



gettler — ryan inc.

general contractors

April 14, 1989

~~Mr. Steven R. Ritchie
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, California 94607~~

Reference: Shell Service Station
1800 Powell Street
Emeryville, California

Gentlemen:

As requested by Ms. Diane Lundquist of Shell Oil Company, Gettler-Ryan Inc. is forwarding a copy of the Quarterly Ground-Water Sampling Report issued by GeoStrategies Inc. on April 14, 1989 for the referenced location. The Quarterly Summary Reports (Shell Oil Company's CALWATER program) are also enclosed. The summary reports cover the first quarter of 1989 (January - March, 1989).

Please do not hesitate to call should you have any questions or comments.

Sincerely,

John P. Werfal
Project Manager

JPW/ns

enclosure

cc: Ms. Diane Lundquist, Shell Oil Company
Mr. Rafat Shahid, Alameda County Environmental Health



GeoStrategies Inc.

QUARTERLY GROUND-WATER SAMPLING REPORT

JANUARY - MARCH 1989

Shell Oil Company
1800 Powell Street
Emeryville, California

Report No. 7605

April 14, 1989



GeoStrategies Inc.

2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545

(415) 352-4800

April 14, 1989

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

Attn: Mr. John Werfal

Re: Quarterly Monitoring Report
Shell Service Station
1800 Powell Street
Emeryville, California

Gentlemen:

GeoStrategies Inc. has prepared this quarterly monitoring report for the above referenced site for the January through March, 1989 quarter.

If you have any questions, please call.

GeoStrategies Inc. by,

A handwritten signature in cursive script that reads "Jeffrey L. Peterson".

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

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

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

JLP/CMP/ja

Project No. 7605

GeoStrategies Inc.

GeoStrategies Inc.
Project 7605

1.0 INTRODUCTION

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

This report describes the results of the first 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 analyzed data discussed in this report were collected between January 1, and March 31, 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.

An additional five 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).

G-R began quarterly sampling at the site in October, 1988, at the request of Shell Oil Company. The fourth quarter sampling data for 1988 was reported by G-R.

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Project 7605

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 the well box and recorded to the nearest ± 0.01 foot. Plate 1 presents the location of each monitoring 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. Ground-water fluctuations are surmised to be tidally influenced in the site region. Water-level measurements for this quarter have been compiled with databased historical water-level data presented in Appendix A of this report.

3.2 Floating-Product Measurements

Separate-phase petroleum hydrocarbons (floating product) were measured in each monitoring 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 (1.3 feet in measured thickness), and sheens were observed in Wells S-5 and S-6. Floating-product measurements for the quarter are presented in the appended Groundwater Sampling Report (See Appendix C). These data have been compiled in Table 1 and have been added to the historical database presented in Appendix A.

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Project 7605

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected from the site monitoring wells on February 10, 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 Santa Clara, California. The G-R Groundwater Sampling Report for the first quarter sampling round performed in 1989 is presented in Appendix C.

Several 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 beyond 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

A trip blank was submitted to the analytical laboratory as a Quality Control (QC) sample for this quarter ground-water sampling. The trip blank was prepared in the IT Laboratory using organic-free water to evaluate laboratory handling and analytical 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 Groundwater Sampling Report presented in Appendix C. G-R Sampling Protocol are presented in Appendix D.

Water-quality data for this quarterly report are summarized in Table 1. TPH and benzene chemical analytical data were used to prepare Isoconcentration maps for this quarter (Refer to Plates 3 and 4).

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Project 7605

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 (1.3 feet in measured thickness). Petroleum hydrocarbon sheens were observed in Wells S-5 and S-6.
- o TPH was detected in all wells sampled this quarter (Table 1). TPH concentrations ranged from 0.05 to 6.50 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 extent of petroleum aromatic fraction (BTEX) migration from the site. Future scopes of work will be proposed in a separate document and implemented under the site-specific work plan.

6.0 PLANNED SITE ACTIVITIES

The following activities are planned for the second quarter, April to July 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 Isoconcentration maps for TPH and Benzene.

TABLE 1

GROUND-WATER ANALYSES DATA

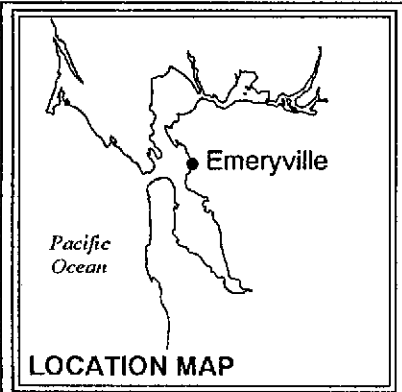
WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPM)	BENZENE (PPM)	ETHYLBENZENE (PPM)	TOLUENE (PPM)	XYLENES (PPM)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
S-5	10-Feb-89	22-Feb-89	2.90	0.5500	0.020	0.020	0.030	----	----	----	9.80
S-6	10-Feb-89	22-Feb-89	2.80	0.7400	0.020	0.020	0.140	12.65	3.01	----	9.64
S-7	10-Feb-89	22-Feb-89	0.05	0.0009	<0.001	<0.001	<0.003	12.83	2.01	----	10.82
S-8	10-Feb-89	22-Feb-89	0.50	0.1600	<0.002	0.005	0.017	12.79	1.99	----	10.80
S-9	10-Feb-89	22-Feb-89	----	----	----	----	----	12.78	3.63	1.30	9.15
S-10	10-Feb-89	22-Feb-89	6.50	0.4800	0.100	0.700	1.800	12.62	4.79	----	7.83
SD-5	10-Feb-89	22-Feb-89	3.20	0.5700	0.020	0.020	0.030	----	----	----	9.80

TPH = Total Petroleum Hydrocarbons as Gasoline
 PPM = parts per million
 NA = Not Analyzed
 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

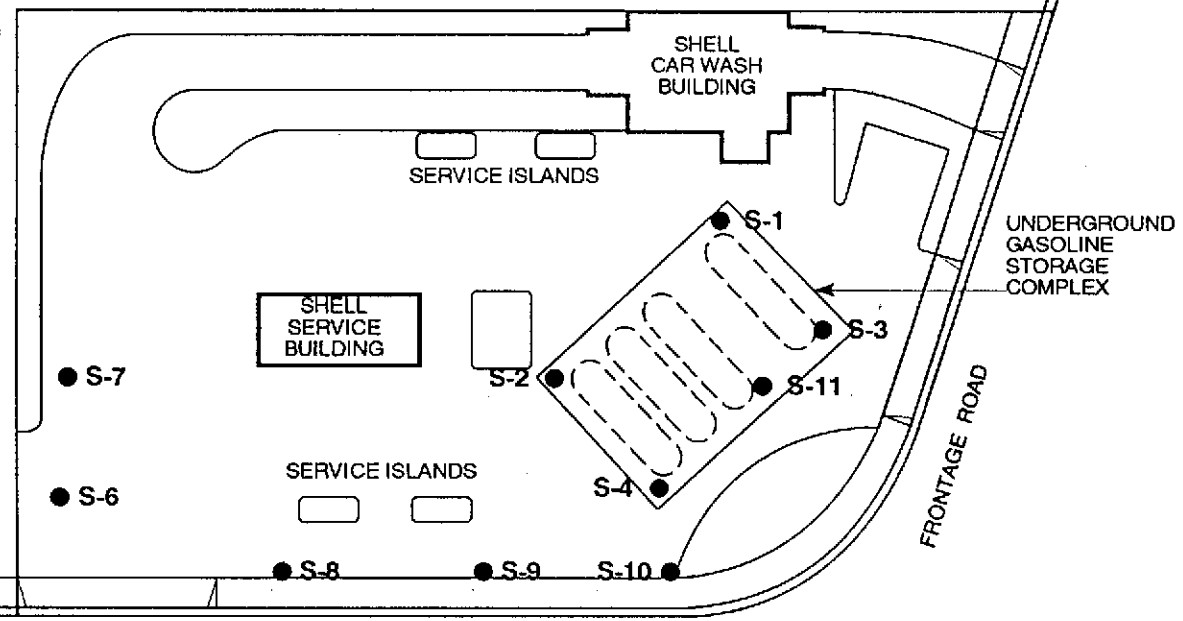
Note: 1. For chemical parameter detection limits, refer to I.T. laboratory reports in Appendix B
 2. Well elevations referenced to mean sea level (MSL)
 3. Well S-9 contained floating product therefore, this well was not sampled



HOLIDAY INN

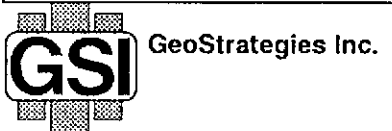
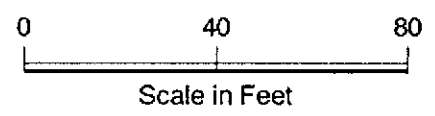
S-5
PG&E VAULT

PARKING



EXPLANATION

● S-1 Groundwater monitoring well location



Site Plan
Shell Service Station
1800 Powell Street
Emeryville, California

PLATE

1

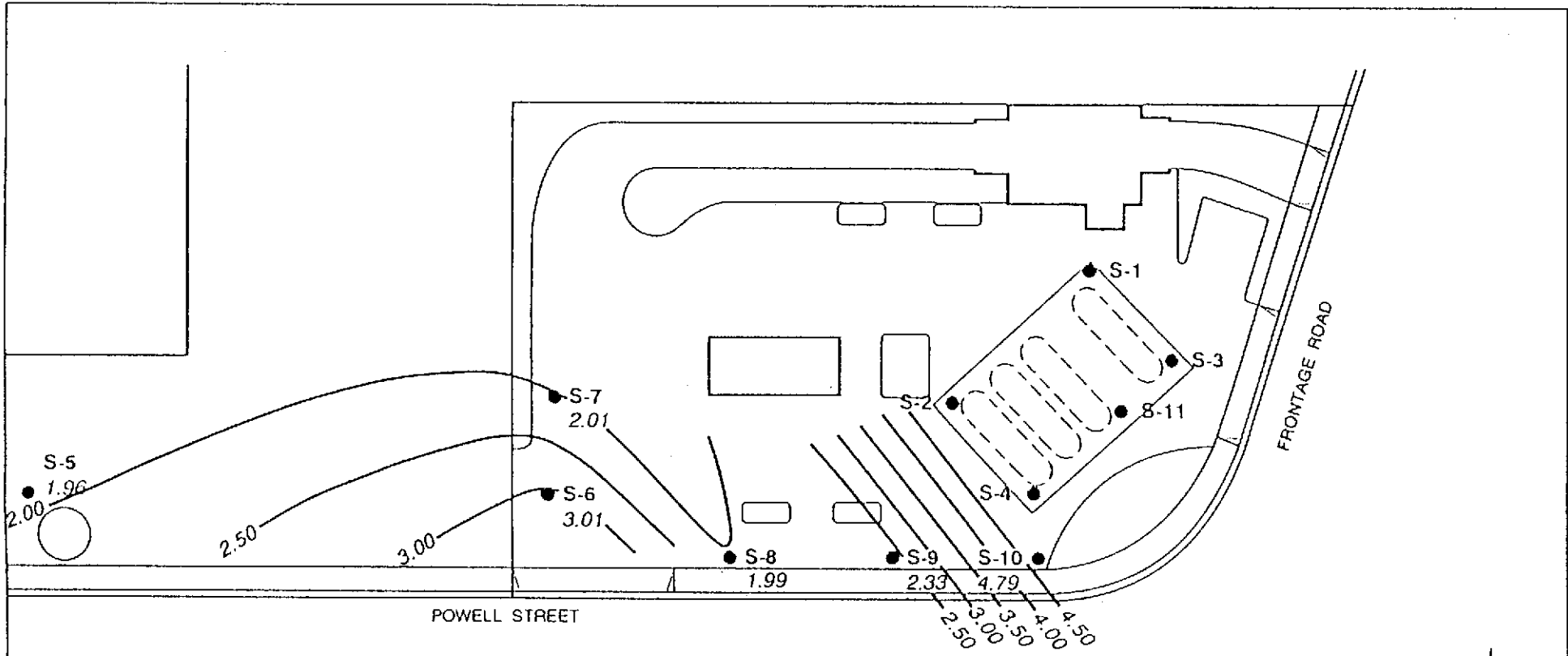
JOB NUMBER
7605

REVIEWED BY:RG/CEG
RG

DATE
4/89

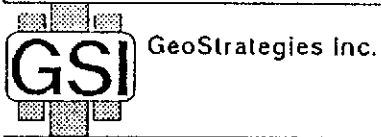
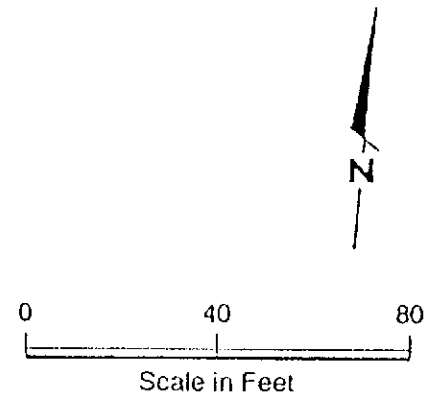
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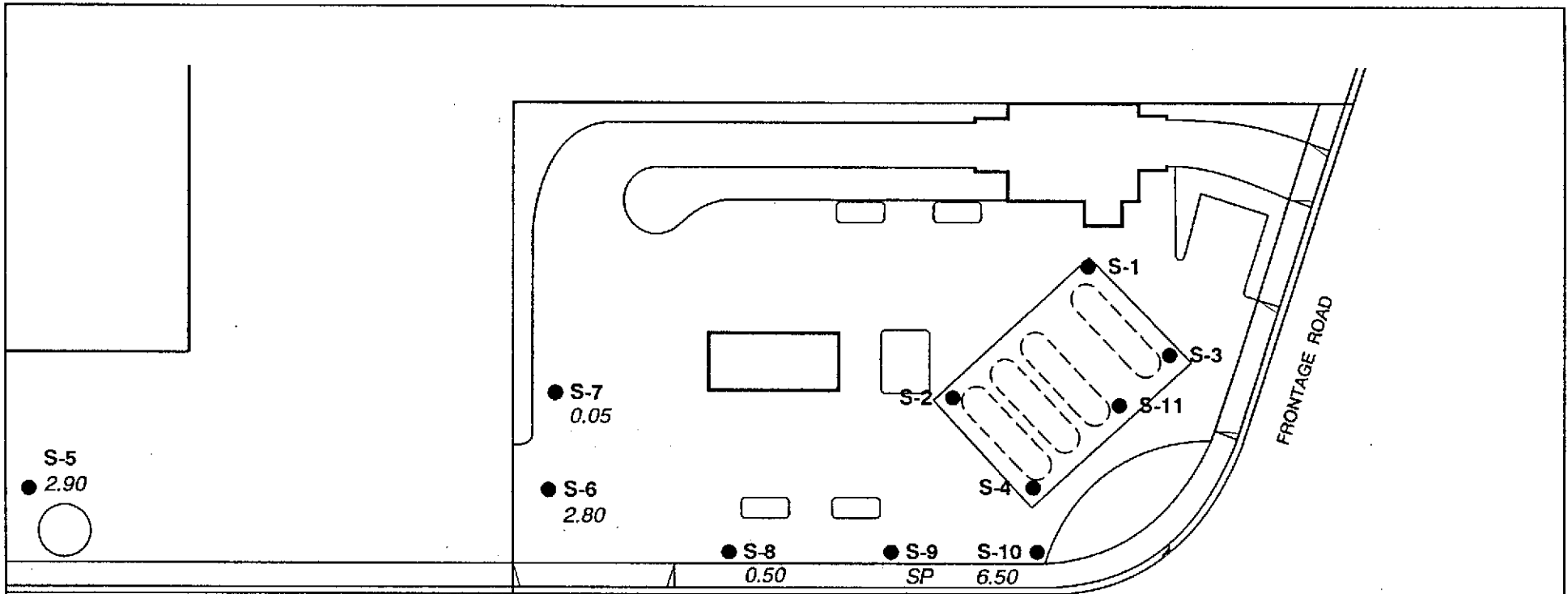
EXPLANATION

- S-1 Groundwater monitoring well location
- 3.00 Groundwater elevation contour
Interval = 0.50 feet; Gradient not calculated
- 3.01 Groundwater elevation measured on 2/10/89
in feet referenced to Mean Sea Level (MSL)



Potentiometric Map
Shell Service Station
1800 Powell Street
Emeryville, California

PLATE
2

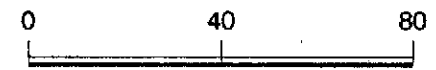


POWELL STREET

FRONTAGE ROAD

EXPLANATION

- S-1 Groundwater monitoring well location
- 2.80 TPH (Total Petroleum Hydrocarbon) concentration measured on 2/10/89 in ppm (parts per million)
- SP Separate Phase gasoline



Scale in Feet



GeoStrategies Inc.

