

Shell Oil Company



P.O. Box 4023
Concord, CA 94520

Telephone: (415) 676-1414

7/19/89

July 14, 1989

Mr. Tom Callaghan
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson St., Rm. 6040
Oakland, California 94607

SUBJECT: SHELL SERVICE STATION
1800 POWELL STREET
EMERYVILLE, CALIFORNIA

Dear Mr. Callaghan:

Enclosed is a copy of the report issued by GeoStrategies Inc., dated July 13, 1989, documenting the quarterly groundwater sampling and site activities conducted between April 1989 through June 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,

A handwritten signature in cursive script that reads "Diane M. Lundquist".

Diane M. Lundquist
Environmental Engineer

DML/jw

enclosure

cc: Mr. Rafat Shahid, Alameda County Environmental Health
Mr. John Werfal, Gettler-Ryan Inc.



GeoStrategies Inc.

QUARTERLY GROUND-WATER SAMPLING REPORT

APRIL - JUNE 1989

Shell Service Station
1800 Powell Street
Emeryville, California

Report No. 7605-2

July 13, 1989



GeoStrategies Inc.

2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545

(415) 352-4800

July 13, 1989

RECEIVED

JUL 14 1989

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

GETTLER-RYAN INC.
GENERAL CONTRACTORS

Attn: Mr. John Werfal

Re: QUARTERLY MONITORING REPORT
Shell Service Station
1800 Powell Street
Emeryville, California

Gentlemen:

This quarterly monitoring report has been prepared for the above referenced site, for the April through June, 1989 quarter.

If you have any questions, please call.

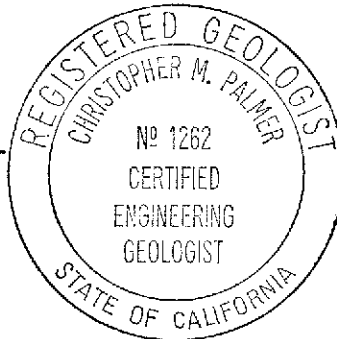
GeoStrategies Inc. by,

A handwritten signature in cursive script that reads "Stephen J. Carter".

Stephen J. Carter
Staff Geologist

A handwritten signature in cursive script that reads "Christopher M. Palmer".

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



SJC/CMP/kj

Report No. 7605-2

GeoStrategies Inc.

1.0 INTRODUCTION

This Quarterly Ground-Water Sampling Report has been prepared for the Shell Service Station located at 1800 Powell Street in Emeryville, California (Plate 1).

This report describes the results of the second quarterly ground-water sampling for 1989 performed by Gettler-Ryan Inc. (G-R), in accordance with the current quarterly monitoring plan for the site. Field work and laboratory analysis methods were performed in compliance with current State of California Water Resources Control Board (SWRCB) procedures for conducting environmental investigations related to leaking underground fuel tanks. The field and chemical analytical data discussed in this report were collected between April 1, and June 30, 1989.

2.0 SITE HISTORY

Prior to 1982, five ground-water monitoring wells were installed (Wells S-1 through S-5) to assess the impact of reported product loss (Plate 1). These wells were installed to evaluate soil and shallow ground-water quality conditions at the site. Separate-phase petroleum hydrocarbons (floating product) was observed in the initial six monitoring wells ranging from a film up to 0.2 feet in measured thickness.

Between September 1982, and August 1983, five additional monitoring wells (Wells S-6 through S-11) were installed to further assess the extent of petroleum hydrocarbon migration away from the underground tank complex beneath the site. The location of the additional five wells are shown on Plate 1. Wells S-1 through S-4, and S-11 were installed along the periphery of the new tanks as backfill wells.

In October 1987, the existing monitoring network outside of the tank area (Wells S-5 through S-10) was sampled for Total Petroleum Hydrocarbons (TPH); and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX). TPH concentrations ranged from 0.05 to 700 parts per million (ppm). Benzene concentrations ranged from 0.0011 to 37.0 ppm. Well S-9 contained separate-phase petroleum hydrocarbons (1.21 to 1.51 feet in measured thickness).

In October 1988, G-R began quarterly sampling at the site, at the request of Shell Oil Company. The first quarter sampling data for 1989, (January through March) identified floating product sheens in Wells S-5 and S-6, and 1.3 feet of floating product in Well S-9. TPH concentrations ranged from 0.05 to 6.5 ppm. Benzene concentrations ranged from 0.0009 to 0.7400 ppm.

3.0 GROUND-WATER LEVEL MONITORING

3.1 Potentiometric Data

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

Ground-water elevation data for this quarter have been plotted and contoured and are presented on Plate 2. Water-level data used to prepare the quarterly potentiometric map were taken from data collected on the same day that ground-water sampling occurred. Water-level measurements for this quarter are presented in G-R Groundwater Sampling Report in Appendix B of this report.

