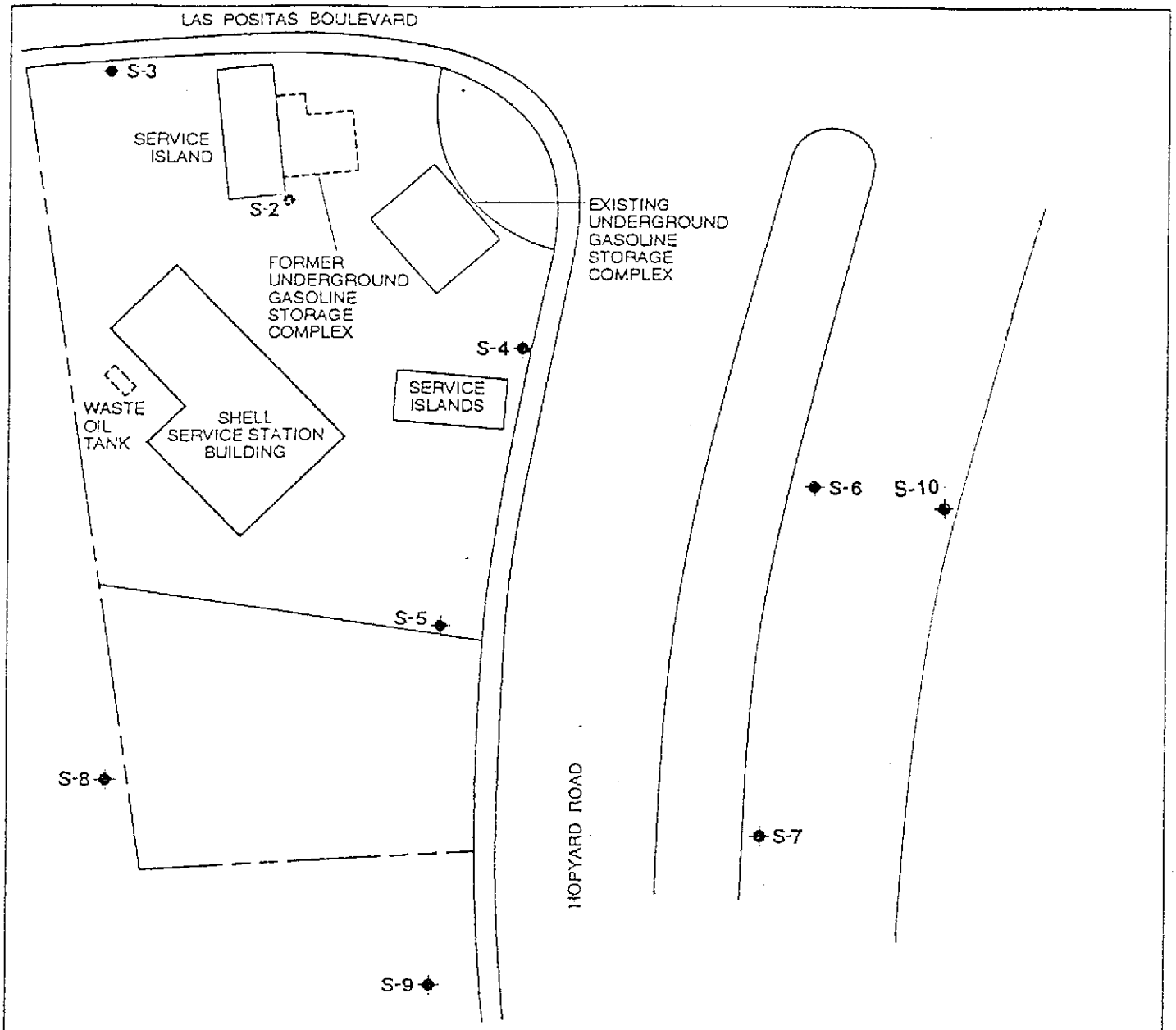
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	S-10
Casing Diameter (inches)	
Total Well Depth (feet)	34.90
Depth to Water (feet)	12.93
Free Product (feet)	none
Reason Not Sampled	----
Calculated 4 Case Vol.(gal.)	33.2
Did Well Dewater?	no
Volume Evacuated (gal.)	56.0
Purging Device	Bladder
Sampling Device	Bladder
Time	10:30
Temperature (F)*	65.9
pH*	6.79
Conductivity (umhos/cm)*	2800

* Indicates Stabilized Value



Base Map: Woodward-Clyde Consultants

GeoStrategies Inc.

Site Plan
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE 1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
632		7/89		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: September 25, 1989

Work Order Number: S9-08-146

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3632-2, Shell, 3790 Hopyard Road/ Las Positas, Pleasanton, CA
Date Received by Lab:	8/11/89
Number of Samples:	2
Sample Type:	Water

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

Reviewed and Approved

David A. Pichette
Project Manager

DAP/an
1 Page Following - Table of Results

Date: September 25, 1989
Client Project ID: GR #3632-2, Shell,
3790 Hopyard Rd./Las Positas, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-08-146

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-08-146-01	S-10	8/11/89	8/17/89	cool pH ≤2
S9-08-146-02	Trip Blank	8/11/89	8/17/89	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)
S9-08-146-01	S-10	ND	ND	ND	ND	ND
S9-08-146-02	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

Geffler - Ryan Inc. ENVIRONMENTAL DIVISION 89-08-146 0720 Chain of Custody

COMPANY Shell Oil Co. JOB NO.

