



grettler — ryan inc.

general contractors

May 1, 1989

~~Mr. Steven Ritchie
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6040
Oakland, California 94567~~

Reference: ARCO Service Station #4931
731 W. Macarthur Boulevard
Oakland, California

ALAMEDA COUNTY
DEPARTMENT OF HEALTH
OFFICE OF ENVIRONMENTAL HEALTH
1000 CENTRAL EXPRESSWAY
OAKLAND, CALIFORNIA 94612

Gentlemen:

As requested by Mr. Kyle Christie of ARCO Products Company, we are forwarding a copy of the Quarterly Ground-Water Sampling Report issued by GeoStrategies Inc. on April 20, 1989 for the above referenced location. The enclosed quarterly technical report was prepared in accordance with your request to ARCO Products Company of November 23, 1988.

If you should have any questions or comments regarding this project please do not hesitate to call.

Sincerely,

John P. Werfal
Project Manager

JW/em

enclosures

cc: Mr. H. C. Winsor, ARCO Products Company
Mr. Kyle Christie, ARCO Products Company
Mr. Rafat Shahid, Alameda County of Environmental Health



GeoStrategies Inc.

QUARTERLY GROUND-WATER SAMPLING REPORT

JANUARY - MARCH 1989

ARCO Service Station
731 West Mac Arthur Boulevard
Oakland, California

Project No. 7909

April 20, 1989



GeoStrategies Inc.

2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545

(415) 352-4800

April 20, 1989

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

Attn: Mr. John Werfal

Re: Quarterly Monitoring Report
ARCO Service Station
731 West Mac Arthur Boulevard
Oakland, California

Gentlemen:

This quarterly monitoring report has been prepared 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" followed by a small mark that appears to be "CMP".

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/kj

Project No. 7909

GeoStrategies Inc.

1.0 INTRODUCTION

This Quarterly Ground-Water Sampling Report has been prepared by GeoStrategies Inc. (GSI) for the ARCO Service Station located at 731 West Mac Arthur Boulevard in Oakland, 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 analytical data discussed in this report were collected between January 1, and March 31, 1989.

2.0 SITE HISTORY

A petroleum hydrocarbon product loss reportedly occurred in November, 1982. As a result, four ground-water monitoring wells were installed at the site in December 1982. Four additional ground-water monitoring wells were installed by Groundwater Technology Inc. in March 1983.

On June 18, 1986, Emcon Associates (EMCON) issued a report discussing ground-water quality conditions beneath the site. Emcon recommended the installation of four additional ground-water monitoring wells to further delineate the extent of lateral migration of petroleum hydrocarbons. In December, 1987, four additional ground-water monitoring wells were installed by Pacific Environmental Group, Inc.

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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 \pm 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.

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 was observed in monitoring well A-8, (0.66 feet in measured thickness) during this quarter.

4.0 CHEMICAL ANALYTICAL DATA

Ground-water samples were collected from site monitoring wells on March 20 and March 21, 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.

A total of six 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 Wells A-2, A-3, A-4, A-6, A-7, and A-9. The highest benzene concentrations were detected in Wells A-2 (1,200.00 parts per billion - ppb), A-4 (1,500.00 ppb), and A-6 (33.00 ppb).

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4.1 Quality Control

Quality Control (QC) samples for this quarter ground-water sampling included a trip blank, and a field blank. The trip blank was prepared in the IT Laboratory using organic-free water to evaluate laboratory handling and analytical procedures. The field blank was prepared in the field using organic-free water to evaluate field sampling procedures. 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 a concentration map for this quarter (Refer to Plate 3).

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 detected in monitoring well A-8 (0.66 feet in measured thickness), this quarter.
- o Detected TPH concentrations ranged from 50.00 to 360,000 ppb.
- o Detected benzene concentrations ranged from 0.50 to 1,500 ppb.
- o Chemical analytical results for this quarter indicate that the present ground-water monitoring network at the site does not appear to be adequate for petroleum hydrocarbon plume definition. Additional monitoring wells may be required to evaluate the lateral extent of petroleum aromatic fraction (benzene) migration from the site; particularly north of Well A-6 and perhaps west of Wells A-5, A-8, and A-9. Future scopes of work will be proposed in a separate document and implemented under the site-specific work plan.

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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 quarterly 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 ANALYSIS DATA

WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPB)	BENZENE (PPB)	ETHYLBENZENE (PPB)	TOLUENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
A-2	21-Mar-89	03-Apr-89	22,000.00	1,200.00	1,200.00	1,800.00	7,700.00	103.35	99.90	----	3.45
A-3	21-Mar-89	31-Mar-89	230.00	1.60	3.00	<1.00	3.00	102.45	94.94	----	7.51
A-4	21-Mar-89	06-Apr-89	360,000.00	1,500.00	6,500.00	3,700.00	35,000.00	102.59	94.46	----	8.13
A-5	21-Mar-89	31-Mar-89	60.00	0.50	2.00	1.00	10.00	102.00	93.91	----	8.09
A-6	21-Mar-89	02-Apr-89	220.00	33.00	9.00	21.00	39.00	103.07	96.64	----	6.43
A-7	21-Mar-89	02-Apr-89	<50.00	0.90	<1.00	<1.00	<3.00	102.63	96.34	----	6.29
A-8	21-Mar-89	----	----	----	----	----	----	101.57	93.84	0.66	7.73
A-9	21-Mar-89	02-Apr-89	50.00	2.80	1.00	1.00	3.00	101.57	95.29	----	6.28
A-10	21-Mar-89	04-Apr-89	<50.00	<0.50	<1.00	<1.00	<3.00	102.13	93.61	----	8.52

TPH = Total Petroleum Hydrocarbons as Gasoline

PPB = parts per billion

AF = Field Blank

TB = Trip Blank

CURRENT DEPARTMENT OF HEALTH SERVICES ACTION LEVELS

Benzene 0.7 ppb

Toluene 100 ppb

Xylenes 620 ppb

Ethylbenzene 680 ppb

Note: 1. For chemical parameter detection limits, refer to I.T. laboratory reports in Appendix B

2. Water level elevations referenced to project site datum

3. Well A-8 contained floating product and was not sampled

4. Static and Depth to Water corrected for product thickness

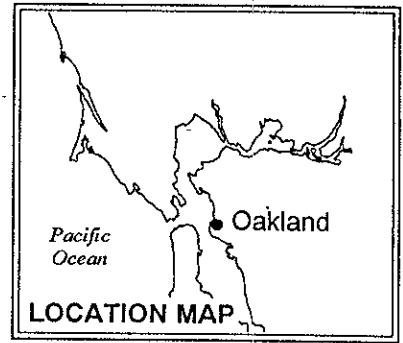
TABLE 1

GROUND-WATER ANALYSIS DATA

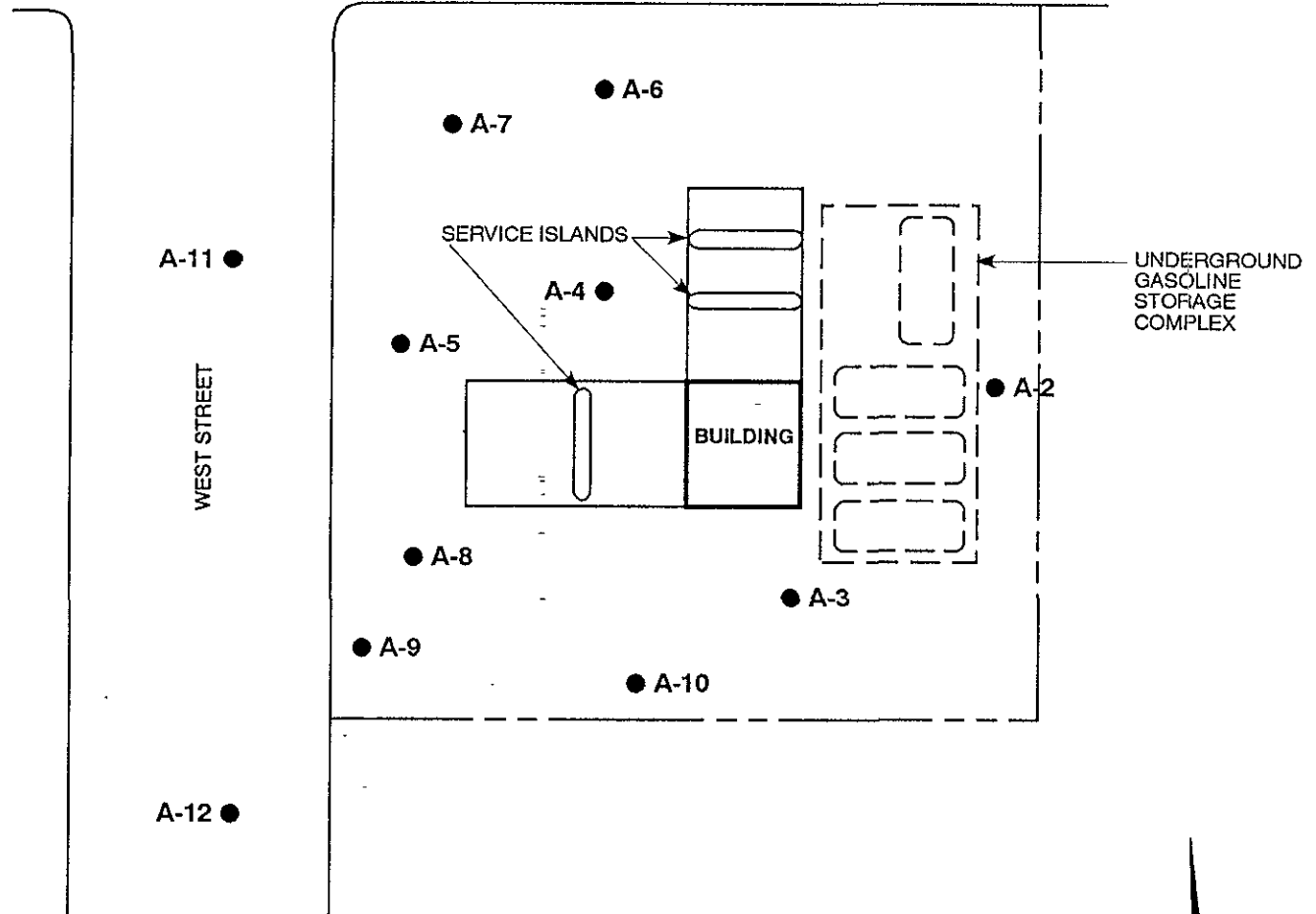
WELL NO	SAMPLE DATE	ANALYSIS DATE	TPH (PPB)	BENZENE (PPB)	ETHYLBENZENE (PPB)	TOLUENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
A-11	21-Mar-89	03-Apr-89	<50.00	<0.50	<1.00	<1.00	<3.00	101.00	92.89	----	8.11
A-12	21-Mar-89	04-Apr-89	<50.00	<0.50	<1.00	<1.00	<3.00	101.70	93.70	----	8.00
AF-6	21-Mar-89	03-Apr-89	<50.00	<0.50	<1.00	<1.00	<3.00	----	----	----	----
TB	21-Mar-89	03-Apr-89	<50.00	<0.50	<1.00	<1.00	<3.00	----	----	----	----

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ILLUSTRATIONS

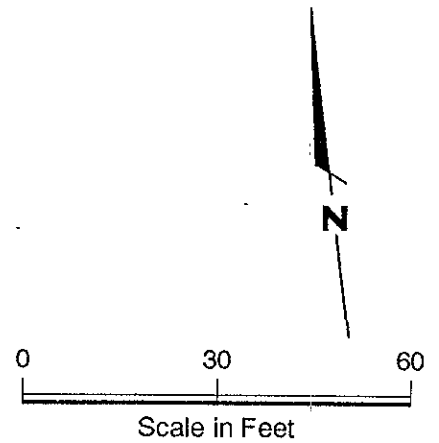


MACARTHUR BOULEVARD



EXPLANATION

- A-2 Groundwater monitoring well location



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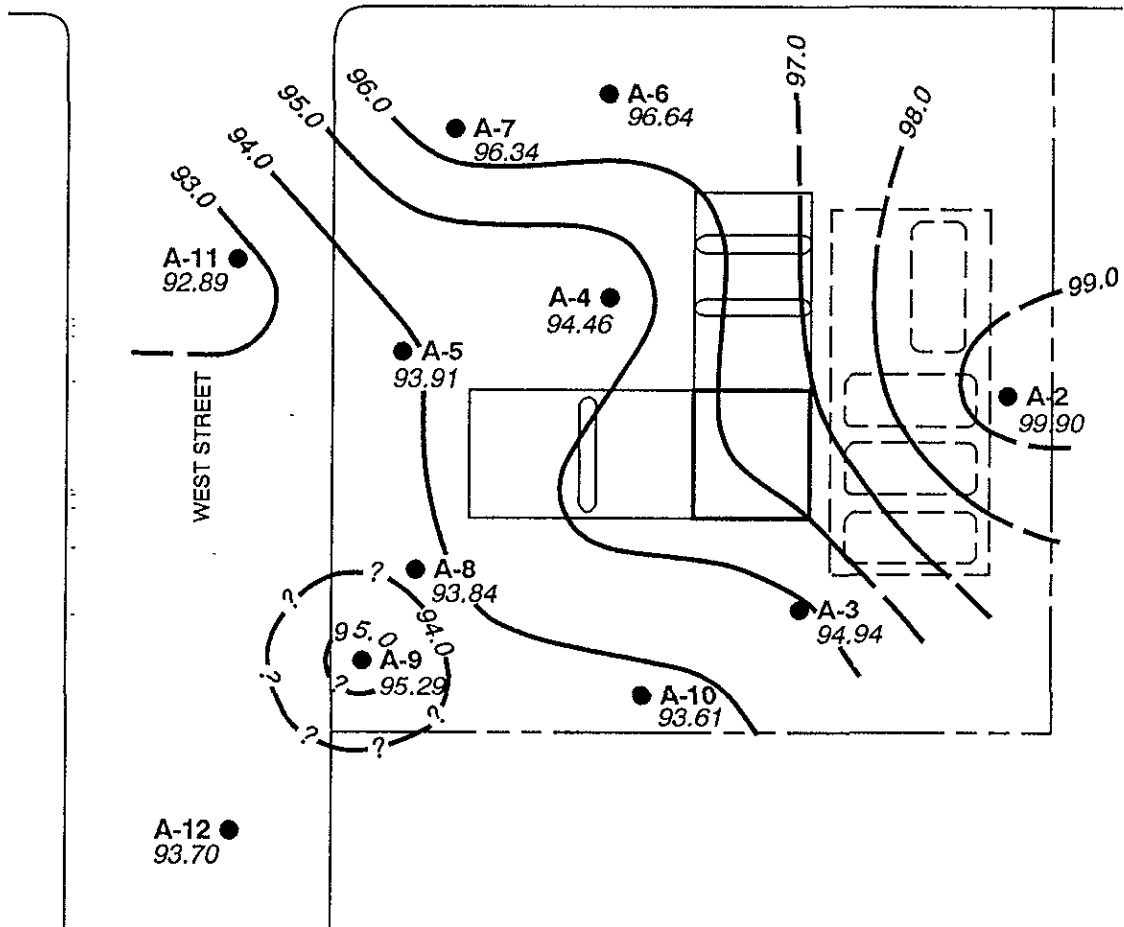
Site Plan

Arco Service Station
MacArthur Boulevard and West Street
Oakland, California

PLATE

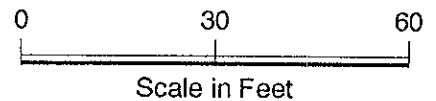
1

MACARTHUR BOULEVARD



EXPLANATION

- A-2 Groundwater monitoring well location
- 95.0 Groundwater elevation contour (dashed where approximate)
Interval = 1.0 feet; Approximate Gradient = 0.03
- 93.84 Groundwater elevation measured on 3/21/89
in feet referenced to project datum

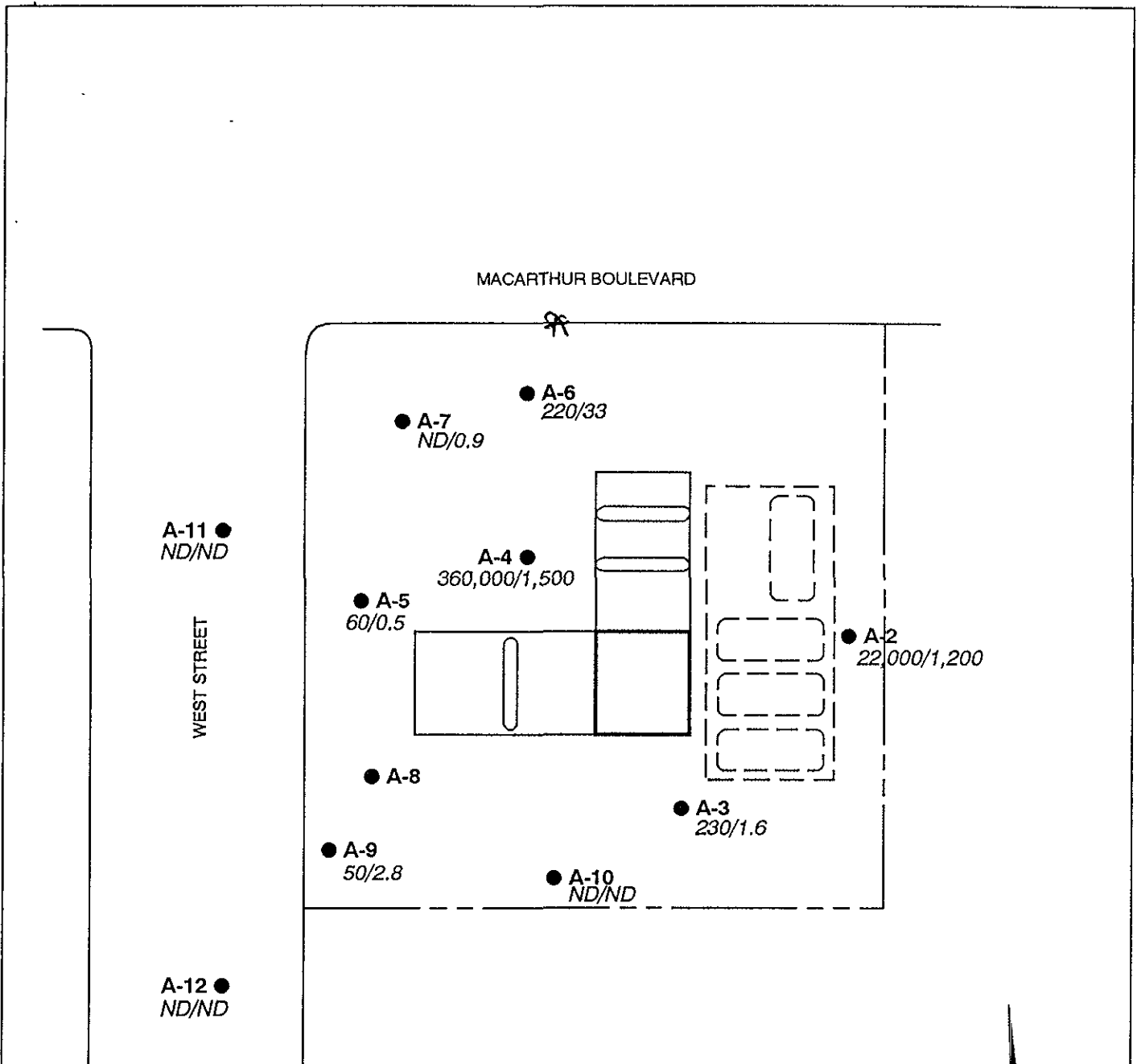


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Potentiometric Map
Arco Service Station
MacArthur Boulevard and West Street
Oakland, California

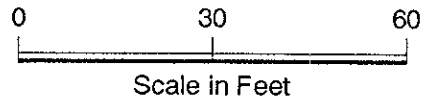
PLATE

2



EXPLANATION

- A-2 Groundwater monitoring well location
- 230/1.6 TPH (Total Petroleum Hydrocarbon)/Benzene concentrations measured 3/21/89 in ppb (parts per billion)
- ND Not Detected (see laboratory reports for detection limits)



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TPH/Benzene Concentration Map
 Arco Service Station
 MacArthur Boulevard and West Street
 Oakland, California

PLATE

3

APPENDIX A

HISTORICAL DATABASE

- A-1: Chemical Analytical Data
- A-2: Well Monitoring Data

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A-1: CHEMICAL ANALYTICAL DATA