3.2 Floating-Product Measurements

Separate-phase petroleum hydrocarbons (floating product) were measured in each well using a calibrated portable oil-water interface probe. Floating-product thicknesses were measured and recorded to the nearest ± 0.01 foot. Floating product was detected in Well S-9 only (1.25 feet in measured thickness) during this quarter. Floating product data is presented in Table 1.

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected from site monitoring wells on April 28, 1989. The ground-water samples were analyzed for Total Petroleum Hydrocarbons (TPH) according to EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) according to EPA Method 8020. The State-Certified analytical laboratory that performed gas chromatography analysis on the ground-water samples was International Technology Corporation (IT), of San Jose, California.

TABLE 1

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-5	28-Apr-89	09-May-89	4.3	0.75	0.01	0.02	ND	11.76	2.50	----	9.26
S-6	28-Apr-89	08-May-89	6.5	2.4	0.03	0.05	0.21	12.65	2.65	----	10.00
S-7	28-Apr-89	08-May-89	ND	0.0010	ND	ND	ND	12.83	2.62	----	10.21
S-8	28-Apr-89	09-May-89	2.7	1.5	0.02	0.01	0.04	12.79	2.50	----	10.29
S-9	28-Apr-89	----	----	----	----	----	----	12.78	1.32	1.25	11.46
S-10	28-Apr-89	09-May-89	13.	1.3	0.5	0.6	3.7	12.62	6.08	----	6.54
SD-7	28-Apr-89	08-May-89	ND	0.0011	ND	ND	ND	----	----	----	----
SF-6	28-Apr-89	08-May-89	ND	ND	ND	ND	ND	----	----	----	----
TB	28-Apr-89	08-May-89	ND	ND	ND	ND	ND	----	----	----	----

TPH = Total Petroleum Hydrocarbons as Gasoline
 PPM = parts per million SF = Field Blank
 ND = None Detected TB = Trip Blank
 SD = Duplicate sample

CURRENT DEPARTMENT OF HEALTH SERVICES ACTION LEVELS

Benzene 0.0007 ppm
 Toluene 0.100 ppm
 Xylenes 0.620 ppm
 Ethylbenzene 0.68 ppm

Note: 1. For chemical parameter detection limits, refer to I.T. laboratory reports in Appendix B
 2. Well elevations referenced to mean sea level (MSL)
 3. Well S-9 contained floating product therefore, this well was not sampled

4.0 CHEMICAL ANALYTICAL DATA (continued)

A total of five wells at the site were found to contain aromatic fractions of petroleum hydrocarbon products above established action levels set by the State of California Department of Health Services (DHS). As shown on Table 1, benzene concentrations were identified in ground-water samples above DHS action levels in every well sampled this quarter. Furthermore, it appears that benzene has migrated west of Well S-5 at concentrations that exceed present action levels. Detected concentrations of ethylbenzene were below DHS action levels in all wells sampled this quarter. Toluene and Xylenes were identified above DHS action levels in Well S-10 only.

4.1 Quality Control

Quality Control (QC) samples for this quarter ground-water sampling included a trip blank, field blank, and a duplicate sample. The trip blank was prepared in the IT Laboratory using organic-free water to evaluate laboratory handling and analytical procedures. The field blank was poured in the field using laboratory prepared organic-free water to assess sampling procedures. A duplicate sample was collected as a split (second sample) to quantitatively assess laboratory procedures and analytical results. The IT Laboratory chemical analytical reports for this quarter ground-water sampling are presented in Appendix B. G-R Ground-Water Sampling Forms and Chain-of-Custody Forms are included in the Ground-Water Sampling Report presented in Appendix B. G-R Sampling Protocol are presented in Appendix A.

Water-quality data for this quarterly report are summarized in Table 1. TPH and benzene chemical analytical data were used to prepare a concentration map for this quarter (Refer to Plate 3).

GeoStrategies Inc.

5.0 SUMMARY

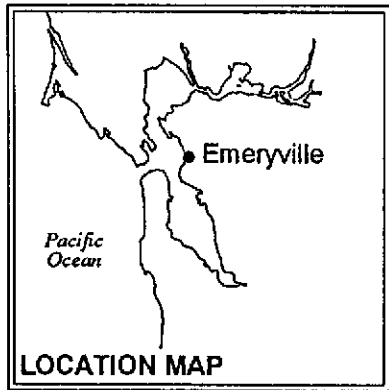
A summary of activities and findings associated with this quarterly report are presented below:

- o Water levels were measured in selected monitoring wells (Table 1). A potentiometric map was constructed from static water-level data.
- o Floating product was found in Well S-9 (1.25 feet in measured thickness).
- o TPH was detected in all wells sampled this quarter (Table 1). Detected TPH concentrations ranged from 2.7 to 13 ppm.
- o Benzene concentrations exceed the DHS action level for all ground-water samples analyzed this quarter.
- o Chemical analytical results for this quarter indicate that the present ground-water monitoring network at the site is not adequate for petroleum hydrocarbon plume definition. Additional monitoring wells will be required to evaluate the lateral and vertical extent of petroleum hydrocarbon migration from the site. Future scopes of work will be proposed in a separate document and implemented under a site-specific work plan.