JOB LOCATION 3790 Hopyard Rd / Las Positas

CITY Pleasanton PHONE NO. (415) 783-7500

AUTHORIZED John Werfal DATE 8/11/89 P.O. NO. 3632-2

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-10	3	Liquid	8/11/89 / 10:30	TH(CG,A) BTXE	OK / COOL
trip blank	#2	↓	8/8/89 / —	↓	↓

RELINQUISHED BY: Guadalupe Sanchez 8/11/89 11:39

RELINQUISHED BY:

RELINQUISHED BY:

RECEIVED BY:

RECEIVED BY:

RECEIVED BY LAB: Julie Clifford 8/11/89 12:02

DESIGNATED LABORATORY: IT SCV DHS #: 137

REMARKS: Normal TAT Results due 8/25/89

DATE COMPLETED 8/11/89 Sampler FOREMAN Guadalupe Sanchez

ORIGINAL

gettler — ryan inc.

November 6, 1989

GROUNDWATER SAMPLING REPORT

Referenced Site: Shell Service Station
3790 Hopyard Road/Las Positas Boulevard
Pleasanton, California

Sampling Date: October 11, 1989

This report presents the results of the groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on October 11, 1989 at the referenced location. The site is occupied by an operating service station located on the southwest corner of Hopyard Road and Los Positas Boulevard. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products and waste oil.

There are currently four groundwater monitoring wells on site, five off site, and three recovery wells at the locations shown on the attached site map. Recently installed recovery wells SR-1, SR-2, and SR-3 were sampled during this event. Prior to sampling, the recovery wells were inspected for total well depth, water levels, and presence of separate phase product using an electronic interface probe. A clean acrylic bailer was used to visually detect the presence of separate phase product. Separate phase product was not observed in any recovery wells. Groundwater depths ranged from 13.68 to 15.84 feet below grade.

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 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.

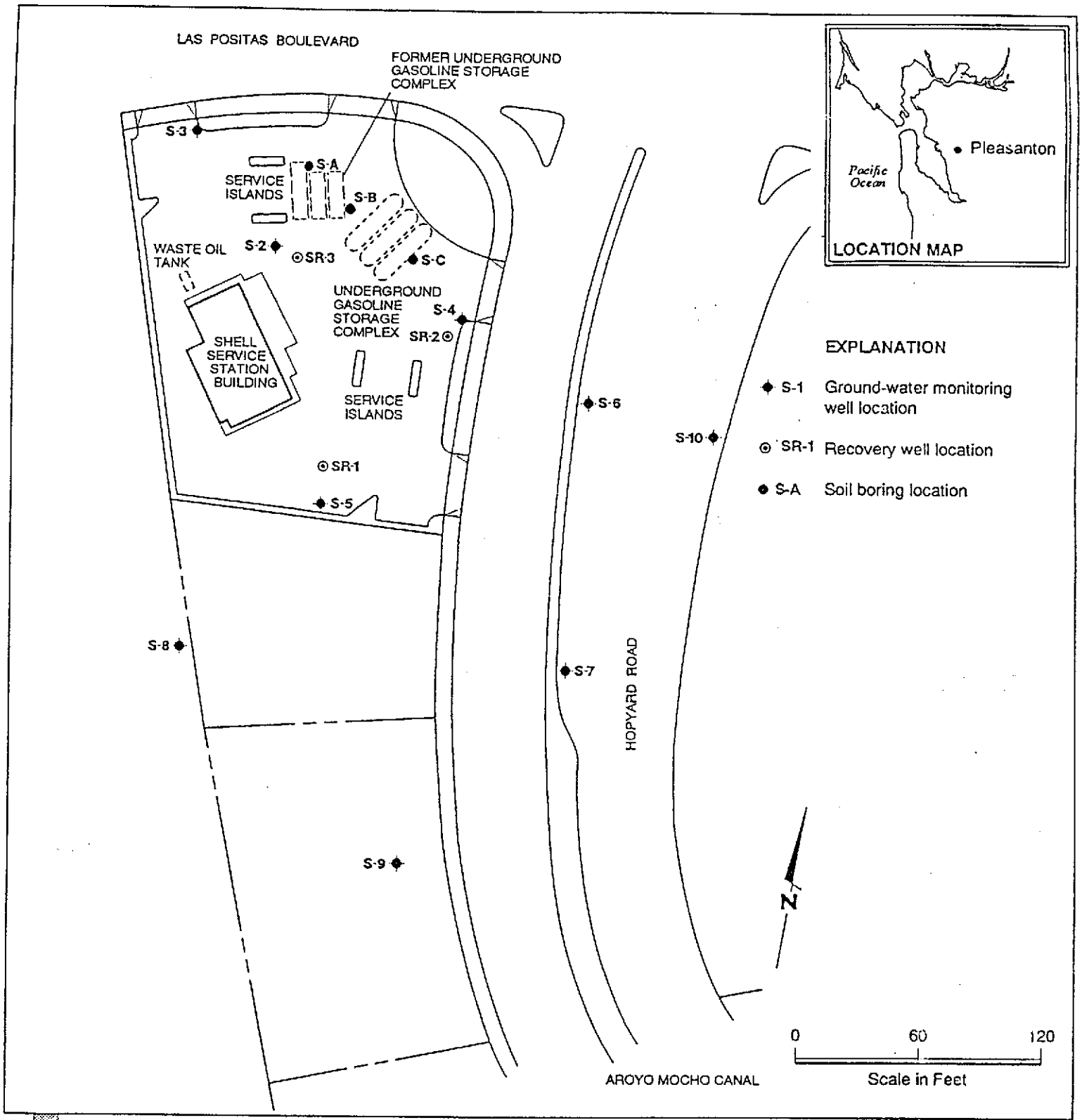
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

WELL I.D.	SR-1	SR-2	SR-3
Casing Diameter (inches)	4	4	4
Total Well Depth (feet)	35.1	35.3	35.1
Depth to Water (feet)	15.84	13.68	14.00
Free Product (feet)	none	none	none
Reason Not Sampled	----	----	----
Calculated 4 Case Vol.(gal.)	50.8	57.1	55.7
Did Well Dewater?	no	no	no
Volume Evacuated (gal.)	103	86	125
Purging Device	Suction	Suction	Suction
Sampling Device	Bailer	Bailer	Bailer
Time	14:04	15:24	16:42
Temperature (F)*	69.6	70.0	68.0
pH*	6.85	6.83	6.78
Conductivity (umhos/cm)*	4990	4450	4500

* Indicates Stabilized Value



GeoStrategies Inc.