TPH Isoconcentration Map
 Shell Service Station
 1800 Powell Street
 Emeryville, California

PLATE

3

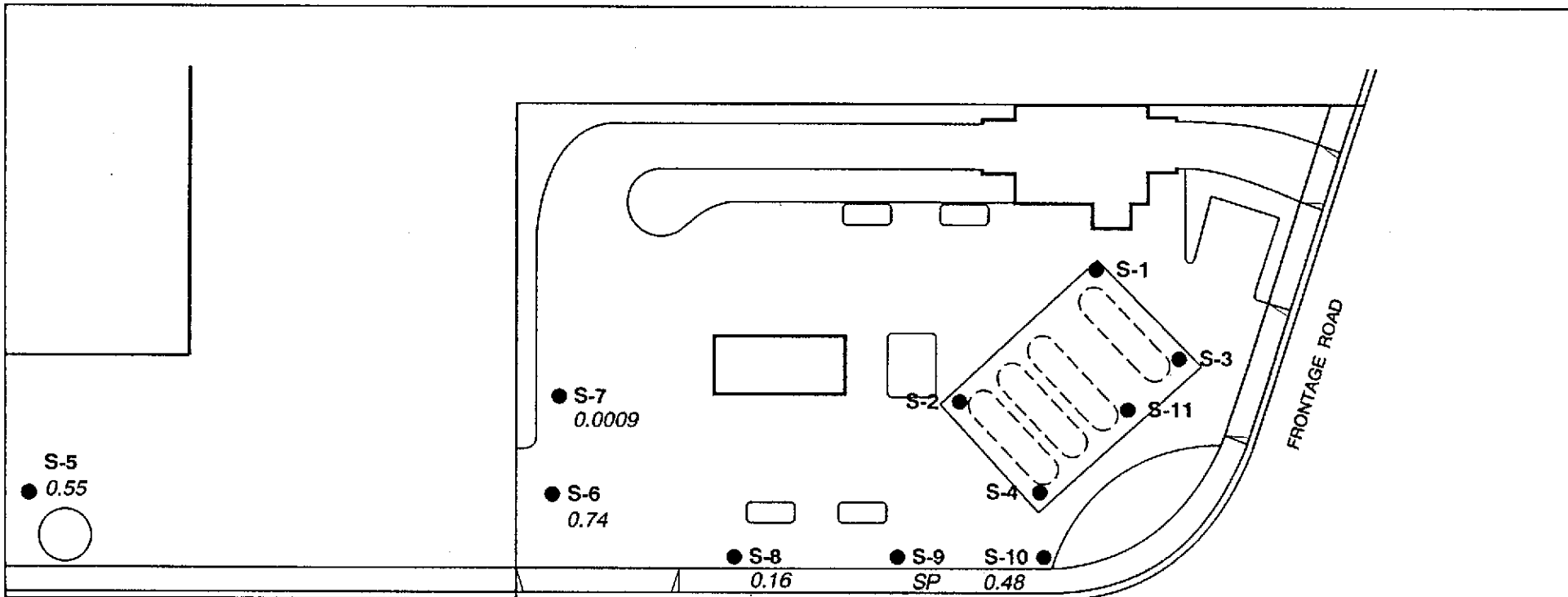
JOB NUMBER
7605

REVIEWED BY RG/CEG
CMP

DATE
4/89

REVISED DATE

REVISED DATE

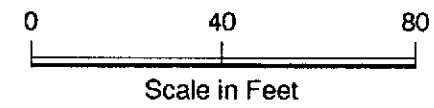


POWELL STREET

FRONTAGE ROAD

EXPLANATION

- S-1 Groundwater monitoring well location
- 0.74 Benzene concentration measured on 2/10/89 in ppm (parts per million)
- SP Separate Phase gasoline



APPENDIX A

HISTORICAL DATABASE

A-1: Chemical Analytical Data

A-2: Well Monitoring Data



Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

ATTN: John Werfal

RECEIVED

MAR 14 1989

GETTLER-RYAN INC.
March 4, 1989

Following are the results of analyses on the samples described below.

Project: GR #3605, 1800 Powell St and I-580/B0, Emeryville
Lab Numbers: S9-02-152-01 thru S9-02-152-07
Number of Samples: 7
Sample Type: Water
Date Received: 2/13/89
Analyses Requested: Low Boiling Hydrocarbons

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.

ITAS/San Jose Lab Number	Client Sample Identification	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-02-152-01	S-5	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-02	S-6	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-03	S-7	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-04	S-8	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-05	S-10	2/11/89	2/23/89	Cool, pH \leq 2
S9-02-152-06	SD-5	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-07	Trip Blank	2/10/89	2/21/89	Cool, pH \leq 2


Fred Rouse

FR/mlh
1 Page Following - Table of Results

ITAS/San Jose to Gettler-Ryan
ATTN: John Werfal

March 4, 1989
Page 1 of 1

Project: GR #3605, 1800 Powell St and I-580/80,
Emeryville

ND = None Detected

Summary of Results - Milligrams per Liter

Lab Number	Sample Identification	Low Boiling Hydrocarbons (calculated as gasoline)				
		Benzene	Toluene	Ethyl Benzene	Xylenes	
S9-02-152-01	S-5	2.9	0.55	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-02	S-6	2.8	0.74	0.02	0.02	0.14
Detection Limits		1.0	0.01	0.02	0.02	0.06
S9-02-152-03	S-7	0.05	0.0009	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003
S9-02-152-04	S-8	0.5	0.16	0.005	ND	0.017
Detection Limits		0.1	0.001	0.002	0.002	0.008
S9-02-152-05	S-10	6.5	0.48	0.7	0.1	1.8
Detection Limits		5.0	0.05	0.1	0.1	0.3
S9-02-152-06	SD-5	3.2	0.57	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-07	Trip Blank	ND	ND	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003

=====
 ANALYTICAL LOG

DATE	SAMPLE POINT	TVHC (PPM)	BENZENE (PPM)	TOLUENE (PPM)	E.B. (PPM)	XYLENES (PPM)
DETECTION LIMITS		0.05	0.0005	0.001	0.001	0.003
27-Oct-88	S-5	3.00	0.6600	0.020	0.020	0.070
13-Feb-89	S-5	2.90	0.5500	0.020	0.020	0.030
27-Oct-88	S-6	6.00	1.7000	0.050	0.080	0.420
13-Feb-89	S-6	2.80	0.7400	0.020	0.020	0.140
27-Oct-88	S-7	0.05	0.0011	<0.001	<0.001	0.004
13-Feb-89	S-7	0.05	0.0009	<0.001	<0.001	<0.003
27-Oct-88	S-8	1.00	0.6100	0.009	0.001	0.042
13-Feb-89	S-8	0.50	0.1600	0.005	<0.002	0.017
27-Oct-88	S-10	700.00	37.0000	100.000	20.000	110.000
13-Feb-89	S-10	6.50	0.4800	0.700	0.100	1.800
13-Feb-89	SD-5	3.20	0.5700	0.020	0.020	0.030



DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	X	WT-G	NC	C. ELEV
					0.00	0.0	0.00	0.00				
12-Jan-88	1		8.23	0.00	8.23	0.0	8.23	92.72	X			100.95
26-Jan-88	1		8.17	0.00	8.17	0.0	8.17	92.78	X			100.95
09-Feb-88	1	7.80	(1.00)	.00	7.80	.0	7.80	93.15	X			100.95
23-Feb-88	1		7.77	0.00	7.77	0.0	7.77	93.18	X			100.95
08-Mar-88	1		7.76	0.00	7.76	0.0	7.76	93.19	X			100.95
22-Mar-88	1		7.78	0.00	7.78	0.0	7.78	93.17	X			100.95
05-Apr-88	1	7.86	(1.00)	.00	7.86	.0	7.86	93.09	X			100.95
19-Apr-88	1		8.13	0.00	8.13	0.0	8.13	92.82	X			100.95
03-May-88	1		7.75	0.00	7.75	0.0	7.75	93.20	X			100.95
17-May-88	1	6.28	(1.00)	.00	6.28	.0	6.28	94.67	X			100.95
31-May-88	1	5.53	(1.00)	.00	5.53	.0	5.53	95.42	X			100.95
14-Jun-88	1		4.44	0.00	4.44	0.0	4.44	96.51	X			100.95
28-Jun-88	1		6.12	0.00	6.12	0.0	6.12	94.83	X			100.95
12-Jul-88	1		6.93	0.00	6.93	0.0	6.93	94.02	X			100.95
26-Jul-88	1		7.50	0.00	7.50	0.0	7.50	93.45	X			100.95
09-Aug-88	1		7.81	0.00	7.81	0.0	7.81	93.14	X			100.95
23-Aug-88	1		7.97	0.00	7.97	0.0	7.97	92.98	X			100.95
06-Sep-88	1		7.85	0.00	7.85	0.0	7.85	93.10	X			100.95
20-Sep-88	1		8.11	0.00	8.11	0.0	8.11	92.84	X			100.95
04-Oct-88	1		8.27	0.00	8.27	0.0	8.27	92.68	X			100.95
18-Oct-88	1		8.18	0.00	8.18	0.0	8.18	92.77	X			100.95
01-Nov-88	1		8.20	0.00	8.20	0.0	8.20	92.75	X			100.95
15-Nov-88	1		N/A		ERR	0.0	ERR	ERR	X			100.95
29-Nov-88	1		8.60	0.00	8.60	0.0	8.60	92.35	X			100.95
13-Dec-88	1		8.89	0.00	8.89	0.0	8.89	92.06	X			100.95
27-Dec-88	1		8.61	0.00	8.61	0.0	8.61	92.34	X			100.95
10-Jan-89	1		8.89	0.00	8.89	0.0	8.89	92.06	X			100.95
24-Jan-89	1		9.16	0.00	9.16	0.0	9.16	91.79	X			100.95
07-Feb-89	1		9.24	0.00	9.24	0.0	9.24	91.71	X			100.95
12-Jan-88	2		8.46	0.00	8.46	0.0	8.46	92.73	X			101.19
26-Jan-88	2		8.44	0.00	8.44	0.0	8.44	92.75	X			101.19
09-Feb-88	2		8.01	0.00	8.01	0.0	8.01	93.18	X			101.19
23-Feb-88	2		7.96	0.00	7.96	0.0	7.96	93.28	X			101.19
08-Mar-88	2	7.98	(1.00)	.00	7.98	.0	7.98	93.21	X			101.19
22-Mar-88	2		8.03	0.00	8.03	0.0	8.03	93.16	X			101.19
05-Apr-88	2		8.09	0.00	8.09	0.0	8.09	93.10	X			101.19
19-Apr-88	2		8.38	0.00	8.38	0.0	8.38	92.81	X			101.19
03-May-88	2		8.00	0.00	8.00	0.0	8.00	93.19	X			101.19
17-May-88	2		6.50	0.00	6.50	0.0	6.50	94.69	X			101.19
31-May-88	2	5.81	(1.00)	.00	5.81	.0	5.81	95.38	X			101.19
14-Jun-88	2		4.69	0.00	4.69	0.0	4.69	96.50	X			101.19
28-Jun-88	2		6.38	0.00	6.38	0.0	6.38	94.81	X			101.19
12-Jul-88	2	7.18	(1.00)	.00	7.18	.0	7.18	94.01	X			101.19
26-Jul-88	2		7.72	0.00	7.72	0.0	7.72	93.47	X			101.19
09-Aug-88	2		8.01	0.00	8.01	0.0	8.01	93.18	X			101.19
23-Aug-88	2		8.24	0.00	8.24	0.0	8.24	92.95	X			101.19
06-Sep-88	2		8.11	0.00	8.11	0.0	8.11	93.08	X			101.19
20-Sep-88	2		8.37	0.00	8.37	0.0	8.37	92.82	X			101.19
04-Oct-88	2		8.50	0.00	8.50	0.0	8.50	92.69	X			101.19
18-Oct-88	2		8.41	0.00	8.41	0.0	8.41	92.78	X			101.19
01-Nov-88	2		8.46	0.00	8.46	0.0	8.46	92.73	X			101.19



Gertler - Ryan Inc.