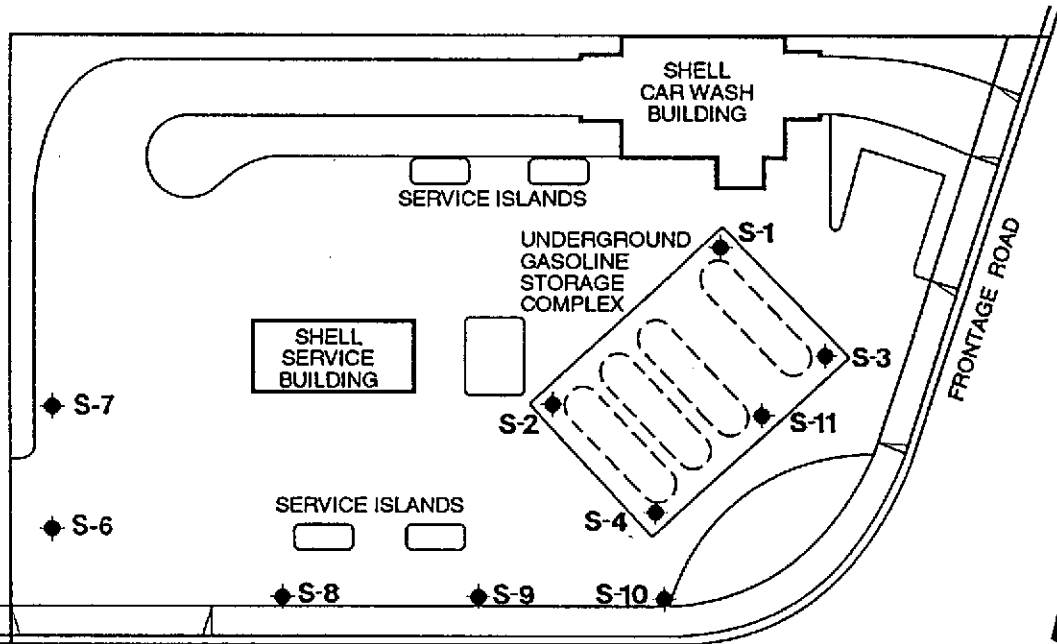
6.0 PLANNED SITE ACTIVITIES

The following activities are planned for the third quarter July to September 1989 at the site:

- o All scheduled wells will be sampled and analyzed for Total Petroleum Hydrocarbons (TPH) according to EPA Method 8015 (Modified); and Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) according to EPA Method 8020.
- o Water-levels will be measured monthly and selected data will be used to prepare a potentiometric map across the site. The local ground-water gradient will be calculated.
- o Chemical data will be used to construct Concentration maps for TPH and Benzene.
- o Prepare a site specific work plan and implement.

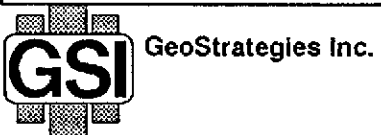
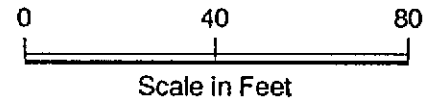