=====
 ANALYTICAL LOG
 =====

DATE	SAMPLE POINT	TVHC (PPB)	BENZENE (PPB)	TOLUENE (PPB)	XYLENES (PPB)
DETECTION LIMITS		N/A	0.7	100	500
07-Jan-88	A-2	12000.00	920.00	1500.00	4000.00
07-Jan-88	A-3	250.00	2.30	8.00	21.00
07-Jan-88	A-5	<50.00	0.50	1.00	4.00
07-Jan-88	A-6	390.00	54.00	89.00	110.00
07-Jan-88	A-7	<50.00	<0.50	1.00	4.00
07-Jan-88	A-9	300.00	45.00	14.00	43.00
07-Jan-88	A-10	<50.00	0.60	11.00	4.00
07-Jan-88	A-11	<50.00	1.10	2.00	5.00
07-Jan-88	A-12	<50.00	<0.50	<1.00	<4.00

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A-2: WELL MONITORING DATA

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			
									X			
26-Jan-87	A	7.40	(1.00)	0.01	7.40	.0	7.40	-7.40	X			
09-Feb-87	A	7.42	(1.00)	0.03	7.42	.0	7.42	-7.42	X			
23-Feb-87	A	7.32	(1.00)	0.01	7.32	.0	7.32	-7.32	X			
02-Mar-87	A	7.41	(1.00)	0.02	7.41	.0	7.41	-7.41	X			
09-Mar-87	A		N/A		ERR	0.0	ERR	ERR	X			
16-Mar-87	A	7.37	(1.00)	0.03	7.37	.0	7.37	-7.37	X			
23-Mar-87	A	7.35	(1.00)	.00	7.35	.0	7.35	-7.35	X			
30-Mar-87	A	7.40	(1.00)	0.03	7.40	.0	7.40	-7.40	X			
07-Apr-87	A	7.68	(1.00)	0.01	7.68	.0	7.68	-7.68	X			
14-Apr-87	A	7.40	(1.00)	0.05	7.40	0.1	7.40	-7.40	X			
21-Apr-87	A	7.40	(1.00)	0.02	7.40	.0	7.40	-7.40	X			
28-Apr-87	A	7.32	(1.00)	0.01	7.32	.0	7.32	-7.32	X			
26-Jan-87	B	7.45	(1.00)	0.01	7.45	.0	7.45	-7.45	X			
09-Feb-87	B	7.53	(1.00)	0.03	7.53	.0	7.53	-7.53	X			
23-Feb-87	B	7.44	(1.00)	0.03	7.44	.0	7.44	-7.44	X			
02-Mar-87	B	7.42	(1.00)	0.01	7.42	.0	7.42	-7.42	X			
09-Mar-87	B		N/A		ERR	0.0	ERR	ERR	X			
16-Mar-87	B	7.47	(1.00)	0.03	7.47	.0	7.47	-7.47	X			
23-Mar-87	B	7.47	(1.00)	0.01	7.47	.0	7.47	-7.47	X			
30-Mar-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
07-Apr-87	B	7.47	(1.00)	0.01	7.47	.0	7.47	-7.47	X			
14-Apr-87	B	7.50	(1.00)	0.03	7.50	.0	7.50	-7.50	X			
21-Apr-87	B	7.49	(1.00)	0.02	7.49	.0	7.49	-7.49	X			
28-Apr-87	B	7.50	(1.00)	0.01	7.50	.0	7.50	-7.50	X			
01-May-86	2		4.37	0.00	4.37	0.0	4.37	50.04	X			54.41
08-May-86	2		4.58	0.00	4.58	0.0	4.58	49.83	X			54.41
15-May-86	2		4.52	0.00	4.52	0.0	4.52	49.89	X			54.41
22-May-86	2		5.10	0.00	5.10	0.0	5.10	49.31	X			54.41
29-May-86	2		10.45	0.00	10.45	0.0	10.45	43.96	X			54.41
03-Jun-86	2		4.21	0.00	4.21	0.0	4.21	50.20	X			54.41
05-Jun-86	2		7.85	0.00	7.85	0.0	7.85	46.56	X			54.41
12-Jun-86	2		8.80	0.00	8.80	0.0	8.80	45.61	X			54.41
19-Jun-86	2		9.55	0.00	9.55	0.0	9.55	44.86	X			54.41
26-Jun-86	2		9.64	0.00	9.64	0.0	9.64	44.77	X			54.41
10-Jul-86	2		9.60	0.00	9.60	0.0	9.60	44.81	X			54.41
17-Jul-86	2		9.80	0.00	9.80	0.0	9.80	44.61	X			54.41
24-Jul-86	2		10.38	0.00	10.38	0.0	10.38	44.03	X			54.41
31-Jul-86	2		10.30	0.00	10.30	0.0	10.30	44.11	X			54.41
07-Aug-86	2		10.31	0.00	10.31	0.0	10.31	44.10	X			54.41
14-Aug-86	2		10.50	0.00	10.50	0.0	10.50	43.91	X			54.41
21-Aug-86	2		10.76	0.00	10.76	0.0	10.76	43.65	X			54.41
28-Aug-86	2		10.98	0.00	10.98	0.0	10.98	43.43	X			54.41
04-Sep-86	2		10.95	0.00	10.95	0.0	10.95	43.46	X			54.41
11-Sep-86	2		10.90	0.00	10.90	0.0	10.90	43.51	X			54.41
18-Sep-86	2		10.54	0.00	10.54	0.0	10.54	43.87	X			54.41
25-Sep-86	2		9.28	0.00	9.28	0.0	9.28	45.13	X			54.41
02-Oct-86	2		9.39	0.00	9.39	0.0	9.39	45.02	X			54.41
09-Oct-86	2		9.62	0.00	9.62	0.0	9.62	44.79	X			54.41
16-Oct-86	2		10.20	0.00	10.20	0.0	10.20	44.21	X			54.41
23-Oct-86	2	10.49	(1.00)	.00	10.49	.0	10.49	43.92	X			54.41
30-Oct-86	2		10.82	0.00	10.82	0.0	10.82	43.59	X			54.41



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			
03-Nov-86	2		10.98	0.00	10.98	0.0	10.98	43.43	X			54.41
10-Nov-86	2		10.85	0.00	10.85	0.0	10.85	43.56	X			54.41
17-Nov-86	2		11.02	0.00	11.02	0.0	11.02	43.39	X			54.41
24-Nov-86	2		11.36	0.00	11.36	0.0	11.36	43.05	X			54.41
01-Dec-86	2		11.40	0.00	11.40	0.0	11.40	43.01	X			54.41
08-Dec-86	2		10.35	0.00	10.35	0.0	10.35	44.06	X			54.41
15-Dec-86	2		10.47	0.00	10.47	0.0	10.47	43.94	X			54.41
22-Dec-86	2		10.32	0.00	10.32	0.0	10.32	44.09	X			54.41
29-Dec-86	2		10.69	0.00	10.69	0.0	10.69	43.72	X			54.41
05-Jan-87	2		5.32	0.00	5.32	0.0	5.32	49.09	X			54.41
12-Jan-87	2		7.08	0.00	7.08	0.0	7.08	47.33	X			54.41
19-Jan-87	2		8.50	0.00	8.50	0.0	8.50	45.91	X			54.41
26-Jan-87	2		5.18	0.00	5.18	0.0	5.18	49.23	X			54.41
02-Feb-87	2		5.12	0.00	5.12	0.0	5.12	49.29	X			54.41
09-Feb-87	2		5.07	0.00	5.07	0.0	5.07	49.34	X			54.41
23-Feb-87	2		3.64	0.00	3.64	0.0	3.64	50.77	X			54.41
02-Mar-87	2		4.05	0.00	4.05	0.0	4.05	50.36	X			54.41
09-Mar-87	2		4.09	0.00	4.09	0.0	4.09	50.32	X			54.41
16-Mar-87	2		3.52	0.00	3.52	0.0	3.52	50.89	X			54.41
23-Mar-87	2		3.66	0.00	3.66	0.0	3.66	50.75	X			54.41
30-Mar-87	2		4.02	0.00	4.02	0.0	4.02	50.39	X			54.41
07-Apr-87	2		4.37	0.00	4.37	0.0	4.37	50.04	X			54.41
14-Apr-87	2		4.55	0.00	4.55	0.0	4.55	49.86	X			54.41
21-Apr-87	2		4.86	0.00	4.86	0.0	4.86	49.55	X			54.41
28-Apr-87	2		5.03	0.00	5.03	0.0	5.03	49.38	X			54.41
01-May-86	3		10.10	0.00	10.10	0.0	10.10	43.24	X			53.34
08-May-86	3		10.30	0.00	10.30	0.0	10.30	43.04	X			53.34
15-May-86	3		10.11	0.00	10.11	0.0	10.11	43.23	X			53.34
22-May-86	3		10.55	0.00	10.55	0.0	10.55	42.79	X			53.34
29-May-86	3		10.87	0.00	10.87	0.0	10.87	42.47	X			53.34
03-Jun-86	3		11.30	0.00	11.30	0.0	11.30	42.04	X			53.34
05-Jun-86	3		10.91	0.00	10.91	0.0	10.91	42.43	X			53.34
12-Jun-86	3		11.10	0.00	11.10	0.0	11.10	42.24	X			53.34
19-Jun-86	3		11.07	0.00	11.07	0.0	11.07	42.27	X			53.34
26-Jun-86	3		11.24	0.00	11.24	0.0	11.24	42.10	X			53.34
10-Jul-86	3		11.05	0.00	11.05	0.0	11.05	42.29	X			53.34
17-Jul-86	3		11.20	0.00	11.20	0.0	11.20	42.14	X			53.34
24-Jul-86	3		11.33	0.00	11.33	0.0	11.33	42.01	X			53.34
31-Jul-86	3		11.01	0.00	11.01	0.0	11.01	42.33	X			53.34
07-Aug-86	3		11.15	0.00	11.15	0.0	11.15	42.19	X			53.34
14-Aug-86	3		11.32	0.00	11.32	0.0	11.32	42.02	X			53.34
21-Aug-86	3		11.42	0.00	11.42	0.0	11.42	41.92	X			53.34
28-Aug-86	3		11.51	0.00	11.51	0.0	11.51	41.83	X			53.34
04-Sep-86	3		11.41	0.00	11.41	0.0	11.41	41.93	X			53.34
11-Sep-86	3		11.42	0.00	11.42	0.0	11.42	41.92	X			53.34
18-Sep-86	3		11.31	0.00	11.31	0.0	11.31	42.03	X			53.34
25-Sep-86	3		10.96	0.00	10.96	0.0	10.96	42.38	X			53.34
02-Oct-86	3		11.16	0.00	11.16	0.0	11.16	42.18	X			53.34
09-Oct-86	3		11.11	0.00	11.11	0.0	11.11	42.23	X			53.34
16-Oct-86	3		11.23	0.00	11.23	0.0	11.23	42.11	X			53.34
23-Oct-86	3		11.42	0.00	11.42	0.0	11.42	41.92	X			53.34
30-Oct-86	3		11.38	0.00	11.38	0.0	11.38	41.96	X			53.34



Gertler - Ryan Inc.

(415) 783-7500

general and environmental contractors

03/13/89

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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			
03-Nov-86	3		11.65	0.00	11.65	0.0	11.65	41.69	X			53.34
10-Nov-86	3		11.57	0.00	11.57	0.0	11.57	41.77	X			53.34
17-Nov-86	3		11.52	0.00	11.52	0.0	11.52	41.82	X			53.34
24-Nov-86	3		11.55	0.00	11.55	0.0	11.55	41.79	X			53.34
01-Dec-86	3		11.52	0.00	11.52	0.0	11.52	41.82	X			53.34
08-Dec-86	3		11.35	0.00	11.35	0.0	11.35	41.99	X			53.34
15-Dec-86	3		11.14	0.00	11.14	0.0	11.14	42.20	X			53.34
22-Dec-86	3		11.02	0.00	11.02	0.0	11.02	42.32	X			53.34
29-Dec-86	3		11.23	0.00	11.23	0.0	11.23	42.11	X			53.34
05-Jan-87	3		10.05	0.00	10.05	0.0	10.05	43.29	X			53.34
12-Jan-87	3		10.45	0.00	10.45	0.0	10.45	42.89	X			53.34
19-Jan-87	3		10.80	0.00	10.80	0.0	10.80	42.54	X			53.34
26-Jan-87	3		10.04	0.00	10.04	0.0	10.04	43.30	X			53.34
02-Feb-87	3		9.03	0.00	9.03	0.0	9.03	44.31	X			53.34
09-Feb-87	3		9.36	0.00	9.36	0.0	9.36	43.98	X			53.34
23-Feb-87	3		8.17	0.00	8.17	0.0	8.17	45.17	X			53.34
02-Mar-87	3		9.14	0.00	9.14	0.0	9.14	44.20	X			53.34
09-Mar-87	3		8.97	0.00	8.97	0.0	8.97	44.37	X			53.34
16-Mar-87	3		8.09	0.00	8.09	0.0	8.09	45.25	X			53.34
23-Mar-87	3		8.22	0.00	8.22	0.0	8.22	45.12	X			53.34
30-Mar-87	3		9.14	0.00	9.14	0.0	9.14	44.20	X			53.34
07-Apr-87	3		8.84	0.00	8.84	0.0	8.84	44.50	X			53.34
14-Apr-87	3		9.90	0.00	9.90	0.0	9.90	43.44	X			53.34
21-Apr-87	3		10.20	0.00	10.20	0.0	10.20	43.14	X			53.34
28-Apr-87	3		10.40	0.00	10.40	0.0	10.40	42.94	X			53.34
01-May-86	4	9.68	(1.00)	2.80	9.91	2.8	9.68	43.66	X			53.40
08-May-86	4	9.93	(1.00)	1.05	10.02	1.1	9.93	43.45	X			53.40
15-May-86	4	9.82	(1.00)	2.10	10.00	2.1	9.82	43.54	X			53.40
22-May-86	4	10.30	(1.00)	1.89	10.46	1.9	10.30	43.06	X			53.40
29-May-86	4	10.58	(1.00)	1.32	10.69	1.3	10.58	42.79	X			53.40
03-Jun-86	4		11.78	0.00	11.78	0.0	11.78	41.62	X			53.40
05-Jun-86	4	10.50	(1.00)	1.80	10.65	1.8	10.50	42.86	X			53.40
12-Jun-86	4	10.70	(1.00)	3.00	10.95	3.0	10.70	42.64	X			53.40
19-Jun-86	4	10.70	(1.00)	1.87	10.86	1.9	10.70	42.66	X			53.40
26-Jun-86	4	10.82	(1.00)	1.25	10.92	1.3	10.82	42.55	X			53.40
10-Jul-86	4	10.70	(1.00)	0.30	10.73	0.3	10.70	42.69	X			53.40
17-Jul-86	4	10.10	(1.00)	1.51	10.23	1.5	10.10	43.27	X			53.40
24-Jul-86	4	10.86	(1.00)	1.12	10.95	1.1	10.86	42.52	X			53.40
31-Jul-86	4	9.77	(1.00)	1.49	9.89	1.5	9.77	43.60	X			53.40
07-Aug-86	4	10.65	(1.00)	2.60	10.87	2.6	10.65	42.70	X			53.40
14-Aug-86	4	10.73	(1.00)	1.53	10.86	1.5	10.73	42.64	X			53.40
21-Aug-86	4	10.88	(1.00)	0.60	10.93	0.6	10.88	42.51	X			53.40
28-Aug-86	4	10.86	(1.00)	1.84	11.01	1.8	10.86	42.50	X			53.40
04-Sep-86	4	10.75	(1.00)	2.10	10.93	2.1	10.75	42.61	X			53.40
11-Sep-86	4	10.82	(1.00)	1.77	10.97	1.8	10.82	42.54	X			53.40
18-Sep-86	4	10.75	(1.00)	3.13	11.01	3.1	10.75	42.58	X			53.40
25-Sep-86	4	10.60	(1.00)	1.90	10.76	1.9	10.60	42.76	X			53.40
02-Oct-86	4	10.75	(1.00)	3.00	11.00	3.0	10.75	42.59	X			53.40
09-Oct-86	4	10.58	(1.00)	3.50	10.87	3.5	10.58	42.75	X			53.40
16-Oct-86	4	10.72	(1.00)	1.58	10.85	1.6	10.72	42.65	X			53.40
23-Oct-86	4	10.82	(1.00)	3.72	11.13	3.7	10.82	42.50	X			53.40
30-Oct-86	4	10.86	(1.00)	0.50	10.90	0.5	10.86	42.53	X			53.40



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			
03-Nov-86	4	10.97	(1.00)	1.47	11.09	1.5	10.97	42.40	X			53.40
10-Nov-86	4	11.05	(1.00)	1.30	11.16	1.3	11.05	42.32	X			53.40
17-Nov-86	4	10.90	(1.00)	+2.00	ERR	+2.00	10.90	ERR	X			53.40
24-Nov-86	4	9.97	(1.00)	3.05	10.22	3.1	9.97	43.37	X			53.40
01-Dec-86	4	11.82	(1.00)	3.26	12.09	3.3	11.82	41.51	X			53.40
08-Dec-86	4	10.82	(1.00)	1.04	10.91	1.0	10.82	42.56	X			53.40
15-Dec-86	4	10.62	(1.00)	1.70	10.76	1.7	10.62	42.74	X			53.40
22-Dec-86	4	10.63	(1.00)	1.45	10.75	1.5	10.63	42.74	X			53.40
29-Dec-86	4	11.94	(1.00)	2.40	12.14	2.4	11.94	41.41	X			53.40
05-Jan-87	4	10.64	(1.00)	0.09	10.65	0.1	10.64	42.76	X			53.40
12-Jan-87	4	10.90	(1.00)	0.03	10.90	.0	10.90	42.50	X			53.40
19-Jan-87	4	11.18	(1.00)	0.03	11.18	.0	11.18	42.22	X			53.40
26-Jan-87	4	10.60	(1.00)	0.06	10.61	0.1	10.60	42.80	X			53.40
26-Jan-87	4	10.60	(1.00)	0.06	10.61	0.1	10.60	42.80	X			53.40
02-Feb-87	4	10.14	(1.00)	2.48	10.35	2.5	10.14	43.21	X			53.40
09-Feb-87	4	8.00	(1.00)	0.07	8.01	0.1	8.00	45.40	X			53.40
23-Feb-87	4	9.20	(1.00)	0.07	9.21	0.1	9.20	44.20	X			53.40
02-Mar-87	4	9.96	(1.00)	0.04	9.96	.0	9.96	43.44	X			53.40
09-Mar-87	4	9.79	(1.00)	0.03	9.79	.0	9.79	43.61	X			53.40
16-Mar-87	4	9.29	(1.00)	0.09	9.30	0.1	9.29	44.11	X			53.40
23-Mar-87	4	9.55	(1.00)	0.15	9.56	0.2	9.55	43.85	X			53.40
30-Mar-87	4	9.94	(1.00)	0.06	9.95	0.1	9.94	43.46	X			53.40
07-Apr-87	4	10.42	(1.00)	0.03	10.42	.0	10.42	42.98	X			53.40
14-Apr-87	4	10.57	(1.00)	.00	10.57	.0	10.57	42.83	X			53.40
21-Apr-87	4	10.87	(1.00)	0.05	10.87	0.1	10.87	42.53	X			53.40
28-Apr-87	4	10.97	(1.00)	0.03	10.97	.0	10.97	42.43	X			53.40
01-May-86	5	10.44	0.00	10.44	10.44	0.0	10.44	42.35	X			52.79
08-May-86	5	10.56	0.00	10.56	10.56	0.0	10.56	42.23	X			52.79
15-May-86	5	10.40	0.00	10.40	10.40	0.0	10.40	42.39	X			52.79
22-May-86	5	10.83	0.00	10.83	10.83	0.0	10.83	41.96	X			52.79
29-May-86	5	11.20	0.00	11.20	11.20	0.0	11.20	41.59	X			52.79
03-Jun-86	5	14.03	0.00	14.03	14.03	0.0	14.03	38.76	X			52.79
05-Jun-86	5	11.03	0.00	11.03	11.03	0.0	11.03	41.76	X			52.79
12-Jun-86	5	11.15	0.00	11.15	11.15	0.0	11.15	41.64	X			52.79
19-Jun-86	5	11.20	0.00	11.20	11.20	0.0	11.20	41.59	X			52.79
26-Jun-86	5	11.30	0.00	11.30	11.30	0.0	11.30	41.49	X			52.79
10-Jul-86	5	11.28	0.00	11.28	11.28	0.0	11.28	41.51	X			52.79
17-Jul-86	5	11.22	0.00	11.22	11.22	0.0	11.22	41.57	X			52.79
24-Jul-86	5	11.54	0.00	11.54	11.54	0.0	11.54	41.25	X			52.79
31-Jul-86	5	11.07	0.00	11.07	11.07	0.0	11.07	41.72	X			52.79
07-Aug-86	5	11.25	0.00	11.25	11.25	0.0	11.25	41.54	X			52.79
14-Aug-86	5	11.35	0.00	11.35	11.35	0.0	11.35	41.44	X			52.79
21-Aug-86	5	11.49	0.00	11.49	11.49	0.0	11.49	41.30	X			52.79
28-Aug-86	5	11.52	0.00	11.52	11.52	0.0	11.52	41.27	X			52.79
04-Sep-86	5	11.42	0.00	11.42	11.42	0.0	11.42	41.37	X			52.79
11-Sep-86	5	11.47	0.00	11.47	11.47	0.0	11.47	41.32	X			52.79
18-Sep-86	5	11.40	0.00	11.40	11.40	0.0	11.40	41.39	X			52.79
25-Sep-86	5	11.16	0.00	11.16	11.16	0.0	11.16	41.63	X			52.79
02-Oct-86	5	11.28	0.00	11.28	11.28	0.0	11.28	41.51	X			52.79
09-Oct-86	5	11.10	0.00	11.10	11.10	0.0	11.10	41.69	X			52.79
16-Oct-86	5	11.20	0.00	11.20	11.20	0.0	11.20	41.59	X			52.79
23-Oct-86	5	11.37	0.00	11.37	11.37	0.0	11.37	41.42	X			52.79