(415) 783-7500

general and environmental contractors

03/09/89

PAGE 1

DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	I	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
									I			
15-Nov-88	2		N/A		ERR	0.0	ERR	ERR	I			101.19
29-Nov-88	2		8.83	0.00	8.83	0.0	8.83	92.36	I			101.19
13-Dec-88	2		D/W		ERR	0.0	ERR	ERR	I			101.19
27-Dec-88	2		8.87	0.00	8.87	0.0	8.87	92.32	I			101.19
10-Jan-89	2		9.10	0.00	9.10	0.0	9.10	92.09	I			101.19
24-Jan-89	2		D/W		ERR	0.0	ERR	ERR	I			101.19
07-Feb-89	2		D/W		ERR	0.0	ERR	ERR	I			101.19
12-Jan-88	3	7.26	(1.00)	.00	7.26	.0	7.26	92.74	I			100.00
26-Jan-88	3	7.22	(1.00)	.00	7.22	.0	7.22	92.78	I			100.00
09-Feb-88	3		6.83	0.00	6.83	0.0	6.83	93.17	I			100.00
23-Feb-88	3	6.80	(1.00)	.00	6.80	.0	6.80	93.20	I			100.00
08-Mar-88	3	6.81	(1.00)	.00	6.81	.0	6.81	93.19	I			100.00
22-Mar-88	3		6.81	0.00	6.81	0.0	6.81	93.19	I			100.00
05-Apr-88	3		6.71	0.00	6.71	0.0	6.71	93.29	I			100.00
19-Apr-88	3	7.16	(1.00)	.00	7.16	.0	7.16	92.84	I			100.00
03-May-88	3		6.78	0.00	6.78	0.0	6.78	93.22	I			100.00
17-May-88	3		5.34	0.00	5.34	0.0	5.34	94.66	I			100.00
31-May-88	3	4.61	(1.00)	.00	4.61	.0	4.61	95.39	I			100.00
14-Jun-88	3	3.48	(1.00)	.00	3.48	.0	3.48	96.52	I			100.00
28-Jun-88	3	5.20	(1.00)	.00	5.20	.0	5.20	94.80	I			100.00
12-Jul-88	3	6.00	(1.00)	.00	6.00	.0	6.00	94.00	I			100.00
26-Jul-88	3	6.53	(1.00)	.00	6.53	.0	6.53	93.47	I			100.00
09-Aug-88	3	6.87	(1.00)	.00	6.87	.0	6.87	93.13	I			100.00
23-Aug-88	3		7.05	0.00	7.05	0.0	7.05	92.95	I			100.00
06-Sep-88	3	6.92	(1.00)	.00	6.92	.0	6.92	93.08	I			100.00
20-Sep-88	3		7.14	0.00	7.14	0.0	7.14	92.86	I			100.00
04-Oct-88	3	7.32	(1.00)	.00	7.32	.0	7.32	92.68	I			100.00
18-Oct-88	3		7.21	0.00	7.21	0.0	7.21	92.79	I			100.00
01-Nov-88	3		7.27	0.00	7.27	0.0	7.27	92.73	I			100.00
15-Nov-88	3		7.51	0.00	7.51	0.0	7.51	92.49	I			100.00
29-Nov-88	3		7.68	0.00	7.68	0.0	7.68	92.32	I			100.00
13-Dec-88	3		7.96	0.00	7.96	0.0	7.96	92.04	I			100.00
27-Dec-88	3		7.67	0.00	7.67	0.0	7.67	92.33	I			100.00
10-Jan-89	3		7.97	0.00	7.97	0.0	7.97	92.03	I			100.00
24-Jan-89	3		8.30	0.00	8.30	0.0	8.30	91.70	I			100.00
07-Feb-89	3		8.34	0.00	8.34	0.0	8.34	91.66	I			100.00
12-Jan-88	4		8.28	0.00	8.28	0.0	8.28	92.64	I			100.92
26-Jan-88	4		8.23	0.00	8.23	0.0	8.23	92.69	I			100.92
09-Feb-88	4		7.80	0.00	7.80	0.0	7.80	93.12	I			100.92
23-Feb-88	4		7.84	0.00	7.84	0.0	7.84	93.08	I			100.92
08-Mar-88	4		7.80	0.00	7.80	0.0	7.80	93.12	I			100.92
22-Mar-88	4		7.84	0.00	7.84	0.0	7.84	93.08	I			100.92
05-Apr-88	4		7.90	0.00	7.90	0.0	7.90	93.02	I			100.92
19-Apr-88	4		8.21	0.00	8.21	0.0	8.21	92.71	I			100.92
03-May-88	4		7.80	0.00	7.80	0.0	7.80	93.12	I			100.92
17-May-88	4		6.27	0.00	6.27	0.0	6.27	94.65	I			100.92
31-May-88	4		5.62	0.00	5.62	0.0	5.62	95.30	I			100.92
14-Jun-88	4		4.42	0.00	4.42	0.0	4.42	96.50	I			100.92
28-Jun-88	4		6.10	0.00	6.10	0.0	6.10	94.82	I			100.92
12-Jul-88	4		6.98	0.00	6.98	0.0	6.98	93.94	I			100.92
26-Jul-88	4		7.55	0.00	7.55	0.0	7.55	93.37	I			100.92
09-Aug-88	4		7.86	0.00	7.86	0.0	7.86	93.06	I			100.92



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	I	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
23-Aug-88	4		8.09	0.00	8.09	0.0	8.09	92.83	I			100.92
06-Sep-88	4		7.90	0.00	7.90	0.0	7.90	93.02	I			100.92
20-Sep-88	4		8.19	0.00	8.19	0.0	8.19	92.73	I			100.92
04-Oct-88	4		8.29	0.00	8.29	0.0	8.29	92.63	I			100.92
18-Oct-88	4		8.21	0.00	8.21	0.0	8.21	92.71	I			100.92
01-Nov-88	4		8.24	0.00	8.24	0.0	8.24	92.68	I			100.92
15-Nov-88	4		8.51	0.00	8.51	0.0	8.51	92.41	I			100.92
29-Nov-88	4		8.65	0.00	8.65	0.0	8.65	92.27	I			100.92
13-Dec-88	4		8.99	0.00	8.99	0.0	8.99	91.93	I			100.92
27-Dec-88	4		8.65	0.00	8.65	0.0	8.65	92.27	X			100.92
10-Jan-89	4		8.94	0.00	8.94	0.0	8.94	91.98	X			100.92
24-Jan-89	4		9.25	0.00	9.25	0.0	9.25	91.67	X			100.92
07-Feb-89	4		9.38	0.00	9.38	0.0	9.38	91.54	X			100.92
12-Jan-88	5		8.81	0.00	8.81	0.0	8.81	-8.81	X			
26-Jan-88	5		8.85	0.00	8.85	0.0	8.85	-8.85	X			
09-Feb-88	5		8.87	0.00	8.87	0.0	8.87	-8.87	X			
23-Feb-88	5		9.00	0.00	9.00	0.0	9.00	-9.00	X			
08-Mar-88	5		9.10	0.00	9.10	0.0	9.10	-9.10	X			
22-Mar-88	5		8.92	0.00	8.92	0.0	8.92	-8.92	X			
05-Apr-88	5		9.01	0.00	9.01	0.0	9.01	-9.01	X			
19-Apr-88	5		8.60	0.00	8.60	0.0	8.60	-8.60	X			
03-May-88	5		8.41	0.00	8.41	0.0	8.41	-8.41	X			
17-May-88	5		8.20	0.00	8.20	0.0	8.20	-8.20	X			
31-May-88	5		N/A		ERR	0.0	ERR	ERR	X			
14-Jun-88	5		7.92	0.00	7.92	0.0	7.92	-7.92	X			
28-Jun-88	5		8.32	0.00	8.32	0.0	8.32	-8.32	X			
12-Jul-88	5		8.76	0.00	8.76	0.0	8.76	-8.76	X			
26-Jul-88	5		9.10	0.00	9.10	0.0	9.10	-9.10	X			
09-Aug-88	5		9.25	0.00	9.25	0.0	9.25	-9.25	X			
23-Aug-88	5		9.09	0.00	9.09	0.0	9.09	-9.09	X			
06-Sep-88	5		9.27	0.00	9.27	0.0	9.27	-9.27	X			
20-Sep-88	5		9.26	0.00	9.26	0.0	9.26	-9.26	X			
04-Oct-88	5		9.43	0.00	9.43	0.0	9.43	-9.43	X			
18-Oct-88	5		9.50	0.00	9.50	0.0	9.50	-9.50	X			
01-Nov-88	5		9.71	0.00	9.71	0.0	9.71	-9.71	X			
15-Nov-88	5		9.84	0.00	9.84	0.0	9.84	-9.84	X			
29-Nov-88	5		9.77	0.00	9.77	0.0	9.77	-9.77	X			
13-Dec-88	5		9.90	0.00	9.90	0.0	9.90	-9.90	X			
27-Dec-88	5		9.61	0.00	9.61	0.0	9.61	-9.61	X			
10-Jan-89	5		9.61	0.00	9.61	0.0	9.61	-9.61	X			
24-Jan-89	5		9.79	0.00	9.79	0.0	9.79	-9.79	X			
07-Feb-89	5		9.91	0.00	9.91	0.0	9.91	-9.91	X			
12-Jan-88	6	7.88	(1.00)	.00	7.88	.0	7.88	92.82	X			100.70
26-Jan-88	6	7.32	(1.00)	.00	7.32	.0	7.32	93.38	X			100.70
09-Feb-88	6	8.05	(1.00)	.00	8.05	.0	8.05	92.65	X			100.70
23-Feb-88	6	8.15	(1.00)	.00	8.15	.0	8.15	92.55	X			100.70
08-Mar-88	6	7.71	(1.00)	.00	7.71	.0	7.71	92.99	X			100.70
22-Mar-88	6	7.83	(1.00)	.00	7.83	.0	7.83	92.87	X			100.70
05-Apr-88	6	8.35	(1.00)	.00	8.35	.0	8.35	92.35	X			100.70
19-Apr-88	6		8.00	0.00	8.00	0.0	8.00	92.70	X			100.70
03-May-88	6		7.61	0.00	7.61	0.0	7.61	93.09	X			100.70
17-May-88	6	6.99	(1.00)	.00	6.99	.0	6.99	93.71	X			100.70



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	Y	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
31-May-88	6	7.46	(1.00)	.00	7.46	.0	7.46	93.24	I			100.70
14-Jun-88	6	6.97	(1.00)	.00	6.97	.0	6.97	93.73	I			100.70
28-Jun-88	6		8.06	0.00	8.06	0.0	8.06	92.64	I			100.70
12-Jul-88	6		8.92	0.00	8.92	0.0	8.92	91.78	I			100.70
26-Jul-88	6		9.70	0.00	9.70	0.0	9.70	91.00	I			100.70
09-Aug-88	6	9.85	(1.00)	.00	9.85	.0	9.85	90.85	I			100.70
23-Aug-88	6		9.92	0.00	9.92	0.0	9.92	90.78	I			100.70
06-Sep-88	6		9.92	0.00	9.92	0.0	9.92	90.78	I			100.70
20-Sep-88	6		10.09	0.00	10.09	0.0	10.09	90.61	I			100.70
04-Oct-88	6		10.01	0.00	10.01	0.0	10.01	90.69	I			100.70
18-Oct-88	6		9.25	0.00	9.25	0.0	9.25	91.45	I			100.70
01-Nov-88	6	10.00	(1.00)	.00	10.00	.0	10.00	90.70	I			100.70
15-Nov-88	6		N/A		ERR	0.0	ERR	ERR	I			100.70
29-Nov-88	6		9.80	0.00	9.80	0.0	9.80	90.90	I			100.70
13-Dec-88	6	10.27	(1.00)	.00	10.27	.0	10.27	90.43	I			100.70
27-Dec-88	6		7.85	0.00	7.85	0.0	7.85	92.85	I			100.70
10-Jan-89	6		8.98	0.00	8.98	0.0	8.98	91.72	I			100.70
24-Jan-89	6		10.04	0.00	10.04	0.0	10.04	90.66	I			100.70
07-Feb-89	6		10.00	0.00	10.00	0.0	10.00	90.70	I			100.70
12-Jan-88	7		8.74	0.00	8.74	0.0	8.74	92.14	X			100.88
26-Jan-88	7		8.62	0.00	8.62	0.0	8.62	92.26	X			100.88
09-Feb-88	7		8.50	0.00	8.50	0.0	8.50	92.38	X			100.88
23-Feb-88	7		8.38	0.00	8.38	0.0	8.38	92.50	X			100.88
08-Mar-88	7		8.72	0.00	8.72	0.0	8.72	92.16	X			100.88
22-Mar-88	7		8.65	0.00	8.65	0.0	8.65	92.23	X			100.88
05-Apr-88	7		9.05	0.00	9.05	0.0	9.05	91.83	X			100.88
19-Apr-88	7		8.21	0.00	8.21	0.0	8.21	92.67	X			100.88
03-May-88	7		8.14	0.00	8.14	0.0	8.14	92.74	X			100.88
17-May-88	7		8.16	0.00	8.16	0.0	8.16	92.72	X			100.88
31-May-88	7		8.40	0.00	8.40	0.0	8.40	92.48	X			100.88
14-Jun-88	7		7.49	0.00	7.49	0.0	7.49	93.39	X			100.88
28-Jun-88	7		7.80	0.00	7.80	0.0	7.80	93.08	X			100.88
12-Jul-88	7		8.74	0.00	8.74	0.0	8.74	92.14	X			100.88
26-Jul-88	7		9.10	0.00	9.10	0.0	9.10	91.78	X			100.88
09-Aug-88	7		9.21	0.00	9.21	0.0	9.21	91.67	X			100.88
23-Aug-88	7		9.33	0.00	9.33	0.0	9.33	91.55	X			100.88
06-Sep-88	7		9.30	0.00	9.30	0.0	9.30	91.58	X			100.88
20-Sep-88	7		9.44	0.00	9.44	0.0	9.44	91.44	X			100.88
04-Oct-88	7		9.40	0.00	9.40	0.0	9.40	91.48	X			100.88
18-Oct-88	7		N/A		ERR	0.0	ERR	ERR	X			100.88
01-Nov-88	7		10.40	0.00	10.40	0.0	10.40	90.48	X			100.88
15-Nov-88	7		10.62	0.00	10.62	0.0	10.62	90.26	X			100.88
29-Nov-88	7		10.70	0.00	10.70	0.0	10.70	90.18	X			100.88
13-Dec-88	7		10.67	0.00	10.67	0.0	10.67	90.21	X			100.88
27-Dec-88	7		10.65	0.00	10.65	0.0	10.65	90.23	X			100.88
10-Jan-89	7		10.52	0.00	10.52	0.0	10.52	90.36	X			100.88
24-Jan-89	7		10.75	0.00	10.75	0.0	10.75	90.13	X			100.88
07-Feb-89	7		10.81	0.00	10.81	0.0	10.81	90.07	X			100.88
12-Jan-88	8		9.82	0.00	9.82	0.0	9.82	91.02	X			100.84
26-Jan-88	8		9.77	0.00	9.77	0.0	9.77	91.07	X			100.84
09-Feb-88	8		9.82	0.00	9.82	0.0	9.82	91.02	X			100.84
23-Feb-88	8		9.78	0.00	9.78	0.0	9.78	91.06	X			100.84