PARKING



EXPLANATION

◆ S-1 Groundwater monitoring well location



Site Plan
Shell Service Station
1800 Powell Street
Emeryville, California

PLATE

1

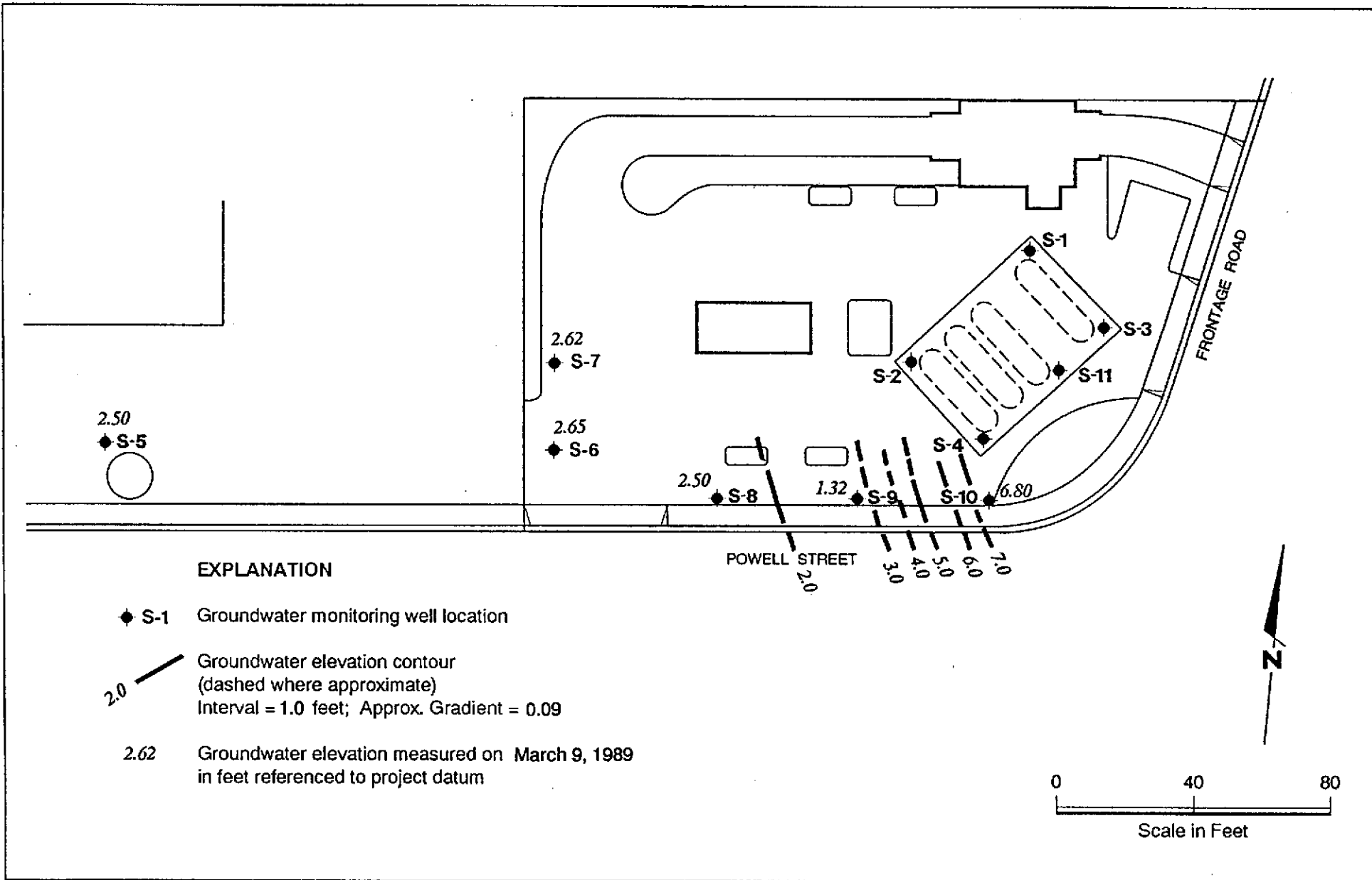
JOB NUMBER
7605

REVIEWED BY RG/CEG
OMP CEG 1262

DATE
7/89

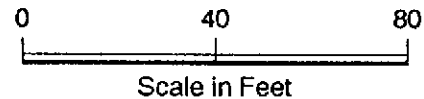
REVISED DATE

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EXPLANATION

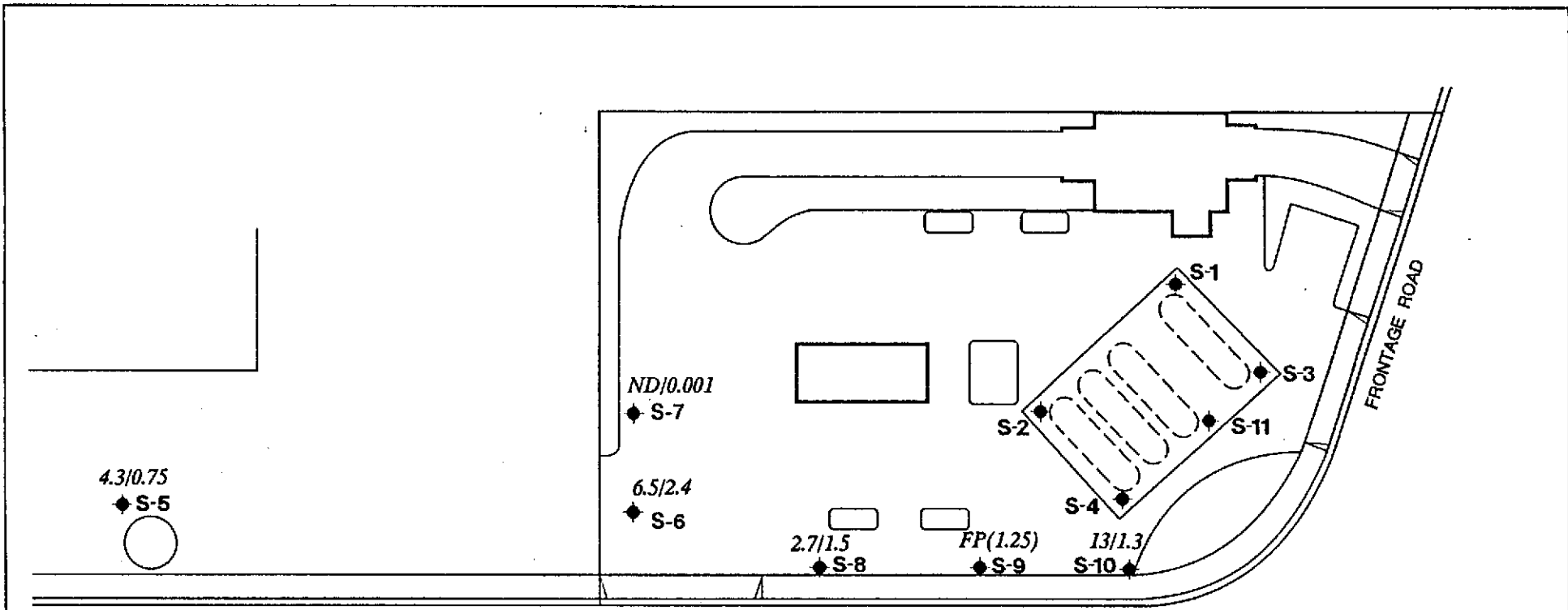
- ◆ S-1 Groundwater monitoring well location
- 2.0 — Groundwater elevation contour (dashed where approximate)
Interval = 1.0 feet; Approx. Gradient = 0.09
- 2.62 Groundwater elevation measured on March 9, 1989
in feet referenced to project datum