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			
30-Oct-86	5		11.45	0.00	11.45	0.0	11.45	41.34	X			52.79
03-Nov-86	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
10-Nov-86	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
17-Nov-86	5		11.50	0.00	11.50	0.0	11.50	41.29	X			52.79
24-Nov-86	5		11.47	0.00	11.47	0.0	11.47	41.32	X			52.79
01-Dec-86	5		11.51	0.00	11.51	0.0	11.51	41.28	X			52.79
08-Dec-86	5		11.30	0.00	11.30	0.0	11.30	41.49	X			52.79
15-Dec-86	5		11.18	0.00	11.18	0.0	11.18	41.61	X			52.79
22-Dec-86	5		11.10	0.00	11.10	0.0	11.10	41.69	X			52.79
29-Dec-86	5		11.04	0.00	11.04	0.0	11.04	41.75	X			52.79
05-Jan-87	5		10.37	0.00	10.37	0.0	10.37	42.42	X			52.79
12-Jan-87	5		10.63	0.00	10.63	0.0	10.63	42.16	X			52.79
19-Jan-87	5		10.90	0.00	10.90	0.0	10.90	41.89	X			52.79
26-Jan-87	5		10.33	0.00	10.33	0.0	10.33	42.46	X			52.79
02-Feb-87	5		9.39	0.00	9.39	0.0	9.39	43.40	X			52.79
09-Feb-87	5		9.86	0.00	9.86	0.0	9.86	42.93	X			52.79
23-Feb-87	5		8.93	0.00	8.93	0.0	8.93	43.86	X			52.79
02-Mar-87	5		9.66	0.00	9.66	0.0	9.66	43.13	X			52.79
09-Mar-87	5		9.42	0.00	9.42	0.0	9.42	43.37	X			52.79
16-Mar-87	5		9.02	0.00	9.02	0.0	9.02	43.77	X			52.79
23-Mar-87	5		9.28	0.00	9.28	0.0	9.28	43.51	X			52.79
30-Mar-87	5		9.61	0.00	9.61	0.0	9.61	43.18	X			52.79
07-Apr-87	5		10.15	0.00	10.15	0.0	10.15	42.64	X			52.79
14-Apr-87	5		10.31	0.00	10.31	0.0	10.31	42.48	X			52.79
21-Apr-87	5		10.49	0.00	10.49	0.0	10.49	42.30	X			52.79
28-Apr-87	5		10.65	0.00	10.65	0.0	10.65	42.14	X			52.79
01-May-86	6		8.44	0.00	8.44	0.0	8.44	45.33	X			53.77
08-May-86	6		8.52	0.00	8.52	0.0	8.52	45.25	X			53.77
15-May-86	6		8.42	0.00	8.42	0.0	8.42	45.35	X			53.77
22-May-86	6		8.86	0.00	8.86	0.0	8.86	44.91	X			53.77
29-May-86	6		9.00	0.00	9.00	0.0	9.00	44.77	X			53.77
03-Jun-86	6		11.01	0.00	11.01	0.0	11.01	42.76	X			53.77
05-Jun-86	6		9.15	0.00	9.15	0.0	9.15	44.62	X			53.77
12-Jun-86	6		9.35	0.00	9.35	0.0	9.35	44.42	X			53.77
19-Jun-86	6		9.36	0.00	9.36	0.0	9.36	44.41	X			53.77
26-Jun-86	6		9.49	0.00	9.49	0.0	9.49	44.28	X			53.77
10-Jul-86	6		9.35	0.00	9.35	0.0	9.35	44.42	X			53.77
17-Jul-86	6		9.33	0.00	9.33	0.0	9.33	44.44	X			53.77
24-Jul-86	6		9.61	0.00	9.61	0.0	9.61	44.16	X			53.77
31-Jul-86	6		9.10	0.00	9.10	0.0	9.10	44.67	X			53.77
07-Aug-86	6		9.33	0.00	9.33	0.0	9.33	44.44	X			53.77
14-Aug-86	6		9.43	0.00	9.43	0.0	9.43	44.34	X			53.77
21-Aug-86	6		9.60	0.00	9.60	0.0	9.60	44.17	X			53.77
28-Aug-86	6		9.60	0.00	9.60	0.0	9.60	44.17	X			53.77
04-Sep-86	6		9.60	0.00	9.60	0.0	9.60	44.17	X			53.77
11-Sep-86	6		9.70	0.00	9.70	0.0	9.70	44.07	X			53.77
18-Sep-86	6		9.57	0.00	9.57	0.0	9.57	44.20	X			53.77
25-Sep-86	6		9.34	0.00	9.34	0.0	9.34	44.43	X			53.77
02-Oct-86	6		9.29	0.00	9.29	0.0	9.29	44.48	X			53.77
09-Oct-86	6		9.24	0.00	9.24	0.0	9.24	44.53	X			53.77
16-Oct-86	6		9.42	0.00	9.42	0.0	9.42	44.35	X			53.77
23-Oct-86	6		9.63	0.00	9.63	0.0	9.63	44.14	X			53.77



DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	X	WT-G	HC	C.BLEV
					0.00	0.0	0.00	0.00	X			
30-Oct-86	6		9.69	0.00	9.69	0.0	9.69	44.08	X			53.77
03-Nov-86	6		9.75	0.00	9.75	0.0	9.75	44.02	X			53.77
10-Nov-86	6		9.82	0.00	9.82	0.0	9.82	43.95	X			53.77
17-Nov-86	6		9.80	0.00	9.80	0.0	9.80	43.97	X			53.77
24-Nov-86	6		9.79	0.00	9.79	0.0	9.79	43.98	X			53.77
01-Dec-86	6		9.98	0.00	9.98	0.0	9.98	43.79	X			53.77
08-Dec-86	6		9.61	0.00	9.61	0.0	9.61	44.16	X			53.77
15-Dec-86	6		9.47	0.00	9.47	0.0	9.47	44.30	X			53.77
22-Dec-86	6		9.39	0.00	9.39	0.0	9.39	44.38	X			53.77
29-Dec-86	6		9.73	0.00	9.73	0.0	9.73	44.04	X			53.77
05-Jan-87	6		8.61	0.00	8.61	0.0	8.61	45.16	X			53.77
12-Jan-87	6		8.78	0.00	8.78	0.0	8.78	44.99	X			53.77
19-Jan-87	6		9.08	0.00	9.08	0.0	9.08	44.69	X			53.77
26-Jan-87	6		8.49	0.00	8.49	0.0	8.49	45.28	X			53.77
02-Feb-87	6		9.03	0.00	9.03	0.0	9.03	44.74	X			53.77
09-Feb-87	6		7.90	0.00	7.90	0.0	7.90	45.87	X			53.77
23-Feb-87	6		6.86	0.00	6.86	0.0	6.86	46.91	X			53.77
02-Mar-87	6		7.69	0.00	7.69	0.0	7.69	46.08	X			53.77
09-Mar-87	6		7.62	0.00	7.62	0.0	7.62	46.15	X			53.77
16-Mar-87	6		7.11	0.00	7.11	0.0	7.11	46.66	X			53.77
23-Mar-87	6		7.33	0.00	7.33	0.0	7.33	46.44	X			53.77
30-Mar-87	6		7.67	0.00	7.67	0.0	7.67	46.10	X			53.77
07-Apr-87	6		8.23	0.00	8.23	0.0	8.23	45.54	X			53.77
14-Apr-87	6		8.38	0.00	8.38	0.0	8.38	45.39	X			53.77
21-Apr-87	6		8.62	0.00	8.62	0.0	8.62	45.15	X			53.77
28-Apr-87	6		8.70	0.00	8.70	0.0	8.70	45.07	X			53.77
01-May-86	7		8.20	0.00	8.20	0.0	8.20	45.26	X			53.46
08-May-86	7		8.30	0.00	8.30	0.0	8.30	45.16	X			53.46
15-May-86	7		8.15	0.00	8.15	0.0	8.15	45.31	X			53.46
22-May-86	7		8.60	0.00	8.60	0.0	8.60	44.86	X			53.46
29-May-86	7		8.83	0.00	8.83	0.0	8.83	44.63	X			53.46
03-Jun-86	7		10.89	0.00	10.89	0.0	10.89	42.57	X			53.46
05-Jun-86	7		8.89	0.00	8.89	0.0	8.89	44.57	X			53.46
12-Jun-86	7		9.05	0.00	9.05	0.0	9.05	44.41	X			53.46
19-Jun-86	7		9.16	0.00	9.16	0.0	9.16	44.30	X			53.46
26-Jun-86	7		9.20	0.00	9.20	0.0	9.20	44.26	X			53.46
10-Jul-86	7		9.08	0.00	9.08	0.0	9.08	44.38	X			53.46
17-Jul-86	7		9.07	0.00	9.07	0.0	9.07	44.39	X			53.46
24-Jul-86	7		9.45	0.00	9.45	0.0	9.45	44.01	X			53.46
31-Jul-86	7		8.79	0.00	8.79	0.0	8.79	44.67	X			53.46
07-Aug-86	7		9.09	0.00	9.09	0.0	9.09	44.37	X			53.46
14-Aug-86	7		9.15	0.00	9.15	0.0	9.15	44.31	X			53.46
21-Aug-86	7		9.30	0.00	9.30	0.0	9.30	44.16	X			53.46
28-Aug-86	7		9.38	0.00	9.38	0.0	9.38	44.08	X			53.46
04-Sep-86	7		9.35	0.00	9.35	0.0	9.35	44.11	X			53.46
11-Sep-86	7		9.43	0.00	9.43	0.0	9.43	44.03	X			53.46
18-Sep-86	7		9.31	0.00	9.31	0.0	9.31	44.15	X			53.46
25-Sep-86	7		9.10	0.00	9.10	0.0	9.10	44.36	X			53.46
02-Oct-86	7		9.04	0.00	9.04	0.0	9.04	44.42	X			53.46
09-Oct-86	7		9.00	0.00	9.00	0.0	9.00	44.46	X			53.46
16-Oct-86	7		9.15	0.00	9.15	0.0	9.15	44.31	X			53.46
23-Oct-86	7		9.34	0.00	9.34	0.0	9.34	44.12	X			53.46



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			
30-Oct-86	7		9.42	0.00	9.42	0.0	9.42	44.04	X			53.46
03-Nov-86	7		9.47	0.00	9.47	0.0	9.47	43.99	X			53.46
10-Nov-86	7		9.53	0.00	9.53	0.0	9.53	43.93	X			53.46
17-Nov-86	7		9.51	0.00	9.51	0.0	9.51	43.95	X			53.46
24-Nov-86	7		9.51	0.00	9.51	0.0	9.51	43.95	X			53.46
01-Dec-86	7		9.62	0.00	9.62	0.0	9.62	43.84	X			53.46
08-Dec-86	7		9.35	0.00	9.35	0.0	9.35	44.11	X			53.46
15-Dec-86	7		9.23	0.00	9.23	0.0	9.23	44.23	X			53.46
22-Dec-86	7		9.09	0.00	9.09	0.0	9.09	44.37	X			53.46
29-Dec-86	7		9.15	0.00	9.15	0.0	9.15	44.31	X			53.46
05-Jan-87	7		8.35	0.00	8.35	0.0	8.35	45.11	X			53.46
12-Jan-87	7		8.55	0.00	8.55	0.0	8.55	44.91	X			53.46
19-Jan-87	7		8.81	0.00	8.81	0.0	8.81	44.65	X			53.46
26-Jan-87	7		8.24	0.00	8.24	0.0	8.24	45.22	X			53.46
26-Jan-87	7		5.18	0.00	5.18	0.0	5.18	48.28	X			53.46
02-Feb-87	7		8.85	0.00	8.85	0.0	8.85	44.61	X			53.46
09-Feb-87	7		7.68	0.00	7.68	0.0	7.68	45.78	X			53.46
23-Feb-87	7		6.62	0.00	6.62	0.0	6.62	46.84	X			53.46
02-Mar-87	7		7.47	0.00	7.47	0.0	7.47	45.99	X			53.46
09-Mar-87	7		7.30	0.00	7.30	0.0	7.30	46.16	X			53.46
16-Mar-87	7		6.90	0.00	6.90	0.0	6.90	46.56	X			53.46
23-Mar-87	7		7.13	0.00	7.13	0.0	7.13	46.33	X			53.46
30-Mar-87	7		7.44	0.00	7.44	0.0	7.44	46.02	X			53.46
07-Apr-87	7		8.02	0.00	8.02	0.0	8.02	45.44	X			53.46
14-Apr-87	7		8.10	0.00	8.10	0.0	8.10	45.36	X			53.46
21-Apr-87	7		8.41	0.00	8.41	0.0	8.41	45.05	X			53.46
28-Apr-87	7		8.52	0.00	8.52	0.0	8.52	44.94	X			53.46
01-May-86	8	9.84	(1.00)	.00	9.84	.0	9.84	42.88	X			52.72
08-May-86	8	9.96	(1.00)	0.01	9.96	.0	9.96	42.76	X			52.72
15-May-86	8	9.80	(1.00)	0.01	9.80	.0	9.80	42.92	X			52.72
22-May-86	8	10.26	(1.00)	.00	10.26	.0	10.26	42.46	X			52.72
29-May-86	8		10.38	0.00	10.38	0.0	10.38	42.34	X			52.72
03-Jun-86	8	10.68	(1.00)	.00	10.68	.0	10.68	42.04	X			52.72
05-Jun-86	8	10.92	(1.00)	.00	10.92	.0	10.92	41.80	X			52.72
12-Jun-86	8	10.57	(1.00)	.00	10.57	.0	10.57	42.15	X			52.72
19-Jun-86	8	10.62	(1.00)	.00	10.62	.0	10.62	42.10	X			52.72
26-Jun-86	8	10.79	(1.00)	0.01	10.79	.0	10.79	41.93	X			52.72
10-Jul-86	8	10.69	(1.00)	.00	10.69	.0	10.69	42.03	X			52.72
17-Jul-86	8	10.66	(1.00)	0.01	10.66	.0	10.66	42.06	X			52.72
24-Jul-86	8	10.89	(1.00)	.00	10.89	.0	10.89	41.83	X			52.72
31-Jul-86	8	10.51	(1.00)	.00	10.51	.0	10.51	42.21	X			52.72
07-Aug-86	8	10.7	(1.00)	.00	10.70	.0	10.70	42.02	X			52.72
14-Aug-86	8	10.83	(1.00)	0.01	10.83	.0	10.83	41.89	X			52.72
21-Aug-86	8		10.92	0.00	10.92	0.0	10.92	41.80	X			52.72
28-Aug-86	8	10.99	(1.00)	0.03	10.99	.0	10.99	41.73	X			52.72
04-Sep-86	8	10.92	(1.00)	0.02	10.92	.0	10.92	41.80	X			52.72
11-Sep-86	8	10.95	(1.00)	0.04	10.95	.0	10.95	41.77	X			52.72
18-Sep-86	8	10.92	(1.00)	0.05	10.92	0.1	10.92	41.80	X			52.72
25-Sep-86	8	10.69	(1.00)	0.02	10.69	.0	10.69	42.03	X			52.72
02-Oct-86	8	10.72	(1.00)	0.01	10.72	.0	10.72	42.00	X			52.72
09-Oct-86	8	10.64	(1.00)	0.02	10.64	.0	10.64	42.08	X			52.72
16-Oct-86	8	10.75	(1.00)	0.02	10.75	.0	10.75	41.97	X			52.72



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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			
23-Oct-86	8	10.89	(1.00)	0.04	10.89	.0	10.89	41.83	X			52.72
30-Oct-86	8	10.95	(1.00)	0.05	10.95	0.1	10.95	41.77	X			52.72
03-Nov-86	8	10.98	(1.00)	0.01	10.98	.0	10.98	41.74	X			52.72
10-Nov-86	8	11.00	(1.00)	0.03	11.00	.0	11.00	41.72	X			52.72
17-Nov-86	8	11.00	(1.00)	0.08	11.01	0.1	11.00	41.72	X			52.72
24-Nov-86	8	11.02	(1.00)	0.05	11.02	0.1	11.02	41.70	X			52.72
01-Dec-86	8	11.02	(1.00)	0.01	11.02	.0	11.02	41.70	X			52.72
08-Dec-86	8	10.87	(1.00)	0.02	10.87	.0	10.87	41.85	X			52.72
15-Dec-86	8	10.41	(1.00)	0.04	10.41	.0	10.41	42.31	X			52.72
22-Dec-86	8	10.43	(1.00)	0.10	10.44	0.1	10.43	42.29	X			52.72
29-Dec-86	8	10.39	(1.00)	.00	10.39	.0	10.39	42.33	X			52.72
05-Jan-87	8		9.96	0.00	9.96	0.0	9.96	42.76	X			52.72
12-Jan-87	8	10.19	(1.00)	.00	10.19	.0	10.19	42.53	X			52.72
19-Jan-87	8	10.42	(1.00)	.00	10.42	.0	10.42	42.30	X			52.72
26-Jan-87	8		10.04	0.00	10.04	0.0	10.04	42.68	X			52.72
26-Jan-87	8	9.94	(1.00)	.00	9.94	.0	9.94	42.78	X			52.72
02-Feb-87	8	9.21	(1.00)	.00	9.21	.0	9.21	43.51	X			52.72
09-Feb-87	8	7.42	9.44	0.00	9.44	24.2	7.42	44.97	X			52.72
23-Feb-87	8		8.38	0.00	8.38	0.0	8.38	44.34	X			52.72
02-Mar-87	8	9.14	(1.00)	.00	9.14	.0	9.14	43.58	X			52.72
09-Mar-87	8	9.02	(1.00)	.00	9.02	.0	9.02	43.70	X			52.72
16-Mar-87	8		8.62	0.00	8.62	0.0	8.62	44.10	X			52.72
23-Mar-87	8		8.80	0.00	8.80	0.0	8.80	43.92	X			52.72
30-Mar-87	8	9.22	(1.00)	.00	9.22	.0	9.22	43.50	X			52.72
07-Apr-87	8		9.72	0.00	9.72	0.0	9.72	43.00	X			52.72
14-Apr-87	8		9.81	0.00	9.81	0.0	9.81	42.91	X			52.72
21-Apr-87	8	10.08	(1.00)	.00	10.08	.0	10.08	42.64	X			52.72
28-Apr-87	8	10.32	(1.00)	0.01	10.32	.0	10.32	42.40	X			52.72