Site Plan
Shell Service Station
3790 Hopyard Road
Pleasanton, California

PLATE
2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
632		11/89		

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: October 20, 1989

Work Order Number: S9-10-131

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3632, Shell, 3790 Hopyard/Los Positas, Pleasanton, CA
Date Received by Lab:	10/12/89
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.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/tw
1 Page Following - Table of Results

Page: 1 of 1
Date: October 20, 1989
Client Project ID: GR #3632, Shell, 3790 Hopyard/ Los Positas, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-10-131

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-10-131-01	SR-1	10/11/89	10/16/89	Cool, pH≤2
S9-10-131-02	SR-2	10/11/89	10/16/89	Cool, pH≤2
S9-10-131-03	SR-3	10/11/89	10/16/89	Cool, pH≤2
S9-10-131-04	TRIP BLANK	----	10/13/89	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)
S9-10-131-01	SR-1	0.20	0.10	ND	0.010	0.010
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-131-02	SR-2	0.88	ND	0.001	0.029	0.033
Detection Limit		0.050	0.01	0.001	0.001	0.003
S9-10-131-03	SR-3	0.50	0.092	0.010	0.043	0.10
Detection Limit		0.050	0.0005	0.001	0.001	0.003
S9-10-131-04	TRIP BLANK	ND	ND	ND	ND	ND
Detection Limit		0.050	0.0005	0.001	0.001	0.003

Geffler - Ryan Inc. ENVIRONMENTAL DIVISION 1253 **Chain of Custody**

COMPANY Shell Oil Company JOB NO. 89-10-131

JOB LOCATION 3790 Hopyard / Los Positas

CITY Pleasanton CA PHONE NO.

AUTHORIZED Christa Lopez DATE 10-11-89 P.O. NO. ~~5446~~ 3632

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
SR-1	3	Liquid	10-11-89 14:20	TPHC (gas) BTXE	BUBBLE/cool
SR-2	3		15:24		
SR-3	3		16:42		
Trip Blank	1				

RELINQUISHED BY: John P. Zwerynski

RECEIVED BY: 10-12-89 07:30

RELINQUISHED BY: 10-12-89 10:05

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: 10/12/89 10:05

DESIGNATED LABORATORY: ITI/SCV DHS #: 137

REMARKS: Normal TAT

Exp Code 5440

WIC No 204-6138-05-01, AFE No 986624, Eng: Diane Lundquist

DATE COMPLETED FOREMAN

ORIGINAL

SOIL ANALYTICAL REPORTS

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: November 15, 1989

Work Order Number: S9-08-147

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7632, Shell, 3790 Hopyard Road/Las Positas, Pleasanton, CA, CORRECTED REPORT
Date Received by Lab:	8/11/89
Number of Samples:	4
Sample Type:	Soil

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

Reviewed and Approved

Michael E. Dean
Project Manager

MED/an
1 Page Following - Table of Results

Date: November 15, 1989
Client Project ID: GR #7632, Shell, CORRECTED REPORT
3790 Hopyard Rd./Las Positas, Pleasanton

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-08-147

Lab Sample ID	Client Sample ID	Sample Date	Extraction Date	Date Analysis Completed	Sample Condition on Receipt
S9-08-147-01	SR-1-15	8/9/89	8/18/89	8/18/89	cool
S9-08-147-02	SR-1-20	8/9/89	8/15/89	8/15/89	cool
S9-08-147-03	S-10-15	8/9/89	8/15/89	8/15/89	cool
S9-08-147-04	S-10-20	8/9/89	8/15/89	8/15/89	cool

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

ND = None Detected

Results - Milligrams per Kilogram

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-08-147-01	SR-1-15	ND	ND	ND	ND	ND
Detection Limit		5.0	0.1	0.1	0.1	0.3
S9-08-147-02	SR-1-20	40.	5.4	ND	2.5	2.7
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-08-147-03	S-10-15	ND	ND	ND	ND	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-08-147-04	S-10-20	ND	ND	ND	ND	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3

Gettler - Ryan Inc. — 89-08-147 — ENVIRONMENTAL DIVISION — 0760 Chain of Custody

COMPANY Shell — JOB NO. 7632

JOB LOCATION 3790 Hopyard Road

CITY Pleasanton — PHONE NO.

AUTHORIZED John Wetzel — DATE 8/9/89 — P.O. NO.

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
SR-1-15	1	Soil	8/9/89	TPH (8015 Mod) BTEX (8020)	OIC/COC
SR-1-20	1	"	"	"	
S-10-15	1	Soil	"	"	
S-10-20	1	Soil	"	"	

RELINQUISHED BY: John Vargo 8/10/89

RECEIVED BY: 8/10/89 12:00

RELINQUISHED BY: 8/11/89 12:00

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 8/11/89 12:08

DESIGNATED LABORATORY: IT/SCV — DHS #: 137

REMARKS: Normal TAT Results due 8-25-89

DATE COMPLETED — FOREMAN

ORIGINAL

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

Date: September 30, 1989

Work Order Number: S9-09-245

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #7632, Shell, Hopyard/Las Positas, Pleasanton, CA
Date Received by Lab:	9/21/89
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.