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	Y	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
08-Mar-88	8		9.99	0.00	9.99	0.0	9.99	90.85	I			100.84
22-Mar-88	8		9.99	0.00	9.99	0.0	9.99	90.85	I			100.84
05-Apr-88	8		10.03	0.00	10.03	0.0	10.03	90.81	I			100.84
19-Apr-88	8		9.77	0.00	9.77	0.0	9.77	91.07	I			100.84
03-May-88	8		9.68	0.00	9.68	0.0	9.68	91.16	I			100.84
17-May-88	8		9.44	0.00	9.44	0.0	9.44	91.40	I			100.84
31-May-88	8	9.22	(1.00)	1.00 +	ERR	1.00 +	9.22	ERR	I			100.84
14-Jun-88	8		8.64	0.00	8.64	0.0	8.64	92.20	I			100.84
28-Jun-88	8		9.18	0.00	9.18	0.0	9.18	91.66	I			100.84
12-Jul-88	8		9.79	0.00	9.79	0.0	9.79	91.05	I			100.84
26-Jul-88	8		10.05	0.00	10.05	0.0	10.05	90.79	I			100.84
09-Aug-88	8		10.19	0.00	10.19	0.0	10.19	90.65	I			100.84
23-Aug-88	8		10.30	0.00	10.30	0.0	10.30	90.54	I			100.84
06-Sep-88	8		10.32	0.00	10.32	0.0	10.32	90.52	I			100.84
20-Sep-88	8		10.38	0.00	10.38	0.0	10.38	90.46	I			100.84
04-Oct-88	8		10.34	0.00	10.34	0.0	10.34	90.50	I			100.84
18-Oct-88	8		10.34	0.00	10.34	0.0	10.34	90.50	I			100.84
01-Nov-88	8		10.45	0.00	10.45	0.0	10.45	90.39	I			100.84
15-Nov-88	8		10.60	0.00	10.60	0.0	10.60	90.24	I			100.84
29-Nov-88	8		10.71	0.00	10.71	0.0	10.71	90.13	I			100.84
13-Dec-88	8		10.72	0.00	10.72	0.0	10.72	90.12	X			100.84
27-Dec-88	8		10.69	0.00	10.69	0.0	10.69	90.15	X			100.84
10-Jan-89	8		10.60	0.00	10.60	0.0	10.60	90.24	X			100.84
24-Jan-89	8		9.75	0.00	9.75	0.0	9.75	91.09	X			100.84
07-Feb-89	8		10.85	0.00	10.85	0.0	10.85	89.99	X			100.84
12-Jan-88	9	9.98	(1.00)	0.10	9.99	0.1	9.98	90.79	X			100.77
26-Jan-88	9		D/W		ERR	0.0	ERR	ERR	X			100.77
09-Feb-88	9	9.95	(1.00)	0.15	9.96	0.2	9.95	90.82	X			100.77
23-Feb-88	9		D/W		ERR	0.0	ERR	ERR	X			100.77
08-Mar-88	9	10.02	(1.00)	0.30	10.05	0.3	10.02	90.74	X			100.77
22-Mar-88	9	10.01	(1.00)	0.25	10.03	0.3	10.01	90.75	X			100.77
05-Apr-88	9	10.06	(1.00)	0.90	10.14	0.9	10.06	90.69	X			100.77
19-Apr-88	9	9.85	(1.00)	1.20	9.95	1.2	9.85	90.90	X			100.77
03-May-88	9	9.61	(1.00)	1.00	9.69	1.0	9.61	91.14	X			100.77
17-May-88	9	9.40	(1.00)	1.30	9.51	1.3	9.40	91.34	X			100.77
31-May-88	9		9.23	0.00	9.23	0.0	9.23	91.54	X			100.77
14-Jun-88	9	8.51	(1.00)	1.00	8.59	1.0	8.51	92.24	X			100.77
28-Jun-88	9	9.27	(1.00)	1.00	9.35	1.0	9.27	91.48	X			100.77
12-Jul-88	9	9.84	(1.00)	1.00	9.92	1.0	9.84	90.91	X			100.77
26-Jul-88	9	10.10	(1.00)	0.62	10.15	0.6	10.10	90.66	X			100.77
09-Aug-88	9	10.34	(1.00)	0.34	10.37	0.3	10.34	90.42	X			100.77
23-Aug-88	9	10.21	(1.00)	0.90	10.29	0.9	10.21	90.54	X			100.77
06-Sep-88	9	10.28	(1.00)	1.00	10.36	1.0	10.28	90.47	X			100.77
20-Sep-88	9	10.28	(1.00)	1.00	10.36	1.0	10.28	90.47	X			100.77
04-Oct-88	9		10.31	0.00	10.31	0.0	10.31	90.46	X			100.77
18-Oct-88	9	10.31	(1.00)	0.95	10.39	1.0	10.31	90.44	X			100.77
01-Nov-88	9	10.35	(1.00)	1.00	10.43	1.0	10.35	90.40	X			100.77
15-Nov-88	9	10.45	(1.00)	0.80	10.52	0.8	10.45	90.30	X			100.77
29-Nov-88	9	10.64	(1.00)	0.60	10.69	0.6	10.64	90.12	X			100.77
13-Dec-88	9	10.64	(1.00)	1.21	10.74	1.2	10.64	90.10	X			100.77
27-Dec-88	9	10.62	(1.00)	1.50	10.75	1.5	10.62	90.12	X			100.77
10-Jan-89	9	10.59	(1.00)	1.00	10.67	1.0	10.59	90.16	X			100.77



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	WT-G	HC	C-ELEV
					0.00	0.0	0.00	0.00			
24-Jan-89	9	6.67	(1.00)	0.04	6.67	.0	6.67	94.10			100.77
07-Feb-89	9	10.80	(1.00)	1.00	10.88	1.0	10.80	89.95			100.77
12-Jan-88	10		8.06	0.00	8.06	0.0	8.06	92.62			100.68
26-Jan-88	10		7.00	0.00	7.00	0.0	7.00	93.68			100.68
09-Feb-88	10		6.28	0.00	6.28	0.0	6.28	94.40			100.68
23-Feb-88	10		6.76	0.00	6.76	0.0	6.76	93.92			100.68
08-Mar-88	10		6.63	0.00	6.63	0.0	6.63	94.05			100.68
22-Mar-88	10		6.87	0.00	6.87	0.0	6.87	93.81			100.68
05-Apr-88	10		7.62	0.00	7.62	0.0	7.62	93.06			100.68
19-Apr-88	10		4.90	0.00	4.90	0.0	4.90	95.78			100.68
03-May-88	10		5.95	0.00	5.95	0.0	5.95	94.73			100.68
17-May-88	10		5.74	0.00	5.74	0.0	5.74	94.94			100.68
31-May-88	10		6.58	0.00	6.58	0.0	6.58	94.10			100.68
14-Jun-88	10		5.83	0.00	5.83	0.0	5.83	94.85			100.68
28-Jun-88	10		6.51	0.00	6.51	0.0	6.51	94.17			100.68
12-Jul-88	10		7.32	0.00	7.32	0.0	7.32	93.36			100.68
26-Jul-88	10		7.34	0.00	7.34	0.0	7.34	93.34			100.68
09-Aug-88	10		8.08	0.00	8.08	0.0	8.08	92.60			100.68
23-Aug-88	10		7.00	0.00	7.00	0.0	7.00	93.68			100.68
06-Sep-88	10		5.64	0.00	5.64	0.0	5.64	95.04			100.68
20-Sep-88	10		6.72	0.00	6.72	0.0	6.72	93.96			100.68
04-Oct-88	10		8.15	0.00	8.15	0.0	8.15	92.53			100.68
18-Oct-88	10		6.71	0.00	6.71	0.0	6.71	93.97			100.68
01-Nov-88	10	10.05	(1.00)	.00	10.05	.0	10.05	90.63			100.68
15-Nov-88	10	9.22	(1.00)	.00	9.22	.0	9.22	91.46			100.68
29-Nov-88	10	9.81	(1.00)	.00	9.81	.0	9.81	90.87			100.68
13-Dec-88	10		9.04	0.00	9.04	0.0	9.04	91.64			100.68
27-Dec-88	10		7.52	0.00	7.52	0.0	7.52	93.16			100.68
10-Jan-89	10		8.15	0.00	8.15	0.0	8.15	92.53			100.68
24-Jan-89	10		8.19	0.00	8.19	0.0	8.19	92.49			100.68
07-Feb-89	10		9.04	0.00	9.04	0.0	9.04	91.64			100.68
12-Jan-88	11		7.57	0.00	7.57	0.0	7.57	92.74			100.31
26-Jan-88	11		7.50	0.00	7.50	0.0	7.50	92.81			100.31
09-Feb-88	11		7.16	0.00	7.16	0.0	7.16	93.15			100.31
23-Feb-88	11		7.08	0.00	7.08	0.0	7.08	93.23			100.31
08-Mar-88	11		7.14	0.00	7.14	0.0	7.14	93.17			100.31
22-Mar-88	11		7.12	0.00	7.12	0.0	7.12	93.19			100.31
05-Apr-88	11		7.21	0.00	7.21	0.0	7.21	93.10			100.31
19-Apr-88	11		7.52	0.00	7.52	0.0	7.52	92.79			100.31
03-May-88	11		7.10	0.00	7.10	0.0	7.10	93.21			100.31
17-May-88	11		5.65	0.00	5.65	0.0	5.65	94.66			100.31
31-May-88	11		4.93	0.00	4.93	0.0	4.93	95.38			100.31
14-Jun-88	11		3.85	0.00	3.85	0.0	3.85	96.46			100.31
28-Jun-88	11		5.54	0.00	5.54	0.0	5.54	94.77			100.31
12-Jul-88	11		6.30	0.00	6.30	0.0	6.30	94.01			100.31
26-Jul-88	11		6.84	0.00	6.84	0.0	6.84	93.47			100.31
09-Aug-88	11		7.17	0.00	7.17	0.0	7.17	93.14			100.31
23-Aug-88	11		7.35	0.00	7.35	0.0	7.35	92.96			100.31
06-Sep-88	11		7.20	0.00	7.20	0.0	7.20	93.11			100.31
20-Sep-88	11		7.49	0.00	7.49	0.0	7.49	92.82			100.31
04-Oct-88	11		7.61	0.00	7.61	0.0	7.61	92.70			100.31
18-Oct-88	11		7.52	0.00	7.52	0.0	7.52	92.79			100.31



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00			
01-Nov-88	11		7.56	0.00	7.56	0.0	7.56	92.75			100.31
15-Nov-88	11		7.78	0.00	7.78	0.0	7.78	92.53			100.31
29-Nov-88	11		7.96	0.00	7.96	0.0	7.96	92.35			100.31
13-Dec-88	11		8.32	0.00	8.32	0.0	8.32	91.99			100.31
27-Dec-88	11		7.96	0.00	7.96	0.0	7.96	92.35			100.31
10-Jan-89	11		8.22	0.00	8.22	0.0	8.22	92.09			100.31
24-Jan-89	11		N/A		ERR	0.0	ERR	ERR			100.31
07-Feb-89	11		N/A		ERR	0.0	ERR	ERR			100.31



DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	WT-G	HC	C.FLEV
					0.00	0.0	0.00	0.00			
05-Jun-86	1		7.95	0.00	7.95	0.0	7.95	93.00	I		100.95
19-Jun-86	1		8.10	0.00	8.10	0.0	8.10	92.85	I		100.95
03-Jul-86	1		8.30	0.00	8.30	0.0	8.30	92.65	I		100.95
17-Jul-86	1		7.91	0.00	7.91	0.0	7.91	93.04	I		100.95
31-Jul-86	1		7.86	0.00	7.86	0.0	7.86	93.09	I		100.95
14-Aug-86	1		7.93	0.00	7.93	0.0	7.93	93.02	I		100.95
28-Aug-86	1		8.12	0.00	8.12	0.0	8.12	92.83	I		100.95
11-Sep-86	1		8.28	0.00	8.28	0.0	8.28	92.67	I		100.95
02-Oct-86	1		8.01	0.00	8.01	0.0	8.01	92.94	I		100.95
16-Oct-86	1		8.12	0.00	8.12	0.0	8.12	92.83	I		100.95
30-Oct-86	1		8.33	0.00	8.33	0.0	8.33	92.62	I		100.95
10-Nov-86	1		8.53	0.00	8.53	0.0	8.53	92.42	I		100.95
24-Nov-86	1	8.46	(1.00)	.00	8.46	.0	8.46	92.49	I		100.95
08-Dec-86	1		8.38	0.00	8.38	0.0	8.38	92.57	I		100.95
22-Dec-86	1	8.62	(1.00)	.00	8.62	.0	8.62	92.33	I		100.95
05-Jan-87	1		8.50	0.00	8.50	0.0	8.50	92.45	I		100.95
19-Jan-87	1		8.80	0.00	8.80	0.0	8.80	92.15	I		100.95
02-Feb-87	1		7.62	0.00	7.62	0.0	7.62	93.33	I		100.95
23-Feb-87	1		7.88	0.00	7.88	0.0	7.88	93.07	I		100.95
09-Mar-87	1		8.04	0.00	8.04	0.0	8.04	92.91	I		100.95
23-Mar-87	1		7.77	0.00	7.77	0.0	7.77	93.18	I		100.95
07-Apr-87	1		8.22	0.00	8.22	0.0	8.22	92.73	I		100.95
21-Apr-87	1		7.12	0.00	7.12	0.0	7.12	93.83	I		100.95
05-May-87	1		8.00	0.00	8.00	0.0	8.00	92.95	I		100.95
20-May-87	1		8.10	0.00	8.10	0.0	8.10	92.85	I		100.95
02-Jun-87	1		7.97	0.00	7.97	0.0	7.97	92.98	I		100.95
16-Jun-87	1		8.09	0.00	8.09	0.0	8.09	92.86	I		100.95
30-Jun-87	1	8.12	(1.00)	.00	8.12	.0	8.12	92.83	I		100.95
14-Jul-87	1		8.22	0.00	8.22	0.0	8.22	92.73	I		100.95
28-Jul-87	1		8.20	0.00	8.20	0.0	8.20	92.75	I		100.95
11-Aug-87	1	8.01	(1.00)	.00	8.01	.0	8.01	92.94	I		100.95
25-Aug-87	1		7.95	(1.00)	.00	7.95	.0	7.95	93.00	I	100.95
08-Sep-87	1		7.85	(1.00)	.00	7.85	.0	7.85	93.10	I	100.95
22-Sep-87	1		7.86	(1.00)	.00	7.86	.0	7.86	93.09	I	100.95
06-Oct-87	1		7.77	(1.00)	.00	7.77	.0	7.77	93.18	I	100.95
20-Oct-87	1		7.75	(1.00)	.00	7.75	.0	7.75	93.20	I	100.95
03-Nov-87	1		7.55	(1.00)	.00	7.55	.0	7.55	93.40	I	100.95
17-Nov-87	1		7.77	0.00	7.77	0.0	7.77	93.18	I		100.95
01-Dec-87	1		7.84	0.00	7.84	0.0	7.84	93.11	I		100.95
15-Dec-87	1		7.87	0.00	7.87	0.0	7.87	93.08	I		100.95
29-Dec-87	1		8.10	0.00	8.10	0.0	8.10	92.85	I		100.95
05-Jun-86	2		8.20	0.00	8.20	0.0	8.20	92.99	I		101.19
19-Jun-86	2		8.32	0.00	8.32	0.0	8.32	92.87	I		101.19
03-Jul-86	2		8.59	0.00	8.59	0.0	8.59	92.60	I		101.19
17-Jul-86	2		8.15	0.00	8.15	0.0	8.15	93.04	I		101.19
31-Jul-86	2		8.09	0.00	8.09	0.0	8.09	93.10	I		101.19
14-Aug-86	2		8.13	0.00	8.13	0.0	8.13	93.06	I		101.19
28-Aug-86	2		8.34	0.00	8.34	0.0	8.34	92.85	I		101.19
11-Sep-86	2		8.48	0.00	8.48	0.0	8.48	92.71	I		101.19
02-Oct-86	2		8.29	0.00	8.29	0.0	8.29	92.90	I		101.19
16-Oct-86	2		8.35	0.00	8.35	0.0	8.35	92.84	I		101.19