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			
									X			
05-May-87	A	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			
12-May-87	A	7.37	(1.00)	0.02	7.37	.0	7.37	-7.37	X			
19-May-87	A	7.40	(1.00)	0.02	7.40	.0	7.40	-7.40	X			
26-May-87	A	7.38	(1.00)	0.03	7.38	.0	7.38	-7.38	X			
02-Jun-87	A	7.34	(1.00)	0.01	7.34	.0	7.34	-7.34	X			
09-Jun-87	A	7.44	(1.00)	0.03	7.44	.0	7.44	-7.44	X			
16-Jun-87	A	7.42	(1.00)	0.02	7.42	.0	7.42	-7.42	X			
23-Jun-87	A	7.44	(1.00)	0.03	7.44	.0	7.44	-7.44	X			
30-Jun-87	A	7.47	(1.00)	0.04	7.47	.0	7.47	-7.47	X			
07-Jul-87	A	7.35	(1.00)	0.04	7.35	.0	7.35	-7.35	X			
14-Jul-87	A	7.45	(1.00)	0.03	7.45	.0	7.45	-7.45	X			
21-Jul-87	A	7.46	(1.00)	0.03	7.46	.0	7.46	-7.46	X			
28-Jul-87	A	7.48	(1.00)	0.03	7.48	.0	7.48	-7.48	X			
04-Aug-87	A	7.54	(1.00)	0.03	7.54	.0	7.54	-7.54	X			
04-Aug-87	A	7.54	(1.00)	0.03	7.54	.0	7.54	-7.54	X			
04-Aug-87	A	7.54	(1.00)	0.03	7.54	.0	7.54	-7.54	X			
11-Aug-87	A	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
11-Aug-87	A	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
18-Aug-87	A	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
18-Aug-87	A	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
25-Aug-87	A	7.58	(1.00)	0.04	7.58	.0	7.58	-7.58	X			
25-Aug-87	A	7.58	(1.00)	0.04	7.58	.0	7.58	-7.58	X			
01-Sep-87	A	7.58	(1.00)	0.02	7.58	.0	7.58	-7.58	X			
01-Sep-87	A	7.58	(1.00)	0.02	7.58	.0	7.58	-7.58	X			
08-Sep-87	A	7.60	(1.00)	0.04	7.60	.0	7.60	-7.60	X			
08-Sep-87	A	7.60	(1.00)	0.04	7.60	.0	7.60	-7.60	X			
15-Sep-87	A	7.61	(1.00)	0.03	7.61	.0	7.61	-7.61	X			
15-Sep-87	A	7.61	(1.00)	0.03	7.61	.0	7.61	-7.61	X			
22-Sep-87	A	7.65	(1.00)	0.03	7.65	.0	7.65	-7.65	X			
29-Sep-87	A	7.63	(1.00)	0.03	7.63	.0	7.63	-7.63	X			
06-Oct-87	A	7.70	(1.00)	0.02	7.70	.0	7.70	-7.70	X			
13-Oct-87	A	7.68	(1.00)	0.03	7.68	.0	7.68	-7.68	X			
20-Oct-87	A	7.42	(1.00)	.00	7.42	.0	7.42	-7.42	X			
27-Oct-87	A	7.41	(1.00)	0.01	7.41	.0	7.41	-7.41	X			
03-Nov-87	A	7.40	(1.00)	0.03	7.40	.0	7.40	-7.40	X			
10-Nov-87	A		N/A		ERR	0.0	ERR	ERR	X			
17-Nov-87	A	7.30	(1.00)	.00	7.30	.0	7.30	-7.30	X			
24-Nov-87	A	7.44	(1.00)	0.01	7.44	.0	7.44	-7.44	X			
01-Dec-87	A	7.34	(1.00)	0.01	7.34	.0	7.34	-7.34	X			
08-Dec-87	A	7.19	(1.00)	.00	7.19	.0	7.19	-7.19	X			
15-Dec-87	A	7.42	(1.00)	0.02	7.42	.0	7.42	-7.42	X			
22-Dec-87	A	7.38	(1.00)	0.01	7.38	.0	7.38	-7.38	X			
29-Dec-87	A	7.24	(1.00)	0.01	7.24	.0	7.24	-7.24	X			
05-May-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
12-May-87	B	7.50	(1.00)	0.02	7.50	.0	7.50	-7.50	X			
19-May-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
26-May-87	B	7.49	(1.00)	0.03	7.49	.0	7.49	-7.49	X			
02-Jun-87	B	7.49	(1.00)	0.01	7.49	.0	7.49	-7.49	X			
09-Jun-87	B	7.57	(1.00)	0.03	7.57	.0	7.57	-7.57	X			
16-Jun-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
23-Jun-87	B	7.50	(1.00)	0.02	7.50	.0	7.50	-7.50	X			



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			
30-Jun-87	B	7.54	(1.00)	0.03	7.54	.0	7.54	-7.54	X			
07-Jul-87	B	7.49	(1.00)	0.05	7.49	0.1	7.49	-7.49	X			
14-Jul-87	B	7.54	(1.00)	0.02	7.54	.0	7.54	-7.54	X			
21-Jul-87	B	7.66	(1.00)	0.06	7.67	0.1	7.66	-7.66	X			
28-Jul-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
04-Aug-87	B	7.63	(1.00)	0.04	7.63	.0	7.63	-7.63	X			
04-Aug-87	B	7.63	(1.00)	0.04	7.63	.0	7.63	-7.63	X			
04-Aug-87	B	7.63	(1.00)	0.04	7.63	.0	7.63	-7.63	X			
11-Aug-87	B	7.66	(1.00)	0.03	7.66	.0	7.66	-7.66	X			
11-Aug-87	B	7.66	(1.00)	0.03	7.66	.0	7.66	-7.66	X			
18-Aug-87	B	7.64	(1.00)	0.02	7.64	.0	7.64	-7.64	X			
18-Aug-87	B	7.64	(1.00)	0.02	7.64	.0	7.64	-7.64	X			
25-Aug-87	B	7.67	(1.00)	0.04	7.67	.0	7.67	-7.67	X			
25-Aug-87	B	7.67	(1.00)	0.04	7.67	.0	7.67	-7.67	X			
01-Sep-87	B	7.70	(1.00)	0.02	7.70	.0	7.70	-7.70	X			
01-Sep-87	B	7.70	(1.00)	0.02	7.70	.0	7.70	-7.70	X			
08-Sep-87	B	7.70	(1.00)	0.03	7.70	.0	7.70	-7.70	X			
08-Sep-87	B	7.70	(1.00)	0.03	7.70	.0	7.70	-7.70	X			
15-Sep-87	B	7.69	(1.00)	0.02	7.69	.0	7.69	-7.69	X			
15-Sep-87	B	7.69	(1.00)	0.02	7.69	.0	7.69	-7.69	X			
22-Sep-87	B	7.79	(1.00)	0.03	7.79	.0	7.79	-7.79	X			
29-Sep-87	B	7.76	(1.00)	0.02	7.76	.0	7.76	-7.76	X			
06-Oct-87	B	7.78	(1.00)	0.02	7.78	.0	7.78	-7.78	X			
13-Oct-87	B	7.72	(1.00)	0.02	7.72	.0	7.72	-7.72	X			
20-Oct-87	B	7.52	(1.00)	.00	7.52	.0	7.52	-7.52	X			
27-Oct-87	B	7.51	(1.00)	0.01	7.51	.0	7.51	-7.51	X			
03-Nov-87	B	7.52	(1.00)	0.02	7.52	.0	7.52	-7.52	X			
10-Nov-87	B		N/A		ERR	0.0	ERR	ERR	X			
17-Nov-87	B	7.40	(1.00)	.00	7.40	.0	7.40	-7.40	X			
24-Nov-87	B	7.55	(1.00)	0.02	7.55	.0	7.55	-7.55	X			
01-Dec-87	B	7.44	(1.00)	.00	7.44	.0	7.44	-7.44	X			
08-Dec-87	B	7.27	(1.00)	.00	7.27	.0	7.27	-7.27	X			
15-Dec-87	B	7.51	(1.00)	0.02	7.51	.0	7.51	-7.51	X			
22-Dec-87	B	7.48	(1.00)	0.01	7.48	.0	7.48	-7.48	X			
29-Dec-87	B	7.30	(1.00)	.00	7.30	.0	7.30	-7.30	X			
05-May-87	2		6.68	0.00	6.68	0.0	6.68	47.73	X			54.41
12-May-87	2		8.05	0.00	8.05	0.0	8.05	46.36	X			54.41
19-May-87	2		N/A	0.00	ERR	0.0	ERR	ERR	X			54.41
26-May-87	2		9.54	0.00	9.54	0.0	9.54	44.87	X			54.41
02-Jun-87	2		4.03	0.00	4.03	0.0	4.03	50.38	X			54.41
09-Jun-87	2		10.20	0.00	10.20	0.0	10.20	44.21	X			54.41
16-Jun-87	2		10.37	0.00	10.37	0.0	10.37	44.04	X			54.41
23-Jun-87	2		10.52	0.00	10.52	0.0	10.52	43.89	X			54.41
30-Jun-87	2	10.71	(1.00)	.00	10.71	.0	10.71	43.70	X			54.41
07-Jul-87	2		5.10	0.00	5.10	0.0	5.10	49.31	X			54.41
14-Jul-87	2		10.75	0.00	10.75	0.0	10.75	43.66	X			54.41
21-Jul-87	2		11.04	0.00	11.04	0.0	11.04	43.37	X			54.41
28-Jul-87	2		10.97	0.00	10.97	0.0	10.97	43.44	X			54.41
04-Aug-87	2		11.05	0.00	11.05	0.0	11.05	43.36	X			54.41
04-Aug-87	2		11.05	0.00	11.05	0.0	11.05	43.36	X			54.41
04-Aug-87	2		11.05	0.00	11.05	0.0	11.05	43.36	X			54.41
11-Aug-87	2		11.00	0.00	11.00	0.0	11.00	43.41	X			54.41



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			
11-Aug-87	2		11.00	0.00	11.00	0.0	11.00	43.41	X			54.41
18-Aug-87	2		11.05	0.00	11.05	0.0	11.05	43.36	X			54.41
18-Aug-87	2		11.05	0.00	11.05	0.0	11.05	43.36	X			54.41
25-Aug-87	2		11.15	0.00	11.15	0.0	11.15	43.26	X			54.41
25-Aug-87	2		11.15	0.00	11.15	0.0	11.15	43.26	X			54.41
01-Sep-87	2		11.22	0.00	11.22	0.0	11.22	43.19	X			54.41
01-Sep-87	2		11.22	0.00	11.22	0.0	11.22	43.19	X			54.41
08-Sep-87	2		11.28	0.00	11.28	0.0	11.28	43.13	X			54.41
08-Sep-87	2		11.28	0.00	11.28	0.0	11.28	43.13	X			54.41
15-Sep-87	2		11.34	0.00	11.34	0.0	11.34	43.07	X			54.41
15-Sep-87	2		11.34	0.00	11.34	0.0	11.34	43.07	X			54.41
22-Sep-87	2		11.50	0.00	11.50	0.0	11.50	42.91	X			54.41
29-Sep-87	2		11.53	0.00	11.53	0.0	11.53	42.88	X			54.41
06-Oct-87	2		11.61	0.00	11.61	0.0	11.61	42.80	X			54.41
13-Oct-87	2		11.49	0.00	11.49	0.0	11.49	42.92	X			54.41
20-Oct-87	2		11.53	0.00	11.53	0.0	11.53	42.88	X			54.41
27-Oct-87	2		11.24	0.00	11.24	0.0	11.24	43.17	X			54.41
03-Nov-87	2		7.40	0.00	7.40	0.0	7.40	47.01	X			54.41
10-Nov-87	2		8.82	0.00	8.82	0.0	8.82	45.59	X			54.41
17-Nov-87	2		6.12	0.00	6.12	0.0	6.12	48.29	X			54.41
24-Nov-87	2		6.00	0.00	6.00	0.0	6.00	48.41	X			54.41
01-Dec-87	2		5.79	0.00	5.79	0.0	5.79	48.62	X			54.41
08-Dec-87	2		6.37	0.00	6.37	0.0	6.37	48.04	X			54.41
15-Dec-87	2		4.82	0.00	4.82	0.0	4.82	49.59	X			54.41
22-Dec-87	2		5.00	0.00	5.00	0.0	5.00	49.41	X			54.41
29-Dec-87	2		4.51	0.00	4.51	0.0	4.51	49.90	X			54.41
05-May-87	3		10.62	0.00	10.62	0.0	10.62	42.72	X			53.34
12-May-87	3		10.55	0.00	10.55	0.0	10.55	42.79	X			53.34
19-May-87	3		9.15	0.00	9.15	0.0	9.15	44.19	X			53.34
26-May-87	3		10.00	0.00	10.00	0.0	10.00	43.34	X			53.34
02-Jun-87	3		9.39	0.00	9.39	0.0	9.39	43.95	X			53.34
09-Jun-87	3		10.85	0.00	10.85	0.0	10.85	42.49	X			53.34
16-Jun-87	3		11.04	0.00	11.04	0.0	11.04	42.30	X			53.34
23-Jun-87	3		11.02	0.00	11.02	0.0	11.02	42.32	X			53.34
30-Jun-87	3		11.29	0.00	11.29	0.0	11.29	42.05	X			53.34
07-Jul-87	3		10.39	0.00	10.39	0.0	10.39	42.95	X			53.34
14-Jul-87	3		11.22	0.00	11.22	0.0	11.22	42.12	X			53.34
21-Jul-87	3		11.15	0.00	11.15	0.0	11.15	42.19	X			53.34
28-Jul-87	3		10.92	0.00	10.92	0.0	10.92	42.42	X			53.34
04-Aug-87	3		11.26	0.00	11.26	0.0	11.26	42.08	X			53.34
04-Aug-87	3		11.26	0.00	11.26	0.0	11.26	42.08	X			53.34
04-Aug-87	3		11.26	0.00	11.26	0.0	11.26	42.08	X			53.34
11-Aug-87	3		11.32	0.00	11.32	0.0	11.32	42.02	X			53.34
11-Aug-87	3		11.32	0.00	11.32	0.0	11.32	42.02	X			53.34
18-Aug-87	3		11.43	0.00	11.43	0.0	11.43	41.91	X			53.34
18-Aug-87	3		11.43	0.00	11.43	0.0	11.43	41.91	X			53.34
25-Aug-87	3		11.50	0.00	11.50	0.0	11.50	41.84	X			53.34
25-Aug-87	3		11.50	0.00	11.50	0.0	11.50	41.84	X			53.34
01-Sep-87	3		11.58	0.00	11.58	0.0	11.58	41.76	X			53.34
01-Sep-87	3		11.58	0.00	11.58	0.0	11.58	41.76	X			53.34
08-Sep-87	3		11.65	0.00	11.65	0.0	11.65	41.69	X			53.34
08-Sep-87	3		11.65	0.00	11.65	0.0	11.65	41.69	X			53.34



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			
15-Sep-87	3		11.58	0.00	11.58	0.0	11.58	41.76	X			53.34
15-Sep-87	3		11.58	0.00	11.58	0.0	11.58	41.76	X			53.34
22-Sep-87	3		11.82	0.00	11.82	0.0	11.82	41.52	X			53.34
29-Sep-87	3		11.17	0.00	11.17	0.0	11.17	42.17	X			53.34
06-Oct-87	3		11.48	0.00	11.48	0.0	11.48	41.86	X			53.34
13-Oct-87	3		11.53	0.00	11.53	0.0	11.53	41.81	X			53.34
20-Oct-87	3		11.20	0.00	11.20	0.0	11.20	42.14	X			53.34
27-Oct-87	3		11.35	0.00	11.35	0.0	11.35	41.99	X			53.34
03-Nov-87	3		11.00	0.00	11.00	0.0	11.00	42.34	X			53.34
10-Nov-87	3		10.77	0.00	10.77	0.0	10.77	42.57	X			53.34
17-Nov-87	3		10.03	0.00	10.03	0.0	10.03	43.31	X			53.34
24-Nov-87	3		10.30	0.00	10.30	0.0	10.30	43.04	X			53.34
01-Dec-87	3		9.07	0.00	9.07	0.0	9.07	44.27	X			53.34
08-Dec-87	3		9.56	0.00	9.56	0.0	9.56	43.78	X			53.34
15-Dec-87	3		9.13	0.00	9.13	0.0	9.13	44.21	X			53.34
22-Dec-87	3		9.20	0.00	9.20	0.0	9.20	44.14	X			53.34
29-Dec-87	3		7.55	0.00	7.55	0.0	7.55	45.79	X			53.34
05-May-87	4	11.12	(1.00)	0.05	11.12	0.1	11.12	42.28	X			53.40
12-May-87	4	11.06	(1.00)	0.03	11.06	.0	11.06	42.34	X			53.40
19-May-87	4	11.08	(1.00)	0.03	11.08	.0	11.08	42.32	X			53.40
26-May-87	4	11.34	(1.00)	0.04	11.34	.0	11.34	42.06	X			53.40
02-Jun-87	4	9.95	(1.00)	0.03	9.95	.0	9.95	43.45	X			53.40
09-Jun-87	4	11.38	(1.00)	0.02	11.38	.0	11.38	42.02	X			53.40
16-Jun-87	4	11.51	(1.00)	0.03	11.51	.0	11.51	41.89	X			53.40
23-Jun-87	4	11.57	(1.00)	0.02	11.57	.0	11.57	41.83	X			53.40
30-Jun-87	4	11.58	(1.00)	.00	11.58	.0	11.58	41.82	X			53.40
07-Jul-87	4	10.85	(1.00)	0.05	10.85	0.1	10.85	42.55	X			53.40
14-Jul-87	4	11.68	(1.00)	0.02	11.68	.0	11.68	41.72	X			53.40
21-Jul-87	4	11.74	(1.00)	0.02	11.74	.0	11.74	41.66	X			53.40
28-Jul-87	4	11.34	(1.00)	0.02	11.34	.0	11.34	42.06	X			53.40
04-Aug-87	4	11.59	(1.00)	0.03	11.59	.0	11.59	41.81	X			53.40
04-Aug-87	4	11.59	(1.00)	0.03	11.59	.0	11.59	41.81	X			53.40
04-Aug-87	4	11.59	(1.00)	0.03	11.59	.0	11.59	41.81	X			53.40
11-Aug-87	4	11.76	(1.00)	0.03	11.76	.0	11.76	41.64	X			53.40
11-Aug-87	4	11.76	(1.00)	0.03	11.76	.0	11.76	41.64	X			53.40
18-Aug-87	4	11.78	(1.00)	0.02	11.78	.0	11.78	41.62	X			53.40
18-Aug-87	4	11.78	(1.00)	0.02	11.78	.0	11.78	41.62	X			53.40
25-Aug-87	4	11.76	(1.00)	0.04	11.76	.0	11.76	41.64	X			53.40
25-Aug-87	4	11.76	(1.00)	0.04	11.76	.0	11.76	41.64	X			53.40
01-Sep-87	4	11.78	(1.00)	0.02	11.78	.0	11.78	41.62	X			53.40
01-Sep-87	4	11.78	(1.00)	0.02	11.78	.0	11.78	41.62	X			53.40
08-Sep-87	4	11.82	(1.00)	0.02	11.82	.0	11.82	41.58	X			53.40
08-Sep-87	4	11.82	(1.00)	0.02	11.82	.0	11.82	41.58	X			53.40
15-Sep-87	4	11.92	(1.00)	0.02	11.92	.0	11.92	41.48	X			53.40
15-Sep-87	4	11.92	(1.00)	0.02	11.92	.0	11.92	41.48	X			53.40
22-Sep-87	4	11.94	(1.00)	0.02	11.94	.0	11.94	41.46	X			53.40
29-Sep-87	4	11.92	(1.00)	0.02	11.92	.0	11.92	41.48	X			53.40
06-Oct-87	4	11.95	(1.00)	0.02	11.95	.0	11.95	41.45	X			53.40
13-Oct-87	4	11.94	(1.00)	0.02	11.94	.0	11.94	41.46	X			53.40
20-Oct-87	4	11.73	(1.00)	0.02	11.73	.0	11.73	41.67	X			53.40
27-Oct-87	4	11.64	(1.00)	0.01	11.64	.0	11.64	41.76	X			53.40
03-Nov-87	4	11.38	(1.00)	0.01	11.38	.0	11.38	42.02	X			53.40