Reviewed and Approved

cAllom for

Michael E. Dean
Project Manager

MED/an
1 Page Following - Table of Results

Date: September 30, 1989
Client Project ID: GR #7632, Shell,
Hopyard/Las Poitas, Pleasanton, CA

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order Number: S9-09-245

Lab Sample ID	Client Sample ID	Sample Date	Extraction Date	Date Analysis Completed	Sample Condition on Receipt
S9-09-245-01	SR-3-15	9/19/89	9/25/89	9/26/89	cool pH ≤2
S9-09-245-02	SR-3-10	9/19/89	9/25/89	9/26/89	cool pH ≤2
S9-09-245-03	SR-3-20	9/19/89	9/25/89	9/26/89	cool pH ≤2
S9-09-245-04	SR-2-10	9/20/89	9/25/89	9/26/89	cool pH ≤2
S9-09-245-05	SR-2-15	9/20/89	9/25/89	9/26/89	cool pH ≤2
S9-09-245-06	SR-2-20	9/20/89	9/25/89	9/27/89	cool pH ≤2

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

ND = None Detected

Results - Milligrams per Kilogram

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-09-245-01	SR-3-15	54.	3.9	ND	4.2	2.7
Detection Limit		13.	0.1	0.2	0.2	0.8
S9-09-245-02	SR-3-10	ND	0.98	ND	ND	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-09-245-03	SR-3-20	ND	ND	ND	0.2	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-09-245-04	SR-2-10	ND	0.05	ND	ND	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-09-245-05	SR-2-15	67.	0.11	0.1	0.1	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3
S9-09-245-06	SR-2-20	8.4	ND	ND	1.0	ND
Detection Limit		5.0	0.05	0.1	0.1	0.3

Getler - Ryan Inc.) 89-09-245 ENVIRONMENTAL DIVISION) 1263 **Chain of Custody**

COMPANY Shell JOB NO. _____

JOB LOCATION 3970 Hopyard Rd / Las Positas

CITY Pleasanton PHONE NO. _____

AUTHORIZED John Werfal DATE 9/20/89 P.O. NO. 7632

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
SR-3-15	1	SOIL	9/19/89 7:41	Gas (BTEX)	OK / COOL
SR-3-10	1	SOIL	9/19/89 9:55	Gas (BTEX)	
SR-3-20	1	SOIL	9/19/89 9:47	Gas (BTEX)	
SR-2-10	1	SOIL	9/20/89 11:52	Gas (BTEX)	
SR-2-15	1	SOIL	9/20/89 12:37	Gas (BTEX)	
SR-2-20	1	SOIL	9/20/89 12:42	Gas (BTEX)	

RELINQUISHED BY: 9/20/89 17:11

RECEIVED BY: 9-21-89 07:30

RELINQUISHED BY: 9/21/89 15:50

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY LAB: Julie Clifford 9-21-89 16:04

DESIGNATED LABORATORY: IT SCV DHS #: _____

REMARKS: Normal TAT

DATE COMPLETED _____ FOREMAN _____

ORIGINAL

APPENDIX C
EXPLORATORY BORING LOGS

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

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

Field location of boring:	Project No.: 7632	Date: 08/09/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		S-10
	Location: 3790 Hopyard Road		
	City: Pleasanton, California		Sheet 1
	Logged by: J. Vargas	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 8-inches	Top of Box Elevation:	Datum:	

	Water Level	12.93			
	Time				
	Date	08/11/89			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 2 feet
				2				
				3				GRAVEL with SAND (GP) - olive gray (5Y 4/2), loose, damp; 60% gravel; 30-40% sand; 5% clay.
				4				
	250	S&H		5				
	150	push						
NS	150			6				
				7				CLAY with SILT (CL) - very dark gray (5Y 3/1), medium stiff, damp; 70% clay; 20% silt; 10% sand; medium plasticity; no chemical odor.
				8				
				9				
	150	S&H		10				gravel and sand stringers; no chemical odor.
	150	push						
NS	150			11				
				12				
				13				
				14				
	2	S&H		15				stiff; roots; black organics; mottled brown; no chemical odor.
	3							
0	5		S-10-15	16				
				17				
				18				
				19				

Remarks: NS = no sample

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Log of Boring

BORING NO. S-10

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CMP CEG 1262	08/89		

Field location of boring:

(See Plate 2)

Project No.:	7632	Date: 08/09/89	Boring No. S-10
Client:	Shell Oil Company		
Location:	3790 Hopyard Road		
City:	Pleasanton, California		Sheet 2 of 2
Logged by:	J. Vargas	Driller: Bayland	

Drilling method: Hollow-Stem Auger

Hole diameter: 8-inches

Casing installation data: See Well Construction Detail

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
	2	S&H		20				
	4							
0	7		S-10-20	21				
				22				
				23				
				24		▽		saturated at 24 feet; interbedded lamina of fine sand;
	3	S&H						trace coarse sand; no chemical odor.
	5			25				
0	8		S-10-25	26				
				27				
				28				
				29				
	4	S&H						damp; no chemical odor.
	5			30				
0	7		S-10-30	31				
				32				
				33				CLAY with SILT (CL) - dark gray (5Y 4/1), stiff, damp;
				34				80% clay; 20% silt; high plasticity; brown oxidation
	5	S&H						stains; no chemical odor.
	5			35				
0	7		S-10-35	36				Bottom of boring at 35.5 feet.
								Bottom of sample at 35.5 feet.
				37				08/09/89
				38				
				39				

Remarks:

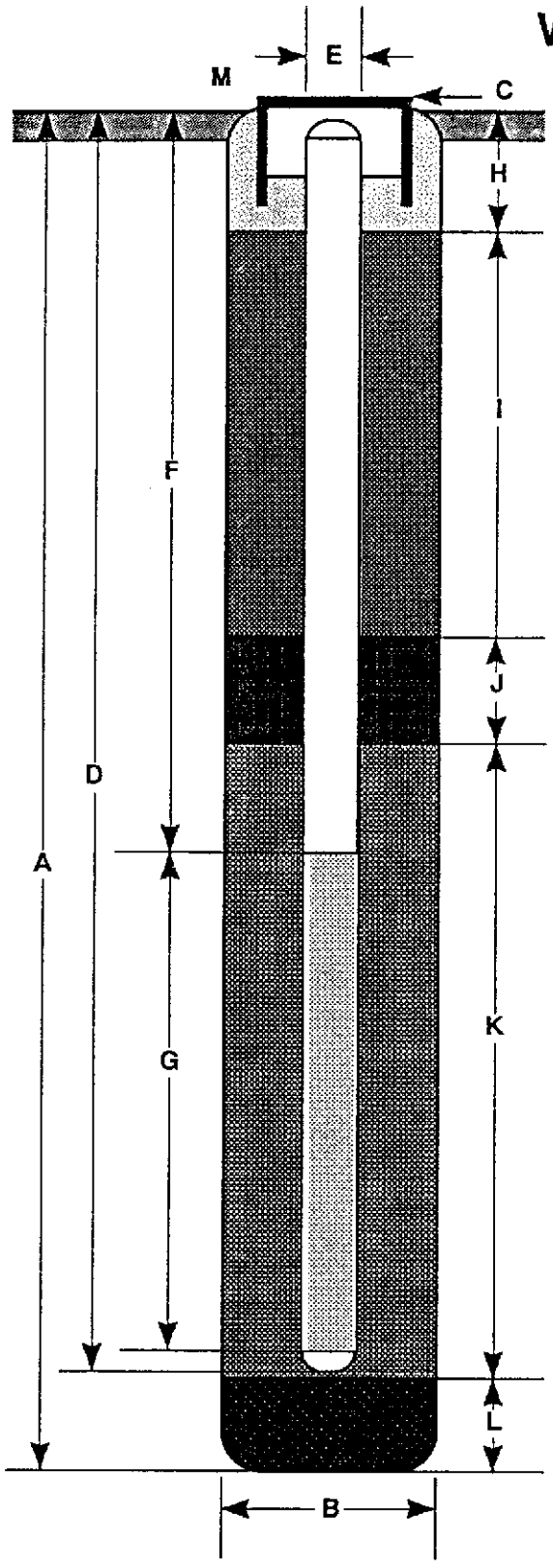
GeoStrategies Inc.

Log of Boring

BORING NO. S-10

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	08/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring: 35.5 ft.

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

C Top of Box Elevation: 326.55 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

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

E Casing Diameter: 3 in.

F Depth to Top Perforations: 15 ft.

G Perforated Length: 20 ft.
Perforated Interval from 15 to 35 ft.
Perforation Type: Machine Slot
Perforation Size: 0.020 in.

H Surface Seal from 0 to 0.5 ft.
Seal Material: Concrete

I Backfill from 0.5 to 11 ft.
Backfill Material: Concrete

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

K Gravel Pack from 13 to 35.5 ft.
Pack Material: 2/12 Lonestar Sand

L Bottom Seal: ft.
Seal Material:

M Christy Box with locking well cap and lock

Note: Depths measured from initial ground surface.

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Well Construction Detail

WELL NO.
S-10

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	10/89		

Field location of boring: (See Plate 2)	Project No.: 7632	Date: 08/09/89	Boring No.: SR-1
	Client: Shell Oil Company		
	Location: 3790 Hopyard Road		
	City: Pleasanton, California		Sheet 1 of 2
	Logged by: J. Vargas	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 12-inches	Top of Box Elevation:	Datum:	
	Water Level		
	Time		
	Date		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 1.0 foot
								CLAY with SILT (CL) - dark olive gray (5Y 3/2), stiff,
				2				damp; medium plasticity; 20% silt; 10-15% fine to coarse
								sand; trace organics, trace fine gravel, mottled brown;
				3				green staining; no chemical odor.
				4				
	250	S&H						COLOR CHANGE to black (5Y 2.5/1) at 4.5 feet.
	250	push		5				
0	400		SR-1-5					CLAYEY SAND (SC) - dark gray (5Y 4/1), medium dense,
				6				damp; 60% fine sand; 40% clay; no chemical odor.
								CLAY with SILT (CL) - black (5Y 2.5/1), very stiff, damp;
				7				medium plasticity; 80% clay; 20% silt; no chemical odor.
				8				
				9				COLOR CHANGE to olive (5Y 4/4) at 9.0 feet.
	400	S&H	SR-1-9					COLOR CHANGE to black (5Y 2.5) at 9.5 feet; no
	400	push		10				chemical odor.
NS	450							
				11				
				12				
				13				
				14				
	3	S&H						
	5			15				stiff; no chemical odor.
0	10		SR-1-15					
				16				
				17				
				18				
						▽		

Remarks: Drilled with 8-inch Hollow-Stem Augers on 08/09/89.
Completed on 9/20/89 with 12-inch Hollow-Stem Augers.

GeoStrategies Inc.

Log of Boring

BORING NO. SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWD CEG 12/92	08/89		

Field location of boring:	Project No.: 7632	Date: 08/09/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		SR-1
	Location: 3790 Hopyard Road		
	City: Pleasanton, California		Sheet 2
	Logged by: J. Vargas	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 12-inches	Top of Box Elevation:	Datum:	
	Water Level		
	Time		
	Date		

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	3	S&H						SANDY CLAY (CL) - olive gray (5Y 4/2), stiff, saturated;
	5			20				medium plasticity; 60% clay; 40% sand; brown-gray
13.6	8		SR-1-20					mottling; roots; moderate chemical odor.
				21				
				22				
				23				
				24				
	0	S&H						
	1			25				CLAY with SILT (CL) - black (5Y 2.5/1), soft, damp,
0	4		SR-1-25					medium plasticity; 10-20% silt; trace organics; roots;
				26				burrows; no chemical odor.
				27				
								moist clay to sand interbed at 24 feet.
				28				
				29				
	4	S&H						
	4			30				stiff; saturated sandy lamina at 29.5 feet. Increased
0	6		SR-1-30					sand, mottled; no chemical odor.
				31				
				32				
				33				
				34				
	3	S&H						
	5			35				saturated at 34.5 to 35 feet; no chemical odor.
0	7		SR-1-35					
				36				
				37				Bottom of boring at 35.5 feet.
								Bottom of sample at 35.5 feet.
				38				09/20/89
				39				