GeoStrategies Inc.

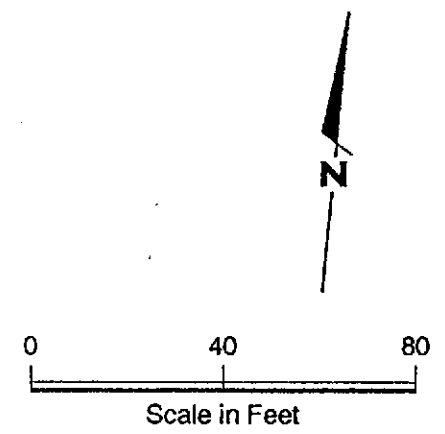
Potentiometric Map
Shell Service Station
1800 Powell Street
Emeryville, California

PLATE
2



EXPLANATION

- ◆ S-1 Groundwater monitoring well location
- 4.3/0.75 TPH (Total Petroleum Hydrocarbon)/Benzene concentrations measured on March 9, 1989 in ppm (parts per million)
- FP Floating Product (feet thick)
- ND Not Detected (see laboratory reports for detection limits)



TPH/Benzene Concentration Map
 Shell Service Station
 1800 Powell Street
 Emeryville, California

PLATE
3

GeoStrategies Inc.

APPENDIX A

METHODS AND PROCEDURES

GROUND-WATER SAMPLING AND ANALYSISQuality 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

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

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)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983

Because many of the ground-water samples collected by G-R are analyzed in 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 glove 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.

May 1, 1989

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 on a rate-specific basis.

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 I.

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. 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 an engineer's scale tape.

Water-Level Measurements (continued)

The monofilament line used to lower the bailer is replaced between wells with new line to preclude the possibility of cross-contamination. Field observations (e.g. well integrity, product color, turbidity, water color, odors, etc.) are noted on the G-R Well Sampling Field Data Sheet shown in Figure A-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 centrifugal pumping system, or (4) a Teflon or Stainless steel bailer. 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 to 5 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 70 percent of the previously measured water column has been replaced by recharge. 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 A-4. Collected field data during purging activities will be entered on the G-R Well Sampling Field Data Sheet shown in Figure A-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 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 A-3) 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.