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			
10-Nov-87	4	11.61	(1.00)	0.01	11.61	.0	11.61	41.79	X			53.40
17-Nov-87	4	11.16	(1.00)	0.02	11.16	.0	11.16	42.24	X			53.40
24-Nov-87	4	10.83	(1.00)	0.02	10.83	.0	10.83	42.57	X			53.40
01-Dec-87	4	10.70	(1.00)	0.01	10.70	.0	10.70	42.70	X			53.40
08-Dec-87	4	10.45	(1.00)	0.01	10.45	.0	10.45	42.95	X			53.40
15-Dec-87	4	9.83	(1.00)	0.02	9.83	.0	9.83	43.57	X			53.40
22-Dec-87	4	10.10	(1.00)	0.01	10.10	.0	10.10	43.30	X			53.40
29-Dec-87	4	9.50	(1.00)	.00	9.50	.0	9.50	43.90	X			53.40
05-May-87	5		10.85	0.00	10.85	0.0	10.85	41.94	X			52.79
12-May-87	5		10.75	0.00	10.75	0.0	10.75	42.04	X			52.79
19-May-87	5		10.81	0.00	10.81	0.0	10.81	41.98	X			52.79
26-May-87	5		10.95	0.00	10.95	0.0	10.95	41.84	X			52.79
02-Jun-87	5		9.67	0.00	9.67	0.0	9.67	43.12	X			52.79
09-Jun-87	5		11.08	0.00	11.08	0.0	11.08	41.71	X			52.79
16-Jun-87	5		11.19	0.00	11.19	0.0	11.19	41.60	X			52.79
23-Jun-87	5		11.22	0.00	11.22	0.0	11.22	41.57	X			52.79
30-Jun-87	5		11.31	0.00	11.31	0.0	11.31	41.48	X			52.79
07-Jul-87	5		10.65	0.00	10.65	0.0	10.65	42.14	X			52.79
14-Jul-87	5		11.38	0.00	11.38	0.0	11.38	41.41	X			52.79
21-Jul-87	5		11.44	0.00	11.44	0.0	11.44	41.35	X			52.79
28-Jul-87	5		11.08	0.00	11.08	0.0	11.08	41.71	X			52.79
04-Aug-87	5		11.46	0.00	11.46	0.0	11.46	41.33	X			52.79
04-Aug-87	5		11.46	0.00	11.46	0.0	11.46	41.33	X			52.79
04-Aug-87	5		11.46	0.00	11.46	0.0	11.46	41.33	X			52.79
11-Aug-87	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
11-Aug-87	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
18-Aug-87	5		11.52	0.00	11.52	0.0	11.52	41.27	X			52.79
18-Aug-87	5		11.52	0.00	11.52	0.0	11.52	41.27	X			52.79
25-Aug-87	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
25-Aug-87	5		11.48	0.00	11.48	0.0	11.48	41.31	X			52.79
01-Sep-87	5		11.56	0.00	11.56	0.0	11.56	41.23	X			52.79
01-Sep-87	5		11.56	0.00	11.56	0.0	11.56	41.23	X			52.79
08-Sep-87	5		11.59	0.00	11.59	0.0	11.59	41.20	X			52.79
08-Sep-87	5		11.59	0.00	11.59	0.0	11.59	41.20	X			52.79
15-Sep-87	5		11.71	0.00	11.71	0.0	11.71	41.08	X			52.79
15-Sep-87	5		11.71	0.00	11.71	0.0	11.71	41.08	X			52.79
22-Sep-87	5		11.71	0.00	11.71	0.0	11.71	41.08	X			52.79
29-Sep-87	5		11.70	0.00	11.70	0.0	11.70	41.09	X			52.79
06-Oct-87	5		11.70	0.00	11.70	0.0	11.70	41.09	X			52.79
13-Oct-87	5		11.72	0.00	11.72	0.0	11.72	41.07	X			52.79
20-Oct-87	5		11.44	0.00	11.44	0.0	11.44	41.35	X			52.79
27-Oct-87	5		11.30	0.00	11.30	0.0	11.30	41.49	X			52.79
03-Nov-87	5		11.10	0.00	11.10	0.0	11.10	41.69	X			52.79
10-Nov-87	5		11.69	0.00	11.69	0.0	11.69	41.10	X			52.79
17-Nov-87	5		10.74	0.00	10.74	0.0	10.74	42.05	X			52.79
24-Nov-87	5		10.57	0.00	10.57	0.0	10.57	42.22	X			52.79
01-Dec-87	5		10.30	0.00	10.30	0.0	10.30	42.49	X			52.79
08-Dec-87	5		10.93	0.00	10.93	0.0	10.93	41.86	X			52.79
15-Dec-87	5		9.52	0.00	9.52	0.0	9.52	43.27	X			52.79
22-Dec-87	5		9.73	0.00	9.73	0.0	9.73	43.06	X			52.79
29-Dec-87	5		9.21	0.00	9.21	0.0	9.21	43.58	X			52.79
05-May-87	6		8.94	0.00	8.94	0.0	8.94	44.83	X	CP		53.77



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			
12-May-87	6		8.92	0.00	8.92	0.0	8.92	44.85	X			53.77
19-May-87	6		8.95	0.00	8.95	0.0	8.95	44.82	X			53.77
26-May-87	6		9.12	0.00	9.12	0.0	9.12	44.65	X			53.77
02-Jun-87	6		7.71	0.00	7.71	0.0	7.71	46.06	X			53.77
09-Jun-87	6		9.32	0.00	9.32	0.0	9.32	44.45	X			53.77
16-Jun-87	6		9.32	0.00	9.32	0.0	9.32	44.45	X			53.77
23-Jun-87	6		9.40	0.00	9.40	0.0	9.40	44.37	X			53.77
30-Jun-87	6		9.47	0.00	9.47	0.0	9.47	44.30	X			53.77
07-Jul-87	6		8.71	0.00	8.71	0.0	8.71	45.06	X			53.77
14-Jul-87	6		9.60	0.00	9.60	0.0	9.60	44.17	X			53.77
21-Jul-87	6		9.73	0.00	9.73	0.0	9.73	44.04	X			53.77
28-Jul-87	6		9.57	0.00	9.57	0.0	9.57	44.20	X			53.77
04-Aug-87	6		9.74	0.00	9.74	0.0	9.74	44.03	X			53.77
04-Aug-87	6		9.74	0.00	9.74	0.0	9.74	44.03	X			53.77
04-Aug-87	6		9.74	0.00	9.74	0.0	9.74	44.03	X			53.77
11-Aug-87	6		9.74	0.00	9.74	0.0	9.74	44.03	X			53.77
11-Aug-87	6		9.74	0.00	9.74	0.0	9.74	44.03	X			53.77
18-Aug-87	6		9.78	0.00	9.78	0.0	9.78	43.99	X			53.77
18-Aug-87	6		9.78	0.00	9.78	0.0	9.78	43.99	X			53.77
25-Aug-87	6		9.80	0.00	9.80	0.0	9.80	43.97	X			53.77
25-Aug-87	6		9.80	0.00	9.80	0.0	9.80	43.97	X			53.77
01-Sep-87	6		9.88	0.00	9.88	0.0	9.88	43.89	X			53.77
01-Sep-87	6		9.88	0.00	9.88	0.0	9.88	43.89	X			53.77
08-Sep-87	6		9.88	0.00	9.88	0.0	9.88	43.89	X			53.77
08-Sep-87	6		9.88	0.00	9.88	0.0	9.88	43.89	X			53.77
15-Sep-87	6		9.99	0.00	9.99	0.0	9.99	43.78	X			53.77
15-Sep-87	6		9.99	0.00	9.99	0.0	9.99	43.78	X			53.77
22-Sep-87	6		10.02	0.00	10.02	0.0	10.02	43.75	X			53.77
29-Sep-87	6		9.98	0.00	9.98	0.0	9.98	43.79	X			53.77
06-Oct-87	6		10.05	0.00	10.05	0.0	10.05	43.72	X			53.77
13-Oct-87	6		10.02	0.00	10.02	0.0	10.02	43.75	X			53.77
20-Oct-87	6		9.86	0.00	9.86	0.0	9.86	43.91	X			53.77
27-Oct-87	6		9.71	0.00	9.71	0.0	9.71	44.06	X			53.77
03-Nov-87	6		9.35	0.00	9.35	0.0	9.35	44.42	X			53.77
10-Nov-87	6		9.60	0.00	9.60	0.0	9.60	44.17	X			53.77
17-Nov-87	6		8.97	0.00	8.97	0.0	8.97	44.80	X			53.77
24-Nov-87	6		8.61	0.00	8.61	0.0	8.61	45.16	X			53.77
01-Dec-87	6		8.53	0.00	8.53	0.0	8.53	45.24	X			53.77
08-Dec-87	6		8.89	0.00	8.89	0.0	8.89	44.88	X			53.77
15-Dec-87	6		7.47	0.00	7.47	0.0	7.47	46.30	X			53.77
22-Dec-87	6		7.81	0.00	7.81	0.0	7.81	45.96	X			53.77
29-Dec-87	6		7.62	0.00	7.62	0.0	7.62	46.15	X			53.77
05-May-87	7		8.65	0.00	8.65	0.0	8.65	44.81	X			53.46
12-May-87	7		8.65	0.00	8.65	0.0	8.65	44.81	X			53.46
19-May-87	7		8.76	0.00	8.76	0.0	8.76	44.70	X			53.46
26-May-87	7		8.88	0.00	8.88	0.0	8.88	44.58	X			53.46
02-Jun-87	7		7.50	0.00	7.50	0.0	7.50	45.96	X			53.46
09-Jun-87	7		9.03	0.00	9.03	0.0	9.03	44.43	X			53.46
16-Jun-87	7		9.13	0.00	9.13	0.0	9.13	44.33	X			53.46
23-Jun-87	7		9.17	0.00	9.17	0.0	9.17	44.29	X			53.46
30-Jun-87	7		9.26	0.00	9.26	0.0	9.26	44.20	X			53.46
07-Jul-87	7		8.50	0.00	8.50	0.0	8.50	44.96	X			53.46



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			
14-Jul-87	7		9.34	0.00	9.34	0.0	9.34	44.12	X			53.46
21-Jul-87	7		9.50	0.00	9.50	0.0	9.50	43.96	X			53.46
28-Jul-87	7		9.30	0.00	9.30	0.0	9.30	44.16	X			53.46
04-Aug-87	7		9.46	0.00	9.46	0.0	9.46	44.00	X			53.46
04-Aug-87	7		9.46	0.00	9.46	0.0	9.46	44.00	X			53.46
04-Aug-87	7		9.46	0.00	9.46	0.0	9.46	44.00	X			53.46
11-Aug-87	7		9.47	0.00	9.47	0.0	9.47	43.99	X			53.46
11-Aug-87	7		9.47	0.00	9.47	0.0	9.47	43.99	X			53.46
18-Aug-87	7		9.48	0.00	9.48	0.0	9.48	43.98	X			53.46
18-Aug-87	7		9.48	0.00	9.48	0.0	9.48	43.98	X			53.46
25-Aug-87	7		9.51	0.00	9.51	0.0	9.51	43.95	X			53.46
25-Aug-87	7		9.51	0.00	9.51	0.0	9.51	43.95	X			53.46
01-Sep-87	7		9.59	0.00	9.59	0.0	9.59	43.87	X			53.46
01-Sep-87	7		9.59	0.00	9.59	0.0	9.59	43.87	X			53.46
08-Sep-87	7		9.62	0.00	9.62	0.0	9.62	43.84	X			53.46
08-Sep-87	7		9.62	0.00	9.62	0.0	9.62	43.84	X			53.46
15-Sep-87	7		9.71	0.00	9.71	0.0	9.71	43.75	X			53.46
15-Sep-87	7		9.71	0.00	9.71	0.0	9.71	43.75	X			53.46
22-Sep-87	7		9.77	0.00	9.77	0.0	9.77	43.69	X			53.46
29-Sep-87	7		9.73	0.00	9.73	0.0	9.73	43.73	X			53.46
06-Oct-87	7		9.77	0.00	9.77	0.0	9.77	43.69	X			53.46
13-Oct-87	7		9.75	0.00	9.75	0.0	9.75	43.71	X			53.46
20-Oct-87	7		0.16	0.00	0.16	0.0	0.16	53.30	X			53.46
27-Oct-87	7		9.42	0.00	9.42	0.0	9.42	44.04	X			53.46
03-Nov-87	7		9.12	0.00	9.12	0.0	9.12	44.34	X			53.46
10-Nov-87	7		9.32	0.00	9.32	0.0	9.32	44.14	X			53.46
17-Nov-87	7		8.73	0.00	8.73	0.0	8.73	44.73	X			53.46
24-Nov-87	7		8.41	0.00	8.41	0.0	8.41	45.05	X			53.46
01-Dec-87	7		8.32	0.00	8.32	0.0	8.32	45.14	X			53.46
08-Dec-87	7		8.51	0.00	8.51	0.0	8.51	44.95	X			53.46
15-Dec-87	7		7.25	0.00	7.25	0.0	7.25	46.21	X			53.46
22-Dec-87	7		7.63	0.00	7.63	0.0	7.63	45.83	X			53.46
29-Dec-87	7		7.40	0.00	7.40	0.0	7.40	46.06	X			53.46
05-May-87	8	10.36	(1.00)	0.01	10.36	.0	10.36	42.36	X			52.72
12-May-87	8	10.25	(1.00)	0.01	10.25	.0	10.25	42.47	X			52.72
19-May-87	8	10.30	(1.00)	0.01	10.30	.0	10.30	42.42	X			52.72
26-May-87	8	10.45	(1.00)	0.05	10.45	0.1	10.45	42.27	X			52.72
02-Jun-87	8	9.32	(1.00)	0.01	9.32	.0	9.32	43.40	X			52.72
09-Jun-87	8	10.52	(1.00)	0.10	10.53	0.1	10.52	42.20	X			52.72
16-Jun-87	8	11.69	(1.00)	0.18	11.71	0.2	11.69	41.03	X			52.72
23-Jun-87	8	10.70	(1.00)	0.30	10.73	0.3	10.70	42.01	X			52.72
30-Jun-87	8	10.75	(1.00)	0.29	10.77	0.3	10.75	41.96	X			52.72
07-Jul-87	8	10.32	(1.00)	0.03	10.32	.0	10.32	42.40	X			52.72
14-Jul-87	8	10.84	(1.00)	0.36	10.87	0.4	10.84	41.87	X			52.72
21-Jul-87	8	11.00	(1.00)	0.82	11.07	0.8	11.00	41.70	X			52.72
28-Jul-87	8	10.52	(1.00)	0.32	10.55	0.3	10.52	42.19	X			52.72
04-Aug-87	8		10.90	0.00	10.90	0.0	10.90	41.82	X			52.72
04-Aug-87	8	10.90	(1.00)	0.28	10.92	0.3	10.90	41.81	X			52.72
04-Aug-87	8	10.90	(1.00)	0.28	10.92	0.3	10.90	41.81	X			52.72
11-Aug-87	8	10.90	(1.00)	0.45	10.94	0.5	10.90	41.81	X			52.72
11-Aug-87	8	10.90	(1.00)	0.45	10.94	0.5	10.90	41.81	X			52.72
18-Aug-87	8	10.92	(1.00)	0.82	10.99	0.8	10.92	41.78	X			52.72



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			
18-Aug-87	8	10.92	(1.00)	0.82	10.99	0.8	10.92	41.78	X			52.72
25-Aug-87	8	10.90	(1.00)	0.50	10.94	0.5	10.90	41.81	X			52.72
25-Aug-87	8	10.90	(1.00)	0.50	10.94	0.5	10.90	41.81	X			52.72
01-Sep-87	8	10.95	(1.00)	0.77	11.01	0.8	10.95	41.75	X			52.72
01-Sep-87	8	10.95	(1.00)	0.77	11.01	0.8	10.95	41.75	X			52.72
08-Sep-87	8	10.97	(1.00)	1.08	11.06	1.1	10.97	41.73	X			52.72
08-Sep-87	8	10.97	(1.00)	1.08	11.06	1.1	10.97	41.73	X			52.72
15-Sep-87	8	11.04	(1.00)	0.95	11.12	1.0	11.04	41.66	X			52.72
15-Sep-87	8	11.04	(1.00)	0.95	11.12	1.0	11.04	41.66	X			52.72
22-Sep-87	8	11.01	(1.00)	1.15	11.11	1.2	11.01	41.69	X			52.72
29-Sep-87	8	11.02	(1.00)	1.35	11.13	1.4	11.02	41.67	X			52.72
06-Oct-87	8	11.04	(1.00)	0.92	11.12	0.9	11.04	41.66	X			52.72
13-Oct-87	8	11.08	(1.00)	0.94	11.16	0.9	11.08	41.62	X			52.72
20-Oct-87	8	10.85	(1.00)	1.08	10.94	1.1	10.85	41.85	X			52.72
27-Oct-87	8	10.65	(1.00)	1.25	10.75	1.3	10.65	42.04	X			52.72
03-Nov-87	8	10.50	(1.00)	0.70	10.56	0.7	10.50	42.21	X			52.72
10-Nov-87	8	10.86	(1.00)	0.27	10.88	0.3	10.86	41.85	X			52.72
17-Nov-87	8	9.90	(1.00)	0.67	9.96	0.7	9.90	42.81	X			52.72
24-Nov-87	8	10.02	(1.00)	1.00	10.10	1.0	10.02	42.68	X			52.72
01-Dec-87	8	9.79	(1.00)	0.31	9.82	0.3	9.79	42.92	X			52.72
08-Dec-87	8	9.98	(1.00)	0.19	10.00	0.2	9.98	42.74	X			52.72
15-Dec-87	8	9.05	(1.00)	0.38	9.08	0.4	9.05	43.66	X			52.72
22-Dec-87	8	9.28	(1.00)	0.35	9.31	0.4	9.28	43.43	X			52.72
29-Dec-87	8	8.63	(1.00)	0.25	8.65	0.3	8.63	44.08	X			52.72
29-Dec-87	9			9.64	0.00	9.64	0.0	9.64	-9.64	X		
29-Dec-87	10			8.28	0.00	8.28	0.0	8.28	-8.28	X		
29-Dec-87	11			9.60	0.00	9.60	0.0	9.60	-9.60	X		



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			
05-Jan-88	A	7.20	(1.00)	0.01	7.20	.0	7.20	-7.20	X			
12-Jan-88	A	7.26	(1.00)	0.01	7.26	.0	7.26	-7.26	X			
19-Jan-88	A	6.75	(1.00)	0.01	6.75	.0	6.75	-6.75	X			
26-Jan-88	A	7.35	(1.00)	0.02	7.35	.0	7.35	-7.35	X			
02-Feb-88	A		N/A		ERR	0.0	ERR	ERR	X			
09-Feb-88	A	7.35	(1.00)	0.05	7.35	0.1	7.35	-7.35	X			
16-Feb-88	A	7.37	(1.00)	0.03	7.37	.0	7.37	-7.37	X			
23-Feb-88	A	7.30	(1.00)	0.02	7.30	.0	7.30	-7.30	X			
01-Mar-88	A	7.40	(1.00)	0.03	7.40	.0	7.40	-7.40	X			
08-Mar-88	A	7.31	(1.00)	0.06	7.32	0.1	7.31	-7.31	X			
15-Mar-88	A	7.37	(1.00)	0.01	7.37	.0	7.37	-7.37	X			
22-Mar-88	A	7.39	(1.00)	0.04	7.39	.0	7.39	-7.39	X			
29-Mar-88	A	7.53	(1.00)	0.02	7.53	.0	7.53	-7.53	X			
05-Apr-88	A	7.41	(1.00)	0.04	7.41	.0	7.41	-7.41	X			
12-Apr-88	A	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			
19-Apr-88	A	7.17	(1.00)	0.01	7.17	.0	7.17	-7.17	X			
26-Apr-88	A	7.40	(1.00)	0.03	7.40	.0	7.40	-7.40	X			
03-May-88	A	7.41	(1.00)	0.03	7.41	.0	7.41	-7.41	X			
10-May-88	A	7.38	(1.00)	0.03	7.38	.0	7.38	-7.38	X			
17-May-88	A	7.36	(1.00)	0.01	7.36	.0	7.36	-7.36	X			
24-May-88	A	7.40	(1.00)	0.02	7.40	.0	7.40	-7.40	X			
31-May-88	A	7.34	(1.00)	0.02	7.34	.0	7.34	-7.34	X			
07-Jun-88	A	7.22	(1.00)	0.03	7.22	.0	7.22	-7.22	X			
14-Jun-88	A	7.40	(1.00)	0.02	7.40	.0	7.40	-7.40	X			
21-Jun-88	A	7.34	(1.00)	0.02	7.34	.0	7.34	-7.34	X			
28-Jun-88	A	7.39	(1.00)	0.02	7.39	.0	7.39	-7.39	X			
05-Jul-88	A	6.40	(1.00)	0.03	6.40	.0	6.40	-6.40	X			
12-Jul-88	A	7.41	(1.00)	0.03	7.41	.0	7.41	-7.41	X			
19-Jul-88	A	7.39	(1.00)	0.03	7.39	.0	7.39	-7.39	X			
26-Jul-88	A	7.46	(1.00)	0.02	7.46	.0	7.46	-7.46	X			
05-Jan-88	B	7.35	(1.00)	.00	7.35	.0	7.35	-7.35	X			
12-Jan-88	B	7.38	(1.00)	0.02	7.38	.0	7.38	-7.38	X			
19-Jan-88	B	6.88	(1.00)	0.01	6.88	.0	6.88	-6.88	X			
26-Jan-88	B	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			
02-Feb-88	B		N/A		ERR	0.0	ERR	ERR	X			
09-Feb-88	B	7.47	(1.00)	0.05	7.47	0.1	7.47	-7.47	X			
16-Feb-88	B	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			
23-Feb-88	B	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			
01-Mar-88	B	7.24	(1.00)	0.03	7.24	.0	7.24	-7.24	X			
08-Mar-88	B	7.42	(1.00)	0.05	7.42	0.1	7.42	-7.42	X			
15-Mar-88	B	7.48	(1.00)	0.05	7.48	0.1	7.48	-7.48	X			
22-Mar-88	B	7.46	(1.00)	0.04	7.46	.0	7.46	-7.46	X			
29-Mar-88	B	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
05-Apr-88	B	7.48	(1.00)	0.04	7.48	.0	7.48	-7.48	X			
12-Apr-88	B	7.55	(1.00)	0.03	7.55	.0	7.55	-7.55	X			
19-Apr-88	B	7.30	(1.00)	0.01	7.30	.0	7.30	-7.30	X			
26-Apr-88	B	7.47	(1.00)	0.02	7.47	.0	7.47	-7.47	X			
03-May-88	B	7.47	(1.00)	0.04	7.47	.0	7.47	-7.47	X			
10-May-88	B	7.47	(1.00)	0.02	7.47	.0	7.47	-7.47	X			
17-May-88	B	7.45	(1.00)	0.01	7.45	.0	7.45	-7.45	X			
24-May-88	B	7.49	(1.00)	0.02	7.49	.0	7.49	-7.49	X			
31-May-88	B	7.44	(1.00)	0.02	7.44	.0	7.44	-7.44	X			



DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-BLEV	X	WT-G	HC	C.BLEV
					0.00	0.0	0.00	0.00	X			
07-Jun-88	B	7.32	(1.00)	0.04	7.32	.0	7.32	-7.32	X			
14-Jun-88	B	7.41	(1.00)	0.03	7.41	.0	7.41	-7.41	X			
21-Jun-88	B	7.43	(1.00)	0.03	7.43	.0	7.43	-7.43	X			
28-Jun-88	B	7.48	(1.00)	0.03	7.48	.0	7.48	-7.48	X			
05-Jul-88	B	6.44	(1.00)	0.03	6.44	.0	6.44	-6.44	X			
12-Jul-88	B	7.48	(1.00)	0.03	7.48	.0	7.48	-7.48	X			
19-Jul-88	B	7.47	(1.00)	0.02	7.47	.0	7.47	-7.47	X			
26-Jul-88	B	7.62	(1.00)	0.02	7.62	.0	7.62	-7.62	X			
05-Jan-88	2		4.04	0.00	4.04	0.0	4.04	50.37	X			54.41
12-Jan-88	2		4.47	0.00	4.47	0.0	4.47	49.94	X			54.41
19-Jan-88	2		3.89	0.00	3.89	0.0	3.89	50.52	X			54.41
26-Jan-88	2		4.33	0.00	4.33	0.0	4.33	50.08	X			54.41
02-Feb-88	2		4.20	0.00	4.20	0.0	4.20	50.21	X			54.41
09-Feb-88	2		4.50	0.00	4.50	0.0	4.50	49.91	X			54.41
16-Feb-88	2		4.82	0.00	4.82	0.0	4.82	49.59	X			54.41
23-Feb-88	2		N/A		ERR	0.0	ERR	ERR	X			54.41
01-Mar-88	2		N/A		ERR	0.0	ERR	ERR	X			54.41
08-Mar-88	2		N/A		ERR	0.0	ERR	ERR	X			54.41
15-Mar-88	2		N/A		ERR	0.0	ERR	ERR	X			54.41
22-Mar-88	2		8.75	0.00	8.75	0.0	8.75	45.66	X			54.41
29-Mar-88	2		9.58	0.00	9.58	0.0	9.58	44.83	X			54.41
05-Apr-88	2		9.85	0.00	9.85	0.0	9.85	44.56	X			54.41
12-Apr-88	2		10.20	0.00	10.20	0.0	10.20	44.21	X			54.41
19-Apr-88	2		9.10	0.00	9.10	0.0	9.10	45.31	X			54.41
26-Apr-88	2		5.02	0.00	5.02	0.0	5.02	49.39	X			54.41
03-May-88	2		6.43	0.00	6.43	0.0	6.43	47.98	X			54.41
10-May-88	2		4.97	0.00	4.97	0.0	4.97	49.44	X			54.41
17-May-88	2		5.17	0.00	5.17	0.0	5.17	49.24	X			54.41
24-May-88	2		6.59	0.00	6.59	0.0	6.59	47.82	X			54.41
31-May-88	2		8.01	0.00	8.01	0.0	8.01	46.40	X			54.41
07-Jun-88	2		8.40	0.00	8.40	0.0	8.40	46.01	X			54.41
14-Jun-88	2		9.15	0.00	9.15	0.0	9.15	45.26	X			54.41
21-Jun-88	2		9.38	0.00	9.38	0.0	9.38	45.03	X			54.41
28-Jun-88	2		9.73	0.00	9.73	0.0	9.73	44.68	X			54.41
05-Jul-88	2		10.07	0.00	10.07	0.0	10.07	44.34	X			54.41
12-Jul-88	2		10.21	0.00	10.21	0.0	10.21	44.20	X			54.41
19-Jul-88	2		10.40	0.00	10.40	0.0	10.40	44.01	X			54.41
26-Jul-88	2		10.69	0.00	10.69	0.0	10.69	43.72	X			54.41
05-Jan-88	3		8.19	0.00	8.19	0.0	8.19	45.15	X			53.34
12-Jan-88	3		8.78	0.00	8.78	0.0	8.78	44.56	X			53.34
19-Jan-88	3		8.00	0.00	8.00	0.0	8.00	45.34	X			53.34
26-Jan-88	3		8.64	0.00	8.64	0.0	8.64	44.70	X			53.34
02-Feb-88	3		8.58	0.00	8.58	0.0	8.58	44.76	X			53.34
09-Feb-88	3		9.17	0.00	9.17	0.0	9.17	44.17	X			53.34
16-Feb-88	3		9.57	0.00	9.57	0.0	9.57	43.77	X			53.34
23-Feb-88	3		9.97	0.00	9.97	0.0	9.97	43.37	X			53.34
01-Mar-88	3		9.37	0.00	9.37	0.0	9.37	43.97	X			53.34
08-Mar-88	3		10.30	0.00	10.30	0.0	10.30	43.04	X			53.34
15-Mar-88	3		10.42	0.00	10.42	0.0	10.42	42.92	X			53.34
22-Mar-88	3		10.74	0.00	10.74	0.0	10.74	42.60	X			53.34
29-Mar-88	3		10.95	0.00	10.95	0.0	10.95	42.39	X			53.34
05-Apr-88	3		10.92	0.00	10.92	0.0	10.92	42.42	X			53.34
12-Apr-88	3		11.00	0.00	11.00	0.0	11.00	42.34	X			53.34



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			
19-Apr-88	3		7.45	0.00	7.45	0.0	7.45	45.89	X			53.34
26-Apr-88	3		9.50	0.00	9.50	0.0	9.50	43.84	X			53.34
03-May-88	3		10.14	0.00	10.14	0.0	10.14	43.20	X			53.34
10-May-88	3		9.78	0.00	9.78	0.0	9.78	43.56	X			53.34
17-May-88	3		9.34	0.00	9.34	0.0	9.34	44.00	X			53.34
24-May-88	3		10.38	0.00	10.38	0.0	10.38	42.96	X			53.34
31-May-88	3		10.58	0.00	10.58	0.0	10.58	42.76	X			53.34
07-Jun-88	3		8.95	0.00	8.95	0.0	8.95	44.39	X			53.34
14-Jun-88	3		10.65	0.00	10.65	0.0	10.65	42.69	X			53.34
21-Jun-88	3		10.51	0.00	10.51	0.0	10.51	42.83	X			53.34
28-Jun-88	3		10.91	0.00	10.91	0.0	10.91	42.43	X			53.34
05-Jul-88	3		11.12	0.00	11.12	0.0	11.12	42.22	X			53.34
12-Jul-88	3		10.78	0.00	10.78	0.0	10.78	42.56	X			53.34
19-Jul-88	3		11.24	0.00	11.24	0.0	11.24	42.10	X			53.34
26-Jul-88	3		11.41	0.00	11.41	0.0	11.41	41.93	X			53.34
05-Jan-88	4	8.99	(1.00)	0.02	8.99	.0	8.99	44.41	X			53.40
12-Jan-88	4	9.41	(1.00)	0.01	9.41	.0	9.41	43.99	X			53.40
19-Jan-88	4	8.79	(1.00)	0.01	8.79	.0	8.79	44.61	X			53.40
26-Jan-88	4	9.45	(1.00)	.00	9.45	.0	9.45	43.95	X			53.40
02-Feb-88	4	9.20	(1.00)	0.01	9.20	.0	9.20	44.20	X			53.40
09-Feb-88	4	9.91	(1.00)	.00	9.91	.0	9.91	43.49	X			53.40
16-Feb-88	4	10.25	(1.00)	0.01	10.25	.0	10.25	43.15	X			53.40
23-Feb-88	4	10.58	(1.00)	.00	10.58	.0	10.58	42.82	X			53.40
01-Mar-88	4	10.60	(1.00)	0.01	10.60	.0	10.60	42.80	X			53.40
08-Mar-88	4	10.82	(1.00)	0.02	10.82	.0	10.82	42.58	X			53.40
15-Mar-88	4	10.06	(1.00)	0.01	10.06	.0	10.06	43.34	X			53.40
22-Mar-88	4	11.20	(1.00)	0.03	11.20	.0	11.20	42.20	X			53.40
29-Mar-88	4	11.36	(1.00)	.00	11.36	.0	11.36	42.04	X			53.40
05-Apr-88	4	11.38	(1.00)	.00	11.38	.0	11.38	42.02	X			53.40
12-Apr-88	4	11.46	(1.00)	.00	11.46	.0	11.46	41.94	X			53.40
19-Apr-88	4	10.87	(1.00)	.00	10.87	.0	10.87	42.53	X			53.40
26-Apr-88	4	10.22	(1.00)	0.02	10.22	.0	10.22	43.18	X			53.40
03-May-88	4	10.51	(1.00)	0.01	10.51	.0	10.51	42.89	X			53.40
10-May-88	4	10.25	(1.00)	0.01	10.25	.0	10.25	43.15	X			53.40
17-May-88	4	10.48	(1.00)	.00	10.48	.0	10.48	42.92	X			53.40
24-May-88	4	10.70	(1.00)	.00	10.70	.0	10.70	42.70	X			53.40
31-May-88	4	10.90	(1.00)	.00	10.90	.0	10.90	42.50	X			53.40
07-Jun-88	4	10.91	(1.00)	0.02	10.91	.0	10.91	42.49	X			53.40
14-Jun-88	4	11.00	(1.00)	0.01	11.00	.0	11.00	42.40	X			53.40
21-Jun-88	4	11.15	(1.00)	0.01	11.15	.0	11.15	42.25	X			53.40
28-Jun-88	4	11.31	(1.00)	0.01	11.31	.0	11.31	42.09	X			53.40
05-Jul-88	4	10.41	(1.00)	0.01	10.41	.0	10.41	42.99	X			53.40
12-Jul-88	4	11.54	(1.00)	.00	11.54	.0	11.54	41.86	X			53.40
19-Jul-88	4	11.56	(1.00)	.00	11.56	.0	11.56	41.84	X			53.40
26-Jul-88	4	11.70	(1.00)	0.02	11.70	.0	11.70	41.70	X			53.40
05-Jan-88	5		8.71	0.00	8.71	0.0	8.71	44.08	X			52.79
12-Jan-88	5		9.14	0.00	9.14	0.0	9.14	43.65	X			52.79
19-Jan-88	5		8.52	0.00	8.52	0.0	8.52	44.27	X			52.79
26-Jan-88	5		9.20	0.00	9.20	0.0	9.20	43.59	X			52.79
02-Feb-88	5		9.19	0.00	9.19	0.0	9.19	43.60	X			52.79
09-Feb-88	5		9.62	0.00	9.62	0.0	9.62	43.17	X			52.79
16-Feb-88	5		9.97	0.00	9.97	0.0	9.97	42.82	X			52.79
23-Feb-88	5		10.33	0.00	10.33	0.0	10.33	42.46	X			52.79



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			
01-Mar-88	5	10.35	(1.00)	.00	10.35	.0	10.35	42.44	X			52.79
08-Mar-88	5		10.55	0.00	10.55	0.0	10.55	42.24	X			52.79
15-Mar-88	5		10.68	0.00	10.68	0.0	10.68	42.11	X			52.79
22-Mar-88	5		10.90	0.00	10.90	0.0	10.90	41.89	X			52.79
29-Mar-88	5		11.15	0.00	11.15	0.0	11.15	41.64	X			52.79
05-Apr-88	5		11.07	0.00	11.07	0.0	11.07	41.72	X			52.79
12-Apr-88	5		11.09	0.00	11.09	0.0	11.09	41.70	X			52.79
19-Apr-88	5		10.72	0.00	10.72	0.0	10.72	42.07	X			52.79
26-Apr-88	5		9.98	0.00	9.98	0.0	9.98	42.81	X			52.79
03-May-88	5		10.34	0.00	10.34	0.0	10.34	42.45	X			52.79
10-May-88	5		10.10	0.00	10.10	0.0	10.10	42.69	X			52.79
17-May-88	5		10.30	0.00	10.30	0.0	10.30	42.49	X			52.79
24-May-88	5		10.53	0.00	10.53	0.0	10.53	42.26	X			52.79
31-May-88	5		10.71	0.00	10.71	0.0	10.71	42.08	X			52.79
07-Jun-88	5		10.55	0.00	10.55	0.0	10.55	42.24	X			52.79
14-Jun-88	5		10.82	0.00	10.82	0.0	10.82	41.97	X			52.79
21-Jun-88	5		11.02	0.00	11.02	0.0	11.02	41.77	X			52.79
28-Jun-88	5		11.08	0.00	11.08	0.0	11.08	41.71	X			52.79
05-Jul-88	5		11.25	0.00	11.25	0.0	11.25	41.54	X			52.79
12-Jul-88	5		11.22	0.00	11.22	0.0	11.22	41.57	X			52.79
19-Jul-88	5		11.30	0.00	11.30	0.0	11.30	41.49	X			52.79
26-Jul-88	5		11.35	0.00	11.35	0.0	11.35	41.44	X			52.79
05-Jan-88	6		6.99	0.00	6.99	0.0	6.99	46.78	X			53.77
12-Jan-88	6		7.29	0.00	7.29	0.0	7.29	46.48	X			53.77
19-Jan-88	6		6.82	0.00	6.82	0.0	6.82	46.95	X			53.77
26-Jan-88	6		7.31	0.00	7.31	0.0	7.31	46.46	X			53.77
02-Feb-88	6		7.32	0.00	7.32	0.0	7.32	46.45	X			53.77
09-Feb-88	6		7.75	0.00	7.75	0.0	7.75	46.02	X			53.77
16-Feb-88	6		8.10	0.00	8.10	0.0	8.10	45.67	X			53.77
23-Feb-88	6		8.48	0.00	8.48	0.0	8.48	45.29	X			53.77
01-Mar-88	6		8.57	0.00	8.57	0.0	8.57	45.20	X			53.77
08-Mar-88	6		8.73	0.00	8.73	0.0	8.73	45.04	X			53.77
15-Mar-88	6		8.92	0.00	8.92	0.0	8.92	44.85	X			53.77
22-Mar-88	6		9.31	0.00	9.31	0.0	9.31	44.46	X			53.77
29-Mar-88	6		9.51	0.00	9.51	0.0	9.51	44.26	X			53.77
05-Apr-88	6		9.46	0.00	9.46	0.0	9.46	44.31	X			53.77
12-Apr-88	6		9.56	0.00	9.56	0.0	9.56	44.21	X			53.77
19-Apr-88	6		9.23	0.00	9.23	0.0	9.23	44.54	X			53.77
26-Apr-88	6		8.10	0.00	8.10	0.0	8.10	45.67	X			53.77
03-May-88	6		8.50	0.00	8.50	0.0	8.50	45.27	X			53.77
10-May-88	6		8.29	0.00	8.29	0.0	8.29	45.48	X			53.77
17-May-88	6		8.48	0.00	8.48	0.0	8.48	45.29	X			53.77
24-May-88	6		8.76	0.00	8.76	0.0	8.76	45.01	X			53.77
31-May-88	6		9.00	0.00	9.00	0.0	9.00	44.77	X			53.77
07-Jun-88	6		8.90	0.00	8.90	0.0	8.90	44.87	X			53.77
14-Jun-88	6		9.06	0.00	9.06	0.0	9.06	44.71	X			53.77
21-Jun-88	6		9.24	0.00	9.24	0.0	9.24	44.53	X			53.77
28-Jun-88	6		9.41	0.00	9.41	0.0	9.41	44.36	X			53.77
05-Jul-88	6		9.70	0.00	9.70	0.0	9.70	44.07	X			53.77
12-Jul-88	6		9.72	0.00	9.72	0.0	9.72	44.05	X			53.77
19-Jul-88	6		9.72	0.00	9.72	0.0	9.72	44.05	X			53.77
26-Jul-88	6		9.83	0.00	9.83	0.0	9.83	43.94	X			53.77
05-Jan-88	7		6.76	0.00	6.76	0.0	6.76	46.70	X			53.46



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			
12-Jan-88	7		7.08	0.00	7.08	0.0	7.08	46.38	X			53.46
19-Jan-88	7		6.56	0.00	6.56	0.0	6.56	46.90	X			53.46
26-Jan-88	7		7.10	0.00	7.10	0.0	7.10	46.36	X			53.46
02-Feb-88	7		7.09	0.00	7.09	0.0	7.09	46.37	X			53.46
09-Feb-88	7		7.52	0.00	7.52	0.0	7.52	45.94	X			53.46
16-Feb-88	7		7.87	0.00	7.87	0.0	7.87	45.59	X			53.46
23-Feb-88	7		8.20	0.00	8.20	0.0	8.20	45.26	X			53.46
01-Mar-88	7		8.22	0.00	8.22	0.0	8.22	45.24	X			53.46
08-Mar-88	7		8.50	0.00	8.50	0.0	8.50	44.96	X			53.46
15-Mar-88	7		8.67	0.00	8.67	0.0	8.67	44.79	X			53.46
22-Mar-88	7		N/A		ERR	0.0	ERR	ERR	X			53.46
29-Mar-88	7		N/A		ERR	0.0	ERR	ERR	X			53.46
05-Apr-88	7		9.28	0.00	9.28	0.0	9.28	44.18	X			53.46
12-Apr-88	7		9.30	0.00	9.30	0.0	9.30	44.16	X			53.46
19-Apr-88	7		8.96	0.00	8.96	0.0	8.96	44.50	X			53.46
26-Apr-88	7		7.92	0.00	7.92	0.0	7.92	45.54	X			53.46
03-May-88	7		8.25	0.00	8.25	0.0	8.25	45.21	X			53.46
10-May-88	7		8.08	0.00	8.08	0.0	8.08	45.38	X			53.46
17-May-88	7		8.39	0.00	8.39	0.0	8.39	45.07	X			53.46
24-May-88	7		8.54	0.00	8.54	0.0	8.54	44.92	X			53.46
31-May-88	7		8.76	0.00	8.76	0.0	8.76	44.70	X			53.46
07-Jun-88	7		8.70	0.00	8.70	0.0	8.70	44.76	X			53.46
14-Jun-88	7		8.80	0.00	8.80	0.0	8.80	44.66	X			53.46
21-Jun-88	7		9.00	0.00	9.00	0.0	9.00	44.46	X			53.46
28-Jun-88	7		9.16	0.00	9.16	0.0	9.16	44.30	X			53.46
05-Jul-88	7		9.32	0.00	9.32	0.0	9.32	44.14	X			53.46
12-Jul-88	7		9.47	0.00	9.47	0.0	9.47	43.99	X			53.46
19-Jul-88	7		9.51	0.00	9.51	0.0	9.51	43.95	X			53.46
26-Jul-88	7		N/A		ERR	0.0	ERR	ERR	X			53.46
05-Jan-88	8	8.53	(1.00)	0.17	8.54	0.2	8.53	44.19	X			52.72
12-Jan-88	8	8.66	(1.00)	0.39	8.69	0.4	8.66	44.05	X			52.72
19-Jan-88	8	8.02	(1.00)	0.30	8.05	0.3	8.02	44.69	X			52.72
26-Jan-88	8	8.70	(1.00)	0.18	8.72	0.2	8.70	44.02	X			52.72
02-Feb-88	8	8.66	(1.00)	0.20	8.68	0.2	8.66	44.06	X			52.72
09-Feb-88	8	9.11	(1.00)	0.30	9.14	0.3	9.11	43.60	X			52.72
16-Feb-88	8	9.50	(1.00)	0.20	9.52	0.2	9.50	43.22	X			52.72
23-Feb-88	8	9.80	(1.00)	0.20	9.82	0.2	9.80	42.92	X			52.72
01-Mar-88	8	9.89	(1.00)	0.20	9.91	0.2	9.89	42.83	X			52.72
08-Mar-88	8	10.01	(1.00)	0.42	10.05	0.4	10.01	42.70	X			52.72
15-Mar-88	8	10.15	(1.00)	0.15	10.16	0.2	10.15	42.57	X			52.72
22-Mar-88	8	10.36	(1.00)	0.50	10.40	0.5	10.36	42.35	X			52.72
29-Mar-88	8	10.59	(1.00)	0.35	10.62	0.4	10.59	42.12	X			52.72
05-Apr-88	8	10.53	(1.00)	0.48	10.57	0.5	10.53	42.18	X			52.72
12-Apr-88	8	10.57	(1.00)	0.20	10.59	0.2	10.57	42.15	X			52.72
19-Apr-88	8	10.00	(1.00)	0.40	10.03	0.4	10.00	42.71	X			52.72
26-Apr-88	8	9.43	(1.00)	0.39	9.46	0.4	9.43	43.28	X			52.72
03-May-88	8	9.74	(1.00)	0.14	9.75	0.1	9.74	42.98	X			52.72
10-May-88	8	9.57	(1.00)	0.35	9.60	0.4	9.57	43.14	X			52.72
17-May-88	8	9.81	(1.00)	0.33	9.84	0.3	9.81	42.90	X			52.72
24-May-88	8	10.05	(1.00)	0.15	10.06	0.2	10.05	42.67	X			52.72
31-May-88	8	10.19	(1.00)	0.60	10.24	0.6	10.19	42.52	X			52.72
07-Jun-88	8	10.11	(1.00)	0.70	10.17	0.7	10.11	42.60	X			52.72
14-Jun-88	8	10.22	(1.00)	0.71	10.28	0.7	10.22	42.49	X			52.72