Remarks:

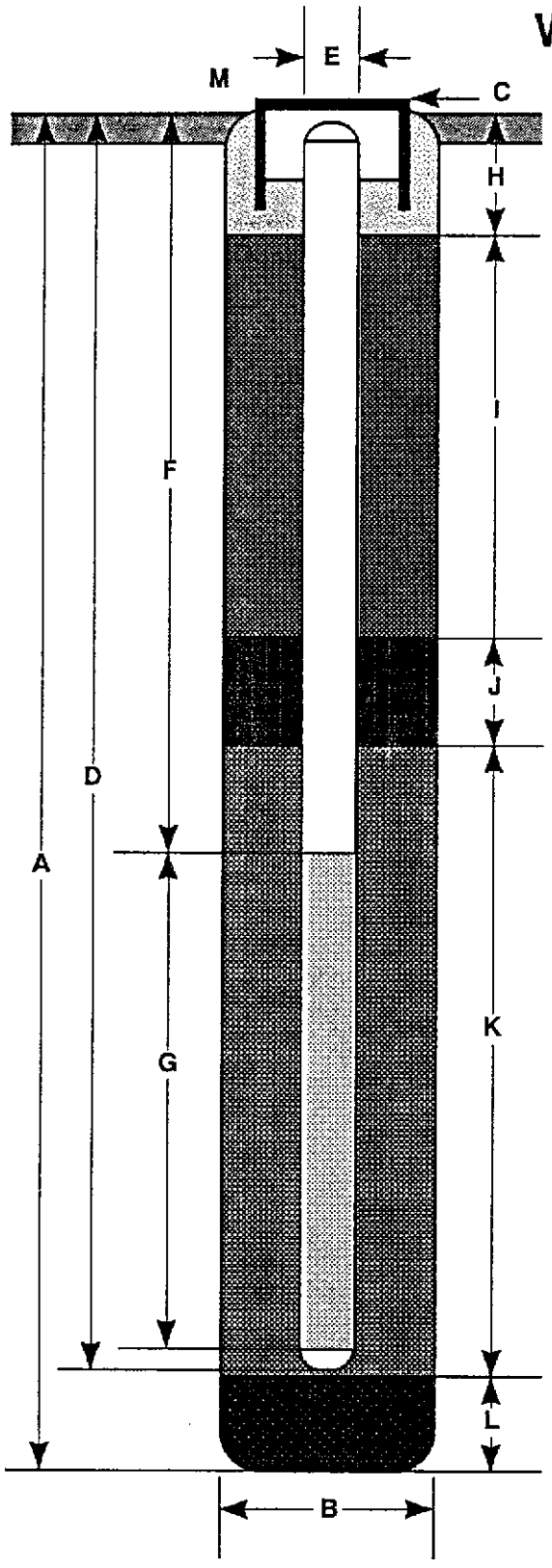
GeoStrategies Inc.

Log of Boring

BORING NO. SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	RMP CEG 1262	08/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 35.5 ft.

B Diameter of Boring 12 in.
Drilling Method Hollow-Stem Auger

C Top of Box Elevation 329.78 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 34.5 ft.
Material Schedule 40 PVC

E Casing Diameter 4 in.

F Depth to Top Perforations 10 ft.

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

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

I Backfill from 1 to 6 ft.
Backfill Material Concrete

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 35.5 ft.
Pack Material 2/12 Lonestar Sand

L Bottom Seal ft.
Seal Material

M Christy Box with locking well cap and lock

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.
SR-1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	10/89		

Field location of boring: (See Plate 2)	Project No.: 7632	Date: 09/20/89	Boring No.: SR-2
	Client: Shell Oil Company		
	Location: 3970 Hopyard Road		
	City: Pleasanton, California		Sheet 1 of 2
	Logged by: D. Ferreira	Driller: Bayland	
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 12-inches	Top of Box Elevation:	Datum:	

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
				1				PAVEMENT SECTION - 0.6 feet
				2				
				3				CLAY with GRAVEL (CL) - brown (10YR 5/4), stiff, damp, low plasticity; 15% gravel; 10% sand; no chemical odor.
				4				SANDY CLAY (CL) - dark gray (5Y 4/1), stiff, damp, low plasticity; increasing sand to 30%; no chemical odor.
	100	S&H		5				
	100	push		6				
0	100		SR-2-5	7				CLAY (CL) - very dark gray (5Y 3/1), medium stiff, damp, low plasticity; 5% fine sand; 5% silt; trace organics; trace pebbles; roots; weak chemical odor.
				8				
				9				
	150	S&H		10				
	150	push		11				
5	150		SR-2-10	12				COLOR CHANGE to dark gray (5Y 4/1); medium plasticity; no chemical odor.
				13				
				14				
	0	S&H		15				
	2			16				
12	4		SR-2-15	17				COLOR CHANGE to very dark gray (5Y 3/1), low plasticity; 10% silt; weak chemical odor.
				18				
				19		▽		

Remarks: Boring drilled with 8-inch Hollow-Stem Augers 09/20/89.
Completed 09/20/89 with 12-inch Hollow-Stem Augers.

GeoStrategies Inc.