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	Y	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	Y			
30-Oct-86	2		D/W		ERR	0.0	ERR	ERR	Y			101.19
10-Nov-86	2		8.75	0.00	8.75	0.0	8.75	92.44	Y			101.19
24-Nov-86	2		8.68	0.00	8.68	0.0	8.68	92.51	Y			101.19
08-Dec-86	2		8.62	0.00	8.62	0.0	8.62	92.57	Y			101.19
22-Dec-86	2		D/W		ERR	0.0	ERR	ERR	Y			101.19
05-Jan-87	2		8.72	0.00	8.72	0.0	8.72	92.47	Y			101.19
19-Jan-87	2		9.05	0.00	9.05	0.0	9.05	92.14	Y			101.19
02-Feb-87	2		7.90	0.00	7.90	0.0	7.90	93.29	Y			101.19
23-Feb-87	2		8.12	0.00	8.12	0.0	8.12	93.07	Y			101.19
09-Mar-87	2		8.23	0.00	8.23	0.0	8.23	92.96	Y			101.19
23-Mar-87	2		8.03	0.00	8.03	0.0	8.03	93.16	Y			101.19
07-Apr-87	2		8.48	0.00	8.48	0.0	8.48	92.71	Y			101.19
21-Apr-87	2		8.05	0.00	8.05	0.0	8.05	93.14	Y			101.19
05-May-87	2		8.30	0.00	8.30	0.0	8.30	92.89	Y			101.19
20-May-87	2		8.22	0.00	8.22	0.0	8.22	92.97	Y			101.19
02-Jun-87	2		8.03	0.00	8.03	0.0	8.03	93.16	Y			101.19
16-Jun-87	2	8.37	(1.00)	.00	8.37	.0	8.37	92.82	Y			101.19
30-Jun-87	2	8.34	(1.00)	.00	8.34	.0	8.34	92.85	Y			101.19
14-Jul-87	2		8.38	0.00	8.38	0.0	8.38	92.81	Y			101.19
28-Jul-87	2		8.44	0.00	8.44	0.0	8.44	92.75	Y			101.19
11-Aug-87	2		8.24	0.00	8.24	0.0	8.24	92.95	Y			101.19
25-Aug-87	2	8.17	(1.00)	.00	8.17	.0	8.17	93.02	Y			101.19
08-Sep-87	2		8.08	0.00	8.08	0.0	8.08	93.11	Y			101.19
22-Sep-87	2	8.1	(1.00)	.00	8.10	.0	8.10	93.09	Y			101.19
06-Oct-87	2		8.00	0.00	8.00	0.0	8.00	93.19	Y			101.19
20-Oct-87	2	8.00	(1.00)	.00	8.00	.0	8.00	93.19	Y			101.19
03-Nov-87	2		7.80	0.00	7.80	0.0	7.80	93.39	Y			101.19
17-Nov-87	2		8.01	0.00	8.01	0.0	8.01	93.18	Y			101.19
01-Dec-87	2		8.11	0.00	8.11	0.0	8.11	93.08	Y			101.19
15-Dec-87	2		8.11	0.00	8.11	0.0	8.11	93.08	Y			101.19
29-Dec-87	2		8.28	0.00	8.28	0.0	8.28	92.91	Y			101.19
05-Jun-86	3		7.01	0.00	7.01	0.0	7.01	92.99	Y			100.00
19-Jun-86	3		7.14	0.00	7.14	0.0	7.14	92.86	Y			100.00
03-Jul-86	3		8.48	0.00	8.48	0.0	8.48	91.52	Y			100.00
17-Jul-86	3		6.96	0.00	6.96	0.0	6.96	93.04	Y			100.00
31-Jul-86	3		6.51	0.00	6.51	0.0	6.51	93.49	Y			100.00
14-Aug-86	3		6.95	0.00	6.95	0.0	6.95	93.05	Y			100.00
28-Aug-86	3		7.50	0.00	7.50	0.0	7.50	92.50	Y			100.00
11-Sep-86	3		7.30	0.00	7.30	0.0	7.30	92.70	Y			100.00
02-Oct-86	3		7.15	0.00	7.15	0.0	7.15	92.85	Y			100.00
16-Oct-86	3	7.16	(1.00)	0.02	7.16	.0	7.16	92.84	Y			100.00
30-Oct-86	3	7.44	(1.00)	0.01	7.44	.0	7.44	92.56	Y			100.00
10-Nov-86	3	7.52	(1.00)	.00	7.52	.0	7.52	92.48	Y			100.00
24-Nov-86	3		7.52	0.00	7.52	0.0	7.52	92.48	Y			100.00
08-Dec-86	3	7.45	(1.00)	0.01	7.45	.0	7.45	92.55	Y			100.00
22-Dec-86	3	7.60	(1.00)	0.01	7.60	.0	7.60	92.40	Y			100.00
05-Jan-87	3		7.54	0.00	7.54	0.0	7.54	92.46	Y			100.00
19-Jan-87	3	7.82	(1.00)	0.02	7.82	.0	7.82	92.18	Y			100.00
02-Feb-87	3	7.51	(1.00)	.00	7.51	.0	7.51	92.49	Y			100.00
23-Feb-87	3	6.92	(1.00)	.00	6.92	.0	6.92	93.08	Y			100.00
09-Mar-87	3		9.06	0.00	9.06	0.0	9.06	90.94	Y			100.00
23-Mar-87	3		6.92	0.00	6.92	0.0	6.92	93.08	Y			100.00



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	I	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
07-Apr-87	3		7.22	0.00	7.22	0.0	7.22	92.78	I			100.00
21-Apr-87	3		8.11	0.00	8.11	0.0	8.11	91.89	I			100.00
05-May-87	3	7.10	(1.00)	.00	7.10	.0	7.10	92.90	I			100.00
20-May-87	3		7.05	0.00	7.05	0.0	7.05	92.95	I			100.00
02-Jun-87	3		7.04	0.00	7.04	0.0	7.04	92.96	I			100.00
16-Jun-87	3		7.15	0.00	7.15	0.0	7.15	92.85	I			100.00
30-Jun-87	3	7.17	(1.00)	.00	7.17	.0	7.17	92.83	I			100.00
14-Jul-87	3		7.23	0.00	7.23	0.0	7.23	92.77	I			100.00
28-Jul-87	3		7.23	0.00	7.23	0.0	7.23	92.77	I			100.00
11-Aug-87	3	7.07	(1.00)	.00	7.07	.0	7.07	92.93	I			100.00
25-Aug-87	3		7.00	0.00	7.00	0.0	7.00	93.00	I			100.00
08-Sep-87	3	6.9	(1.00)	.00	6.90	.0	6.90	93.10	I			100.00
22-Sep-87	3	6.93	(1.00)	.00	6.93	.0	6.93	93.07	I			100.00
06-Oct-87	3	6.81	(1.00)	.00	6.81	.0	6.81	93.19	I			100.00
20-Oct-87	3	6.83	(1.00)	.00	6.83	.0	6.83	93.17	I			100.00
03-Nov-87	3	6.62	(1.00)	.00	6.62	.0	6.62	93.38	I			100.00
17-Nov-87	3	6.83	(1.00)	.00	6.83	.0	6.83	93.17	I			100.00
01-Dec-87	3	6.91	(1.00)	.00	6.91	.0	6.91	93.09	I			100.00
15-Dec-87	3	6.91	(1.00)	.00	6.91	.0	6.91	93.09	I			100.00
29-Dec-87	3	7.10	(1.00)	.00	7.10	.0	7.10	92.90	I			100.00
05-Jun-86	4		8.00	0.00	8.00	0.0	8.00	92.92	I			100.92
19-Jun-86	4		8.17	0.00	8.17	0.0	8.17	92.75	I			100.92
03-Jul-86	4		7.83	0.00	7.83	0.0	7.83	93.09	I			100.92
17-Jul-86	4		8.00	0.00	8.00	0.0	8.00	92.92	I			100.92
31-Jul-86	4		7.85	0.00	7.85	0.0	7.85	93.07	I			100.92
14-Aug-86	4		8.00	0.00	8.00	0.0	8.00	92.92	I			100.92
28-Aug-86	4		8.22	0.00	8.22	0.0	8.22	92.70	I			100.92
11-Sep-86	4	8.33	(1.00)	0.01	8.33	.0	8.33	92.59	I			100.92
02-Oct-86	4		8.12	0.00	8.12	0.0	8.12	92.80	I			100.92
16-Oct-86	4	8.20	(1.00)	.00	8.20	.0	8.20	92.72	I			100.92
30-Oct-86	4		8.59	0.00	8.59	0.0	8.59	92.33	I			100.92
10-Nov-86	4		8.58	0.00	8.58	0.0	8.58	92.34	I			100.92
24-Nov-86	4	8.54	(1.00)	.00	8.54	.0	8.54	92.38	I			100.92
08-Dec-86	4	8.50	(1.00)	.00	8.50	.0	8.50	92.42	I			100.92
22-Dec-86	4		8.63	0.00	8.63	0.0	8.63	92.29	I			100.92
05-Jan-87	4		8.58	0.00	8.58	0.0	8.58	92.34	I			100.92
19-Jan-87	4	8.85	(1.00)	.00	8.85	.0	8.85	92.07	I			100.92
02-Feb-87	4		7.49	0.00	7.49	0.0	7.49	93.43	I			100.92
23-Feb-87	4		7.93	0.00	7.93	0.0	7.93	92.99	I			100.92
09-Mar-87	4		8.12	0.00	8.12	0.0	8.12	92.80	I			100.92
23-Mar-87	4		7.90	0.00	7.90	0.0	7.90	93.02	I			100.92
07-Apr-87	4		8.27	0.00	8.27	0.0	8.27	92.65	I			100.92
21-Apr-87	4		8.30	0.00	8.30	0.0	8.30	92.62	I			100.92
05-May-87	4		8.08	0.00	8.08	0.0	8.08	92.84	I			100.92
20-May-87	4		8.05	0.00	8.05	0.0	8.05	92.87	I			100.92
02-Jun-87	4		8.62	0.00	8.62	0.0	8.62	92.30	I			100.92
16-Jun-87	4		8.17	0.00	8.17	0.0	8.17	92.75	I			100.92
30-Jun-87	4	8.15	(1.00)	.00	8.15	.0	8.15	92.77	I			100.92
14-Jul-87	4		8.26	0.00	8.26	0.0	8.26	92.66	I			100.92
28-Jul-87	4		8.30	0.00	8.30	0.0	8.30	92.62	I			100.92
11-Aug-87	4	8.05	(1.00)	.00	8.05	.0	8.05	92.87	I			100.92
25-Aug-87	4	8.01	(1.00)	.00	8.01	.0	8.01	92.91	I			100.92



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00			
08-Sep-87	4	7.90	(1.00)	.00	7.90	.0	7.90	93.02	I		100.92
22-Sep-87	4		7.90	0.00	7.90	0.0	7.90	93.02	I		100.92
06-Oct-87	4		7.80	0.00	7.80	0.0	7.80	93.12	I		100.92
20-Oct-87	4	7.81	(1.00)	.00	7.81	.0	7.81	93.11	I		100.92
03-Nov-87	4		7.65	0.00	7.65	0.0	7.65	93.27	I		100.92
17-Nov-87	4		7.82	0.00	7.82	0.0	7.82	93.10	I		100.92
01-Dec-87	4		7.90	0.00	7.90	0.0	7.90	93.02	I		100.92
15-Dec-87	4		7.92	0.00	7.92	0.0	7.92	93.00	I		100.92
29-Dec-87	4		8.13	0.00	8.13	0.0	8.13	92.79	I		100.92
05-Jun-86	5		7.46	0.00	7.46	0.0	7.46	-7.46	X		
19-Jun-86	5		8.35	0.00	8.35	0.0	8.35	-8.35	X		
03-Jul-86	5		8.89	0.00	8.89	0.0	8.89	-8.89	X		
17-Jul-86	5		8.76	0.00	8.76	0.0	8.76	-8.76	X		
31-Jul-86	5		8.34	0.00	8.34	0.0	8.34	-8.34	X		
14-Aug-86	5		8.70	0.00	8.70	0.0	8.70	-8.70	X		
28-Aug-86	5		8.79	0.00	8.79	0.0	8.79	-8.79	X		
11-Sep-86	5		8.70	0.00	8.70	0.0	8.70	-8.70	X		
02-Oct-86	5		8.80	0.00	8.80	0.0	8.80	-8.80	X		
16-Oct-86	5		8.61	0.00	8.61	0.0	8.61	-8.61	X		
30-Oct-86	5		8.52	0.00	8.52	0.0	8.52	-8.52	X		
10-Nov-86	5		8.62	0.00	8.62	0.0	8.62	-8.62	X		
24-Nov-86	5		8.98	0.00	8.98	0.0	8.98	-8.98	X		
08-Dec-86	5		9.03	0.00	9.03	0.0	9.03	-9.03	X		
22-Dec-86	5		9.05	0.00	9.05	0.0	9.05	-9.05	X		
05-Jan-87	5		9.11	0.00	9.11	0.0	9.11	-9.11	X		
19-Jan-87	5		9.30	0.00	9.30	0.0	9.30	-9.30	X		
02-Feb-87	5		8.37	0.00	8.37	0.0	8.37	-8.37	X		
23-Feb-87	5		8.35	0.00	8.35	0.0	8.35	-8.35	X		
09-Mar-87	5		8.62	0.00	8.62	0.0	8.62	-8.62	X		
23-Mar-87	5		5.47	0.00	5.47	0.0	5.47	-5.47	X		
07-Apr-87	5		8.28	0.00	8.28	0.0	8.28	-8.28	X		
21-Apr-87	5		8.27	0.00	8.27	0.0	8.27	-8.27	X		
05-May-87	5		8.25	0.00	8.25	0.0	8.25	-8.25	X		
20-May-87	5		8.60	0.00	8.60	0.0	8.60	-8.60	X		
02-Jun-87	5		6.47	0.00	6.47	0.0	6.47	-6.47	X		
16-Jun-87	5		8.75	0.00	8.75	0.0	8.75	-8.75	X		
30-Jun-87	5		8.78	0.00	8.78	0.0	8.78	-8.78	X		
14-Jul-87	5		8.62	0.00	8.62	0.0	8.62	-8.62	X		
28-Jul-87	5		8.90	0.00	8.90	0.0	8.90	-8.90	X		
11-Aug-87	5		8.99	0.00	8.99	0.0	8.99	-8.99	X		
25-Aug-87	5		8.95	0.00	8.95	0.0	8.95	-8.95	X		
08-Sep-87	5		8.79	0.00	8.79	0.0	8.79	-8.79	X		
22-Sep-87	5		8.65	0.00	8.65	0.0	8.65	-8.65	X		
06-Oct-87	5		8.30	0.00	8.30	0.0	8.30	-8.30	X		
20-Oct-87	5		8.51	0.00	8.51	0.0	8.51	-8.51	X		
03-Nov-87	5		8.48	0.00	8.48	0.0	8.48	-8.48	X		
17-Nov-87	5		8.80	0.00	8.80	0.0	8.80	-8.80	X		
01-Dec-87	5		8.84	0.00	8.84	0.0	8.84	-8.84	X		
15-Dec-87	5		8.66	0.00	8.66	0.0	8.66	-8.66	X		
29-Dec-87	5		8.95	0.00	8.95	0.0	8.95	-8.95	X		
05-Jun-86	6		8.81	0.00	8.81	0.0	8.81	91.89	X		100.70
19-Jun-86	6		9.00	0.00	9.00	0.0	9.00	91.70	X		100.70