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 _____

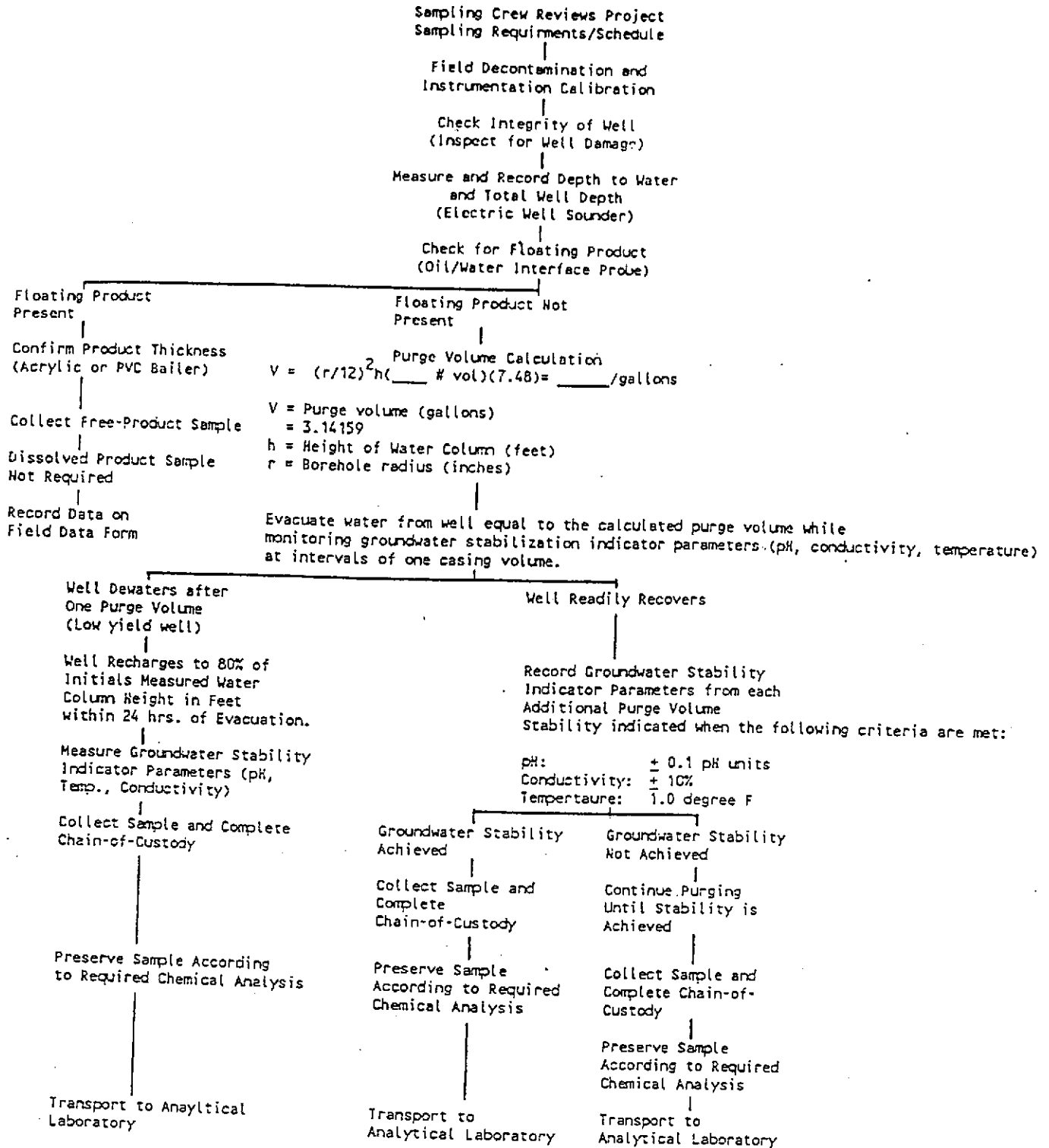
Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

FIGURE 4

Monitoring Well Sampling Protocol Schematic



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 _____

APPENDIX B

CHEMICAL ANALYTICAL REPORTS

GROUNDWATER SAMPLING REPORT

CHEMICAL ANALYTICAL REPORTS



May 22, 1989

GROUNDWATER SAMPLING REPORT

Shell Oil Company
Post Office Box 4023
Concord, California 94520

Referenced Site: Shell Service Station
1800 Powell Street
Emeryville, California

Sampling Date: April 28, 1989

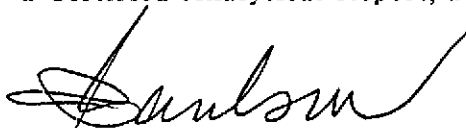
This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on April 28, 1989 at the referenced location. The site is occupied by an operating service station located on the northwest corner of Powell Street and I-80. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products and diesel.

There are currently six groundwater monitoring wells and five tank backfill wells on site at the locations shown on the attached site map. Groundwater samples were not collected from the tank backfill wells. 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 6.54 to 11.46 feet below grade. Separate phase product was observed in well S-9.

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

Samples were collected, using teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A field blank (SF-6) and a trip blank, supplied by the laboratory, were included and analyzed to assess quality control. A duplicate sample (SD-7), was submitted without a well designation to assess laboratory performance. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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

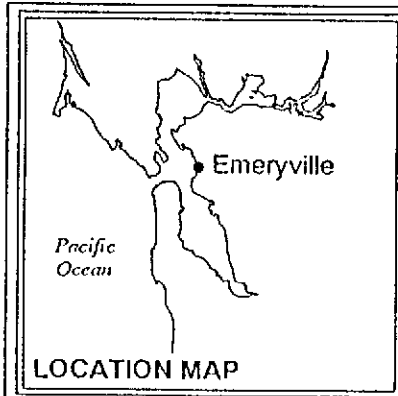
attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