Log of Boring

BORING NO. SR-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1/26/2	08/89		

Field location of boring:	Project No.: 7632	Date: 09/20/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		SR-2
	Location: 3970 Hopyard Road		
	City: Pleasanton, California		Sheet 2
	Logged by: D. Ferreira	Driller: Bayland	of 2

Drilling method: Hollow-Stem Auger

Hole diameter: 12-inches

Casing installation data: See Well Construction Detail

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
	3	S&H						COLOR CHANGE to dark gray (2.5Y N4/), stiff,
	4			20				saturated, low plasticity; trace very fine sand; trace silt;
81	5		SR-2-20					trace organics; weak sulfur odor.
				21				
				22				
				23				
				24				COLOR CHANGE to very dark gray (5Y 3/1), moist, low
	2	S&H						plasticity; trace very fine sand; trace silt; trace organics;
	5			25				trace wood fragments; rootholes filled with silty clay;
73	6		SR-2-25					weak sulfer odor
				26				
				27				
				28				
				29				CLAY (CH) - dark gray (5Y4/1) - stiff, moist, high
	3	S&H						plasticity; trace very fine to fine sand; trace silt; trace
	6			30				organics; oxidation filling rootholes; moderate sulfur
45	9		SR-2-30					odor.
				31				
				32				
				33				
				34				
	6	S&H						moderate to high plasticity.
	6			35				
4	9		SR-2-35					Bottom of boring at 35.5 feet.
				36				Bottom of sample at 35.5 feet.
								09/20/89
				37				
				38				
				39				

Remarks:

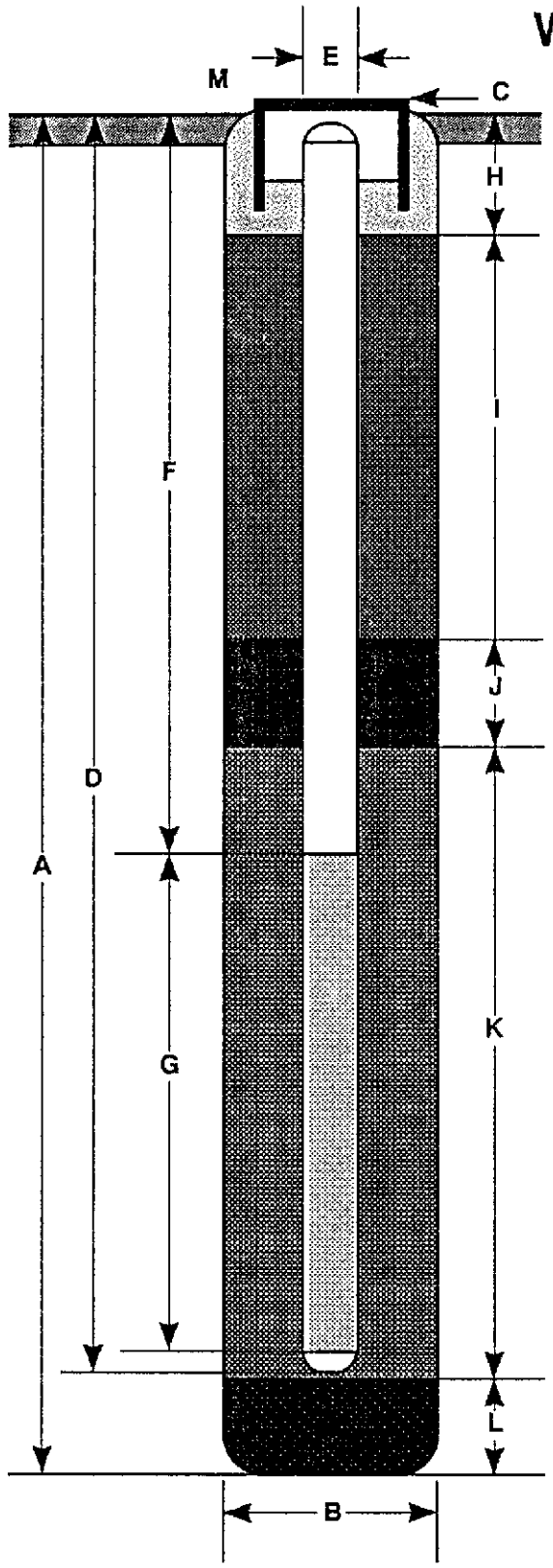
GeoStrategies Inc.

Log of Boring

BORING NO. SR-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 12/62	09/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 35.5 ft.

B Diameter of Boring 12 in.
Drilling Method Hollow-Stem Auger

C Top of Box Elevation 328.35 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 34.5 ft.
Material Schedule 40 PVC

E Casing Diameter 4 in.

F Depth to Top Perforations 10 ft.

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

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

I Backfill from 1 to 6 ft.
Backfill Material Concrete

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 35.5 ft.
Pack Material 2/12 Lonestar Sand

L Bottom Seal ft.
Seal Material

M Christy Box with locking well cap and lock

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.
SR-2

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	10/89		

Field location of boring:	Project No.: 7632	Date: 09/19/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		SR-3
	Location: 3970 Hopyard Road		
	City: Pleasanton, California		Sheet 1
	Logged by: D. Ferreira	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 12-inches	Top of Box Elevation:	Datum:	

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
				0				
								PAVEMENT SECTION - 0.8 feet
				1				
								FILL - Clay (CL) - very dark gray (2.5Y N3/), stiff, damp,
				2				medium to high plasticity; no chemical odor.
				3				10% gravel; cobbles at 2 feet; trace sand; oxidation
								stains at 2.5 feet in rootholes.
				4				
	150	S&H						
	250	push		5				FILL - Gravel (GP) - dark gray (2.5Y N4/), medium dense,
50	150		SR-3-10					saturated (perched zone); asphalt fragments; asphalt
				6				odor.
				7				
				8				
				9				
	100	S&H						CLAY (CL) - very dark gray (5Y 3/1), medium stiff, damp,
	100	push		10				medium plasticity; trace silt; weak chemical odor.
50	150		SR-3-10					
				11				
				12				
				13				
				14				
	2	S&H						CLAY (CL-CH) - black (2.5Y N2/), stiff, moist, medium to
	3			15				high plasticity; trace silt; slightly mottled; rootholes;
220	6		SR-3-15					moderate H_2S odor.
				16				
				17				
				18				
				19		▽		

Remarks: Boring drilled 09/19/89 with 8-inch Hollow-Stem Augers.
Completed on 09/19/89 with 12-inch Hollow-Stem Augers.