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	I	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
03-Jul-86	6		9.56	0.00	9.56	0.0	9.56	91.14	I			100.70
17-Jul-86	6		8.63	0.00	8.63	0.0	8.63	92.07	I			100.70
31-Jul-86	6		8.29	0.00	8.29	0.0	8.29	92.41	I			100.70
14-Aug-86	6		8.76	0.00	8.76	0.0	8.76	91.94	I			100.70
28-Aug-86	6		8.91	0.00	8.91	0.0	8.91	91.79	I			100.70
11-Sep-86	6		9.15	0.00	9.15	0.0	9.15	91.55	I			100.70
02-Oct-86	6		8.96	0.00	8.96	0.0	8.96	91.74	I			100.70
16-Oct-86	6		9.21	0.00	9.21	0.0	9.21	91.49	I			100.70
30-Oct-86	6		7.60	0.00	7.60	0.0	7.60	93.10	I			100.70
10-Nov-86	6		8.72	0.00	8.72	0.0	8.72	91.98	I			100.70
24-Nov-86	6		9.17	0.00	9.17	0.0	9.17	91.53	I			100.70
08-Dec-86	6		8.48	0.00	8.48	0.0	8.48	92.22	I			100.70
22-Dec-86	6	7.50	(1.00)	.00	7.50	.0	7.50	93.20	I			100.70
05-Jan-87	6		7.95	0.00	7.95	0.0	7.95	92.75	I			100.70
19-Jan-87	6		9.45	0.00	9.45	0.0	9.45	91.25	I			100.70
02-Feb-87	6		8.01	0.00	8.01	0.0	8.01	92.69	I			100.70
23-Feb-87	6		8.38	0.00	8.38	0.0	8.38	92.32	I			100.70
09-Mar-87	6		8.49	0.00	8.49	0.0	8.49	92.21	I			100.70
23-Mar-87	6		8.50	0.00	8.50	0.0	8.50	92.20	I			100.70
07-Apr-87	6		8.24	0.00	8.24	0.0	8.24	92.46	I			100.70
21-Apr-87	6		7.18	0.00	7.18	0.0	7.18	93.52	I			100.70
05-May-87	6	7.28	(1.00)	.00	7.28	.0	7.28	93.42	I			100.70
20-May-87	6	7.90	(1.00)	0.01	7.90	.0	7.90	92.80	I			100.70
02-Jun-87	6		8.50	0.00	8.50	0.0	8.50	92.20	I			100.70
16-Jun-87	6	8.46	(1.00)	.00	8.46	.0	8.46	92.24	I			100.70
30-Jun-87	6		8.55	0.00	8.55	0.0	8.55	92.15	I			100.70
14-Jul-87	6	8.63	(1.00)	.00	8.63	.0	8.63	92.07	I			100.70
28-Jul-87	6	9.1	(1.00)	0.01	9.10	.0	9.10	91.60	I			100.70
11-Aug-87	6	7.85	(1.00)	0.01	7.85	.0	7.85	92.85	I			100.70
25-Aug-87	6	7.97	(1.00)	0.01	7.97	.0	7.97	92.73	I			100.70
08-Sep-87	6	8.15	(1.00)	0.01	8.15	.0	8.15	92.55	I			100.70
22-Sep-87	6	7.95	(1.00)	.00	7.95	.0	7.95	92.75	I			100.70
06-Oct-87	6	7.30	(1.00)	.00	7.30	.0	7.30	93.40	I			100.70
20-Oct-87	6	7.74	(1.00)	.00	7.74	.0	7.74	92.96	I			100.70
03-Nov-87	6	7.84	(1.00)	.00	7.84	.0	7.84	92.86	I			100.70
17-Nov-87	6	7.21	(1.00)	.00	7.21	.0	7.21	93.49	I			100.70
01-Dec-87	6	6.98	(1.00)	.00	6.98	.0	6.98	93.72	I			100.70
15-Dec-87	6	8.45	(1.00)	.00	8.45	.0	8.45	92.25	I			100.70
29-Dec-87	6		7.40	0.00	7.40	0.0	7.40	93.30	I			100.70
05-Jun-86	7		8.40	0.00	8.40	0.0	8.40	ERR	I			
19-Jun-86	7		8.56	0.00	8.56	0.0	8.56	92.32	I			100.88
03-Jul-86	7		8.76	0.00	8.76	0.0	8.76	92.12	I			100.88
17-Jul-86	7		8.26	0.00	8.26	0.0	8.26	92.62	I			100.88
31-Jul-86	7		7.84	0.00	7.84	0.0	7.84	93.04	I			100.88
14-Aug-86	7		8.38	0.00	8.38	0.0	8.38	92.50	I			100.88
28-Aug-86	7		8.60	0.00	8.60	0.0	8.60	92.28	I			100.88
11-Sep-86	7		8.51	0.00	8.51	0.0	8.51	92.37	I			100.88
02-Oct-86	7		8.90	0.00	8.90	0.0	8.90	91.98	I			100.88
16-Oct-86	7		8.70	0.00	8.70	0.0	8.70	92.18	I			100.88
30-Oct-86	7		8.19	0.00	8.19	0.0	8.19	92.69	I			100.88
10-Nov-86	7		8.93	0.00	8.93	0.0	8.93	91.95	I			100.88
24-Nov-86	7	8.97	(1.00)	.00	8.97	.0	8.97	91.91	I			100.88

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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	I	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	I			
08-Dec-86	7		8.81	0.00	8.81	0.0	8.81	92.07	I			100.88
22-Dec-86	7		9.00	0.00	9.00	0.0	9.00	91.88	I			100.88
05-Jan-87	7		8.67	0.00	8.67	0.0	8.67	92.21	I			100.88
19-Jan-87	7		9.17	0.00	9.17	0.0	9.17	91.71	I			100.88
02-Feb-87	7		8.72	0.00	8.72	0.0	8.72	92.16	I			100.88
23-Feb-87	7		8.47	0.00	8.47	0.0	8.47	92.41	I			100.88
09-Mar-87	7		8.73	0.00	8.73	0.0	8.73	92.15	I			100.88
23-Mar-87	7		6.70	0.00	6.70	0.0	6.70	94.18	I			100.88
07-Apr-87	7		8.71	0.00	8.71	0.0	8.71	92.17	I			100.88
21-Apr-87	7		8.01	0.00	8.01	0.0	8.01	92.87	I			100.88
05-May-87	7		7.90	0.00	7.90	0.0	7.90	92.98	I			100.88
20-May-87	7		8.50	0.00	8.50	0.0	8.50	92.38	I			100.88
02-Jun-87	7		8.40	0.00	8.40	0.0	8.40	92.48	I			100.88
16-Jun-87	7		8.77	0.00	8.77	0.0	8.77	92.11	I			100.88
30-Jun-87	7		8.81	0.00	8.81	0.0	8.81	92.07	I			100.88
14-Jul-87	7		8.77	0.00	8.77	0.0	8.77	92.11	I			100.88
28-Jul-87	7	8.9	(1.00)	.00	8.90	.0	8.90	91.98	X			100.88
11-Aug-87	7	8.59	(1.00)	.00	8.59	.0	8.59	92.29	X			100.88
25-Aug-87	7		8.30	0.00	8.30	0.0	8.30	92.58	X			100.88
08-Sep-87	7		8.32	0.00	8.32	0.0	8.32	92.56	X			100.88
22-Sep-87	7		8.24	0.00	8.24	0.0	8.24	92.64	X			100.88
06-Oct-87	7		7.87	0.00	7.87	0.0	7.87	93.01	X			100.88
20-Oct-87	7		8.10	0.00	8.10	0.0	8.10	92.78	X			100.88
03-Nov-87	7		8.31	0.00	8.31	0.0	8.31	92.57	X			100.88
17-Nov-87	7		7.91	0.00	7.91	0.0	7.91	92.97	X			100.88
01-Dec-87	7		7.72	0.00	7.72	0.0	7.72	93.16	X			100.88
15-Dec-87	7		8.70	0.00	8.70	0.0	8.70	92.18	X			100.88
29-Dec-87	7		8.80	0.00	8.80	0.0	8.80	92.08	X			100.88
05-Jun-86	8		9.03	0.00	9.03	0.0	9.03	91.81	X			100.84
19-Jun-86	8		9.27	0.00	9.27	0.0	9.27	91.57	X			100.84
03-Jul-86	8		9.35	0.00	9.35	0.0	9.35	91.49	X			100.84
17-Jul-86	8		9.43	0.00	9.43	0.0	9.43	91.41	X			100.84
31-Jul-86	8		9.13	0.00	9.13	0.0	9.13	91.71	X			100.84
14-Aug-86	8		9.47	0.00	9.47	0.0	9.47	91.37	X			100.84
28-Aug-86	8		9.19	0.00	9.19	0.0	9.19	91.65	X			100.84
11-Sep-86	8		9.66	0.00	9.66	0.0	9.66	91.18	X			100.84
02-Oct-86	8		9.54	0.00	9.54	0.0	9.54	91.30	X			100.84
16-Oct-86	8		9.64	0.00	9.64	0.0	9.64	91.20	X			100.84
30-Oct-86	8		9.64	0.00	9.64	0.0	9.64	91.20	X			100.84
10-Nov-86	8		9.79	0.00	9.79	0.0	9.79	91.05	X			100.84
24-Nov-86	8	9.90	(1.00)	.00	9.90	.0	9.90	90.94	X			100.84
08-Dec-86	8		10.00	0.00	10.00	0.0	10.00	90.84	X			100.84
22-Dec-86	8		9.95	0.00	9.95	0.0	9.95	90.89	X			100.84
05-Jan-87	8		9.98	0.00	9.98	0.0	9.98	90.86	X			100.84
19-Jan-87	8		10.12	0.00	10.12	0.0	10.12	90.72	X			100.84
02-Feb-87	8		9.03	0.00	9.03	0.0	9.03	91.81	X			100.84
23-Feb-87	8		9.24	0.00	9.24	0.0	9.24	91.60	X			100.84
09-Mar-87	8		9.62	0.00	9.62	0.0	9.62	91.22	X			100.84
23-Mar-87	8		9.54	0.00	9.54	0.0	9.54	91.30	X			100.84
07-Apr-87	8		9.77	0.00	9.77	0.0	9.77	91.07	X			100.84
21-Apr-87	8		9.51	0.00	9.51	0.0	9.51	91.33	X			100.84
05-May-87	8		9.43	0.00	9.43	0.0	9.43	91.41	X			100.84



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	X	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	X			
									X			
20-May-87	8		9.62	0.00	9.62	0.0	9.62	91.22	X			100.84
02-Jun-87	8		9.47	0.00	9.47	0.0	9.47	91.37	X			100.84
16-Jun-87	8	9.70	(1.00)	.00	9.70	.0	9.70	91.14	X			100.84
30-Jun-87	8	9.78	(1.00)	.00	9.78	.0	9.78	91.06	X			100.84
14-Jul-87	8		9.65	0.00	9.65	0.0	9.65	91.19	X			100.84
28-Jul-87	8		9.81	0.00	9.81	0.0	9.81	91.03	X			100.84
11-Aug-87	8		9.80	0.00	9.80	0.0	9.80	91.04	X			100.84
25-Aug-87	8		9.72	0.00	9.72	0.0	9.72	91.12	X			100.84
08-Sep-87	8		9.73	0.00	9.73	0.0	9.73	91.11	X			100.84
22-Sep-87	8		9.72	0.00	9.72	0.0	9.72	91.12	X			100.84
06-Oct-87	8		9.50	0.00	9.50	0.0	9.50	91.34	X			100.84
20-Oct-87	8		9.63	0.00	9.63	0.0	9.63	91.21	X			100.84
03-Nov-87	8		9.62	0.00	9.62	0.0	9.62	91.22	X			100.84
17-Nov-87	8		9.66	0.00	9.66	0.0	9.66	91.18	X			100.84
01-Dec-87	8		9.89	0.00	9.89	0.0	9.89	90.95	X			100.84
15-Dec-87	8		9.65	0.00	9.65	0.0	9.65	91.19	X			100.84
29-Dec-87	8		9.85	0.00	9.85	0.0	9.85	90.99	X			100.84
05-Jun-86	9	9.21	(1.00)	0.06	9.22	0.1	9.21	91.56	X			100.77
19-Jun-86	9	9.33	(1.00)	0.05	9.33	0.1	9.33	91.44	X			100.77
03-Jul-86	9	10.12	(1.00)	0.03	10.12	.0	10.12	90.65	X			100.77
17-Jul-86	9	9.37	(1.00)	0.06	9.38	0.1	9.37	91.40	X			100.77
31-Jul-86	9	9.04	(1.00)	0.06	9.05	0.1	9.04	91.73	X			100.77
14-Aug-86	9	9.52	(1.00)	0.06	9.53	0.1	9.52	91.25	X			100.77
28-Aug-86	9	9.80	(1.00)	0.05	9.80	0.1	9.80	90.97	X			100.77
11-Sep-86	9	9.64	(1.00)	0.09	9.65	0.1	9.64	91.13	X			100.77
02-Oct-86	9	9.60	(1.00)	0.05	9.60	0.1	9.60	91.17	X			100.77
16-Oct-86	9	9.70	(1.00)	0.04	9.70	.0	9.70	91.07	X			100.77
30-Oct-86	9	9.67	(1.00)	0.20	9.69	0.2	9.67	91.10	X			100.77
10-Nov-86	9	9.82	(1.00)	0.20	9.84	0.2	9.82	90.95	X			100.77
24-Nov-86	9	9.93	(1.00)	0.20	9.95	0.2	9.93	90.84	X			100.77
08-Dec-86	9	9.95	(1.00)	0.03	9.95	.0	9.95	90.82	X			100.77
22-Dec-86	9	10.05	(1.00)	0.15	10.06	0.2	10.05	90.72	X			100.77
05-Jan-87	9	9.92	(1.00)	0.15	9.93	0.2	9.92	90.85	X			100.77
19-Jan-87	9	10.01	(1.00)	0.07	10.02	0.1	10.01	90.76	X			100.77
02-Feb-87	9	8.84	(1.00)	0.05	8.84	0.1	8.84	91.93	X			100.77
23-Feb-87	9	9.10	(1.00)	0.04	9.10	.0	9.10	91.67	X			100.77
09-Mar-87	9	9.58	(1.00)	0.05	9.58	0.1	9.58	91.19	X			100.77
23-Mar-87	9	9.55	(1.00)	0.10	9.56	0.1	9.55	91.22	X			100.77
07-Apr-87	9	9.23	(1.00)	0.05	9.23	0.1	9.23	91.54	X			100.77
21-Apr-87	9	9.32	(1.00)	0.06	9.33	0.1	9.32	91.45	X			100.77
05-May-87	9	9.31	(1.00)	0.03	9.31	.0	9.31	91.46	X			100.77
20-May-87	9	9.65	(1.00)	0.05	9.65	0.1	9.65	91.12	X			100.77
02-Jun-87	9	9.49	(1.00)	0.48	9.53	0.5	9.49	91.27	X			100.77
16-Jun-87	9	9.66	(1.00)	0.20	9.68	0.2	9.66	91.11	X			100.77
30-Jun-87	9	9.89	(1.00)	0.20	9.91	0.2	9.89	90.88	X			100.77
14-Jul-87	9	9.70	(1.00)	0.03	9.70	.0	9.70	91.07	X			100.77
28-Jul-87	9	9.77	(1.00)	0.60	9.82	0.6	9.77	90.99	X			100.77
11-Aug-87	9	9.91	(1.00)	0.20	9.93	0.2	9.91	90.86	X			100.77
25-Aug-87	9	9.84	(1.00)	0.25	9.86	0.3	9.84	90.92	X			100.77
08-Sep-87	9	9.83	(1.00)	0.20	9.85	0.2	9.83	90.94	X			100.77
22-Sep-87	9	9.77	(1.00)	0.20	9.79	0.2	9.77	91.00	X			100.77
06-Oct-87	9	9.59	(1.00)	0.20	9.61	0.2	9.59	91.18	X			100.77