DATE	WELL	DTH	DTW	HT	(DTW)	(HT)	DTL	WT-ELEV	X	WT-G	HC	C.ELEV
					0.0	0.0	0.00	0.00	X			
21-Jun-88	8	10.33	(1.00)	0.65	10.33	0.7	10.33	42.38	X			52.72
28-Jun-88	8	10.44	(1.00)	0.93	10.33	0.9	10.44	42.26	X			52.72
05-Jul-88	8	9.52	(1.00)	0.40	9.52	0.4	9.52	43.19	X			52.72
12-Jul-88	8	10.60	(1.00)	0.82	10.60	0.8	10.60	42.10	X			52.72
19-Jul-88	8	10.58	(1.00)	1.13	10.58	1.1	10.58	42.12	X			52.72
26-Jul-88	8	10.63	(1.00)	1.08	10.63	1.1	10.63	42.07	X			52.72
05-Jan-88	9		7.69	0.00	7.69	0.0	7.69	-7.69	X			
12-Jan-88	9		9.53	0.00	9.53	0.0	9.53	-9.53	X			
19-Jan-88	9		9.00	0.00	9.00	0.0	9.00	-9.00	X			
26-Jan-88	9		9.55	0.00	9.55	0.0	9.55	-9.55	X			
02-Feb-88	9		9.58	0.00	9.58	0.0	9.58	-9.58	X			
09-Feb-88	9		10.00	0.00	10.00	0.0	10.00	-10.00	X			
16-Feb-88	9		10.32	0.00	10.32	0.0	10.32	-10.32	X			
23-Feb-88	9		10.70	0.00	10.70	0.0	10.70	-10.70	X			
01-Mar-88	9		10.68	0.00	10.68	0.0	10.68	-10.68	X			
08-Mar-88	9		10.84	0.00	10.84	0.0	10.84	-10.84	X			
15-Mar-88	9		10.94	0.00	10.94	0.0	10.94	-10.94	X			
22-Mar-88	9		11.22	0.00	11.22	0.0	11.22	-11.22	X			
29-Mar-88	9		11.38	0.00	11.38	0.0	11.38	-11.38	X			
05-Apr-88	9		11.38	0.00	11.38	0.0	11.38	-11.38	X			
12-Apr-88	9		11.38	0.00	11.38	0.0	11.38	-11.38	X			
19-Apr-88	9		11.16	0.00	11.16	0.0	11.16	-11.16	X			
26-Apr-88	9		10.36	0.00	10.36	0.0	10.36	-10.36	X			
03-May-88	9		10.70	0.00	10.70	0.0	10.70	-10.70	X			
10-May-88	9		10.48	0.00	10.48	0.0	10.48	-10.48	X			
17-May-88	9		9.65	0.00	9.65	0.0	9.65	-9.65	X			
24-May-88	9		10.85	0.00	10.85	0.0	10.85	-10.85	X			
31-May-88	9		11.00	0.00	11.00	0.0	11.00	-11.00	X			
07-Jun-88	9		10.90	0.00	10.90	0.0	10.90	-10.90	X			
14-Jun-88	9		11.10	0.00	11.10	0.0	11.10	-11.10	X			
21-Jun-88	9		11.27	0.00	11.27	0.0	11.27	-11.27	X			
28-Jun-88	9		11.42	0.00	11.42	0.0	11.42	-11.42	X			
05-Jul-88	9		11.50	0.00	11.50	0.0	11.50	-11.50	X			
12-Jul-88	9		11.47	0.00	11.47	0.0	11.47	-11.47	X			
19-Jul-88	9		11.55	0.00	11.55	0.0	11.55	-11.55	X			
26-Jul-88	9		11.65	0.00	11.65	0.0	11.65	-11.65	X			
05-Jan-88	10		9.05	0.00	9.05	0.0	9.05	-9.05	X			
12-Jan-88	10		8.30	0.00	8.30	0.0	8.30	-8.30	X			
19-Jan-88	10		7.75	0.00	7.75	0.0	7.75	-7.75	X			
26-Jan-88	10		8.12	0.00	8.12	0.0	8.12	-8.12	X			
02-Feb-88	10		N/A	FLOODED	ERR	0.0	ERR	ERR	X			
09-Feb-88	10		8.65	0.00	8.65	0.0	8.65	-8.65	X			
16-Feb-88	10		8.90	0.00	8.90	0.0	8.90	-8.90	X			
23-Feb-88	10		N/A		ERR	0.0	ERR	ERR	X			
01-Mar-88	10		N/A		ERR	0.0	ERR	ERR	X			
08-Mar-88	10		9.62	0.00	9.62	0.0	9.62	-9.62	X			
15-Mar-88	10		9.45	0.00	9.45	0.0	9.45	-9.45	X			
22-Mar-88	10		9.80	0.00	9.80	0.0	9.80	-9.80	X			
29-Mar-88	10		9.93	0.00	9.93	0.0	9.93	-9.93	X			
05-Apr-88	10		9.95	0.00	9.95	0.0	9.95	-9.95	X			
12-Apr-88	10		10.04	0.00	10.04	0.0	10.04	-10.04	X			
19-Apr-88	10		9.65	0.00	9.65	0.0	9.65	-9.65	X			
26-Apr-88	10		N/A		ERR	0.0	ERR	ERR	X			



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			
03-May-88	10		9.24	0.00	9.24	0.0	9.24	-9.24	X			
10-May-88	10		8.88	0.00	8.88	0.0	8.88	-8.88	X			
17-May-88	10		9.16	0.00	9.16	0.0	9.16	-9.16	X			
24-May-88	10		9.39	0.00	9.39	0.0	9.39	-9.39	X			
31-May-88	10		9.53	0.00	9.53	0.0	9.53	-9.53	X			
07-Jun-88	10		9.42	0.00	9.42	0.0	9.42	-9.42	X			
14-Jun-88	10		9.63	0.00	9.63	0.0	9.63	-9.63	X			
21-Jun-88	10		9.87	0.00	9.87	0.0	9.87	-9.87	X			
28-Jun-88	10		N/A		ERR	0.0	ERR	ERR	X			
05-Jul-88	10	10.12	(1.00)	.00	10.12	.0	10.12	-10.12	X			
12-Jul-88	10		10.10	0.00	10.10	0.0	10.10	-10.10	X			
19-Jul-88	10		10.20	0.00	10.20	0.0	10.20	-10.20	X			
26-Jul-88	10		10.23	0.00	10.23	0.0	10.23	-10.23	X			
05-Jan-88	11		8.93	0.00	8.93	0.0	8.93	-8.93	X			
12-Jan-88	11		9.10	0.00	9.10	0.0	9.10	-9.10	X			
19-Jan-88	11		8.41	0.00	8.41	0.0	8.41	-8.41	X			
26-Jan-88	11		9.10	0.00	9.10	0.0	9.10	-9.10	X			
02-Feb-88	11		9.14	0.00	9.14	0.0	9.14	-9.14	X			
09-Feb-88	11		9.58	0.00	9.58	0.0	9.58	-9.58	X			
16-Feb-88	11		9.97	0.00	9.97	0.0	9.97	-9.97	X			
23-Feb-88	11		10.27	0.00	10.27	0.0	10.27	-10.27	X			
01-Mar-88	11		10.31	0.00	10.31	0.0	10.31	-10.31	X			
08-Mar-88	11		10.49	0.00	10.49	0.0	10.49	-10.49	X			
15-Mar-88	11		10.65	0.00	10.65	0.0	10.65	-10.65	X			
22-Mar-88	11		10.89	0.00	10.89	0.0	10.89	-10.89	X			
29-Mar-88	11		11.02	0.00	11.02	0.0	11.02	-11.02	X			
05-Apr-88	11		11.02	0.00	11.02	0.0	11.02	-11.02	X			
12-Apr-88	11		11.07	0.00	11.07	0.0	11.07	-11.07	X			
19-Apr-88	11		10.66	0.00	10.66	0.0	10.66	-10.66	X			
26-Apr-88	11		9.87	0.00	9.87	0.0	9.87	-9.87	X			
03-May-88	11		10.24	0.00	10.24	0.0	10.24	-10.24	X			
10-May-88	11		10.05	0.00	10.05	0.0	10.05	-10.05	X			
17-May-88	11		10.24	0.00	10.24	0.0	10.24	-10.24	X			
24-May-88	11		10.47	0.00	10.47	0.0	10.47	-10.47	X			
31-May-88	11		10.65	0.00	10.65	0.0	10.65	-10.65	X			
07-Jun-88	11		10.62	0.00	10.62	0.0	10.62	-10.62	X			
14-Jun-88	11		10.78	0.00	10.78	0.0	10.78	-10.78	X			
21-Jun-88	11		10.83	0.00	10.83	0.0	10.83	-10.83	X			
28-Jun-88	11		11.00	0.00	11.00	0.0	11.00	-11.00	X			
05-Jul-88	11		11.10	0.00	11.10	0.0	11.10	-11.10	X			
12-Jul-88	11		11.15	0.00	11.15	0.0	11.15	-11.15	X			
19-Jul-88	11		11.22	0.00	11.22	0.0	11.22	-11.22	X			
26-Jul-88	11		11.26	0.00	11.26	0.0	11.26	-11.26	X			
05-Jan-88	12		8.20	0.00	8.20	0.0	8.20	-8.20	X			
12-Jan-88	12		8.84	0.00	8.84	0.0	8.84	-8.84	X			
19-Jan-88	12		8.21	0.00	8.21	0.0	8.21	-8.21	X			
26-Jan-88	12		8.90	0.00	8.90	0.0	8.90	-8.90	X			
02-Feb-88	12		8.72	0.00	8.72	0.0	8.72	-8.72	X			
09-Feb-88	12		9.26	0.00	9.26	0.0	9.26	-9.26	X			
16-Feb-88	12		9.58	0.00	9.58	0.0	9.58	-9.58	X			
23-Feb-88	12		9.82	0.00	9.82	0.0	9.82	-9.82	X			
01-Mar-88	12		9.87	0.00	9.87	0.0	9.87	-9.87	X			
08-Mar-88	12		9.98	0.00	9.98	0.0	9.98	-9.98	X			



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			
15-Mar-88	12		10.10	0.00	10.10	0.0	10.10	-10.10	X			
22-Mar-88	12		10.32	0.00	10.32	0.0	10.32	-10.32	X			
29-Mar-88	12		10.40	0.00	10.40	0.0	10.40	-10.40	X			
05-Apr-88	12		10.36	0.00	10.36	0.0	10.36	-10.36	X			
12-Apr-88	12		10.40	0.00	10.40	0.0	10.40	-10.40	X			
19-Apr-88	12		9.98	0.00	9.98	0.0	9.98	-9.98	X			
26-Apr-88	12		9.45	0.00	9.45	0.0	9.45	-9.45	X			
03-May-88	12		9.78	0.00	9.78	0.0	9.78	-9.78	X			
10-May-88	12		9.56	0.00	9.56	0.0	9.56	-9.56	X			
17-May-88	12		9.79	0.00	9.79	0.0	9.79	-9.79	X			
24-May-88	12		9.96	0.00	9.96	0.0	9.96	-9.96	X			
31-May-88	12		10.15	0.00	10.15	0.0	10.15	-10.15	X			
07-Jun-88	12		10.07	0.00	10.07	0.0	10.07	-10.07	X			
14-Jun-88	12		10.15	0.00	10.15	0.0	10.15	-10.15	X			
21-Jun-88	12		10.30	0.00	10.30	0.0	10.30	-10.30	X			
28-Jun-88	12		10.33	0.00	10.33	0.0	10.33	-10.33	X			
05-Jul-88	12		10.45	0.00	10.45	0.0	10.45	-10.45	X			
12-Jul-88	12		10.45	0.00	10.45	0.0	10.45	-10.45	X			
19-Jul-88	12		10.50	0.00	10.50	0.0	10.50	-10.50	X			
26-Jul-88	12		10.57	0.00	10.57	0.0	10.57	-10.57	X			



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			
									X			
02-Aug-88	A	7.44	(1.00)	0.01	7.44	.0	7.44	-7.44	X			
09-Aug-88	A	7.47	(1.00)	0.03	7.47	.0	7.47	-7.47	X			
16-Aug-88	A	7.48	(1.00)	0.03	7.48	.0	7.48	-7.48	X			
23-Aug-88	A	7.52	(1.00)	0.03	7.52	.0	7.52	-7.52	X			
30-Aug-88	A	7.51	(1.00)	0.06	7.52	0.1	7.51	-7.51	X			
06-Sep-88	A	7.59	(1.00)	0.04	7.59	.0	7.59	-7.59	X			
13-Sep-88	A	7.54	(1.00)	0.03	7.54	.0	7.54	-7.54	X			
20-Sep-88	A	7.50	(1.00)	0.06	7.51	0.1	7.50	-7.50	X			
27-Sep-88	A	7.60	(1.00)	0.02	7.60	.0	7.60	-7.60	X			
04-Oct-88	A	7.70	(1.00)	0.03	7.70	.0	7.70	-7.70	X			
11-Oct-88	A	7.68	(1.00)	0.02	7.68	.0	7.68	-7.68	X			
18-Oct-88	A	7.41	(1.00)	0.03	7.41	.0	7.41	-7.41	X			
25-Oct-88	A	7.49	(1.00)	0.04	7.49	.0	7.49	-7.49	X			
01-Nov-88	A	7.48	(1.00)	0.01	7.48	.0	7.48	-7.48	X			
08-Nov-88	A	7.41	(1.00)	0.05	7.41	0.1	7.41	-7.41	X			
15-Nov-88	A	7.42	(1.00)	0.03	7.42	.0	7.42	-7.42	X			
02-Aug-88	B	7.57	(1.00)	0.02	7.57	.0	7.57	-7.57	X			
09-Aug-88	B	7.52	(1.00)	0.02	7.52	.0	7.52	-7.52	X			
16-Aug-88	B	7.58	(1.00)	0.04	7.58	.0	7.58	-7.58	X			
23-Aug-88	B	7.56	(1.00)	0.04	7.56	.0	7.56	-7.56	X			
30-Aug-88	B	7.55	(1.00)	0.05	7.55	0.1	7.55	-7.55	X			
06-Sep-88	B	7.67	(1.00)	0.05	7.67	0.1	7.67	-7.67	X			
13-Sep-88	B	7.65	(1.00)	0.03	7.65	.0	7.65	-7.65	X			
20-Sep-88	B	7.60	(1.00)	0.05	7.60	0.1	7.60	-7.60	X			
27-Sep-88	B	7.70	(1.00)	0.05	7.70	0.1	7.70	-7.70	X			
04-Oct-88	B	7.75	(1.00)	0.03	7.75	.0	7.75	-7.75	X			
11-Oct-88	B	7.73	(1.00)	0.03	7.73	.0	7.73	-7.73	X			
18-Oct-88	B	7.52	(1.00)	0.03	7.52	.0	7.52	-7.52	X			
25-Oct-88	B	7.52	(1.00)	0.02	7.52	.0	7.52	-7.52	X			
01-Nov-88	B	7.55	(1.00)	0.02	7.55	.0	7.55	-7.55	X			
08-Nov-88	B	7.50	(1.00)	0.03	7.50	.0	7.50	-7.50	X			
15-Nov-88	B	7.50	(1.00)	0.03	7.50	.0	7.50	-7.50	X			
02-Aug-88	2		10.68	0.00	10.68	0.0	10.68	43.73	X			54.41
09-Aug-88	2		10.80	0.00	10.80	0.0	10.80	43.61	X			54.41
16-Aug-88	2		10.90	0.00	10.90	0.0	10.90	43.51	X			54.41
23-Aug-88	2		11.04	0.00	11.04	0.0	11.04	43.37	X			54.41
30-Aug-88	2		11.13	0.00	11.13	0.0	11.13	43.28	X			54.41
06-Sep-88	2		11.20	0.00	11.20	0.0	11.20	43.21	X			54.41
13-Sep-88	2		11.22	0.00	11.22	0.0	11.22	43.19	X			54.41
20-Sep-88	2		11.18	0.00	11.18	0.0	11.18	43.23	X			54.41
27-Sep-88	2		11.23	0.00	11.23	0.0	11.23	43.18	X			54.41
04-Oct-88	2		11.31	0.00	11.31	0.0	11.31	43.10	X			54.41
11-Oct-88	2		11.38	0.00	11.38	0.0	11.38	43.03	X			54.41
18-Oct-88	2		11.04	0.00	11.04	0.0	11.04	43.37	X			54.41
25-Oct-88	2		11.24	0.00	11.24	0.0	11.24	43.17	X			54.41
01-Nov-88	2		11.41	0.00	11.41	0.0	11.41	43.00	X			54.41
08-Nov-88	2		11.51	0.00	11.51	0.0	11.51	42.90	X			54.41
15-Nov-88	2		11.22	0.00	11.22	0.0	11.22	43.19	X			54.41
02-Aug-88	3		11.38	0.00	11.38	0.0	11.38	41.96	X			53.34
09-Aug-88	3		11.49	0.00	11.49	0.0	11.49	41.85	X			53.34
16-Aug-88	3		11.56	0.00	11.56	0.0	11.56	41.78	X			53.34



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			
23-Aug-88	3		11.53	0.00	11.53	0.0	11.53	41.81	X			53.34
30-Aug-88	3		11.38	0.00	11.38	0.0	11.38	41.96	X			53.34
06-Sep-88	3		11.26	0.00	11.26	0.0	11.26	42.08	X			53.34
13-Sep-88	3		10.85	0.00	10.85	0.0	10.85	42.49	X			53.34
20-Sep-88	3		11.63	0.00	11.63	0.0	11.63	41.71	X			53.34
27-Sep-88	3		11.73	0.00	11.73	0.0	11.73	41.61	X			53.34
04-Oct-88	3		11.46	0.00	11.46	0.0	11.46	41.88	X			53.34
11-Oct-88	3		11.76	0.00	11.76	0.0	11.76	41.58	X			53.34
18-Oct-88	3		11.70	0.00	11.70	0.0	11.70	41.64	X			53.34
25-Oct-88	3		11.89	0.00	11.89	0.0	11.89	41.45	X			53.34
01-Nov-88	3		11.89	0.00	11.89	0.0	11.89	41.45	X			53.34
08-Nov-88	3		11.86	0.00	11.86	0.0	11.86	41.48	X			53.34
15-Nov-88	3		11.10	0.00	11.10	0.0	11.10	42.24	X			53.34
02-Aug-88	4	11.67	(1.00)	.00	11.67	.0	11.67	41.73	X			53.40
09-Aug-88	4	11.78	(1.00)	.00	11.78	.0	11.78	41.62	X			53.40
16-Aug-88	4	11.77	(1.00)	.00	11.77	.0	11.77	41.63	X			53.40
23-Aug-88	4	11.78	(1.00)	.00	11.78	.0	11.78	41.62	X			53.40
30-Aug-88	4	11.74	(1.00)	.00	11.74	.0	11.74	41.66	X			53.40
06-Sep-88	4	11.79	(1.00)	0.01	11.79	.0	11.79	41.61	X			53.40
13-Sep-88	4	11.90	(1.00)	.00	11.90	.0	11.90	41.50	X			53.40
20-Sep-88	4	11.75	(1.00)	.00	11.75	.0	11.75	41.65	X			53.40
27-Sep-88	4	12.00	(1.00)	.00	12.00	.0	12.00	41.40	X			53.40
04-Oct-88	4	12.00	(1.00)	.00	12.00	.0	12.00	41.40	X			53.40
11-Oct-88	4	12.00	(1.00)	.00	12.00	.0	12.00	41.40	X			53.40
18-Oct-88	4	11.98	(1.00)	.00	11.98	.0	11.98	41.42	X			53.40
25-Oct-88	4	12.03	(1.00)	.00	12.03	.0	12.03	41.37	X			53.40
01-Nov-88	4	12.04	(1.00)	.00	12.04	.0	12.04	41.36	X			53.40
08-Nov-88	4	12.00	(1.00)	.00	12.00	.0	12.00	41.40	X			53.40
15-Nov-88	4	11.85	(1.00)	.00	11.85	.0	11.85	41.55	X			53.40
02-Aug-88	5		11.37	0.00	11.37	0.0	11.37	41.42	X			52.79
09-Aug-88	5		11.45	0.00	11.45	0.0	11.45	41.34	X			52.79
16-Aug-88	5		11.47	0.00	11.47	0.0	11.47	41.32	X			52.79
23-Aug-88	5		11.53	0.00	11.53	0.0	11.53	41.26	X			52.79
30-Aug-88	5		11.50	0.00	11.50	0.0	11.50	41.29	X			52.79
06-Sep-88	5		11.59	0.00	11.59	0.0	11.59	41.20	X			52.79
13-Sep-88	5		11.68	0.00	11.68	0.0	11.68	41.11	X			52.79
20-Sep-88	5		11.61	0.00	11.61	0.0	11.61	41.18	X			52.79
27-Sep-88	5		11.69	0.00	11.69	0.0	11.69	41.10	X			52.79
04-Oct-88	5		11.68	0.00	11.68	0.0	11.68	41.11	X			52.79
11-Oct-88	5		11.68	0.00	11.68	0.0	11.68	41.11	X			52.79
18-Oct-88	5		11.67	0.00	11.67	0.0	11.67	41.12	X			52.79
25-Oct-88	5		11.75	0.00	11.75	0.0	11.75	41.04	X			52.79
01-Nov-88	5		11.77	0.00	11.77	0.0	11.77	41.02	X			52.79
08-Nov-88	5		11.70	0.00	11.70	0.0	11.70	41.09	X			52.79
15-Nov-88	5		11.72	0.00	11.72	0.0	11.72	41.07	X			52.79
02-Aug-88	6		9.86	0.00	9.86	0.0	9.86	43.91	X			53.77
09-Aug-88	6		9.94	0.00	9.94	0.0	9.94	43.83	X			53.77
16-Aug-88	6		10.00	0.00	10.00	0.0	10.00	43.77	X			53.77
23-Aug-88	6		10.10	0.00	10.10	0.0	10.10	43.67	X			53.77
30-Aug-88	6		10.05	0.00	10.05	0.0	10.05	43.72	X			53.77
06-Sep-88	6		10.17	0.00	10.17	0.0	10.17	43.60	X			53.77
13-Sep-88	6		10.25	0.00	10.25	0.0	10.25	43.52	X			53.77