<u>WELL I.D.</u>	S-5	S-6	S-7 SD-7	S-8	S-9	S-10
Casing Diameter (inches)	8	8	8	3	----	6
Total Well Depth (feet)	11.9	11.8	16.5	19.4	----	19.4
Depth to Water (feet)	9.26	10.00	10.21	10.29	11.46	6.54
Free Product (feet)	none	none	none	none	1.25	none
Reason Not Sampled	----	----	----	----	free product	----
Calculated 4 Case Vol.(gal.)	27.4	18.7	65.4	13.8	----	77.2
Did Well Dewater?	no	no	no	no	----	yes
Volume Evacuated (gal.)	34.3	24.0	82.0	19.0	----	23.1
Purging Device Sampling Device	Suction Bailer	Suction Bailer	Suction Bailer	Suction Bailer	----	Suction Bailer
Time	09:24	11:51	10:52	12:03	----	12:54
Temperature (F)*	66.4	68.4	69.1	70.1	----	67.3
pH*	6.71	6.21	6.80	6.66	----	6.21
Conductivity (umhos/cm)*	3180	1496	14020	9230	----	1200

* Indicates Stabilized Value

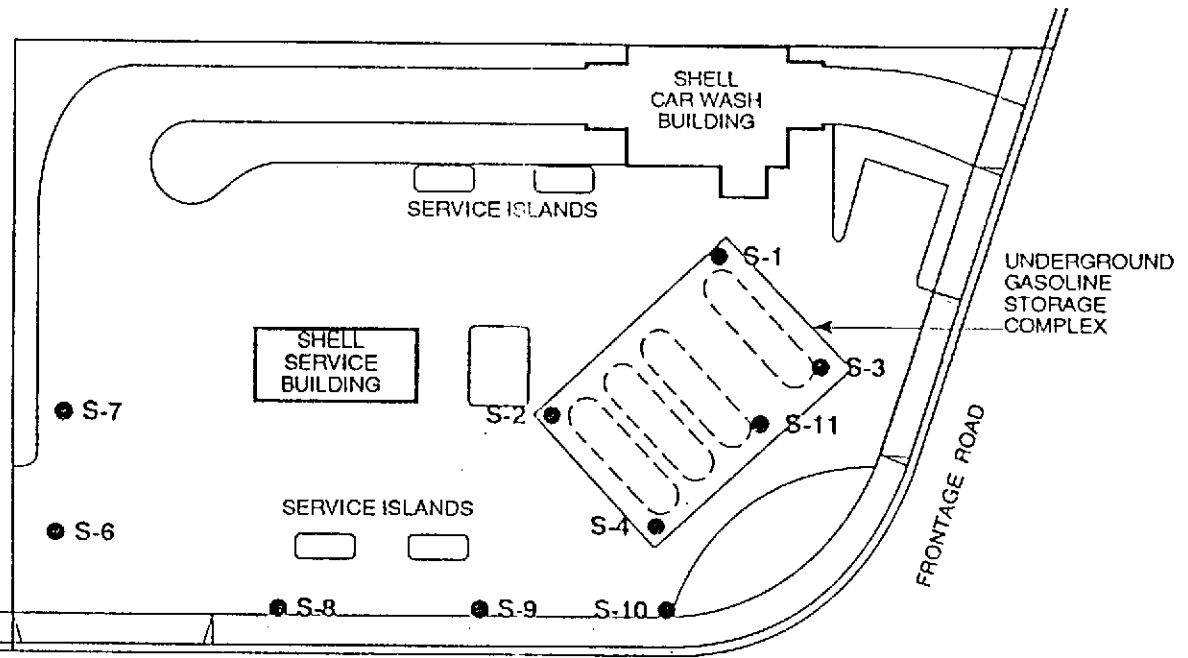
DATE	WELL	DTH	DTW	HT	BAILED	FLOWMETER	PT-LIQ.	PT-H2O	EMP	C.ELEV
	1									100.95
	2									101.19
	3									100.00
	4									100.92
	6									100.70
	7									100.88
	8									100.84
	9									100.77
	10									100.68
	11									100.31
27-Apr-89	1		8.08	0.00					CA	
25-May-89	1		8.18	0.00					BH	
22-Jun-89	1		7.83	0.00					BH	
27-Apr-89	2		8.32	0.00						
25-May-89	2		8.44	0.00						
22-Jun-89	2		8.06	0.00						
27-Apr-89	3		7.14	0.00						
25-May-89	3	7.26	(1.00)	.00						
22-Jun-89	3		6.91	0.00						
27-Apr-89	4		8.16	0.00						
25-May-89	4		8.42	0.00						
22-Jun-89	4		7.97	0.00						
27-Apr-89	5		9.51	0.00						
25-May-89	5		5.95	0.00						
22-Jun-89	5		9.51	0.00						
27-Apr-89	6		9.96	0.00						
25-May-89	6	9.77	(1.00)	.00						
22-Jun-89	6		9.87	0.00						
27-Apr-89	7		10.26	0.00						
25-May-89	7		10.51	0.00						
22-Jun-89	7		10.33	0.00						
27-Apr-89	8		10.34	0.00						
25-May-89	8		10.42	0.00						
22-Jun-89	8		10.28	0.00						
27-Apr-89	9	10.33	(1.00)	1.00						
25-May-89	9	10.40	(1.00)	0.03						
22-Jun-89	9	10.20	(1.00)	1.00						
27-Apr-89	10		6.64	0.00						
25-May-89	10		9.29	0.00						
22-Jun-89	10		8.46	0.00						
27-Apr-89	11		N/A							
25-May-89	11		N/A							
22-Jun-89	11		N/A							