GeoStrategies Inc.

Log of Boring

BORING NO.

SR-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	08/89		

Field location of boring:	Project No.: 7632	Date: 09/19/89	Boring No:
(See Plate 2)	Client: Shell Oil Company		SR-3
	Location: 3970 Hopyard Road		
	City: Pleasanton, California		Sheet 2
	Logged by: D. Ferreira	Driller: Bayland	of 2
Drilling method: Hollow-Stem Auger	Casing installation data: See Well Construction Detail		
Hole diameter: 12-inches	Top of Box Elevation:	Datum:	

	Water Level			
	Time			
	Date			

PID (ppm)	Blows/ft. or Pressure (psi)	Type of Sample	Sample Number	Depth (ft.)	Sample	Well Detail	Soil Group Symbol (USCS)	Description
	0	S&H		20				COLOR CHANGE to dark gray (5Y 4/1), medium stiff,
	2							saturated; trace fossils; trace calcium nodules; no
235	5		SR3-20					chemical odor.
				21				
				22				
				23				
				24				
	6	S&H		25				stiff, moist, medium plasticity; trace silt; trace organics;
	5							weak H_2S odor.
284	7		SR3-25	26				
				27				
				28				
				29				
	3	S&H		30				COLOR CHANGE to gray (10YR 5/1), damp, medium to
	6							high plasticity, saturated rootholes; small mollusk fossils;
115	6		SR3-30	31				red oxidation at 30 feet; no chemical odor.
				32				
				33				
				34				
	4	S&H						
	5			35				CLAY (CH) - dark gray (10YR 4/1), stiff, moist, high
135	7		SR-3-35					plasticity; saturated rootholes; 10% organic matter; trace
				36				sand; trace silt; trace cobbles; no chemical odor.
				37				Bottom of sample at 35.5 feet.
								Bottom of boring at 35.5 feet.
				38				09/19/89
				39				

Remarks:

GeoStrategies Inc.

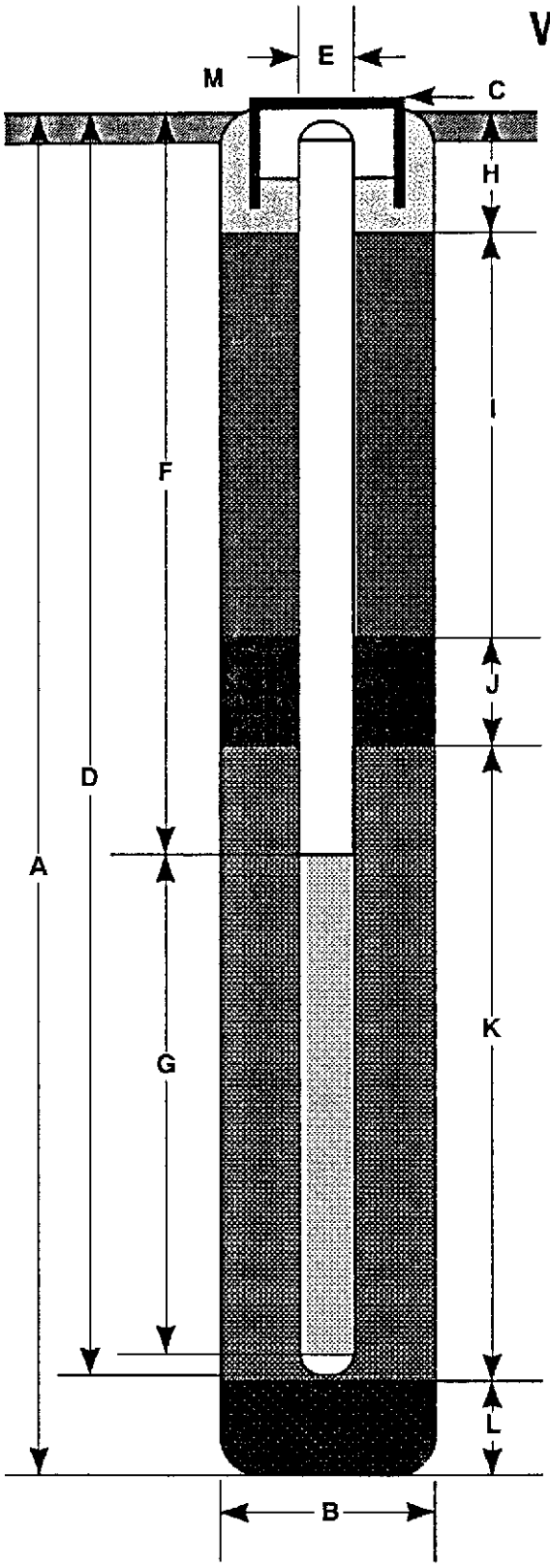
Log of Boring

BORING NO.

SR-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CEG 1262	9/89		

WELL CONSTRUCTION DETAIL



A Total Depth of Boring 35.5 ft.

B Diameter of Boring 12 in.
Drilling Method Hollow-Stem Auger

C Top of Box Elevation 329.11 ft.
[X] Referenced to Mean Sea Level
[ ] Referenced to Project Datum

D Casing Length 34.5 ft.
Material Schedule 40 PVC

E Casing Diameter 4 in.

F Depth to Top Perforations 10 ft.

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

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

I Backfill from 1 to 6 ft.
Backfill Material Concrete

J Seal from 6 to 8 ft.
Seal Material Bentonite Pellets

K Gravel Pack from 8 to 35.5 ft.
Pack Material 2/12 Lonestar Sand

L Bottom Seal ft.
Seal Material

M Christy Box with locking well cap and lock

Note: Depths measured from initial ground surface.

GeoStrategies Inc.

Well Construction Detail

WELL NO.
SR-3

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE	REVISED DATE
7632	CWP CEG 1262	10/89		