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	X	WT-G	HC	C-ELEV
					0.00	0.0	0.00	0.00	X			
20-Oct-87	9	9.78	(1.00)	0.15	9.79	0.2	9.78	90.99	X			100.77
03-Nov-87	9	9.69	(1.00)	0.15	9.70	0.2	9.69	91.08	X			100.77
17-Nov-87	9	9.78	(1.00)	0.10	9.79	0.1	9.78	90.99	X			100.77
01-Dec-87	9	10.00	(1.00)	0.10	10.01	0.1	10.00	90.77	X			100.77
15-Dec-87	9	9.85	(1.00)	0.10	9.86	0.1	9.85	90.92	X			100.77
29-Dec-87	9		D/V		ERR	0.0	ERR	ERR	X			100.77
05-Jun-86	10			9.18	0.00	9.18	0.0	9.18	91.50	X		100.68
19-Jun-86	10			9.26	0.00	9.26	0.0	9.26	91.42	X		100.68
03-Jul-86	10			9.30	0.00	9.30	0.0	9.30	91.38	X		100.68
17-Jul-86	10			9.38	0.00	9.38	0.0	9.38	91.30	X		100.68
31-Jul-86	10			9.01	0.00	9.01	0.0	9.01	91.67	X		100.68
14-Aug-86	10			9.48	0.00	9.48	0.0	9.48	91.20	X		100.68
28-Aug-86	10			8.75	0.00	8.75	0.0	8.75	91.93	X		100.68
11-Sep-86	10			9.60	0.00	9.60	0.0	9.60	91.08	X		100.68
02-Oct-86	10			8.30	0.00	8.30	0.0	8.30	92.38	X		100.68
16-Oct-86	10			8.98	0.00	8.98	0.0	8.98	91.70	X		100.68
30-Oct-86	10			8.95	0.00	8.95	0.0	8.95	91.73	X		100.68
10-Nov-86	10			9.05	0.00	9.05	0.0	9.05	91.63	X		100.68
24-Nov-86	10			8.49	0.00	8.49	0.0	8.49	92.19	X		100.68
08-Dec-86	10			8.25	0.00	8.25	0.0	8.25	92.43	X		100.68
22-Dec-86	10	5.97	(1.00)	.00	5.97	.0	5.97	94.71	X			100.68
05-Jan-87	10			7.62	0.00	7.62	0.0	7.62	93.06	X		100.68
19-Jan-87	10			9.48	0.00	9.48	0.0	9.48	91.20	X		100.68
02-Feb-87	10			6.72	0.00	6.72	0.0	6.72	93.96	X		100.68
23-Feb-87	10			8.90	0.00	8.90	0.0	8.90	91.78	X		100.68
09-Mar-87	10			8.41	0.00	8.41	0.0	8.41	92.27	X		100.68
23-Mar-87	10			5.96	0.00	5.96	0.0	5.96	94.72	X		100.68
07-Apr-87	10			8.50	0.00	8.50	0.0	8.50	92.18	X		100.68
21-Apr-87	10			9.16	0.00	9.16	0.0	9.16	91.52	X		100.68
05-May-87	10			8.54	0.00	8.54	0.0	8.54	92.14	X		100.68
20-May-87	10			9.35	0.00	9.35	0.0	9.35	91.33	X		100.68
02-Jun-87	10			9.43	0.00	9.43	0.0	9.43	91.25	X		100.68
16-Jun-87	10			9.44	0.00	9.44	0.0	9.44	91.24	X		100.68
30-Jun-87	10			9.23	0.00	9.23	0.0	9.23	91.45	X		100.68
14-Jul-87	10			9.67	0.00	9.67	0.0	9.67	91.01	X		100.68
28-Jul-87	10			9.66	0.00	9.66	0.0	9.66	91.02	X		100.68
11-Aug-87	10			8.80	0.00	8.80	0.0	8.80	91.88	X		100.68
25-Aug-87	10	8.24	(1.00)	.00	8.24	.0	8.24	92.44	X			100.68
08-Sep-87	10			6.64	0.00	6.64	0.0	6.64	94.04	X		100.68
22-Sep-87	10			6.51	0.00	6.51	0.0	6.51	94.17	X		100.68
06-Oct-87	10			5.84	0.00	5.84	0.0	5.84	94.84	X		100.68
20-Oct-87	10			6.41	0.00	6.41	0.0	6.41	94.27	X		100.68
03-Nov-87	10			6.10	0.00	6.10	0.0	6.10	94.58	X		100.68
17-Nov-87	10			5.10	0.00	5.10	0.0	5.10	95.58	X		100.68
01-Dec-87	10			5.71	0.00	5.71	0.0	5.71	94.97	X		100.68
15-Dec-87	10			7.94	0.00	7.94	0.0	7.94	92.74	X		100.68
29-Dec-87	10			5.72	0.00	5.72	0.0	5.72	94.96	X		100.68
22-Dec-86	11	7.95	(1.00)	.00	7.95	.0	7.95	92.36	X			100.31
05-Jan-87	11		DESTROYED	1/5/8	ERR	0.0	ERR	ERR	X			100.31
02-Feb-87	11	8.00	(1.00)	.00	8.00	.0	8.00	92.31	X			100.31
09-Mar-87	11			7.29	0.00	7.29	0.0	7.29	93.02	X		100.31
23-Mar-87	11			7.14	0.00	7.14	0.0	7.14	93.17	X		100.31



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DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	Y	WT-G	HC	C.ELEV
					0.00	0.0	0.00	0.00	Y			
07-Apr-87	11		7.52	0.00	7.52	0.0	7.52	92.79	Y			100.31
21-Apr-87	11		7.43	0.00	7.43	0.0	7.43	92.88	Y			100.31
05-May-87	11	7.37	(1.00)	.00	7.37	.0	7.37	92.94	Y			100.31
20-May-87	11		7.33	0.00	7.33	0.0	7.33	92.98	Y			100.31
02-Jun-87	11		7.34	0.00	7.34	0.0	7.34	92.97	Y			100.31
16-Jun-87	11		7.47	0.00	7.47	0.0	7.47	92.84	Y			100.31
30-Jun-87	11		7.46	0.00	7.46	0.0	7.46	92.85	Y			100.31
14-Jul-87	11	7.55	(1.00)	.00	7.55	.0	7.55	92.76	Y			100.31
28-Jul-87	11		7.49	0.00	7.49	0.0	7.49	92.82	Y			100.31
11-Aug-87	11		7.35	0.00	7.35	0.0	7.35	92.96	Y			100.31
25-Aug-87	11	7.28	(1.00)	.00	7.28	.0	7.28	93.03	X			100.31
08-Sep-87	11		7.16	0.00	7.16	0.0	7.16	93.15	Y			100.31
22-Sep-87	11		7.21	0.00	7.21	0.0	7.21	93.10	Y			100.31
06-Oct-87	11		7.15	0.00	7.15	0.0	7.15	93.16	Y			100.31
20-Oct-87	11		7.12	0.00	7.12	0.0	7.12	93.19	X			100.31
03-Nov-87	11		6.92	0.00	6.92	0.0	6.92	93.39	X			100.31
17-Nov-87	11		7.12	0.00	7.12	0.0	7.12	93.19	X			100.31
01-Dec-87	11		7.22	0.00	7.22	0.0	7.22	93.09	Y			100.31
15-Dec-87	11		7.20	0.00	7.20	0.0	7.20	93.11	Y			100.31
29-Dec-87	11		7.44	0.00	7.44	0.0	7.44	92.87	X			100.31



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GeoStrategies Inc.

APPENDIX B

CHEMICAL ANALYTICAL REPORTS

(January through March, 1989)



INTERNATIONAL
TECHNOLOGY
CORPORATION

RECEIVED

MAR 14 1989

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

GETTLER-RYAN INC.
March 4, 1989

ATTN: John Werfal

Following are the results of analyses on the samples described below.

Project: GR #3605, 1800 Powell St and I-580/80, Emeryville
Lab Numbers: S9-02-152-01 thru S9-02-152-07
Number of Samples: 7
Sample Type: Water
Date Received: 2/13/89
Analyses Requested: Low Boiling Hydrocarbons

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.

ITAS/San Jose Lab Number	Client Sample Identification	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-02-152-01	S-5	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-02	S-6	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-03	S-7	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-04	S-8	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-05	S-10	2/11/89	2/23/89	Cool, pH \leq 2
S9-02-152-06	SD-5	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-07	Trip Blank	2/10/89	2/21/89	Cool, pH \leq 2


Fred Rouse

FR/mlh

1 Page Following - Table of Results

ITAS/San Jose to Gettler-Ryan
ATTN: John Werfal

March 4, 1989
Page 1 of 1

Project: GR #3605, 1800 Powell St and I-580/80,
Emeryville

ND = None Detected

Lab Number	Sample Identification	Summary of Results - Milligrams per Liter				
		Low Boiling Hydrocarbons (calculated as gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes
S9-02-152-01	S-5	2.9	0.55	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-02	S-6	2.8	0.74	0.02	0.02	0.14
Detection Limits		1.0	0.01	0.02	0.02	0.06
S9-02-152-03	S-7	0.05	0.0009	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003
S9-02-152-04	S-8	0.5	0.16	0.005	ND	0.017
Detection Limits		0.1	0.001	0.002	0.002	0.008
S9-02-152-05	S-10	6.5	0.48	0.7	0.1	1.8
Detection Limits		5.0	0.05	0.1	0.1	0.3
S9-02-152-06	SD-5	3.2	0.57	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-07	Trip Blank	ND	ND	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003

GeoStrategies Inc.

APPENDIX C

GETTLER-RYAN INC. GROUNDWATER SAMPLING REPORT



gettler — ryan inc.

March 9, 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: February 10, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on February 10, 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 eleven groundwater monitoring wells on 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 7.83 to 10.82 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 trip blank, supplied by the laboratory, was included and analyzed to assess quality control. A duplicate sample (SD-5) was submitted without a well designation to assess laboratory performance. Analytical results for the duplicate sample is 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.



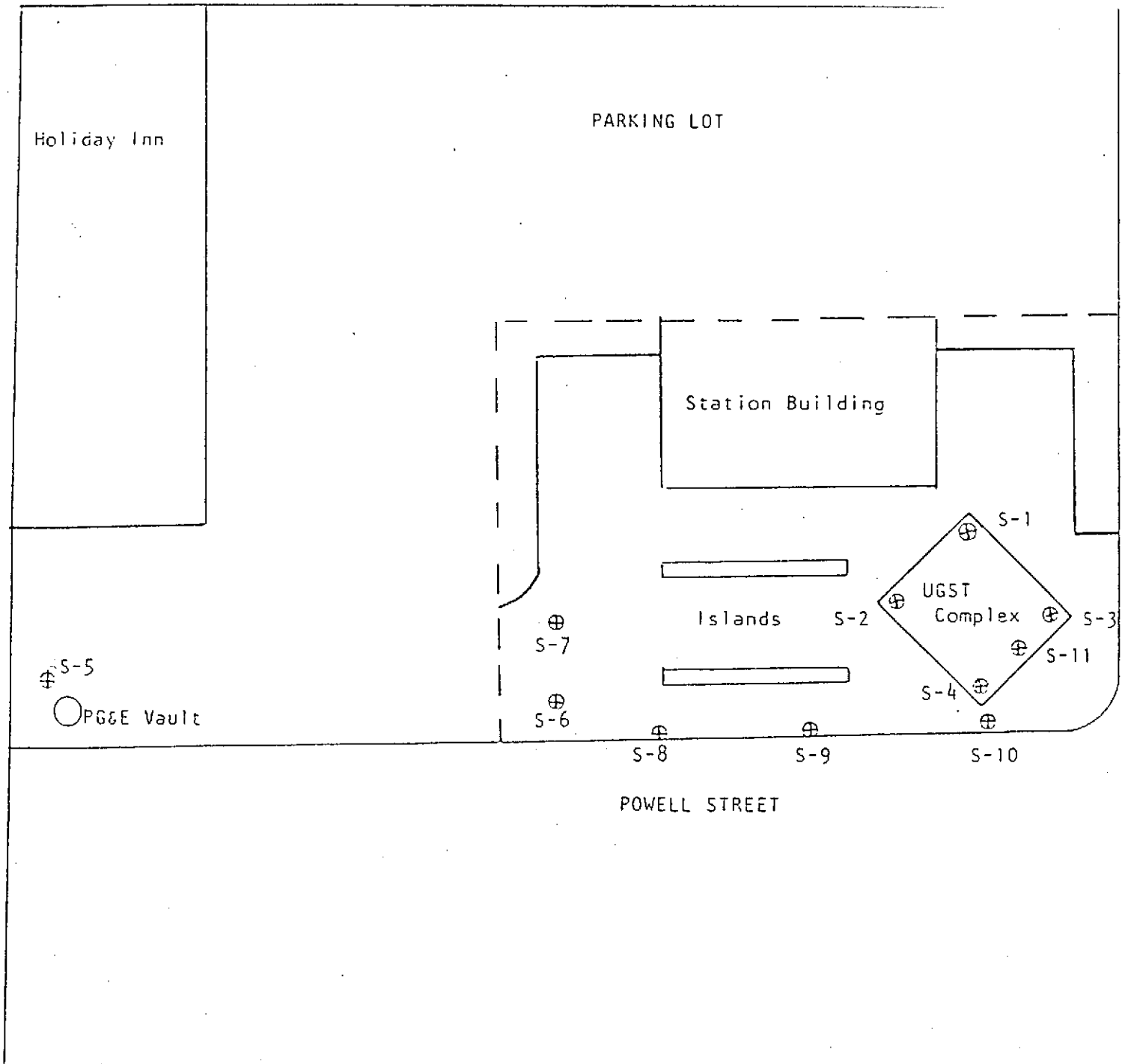
Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