HOLIDAY INN

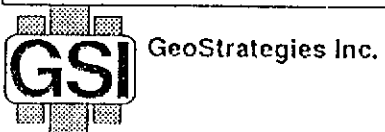
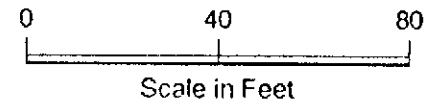
S-5
PG&E VAULT

PARKING



EXPLANATION

● S-1 Groundwater monitoring well location



Site Plan
Shell Service Station
1800 Powell Street
Emeryville, California

PLATE
1

JOB NUMBER
605

REVIEWED BY: PG/CEG
cmf

DATE
4/89

REVISED DATE

REVISED DATE

CERTIFICATE OF ANALYSIS

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

Date: May 16, 1989

Work Order Number: S9-04-300

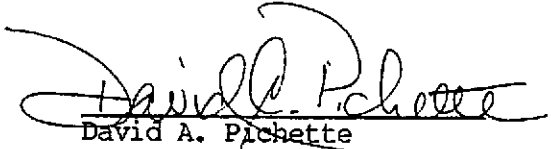
P.O. Number: 3605

This is the Certificate of Analysis for the following samples:

Client Project ID: GR #3605, Shell, 1800 Powell St.
Emeryville, CA
Date Received by Lab: 4/28/89
Number of Samples: 8
Sample Type: Water

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

Reviewed and Approved


David A. Pichette
Project Manager

DAP/an
1 Page Following - Table of Results

Page: 1 of 1
 Date: May 16, 1989
 Client Project ID: GR #3605, Shell,
 1800 Powell Street, Emeryville

IT ANALYTICAL SERVICES
 SAN JOSE, CA

Work Order Number: S9-04-300

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-04-300-01	S-5	4/28/89	5/9/89	cool pH \leq 2
S9-04-300-02	S-6	4/28/89	5/8/89	cool pH \leq 2
S9-04-300-03	S-7	4/28/89	5/8/89	cool pH \leq 2
S9-04-300-04	S-8	4/28/89	5/9/89	cool pH \leq 2
S9-04-300-05	S-10	4/28/89	5/9/89	cool pH \leq 2
S9-04-300-06	SD-7	4/28/89	5/8/89	cool pH \leq 2
S9-04-300-07	SF-6	4/28/89	5/8/89	cool pH \leq 2
S9-04-300-08	Trip Blank	4/28/89	5/8/89	cool pH \leq 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)
S9-04-300-01	S-5	4.3	0.75	0.01	0.02	ND
Detection Limit		0.5	0.005	0.01	0.01	0.03
S9-04-300-02	S-6	6.5	2.4	0.03	0.05	0.21
Detection Limit		1.0	0.01	0.02	0.02	0.06
S9-04-300-03	S-7	ND	0.0010	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-04-300-04	S-8	2.7	1.5	0.02	0.01	0.04
Detection Limit		0.5	0.02	0.01	0.01	0.03
S9-04-300-05	S-10	13.	1.3	0.5	0.6	3.7
Detection Limit		5.	0.05	0.1	0.1	0.3
S9-04-300-06	SD-7	ND	0.0011	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-04-300-07	SF-6	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-04-300-08	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

COMPANY Shell Oil Company JOB NO. 0205

JOB LOCATION 1800 Powell St / I-80, 580

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

AUTHORIZED John Werfel DATE 4/28/89 P.O. NO. 3605

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-5	3	Liquid	4-28/0924	THe(Gas) DTPA	Intact 4/28/89
S-6	3		1151		
S-7	3		1057		
S-8	1		1203		
S-10	1		1254		
SO-7	2		-		
SF-6	3	-	-	-	-
Trip Blank	2	(No date)	-	-	-

RELINQUISHED BY: Philly J. Page 4/28/89 1654 RECEIVED BY: [Signature]

RELINQUISHED BY: [Signature] RECEIVED BY: [Signature]

DESIGNATED LABORATORY: FT SCV DHS #: 137

REMARKS: Normal TAT Result due May 12, 1989

DATE COMPLETED April 28, 1989 FOREMAN Philly J. Page
Sampler [Signature]