<u>WELL I.D.</u>	S-5 SD-5	S-6	S-7	S-8	S-9	S-10
Casing Diameter (inches)	8	8	8	3	----	6
Total Well Depth (feet)	12.0	11.7	16.3	19.3	----	19.2
Depth to Water (feet)	9.80	9.64	10.82	10.80	10.1	7.83
Free Product (feet)	sheen	sheen	none	none	1.3	none
Reason Not Sampled	----	----	----	----	free product	----
Ideal 5 Case Vol.(gallons)	28.6	26.8	71.2	16.2	----	85.3
Did Well Dewater?	no	no	no	no	----	yes
Volume Evacuated (gallons)	28.6	27.0	71.2	17.0	----	21.0
Purging Device	Suction	Suction	Suction	Suction	----	Suction
Sampling Device	Bailer	Bailer	Bailer	Bailer	----	Bailer
Time	13:04	14:35	13:56	15:09	----	16:01
Temperature (F)*	60.7	63.6	63.9	67.7	----	67.2
pH*	6.83	6.21	6.88	7.03	----	6.68
Conductivity (umhos/cm)*	2140	754	9700	8710	----	2110

* Indicates Stabilized Value



LEGEND

⊕ Monitoring well



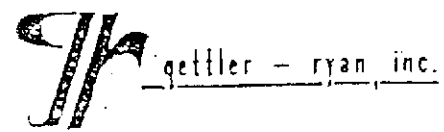
SITE:

Shell Service Station

SITE LOC.:

1800 Powell Street
Emeryville, California
JOB # 605

FIGURE





RECEIVED

MAR 14 1989

Gettler-Ryan
1992 National Avenue
Hayward, CA 94545

GETTLER-RYAN INC.
March 4, 1989
COSTA MESA, CALIFORNIA

ATTN: John Werfal

Following are the results of analyses on the samples described below.

Project: GR #3605, 1800 Powell St and I-580/80, Emeryville
Lab Numbers: S9-02-152-01 thru S9-02-152-07
Number of Samples: 7
Sample Type: Water
Date Received: 2/13/89
Analyses Requested: Low Boiling Hydrocarbons

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.

ITAS/San Jose Lab Number	Client Sample Identification	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-02-152-01	S-5	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-02	S-6	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-03	S-7	2/10/89	2/22/89	Cool, pH \leq 2
S9-02-152-04	S-8	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-05	S-10	2/11/89	2/23/89	Cool, pH \leq 2
S9-02-152-06	SD-5	2/10/89	2/21/89	Cool, pH \leq 2
S9-02-152-07	Trip Blank	2/10/89	2/21/89	Cool, pH \leq 2

Fred Rouse

FR/mlh
1 Page Following - Table of Results

ITAS/San Jose to Gettler-Ryan
ATTN: John Werfal

March 4, 1989
Page 1 of 1

Project: GR #3605, 1800 Powell St and I-580/80,
Emeryville

ND = None Detected

Lab Number	Sample Identification	Summary of Results - Milligrams per Liter				
		Low Boiling Hydrocarbons (calculated as gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes
S9-02-152-01	S-5	2.9	0.55	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-02	S-6	2.8	0.74	0.02	0.02	0.14
Detection Limits		1.0	0.01	0.02	0.02	0.06
S9-02-152-03	S-7	0.05	0.0009	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003
S9-02-152-04	S-8	0.5	0.16	0.005	ND	0.017
Detection Limits		0.1	0.001	0.002	0.002	0.008
S9-02-152-05	S-10	6.5	0.48	0.7	0.1	1.8
Detection Limits		5.0	0.05	0.1	0.1	0.3
S9-02-152-06	SD-5	3.2	0.57	0.02	0.02	0.03
Detection Limits		0.5	0.005	0.01	0.01	0.03
S9-02-152-07	Trip Blank	ND	ND	ND	ND	ND
Detection Limits		0.05	0.0005	0.001	0.001	0.003

COMPANY Shell Oil Company

JOB NO. 0124

JOB LOCATION 18000 Bouch St. / I-580, 800

CITY Emeryville, CA

PHONE NO. (415) 243-7500

AUTHORIZED John Wenzel

DATE 2/10/89

P.O. NO. 3605

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
S-5	3	Liquid	2-10 / 1309	THC (C ₀₁) 10% ↓	Cool / OK
S-6	↓	↓	1435		
S-7	↓	↓	1356		
S-8	↓	↓	1509		
S-10	↓	↓	2-11 / 1600		
SN-5	↓	↓	2-10 / 1304		
Trip Blank	2	↓	2-3 / -		

RELINQUISHED BY:

Phyllis J. Page 2/13/89 0743

RELINQUISHED BY:

John Wenzel 2/13/89 1050

RELINQUISHED BY:

RECEIVED BY:

John Wenzel 2/13/89 0743

RECEIVED BY:

RECEIVED BY LAB:

Gabantha 2/13/89 1050

DHS #: 137

DESIGNATED LABORATORY: IT SCU

REMARKS:

Normal TAT

DATE COMPLETED

2/10/89

FOREMAN

Phyllis J. Page

ORIGINAL

GeoStrategies Inc.

APPENDIX D

GETTLER-RYAN INC. SAMPLING PROTOCOL

ATTACHMENT A
SAMPLING AND ANALYSIS PROCEDURES

INTRODUCTION

The sampling and analysis procedures for Gettler-Ryan Inc. groundwater quality monitoring projects are explained in the appendix, including procedures and techniques for groundwater sample collection, analytical procedures, and chain-of-custody control. These procedures ensure that (1) consistent and reproducible methods will be used to obtain samples from monitoring wells and that (2) proper analyses will be performed on the samples.

The procedures described in this appendix are based on:

Procedures Manual for Ground-Water Monitoring at Solid Waste Disposal Facilities (EPA-530/SW-611, August 1977)

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (EPA SW-846, 3rd. edition, November 1986)

Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (EPA-600/4-82/057, July 1982)

RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (OSWER 9950.1, September 1986)

SAMPLE COLLECTION

Sample collection procedures include equipment cleaning, water level measurements, well purging, sampling and sample preservation and shipment.

Equipment Cleaning

Before starting the sampling event, all equipment that would be placed in the well or come in contact with ground water will be disassembled and cleaned thoroughly with detergent water, and then steamed with deionized water. Any parts that might absorb contaminants, such as plastic pump valves, will be cleaned as described above.

Sample bottles, bottle caps, and septa for use in sampling for volatile organics will be thoroughly cleaned laboratory prepared containers. Sample bottles, bottle caps and septa will be protected from all phases of hydrocarbon contact before the actual usage at the sample site. When plastic bottles and caps are used, they will be constructed of linear polyethylene.

When required, a positive displacement Teflon and stainless steel bladder pump will be cleaned as described above and reassembled. Organic free water will be then pumped through the system to obtain a pump blank. The pump effluent will be sampled and analyzed for the indicator compounds trichloroethylene, tetrachloroethylene, benzene, toluene, xylenes, and ethylbenzenes; the result of the analysis must be below the instrument detection limit for each parameter before the pump is taken to the site for use.

During field sampling, all equipment surfaces that are placed in the well or in contact with ground water will be cleaned before purging or sampling the next well. The surfaces will be cleaned by steam cleaning with deionized water.

Water-Level Measurements

Prior to purging and sampling, the water level in each well will be measured with an electric sounder. A reel mounted, two conductor audible sensor with indicator light allows for the measurement of both water and separate phase product interfaces. Depth to water and product measurements are recorded to the nearest 0.01 foot. The absence or presence of separate phase product is confirmed with a clean, acrylic or polyvinylchloride bailer, by measuring the thickness to the nearest 0.01 foot with an engineer's scale tape. Any observations (eg. well integrity, product color, turbidity, water color, odors etc.) should be noted on the Water Sample Field Data Sheet shown in Figure A-2. Before and after each use, the sounder will be decontaminated by rinsing with a detergent and deionized water.

Wells are monitored from the lowest dissolved product concentrations to the highest dissolved concentrations. To avoid cross contamination, all monitoring equipment is decontaminated after each well by rinsing with detergent and deionized water.

Well Purging

Before sampling, standing water in the casing and sand pack will be purged from the well 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 bailer. Individual purge volumes are calculated for each well from casing size and length of standing water. When possible, five (5) case volumes will be purged. Wells which dewater or have slow recharge periods are often sampled after fewer purging cycles, once sufficient water volumes have recovered. Temperature, pH, and conductivity are closely monitored throughout the evacuation process. Purging is continued until all three (3) parameters have stabilized. Conductivity and pH meters are calibrated daily. Monitoring wells will be purged according to the protocol presented in Figure A-1.

All records of field data will be entered on the Well Sampling Field Data Sheet shown in Figure A-2. Copies of the field data sheets will be reviewed by the sampling supervisor after the sampling event is completed. Field meters will be calibrated each morning before initiating sampling. The calibration will be checked once each day to verify meter performance.

Sampling

Samples are only collected from groundwater wells free of separate phase product or from wells containing product sheens. Wells containing product films or free product levels > 0.01 foot are not normally sampled. When specific situations require samples and free product exists, the field sampler will be informed of this special requirement.

Samples will be collected with a Teflon bailer or positive displacement Teflon bladder pump. Groundwater samples that are analyzed for total petroleum hydrocarbons (calculated as gasoline), benzene, toluene, xylenes, and ethylbenzene will be collected in duplicate utilizing 40 milliliter glass vials with Teflon lined septums, preserved with hydrochloric acid to a pH of less than 2.

Sample bottles for volatile organics analysis will be filled completely to prevent any air from remaining in the bottle. A positive meniscus forms when the bottle is completely full. A Teflon lined septum will be placed over the positive meniscus to seal the container. After capping, the bottle will be inverted and tapped to check that no air bubbles are present.

When required, field blanks and trip blanks made with organic free water will be carried into the field and delivered with the samples to the laboratory. Field blanks will be opened in the field during sample collection to detect any influences from the ambient atmosphere on sample quality. Trip blanks will remain with the bottles used for sampling for the duration of the sampling event. At no time will the trip blanks be uncapped. Trip blanks provide a check on laboratory bottle-cleaning procedures.

All sampling containers will be pre-labeled with preservatives information prior to initiating the sampling event. Labels will be completed during sample collection. Containers will be placed on blue ice immediately upon sampling until delivery to the laboratory. At the time of sampling, the sample will be logged on a chain-of-custody form, which will accompany the sample to the laboratory. Laboratory personnel will accept the samples and assign a unique laboratory number to each sample.

Sample Preservation and Shipment

Sample containers will vary with each type of analytical parameter to be tested. Selected container types and materials will be nonreactive with the sample and the particular analytical parameter to be tested. As noted, sample containers will be properly cleaned and sterilized according to the EPA protocol for the specific analyses to be performed. All samples will be shipped on blue ice to a California state certified laboratory. Chain-of-custody documentation will accompany all sample containers.

ANALYTICAL METHODS

Groundwater samples will be analyzed in a California state certified analytical laboratory in accordance with the methods listed below. All testing procedures follow Regional Water Quality Control Board (RWQCB) guidelines.

Total petroleum hydrocarbons calculated as gasoline: modified EPA method 8015 (headspace) or modified EPA method 5030 (purge and trap).

Benzene, toluene, xylenes and ethylbenzene (BTX and E): modified EPA Method 8020 or 602.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, 3rd. edition, November 1986

Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA 600/4-82-057, U.S. EPA Environmental Monitoring and Support laboratory, Cincinnati, OH 1982

Methods of Chemical Analysis of Water and Wastes, EPA 600/4-49-020, Revised March 1983. U.S. Environmental Monitoring Laboratory Cincinnati, OH

Leaking Underground Fuel Tank (LUFT) Manual, State Water Resources Control Board,
State of California Leaking Underground Fuel Tank Task Force, May 1988

CHAIN-OF-CUSTODY

The following procedures will be used during sampling and analytical activities to provide chain-of-custody control during transfer of samples from collection through storage. Record keeping activities and tools will include:

Well Sampling Field Data Sheet

Sample labels

Chain-of-custody record

Well Sampling Field Data Sheet

In the field, the sampler 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 and water-surface elevation, pH, conductivity, temperature)

Calculated and actual purge volumes

Purging equipment

Sampling equipment

Appearance of each sample (e.g., color, turbidity, sediment, floating product/product odor, etc.)

General comments

Sampler's signature

Sample Labels

Each sample container will be labeled immediately after the sample is taken. Label information will include:

Sample point designation

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Analysis requested

Chain-of-Custody Record

The chain-of-custody records initiated at the time of sampling will contain the following information: Sample type, container type, well number, date of sampling, and name of the sampler. Figure A-3 shows a typical chain-of-custody record. The record sheet will be signed by the sampler when transferring possession of the samples. Custody transfers will be recorded for each individual sample; for example, if samples are split and sent to multiple laboratories, a record sheet will accompany each sample. The number of custodians in the chain of possession will be kept to a minimum.

Groundwater Monitoring

Wells are monitored from the lowest dissolved product concentrations to the highest dissolved concentrations. Wells that contain separate phase product are monitored last. To avoid cross contamination, all monitoring equipment is decontaminated after each well by rinsing with detergent and deionized water.

Prior to purging and sampling, the water level in each well will be measured with an electric sounder. A reel mounted, two conductor audible sensor with indicator light allows for the measurement of both water and separate phase product interfaces. Depth to water and product measurements are recorded to the nearest 0.01 foot. The absence or presence of separate phase product is confirmed with a clean, acrylic or polyvinylchloride bailer, by measuring the thickness to the nearest 0.01 foot with an engineer's scale tape. Any observations (eg. well integrity, product color, turbidity, water color, odors etc.) should be noted on the Water Sample Field Data Sheet shown in Figure A-2.

FIGURE A-1 MONITORING WELL PURGING PROTOCOL