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-Sep-88	6		10.17	0.00	10.17	0.0	10.17	43.60	X			53.77
27-Sep-88	6		10.33	0.00	10.33	0.0	10.33	43.44	X			53.77
04-Oct-88	6		10.30	0.00	10.30	0.0	10.30	43.47	X			53.77
11-Oct-88	6		10.34	0.00	10.34	0.0	10.34	43.43	X			53.77
18-Oct-88	6		10.67	0.00	10.67	0.0	10.67	43.10	X			53.77
25-Oct-88	6		10.43	0.00	10.43	0.0	10.43	43.34	X			53.77
01-Nov-88	6		10.42	0.00	10.42	0.0	10.42	43.35	X			53.77
08-Nov-88	6		10.36	0.00	10.36	0.0	10.36	43.41	X			53.77
15-Nov-88	6		10.30	0.00	10.30	0.0	10.30	43.47	X			53.77
02-Aug-88	7		9.57	0.00	9.57	0.0	9.57	43.89	X			53.46
09-Aug-88	7		9.64	0.00	9.64	0.0	9.64	43.82	X			53.46
16-Aug-88	7		9.74	0.00	9.74	0.0	9.74	43.72	X			53.46
23-Aug-88	7		9.88	0.00	9.88	0.0	9.88	43.58	X			53.46
30-Aug-88	7		9.78	0.00	9.78	0.0	9.78	43.68	X			53.46
06-Sep-88	7		9.90	0.00	9.90	0.0	9.90	43.56	X			53.46
13-Sep-88	7		10.03	0.00	10.03	0.0	10.03	43.43	X			53.46
20-Sep-88	7		9.95	0.00	9.95	0.0	9.95	43.51	X			53.46
27-Sep-88	7		N/A		ERR	0.0	ERR	ERR	X			53.46
04-Oct-88	7		10.10	0.00	10.10	0.0	10.10	43.36	X			53.46
11-Oct-88	7		10.07	0.00	10.07	0.0	10.07	43.39	X			53.46
18-Oct-88	7		9.99	0.00	9.99	0.0	9.99	43.47	X			53.46
25-Oct-88	7		10.10	0.00	10.10	0.0	10.10	43.36	X			53.46
01-Nov-88	7		10.19	0.00	10.19	0.0	10.19	43.27	X			53.46
08-Nov-88	7		10.10	0.00	10.10	0.0	10.10	43.36	X			53.46
15-Nov-88	7		10.05	0.00	10.05	0.0	10.05	43.41	X			53.46
02-Aug-88	8	10.69	(1.00)	.00	10.69	.0	10.69	42.03	X			52.72
09-Aug-88	8	10.72	(1.00)	0.95	10.80	1.0	10.72	41.98	X			52.72
16-Aug-88	8	10.74	(1.00)	1.10	10.83	1.1	10.74	41.96	X			52.72
23-Aug-88	8	10.77	(1.00)	1.28	10.88	1.3	10.77	41.92	X			52.72
30-Aug-88	8	10.77	(1.00)	1.50	10.90	1.5	10.77	41.92	X			52.72
06-Sep-88	8	10.82	(1.00)	1.18	10.92	1.2	10.82	41.88	X			52.72
13-Sep-88	8	10.88	(1.00)	1.05	10.97	1.1	10.88	41.82	X			52.72
20-Sep-88	8	10.86	(1.00)	1.35	10.97	1.4	10.86	41.83	X			52.72
27-Sep-88	8	10.95	(1.00)	2.00	11.12	2.0	10.95	41.73	X			52.72
04-Oct-88	8	10.98	(1.00)	1.45	11.20	1.5	10.98	41.71	X			52.72
11-Oct-88	8	10.96	(1.00)	1.40	11.08	1.4	10.96	41.73	X			52.72
18-Oct-88	8	10.85	(1.00)	1.43	10.97	1.4	10.85	41.84	X			52.72
25-Oct-88	8	10.98	(1.00)	1.13	11.07	1.1	10.98	41.72	X			52.72
01-Nov-88	8	11.00	(1.00)	1.42	11.12	1.4	11.00	41.69	X			52.72
08-Nov-88	8	10.95	(1.00)	1.40	11.07	1.4	10.95	41.74	X			52.72
15-Nov-88	8	10.90	(1.00)	1.60	11.13	1.6	10.90	41.79	X			52.72
02-Aug-88	9		11.63	0.00	11.63	0.0	11.63	-11.63	X			
09-Aug-88	9		11.68	0.00	11.68	0.0	11.68	-11.68	X			
16-Aug-88	9		11.72	0.00	11.72	0.0	11.72	-11.72	X			
23-Aug-88	9		11.78	0.00	11.78	0.0	11.78	-11.78	X			
30-Aug-88	9		11.75	0.00	11.75	0.0	11.75	-11.75	X			
06-Sep-88	9		11.82	0.00	11.82	0.0	11.82	-11.82	X			
13-Sep-88	9		11.94	0.00	11.94	0.0	11.94	-11.94	X			
20-Sep-88	9		11.86	0.00	11.86	0.0	11.86	-11.86	X			
27-Sep-88	9		12.02	0.00	12.02	0.0	12.02	-12.02	X			
04-Oct-88	9		11.89	0.00	11.89	0.0	11.89	-11.89	X			
11-Oct-88	9		11.90	0.00	11.90	0.0	11.90	-11.90	X			



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			
18-Oct-88	9		11.93	0.00	11.93	0.0	11.93	-11.93	X			
25-Oct-88	9		12.00	0.00	12.00	0.0	12.00	-12.00	X			
01-Nov-88	9		12.01	0.00	12.01	0.0	12.01	-12.01	X			
08-Nov-88	9		11.95	0.00	11.95	0.0	11.95	-11.95	X			
15-Nov-88	9		11.89	0.00	11.89	0.0	11.89	-11.89	X			
02-Aug-88	10		10.21	0.00	10.21	0.0	10.21	-10.21	X			
09-Aug-88	10		10.37	0.00	10.37	0.0	10.37	-10.37	X			
16-Aug-88	10		10.37	0.00	10.37	0.0	10.37	-10.37	X			
23-Aug-88	10		10.34	0.00	10.34	0.0	10.34	-10.34	X			
30-Aug-88	10		10.44	0.00	10.44	0.0	10.44	-10.44	X			
06-Sep-88	10		10.47	0.00	10.47	0.0	10.47	-10.47	X			
13-Sep-88	10		10.55	0.00	10.55	0.0	10.55	-10.55	X			
20-Sep-88	10		10.52	0.00	10.52	0.0	10.52	-10.52	X			
27-Sep-88	10		10.61	0.00	10.61	0.0	10.61	-10.61	X			
04-Oct-88	10		10.43	0.00	10.43	0.0	10.43	-10.43	X			
11-Oct-88	10		10.40	0.00	10.40	0.0	10.40	-10.40	X			
18-Oct-88	10		10.56	0.00	10.56	0.0	10.56	-10.56	X			
25-Oct-88	10		10.79	0.00	10.79	0.0	10.79	-10.79	X			
01-Nov-88	10		10.62	0.00	10.62	0.0	10.62	-10.62	X			
08-Nov-88	10		10.68	0.00	10.68	0.0	10.68	-10.68	X			
15-Nov-88	10		10.52	0.00	10.52	0.0	10.52	-10.52	X			
02-Aug-88	11		11.28	0.00	11.28	0.0	11.28	-11.28	X			
09-Aug-88	11		11.34	0.00	11.34	0.0	11.34	-11.34	X			
16-Aug-88	11		11.37	0.00	11.37	0.0	11.37	-11.37	X			
23-Aug-88	11		11.42	0.00	11.42	0.0	11.42	-11.42	X			
30-Aug-88	11		11.39	0.00	11.39	0.0	11.39	-11.39	X			
06-Sep-88	11		11.47	0.00	11.47	0.0	11.47	-11.47	X			
13-Sep-88	11		11.73	0.00	11.73	0.0	11.73	-11.73	X			
20-Sep-88	11		11.54	0.00	11.54	0.0	11.54	-11.54	X			
27-Sep-88	11		11.62	0.00	11.62	0.0	11.62	-11.62	X			
04-Oct-88	11		11.59	0.00	11.59	0.0	11.59	-11.59	X			
11-Oct-88	11		11.62	0.00	11.62	0.0	11.62	-11.62	X			
18-Oct-88	11		11.48	0.00	11.48	0.0	11.48	-11.48	X			
25-Oct-88	11		11.69	0.00	11.69	0.0	11.69	-11.69	X			
01-Nov-88	11		11.62	0.00	11.62	0.0	11.62	-11.62	X			
08-Nov-88	11		11.63	0.00	11.63	0.0	11.63	-11.63	X			
15-Nov-88	11		11.58	0.00	11.58	0.0	11.58	-11.58	X			
02-Aug-88	12		10.57	0.00	10.57	0.0	10.57	-10.57	X			
09-Aug-88	12		10.64	0.00	10.64	0.0	10.64	-10.64	X			
16-Aug-88	12		10.63	0.00	10.63	0.0	10.63	-10.63	X			
23-Aug-88	12		10.64	0.00	10.64	0.0	10.64	-10.64	X			
30-Aug-88	12		10.70	0.00	10.70	0.0	10.70	-10.70	X			
06-Sep-88	12		10.74	0.00	10.74	0.0	10.74	-10.74	X			
13-Sep-88	12		10.85	0.00	10.85	0.0	10.85	-10.85	X			
20-Sep-88	12		10.76	0.00	10.76	0.0	10.76	-10.76	X			
27-Sep-88	12		10.83	0.00	10.83	0.0	10.83	-10.83	X			
04-Oct-88	12		10.83	0.00	10.83	0.0	10.83	-10.83	X			
11-Oct-88	12		10.84	0.00	10.84	0.0	10.84	-10.84	X			
18-Oct-88	12		10.82	0.00	10.82	0.0	10.82	-10.82	X			
25-Oct-88	12		10.93	0.00	10.93	0.0	10.93	-10.93	X			
01-Nov-88	12		10.89	0.00	10.89	0.0	10.89	-10.89	X			
08-Nov-88	12		10.86	0.00	10.86	0.0	10.86	-10.86	X			



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	-----		
15-Nov-88	12		10.88	0.00	10.88	0.0	10.88	-10.88	X			



GeoStrategies Inc.

APPENDIX B

CHEMICAL ANALYTICAL REPORTS

(January through March, 1989)



CERTIFICATE OF ANALYSIS

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

April 17, 1989

Work Order Number: S9-03-259

P.O. Number: 3909

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3909, Arco, 731 West MacArthur Blvd. and West Street, Oakland, CA
Date Received by Lab:	3/21/89
Number of Samples:	12
Sample Type:	Water

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

Reviewed and Approved

David A. Pichette
Project Manager

DAP/an
2 Pages Following - Tables of Results

Page: 1 of 2
 Date: April 17, 1989
 Client Project ID: GR #3909, Arco,
 731 West MacArthur Blvd. & West Street,
 Oakland, CA

IT ANALYTICAL SERVICES
 SAN JOSE, CA

Work Order Number: S9-03-259

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-03-259-01	A-2	3/20/89	4/3/89	cool pH \leq 2
S9-03-259-02	A-3	3/20/89	3/31/89	cool pH \leq 2
S9-03-259-03	A-4	3/20/89	4/6/89	cool pH \leq 2
S9-03-259-04	A-5	3/20/89	3/31/89	cool pH \leq 2
S9-03-259-05	A-6	3/20/89	4/2/89	cool pH \leq 2
S9-03-259-06	A-7	3/20/89	4/2/89	cool pH \leq 2

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

ND = None Detected

Results - Micrograms per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)					Ethyl Xylenes (total)
		Benzene	Toluene	Benzene	Ethyl	Xylenes	
S9-03-259-01	A-2	22,000.	1,200.	1,800.	1,200.	7,700.	
Detection Limit		10,000.	100.	200.	200.	600.	
S9-03-259-02	A-3	230.	1.6	ND	3.	3.	
Detection Limit		50.	0.5	1.	1.	3.	
S9-03-259-03	A-4	360,000.	1,500.	3,700.	6,500.	35,000.	
Detection Limit		5,000.	50.	100.	100.	300.	
S9-03-259-04	A-5	60.	0.5	1.	2.	10.	
Detection Limit		50.	0.5	1.	1.	3.	
S9-03-259-05	A-6	220.	33.	21.	9.	39.	
Detection Limit		50.	0.5	1.	1.	3.	
S9-03-259-06	A-7	ND	0.9	ND	ND	ND	
Detection Limit		50.	0.5	1.	1.	3.	

Page: 2 of 2
 Date: April 17, 1989
 Client Project ID: GR #3909, Arco,
 731 West MacArthur Blvd. & West Street,
 Oakland, CA

IT ANALYTICAL SERVICES
 SAN JOSE, CA

Work Order Number: S9-03-259

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-03-259-07	A-9	3/21/89	4/2/89	cool pH \leq 2
S9-03-259-08	A-10	3/20/89	4/4/89	cool pH \leq 2
S9-03-259-09	A-11	3/20/89	4/3/89	cool pH \leq 2
S9-03-259-10	A-12	3/20/89	4/4/89	cool pH \leq 2
S9-03-259-11	AF-6	3/20/89	4/3/89	cool pH \leq 2
S9-03-259-12	Trip Blank	3/20/89	4/3/89	cool pH \leq 2

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

ND = None Detected

Results - Micrograms per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Results - Micrograms per Liter			
			Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-03-259-07	A-9	50.	2.8	1.	1.	3.
S9-03-259-08	A-10	ND	ND	ND	ND	ND
S9-03-259-09	A-11	ND	ND	ND	ND	ND
S9-03-259-10	A-12	ND	ND	ND	ND	ND
S9-03-259-11	AF-6	ND	ND	ND	ND	ND
S9-03-259-12	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		50.	0.5	1.	1.	3.

Jettler - Ryan Inc.

59-03-259

Chain of Custody

COMPANY ARCO Products Company, S.S. #4931

JOB NO 0224

JOB LOCATION 731 W. MacArthur Blvd / West St.

CITY Oakland, CA

PHONE NO (415) 782-7500

AUTHORIZED John Wurfel

DATE 3/20/89

P.O. NO 3909

SAMPLE ID	NO OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
01 A-2	3	Liquid	3-20/1543	THe(Gas) BTRE	Cool/ok
02 A-3			1151		
03 A-4			1131		
04 A-5			11337		
05 A-6			11208		
06 A-7			11244		
07 A-9			3-21/1030		
08 A-10			3-20/1451		
09 A-11			11121		
10 A-12			11025		
11 AF-6			11208		
12 A-B ring blank	2	(No date)			

RELINQUISHED BY:

Thelma J. Gray 3/21/89 11:46

RELINQUISHED BY:

Thelma 3/21/89 14:35

RELINQUISHED BY:

RECEIVED BY:

Thelma 3/21/89 11:47

RECEIVED BY:

RECEIVED BY LAB:

Thelma 3/21/89 14:45

DESIGNATED LABORATORY:

IT SEN

DHS #:

137

REMARKS:

Normal TAP

DATE COMPLETED:

March 20, 1989

FOR EMERGENCY:

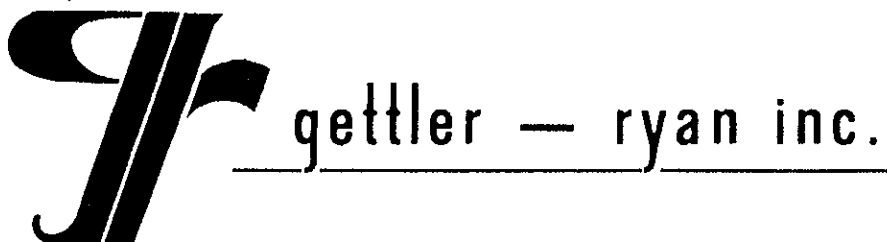
Thelma J. Gray

ORIGINAL

GeoStrategies Inc.

APPENDIX C

GETTLER-RYAN INC. GROUNDWATER SAMPLING REPORT



April 18, 1989

GROUNDWATER SAMPLING REPORT

Arco Products Company
Post Office Box 5811
San Mateo, California 94402

Referenced Site: Arco Service Station #4931
731 W MacArthur Blvd./West St.
Oakland, California

Sampling Date: March 20 and 21, 1989

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on March 20 and 21, 1989 at the referenced location. The site is occupied by an operating service station located on the southeast corner of West MacArthur Boulevard and West Street. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products.

There are currently nine groundwater monitoring wells on site and two off site at the locations shown on the attached site map. Prior to sampling, all wells were inspected for total well depth, water levels, and presence of separate phase product using an electronic interface probe. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase product. Groundwater depths ranged from 3.45 to 8.52 feet below grade. Separate phase product was observed in well A-8.

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. Field and trip blanks, supplied by the laboratory, were included and analyzed to assess quality control. Analytical results for the blanks are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

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.

A handwritten signature in cursive script, appearing to read "Paulson", written in black ink.

Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

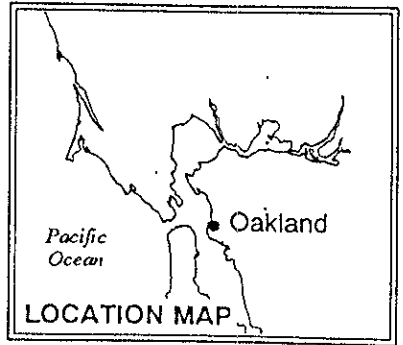
<u>WELL I.D.</u>	A-2	A-3	A-4	A-5	A-6 AF-6	A-7
Casing Diameter (inches)	4	4	4	3	3	3
Total Well Depth (feet)	18.5	19.3	19.4	24.1	25.6	22.8
Depth to Water (feet)	3.45	7.51	8.13	8.09	6.43	6.29
Free Product (feet)	none	none	none	none	none	none
Reason Not Sampled	----	----	----	----	----	----
Calculated 4 Case Vol. (gal.)	39.80	31.10	29.80	24.30	29.10	25.12
Did Well Dewater?	yes	yes	yes	no	yes	no
Volume Evacuated (gal.)	20	12	11	30	20	33
Purging Device Sampling Device	Suction Bailer	Suction Bailer	Suction Bailer	Suction Bailer	Suction Bailer	Suction Bailer
Time	15:43	15:11	13:11	13:37	12:08	12:44
Temperature (F)*	60.0	65.0	66.6	66.7	65.8	66.5
pH*	6.74	6.45	6.86	6.80	6.94	7.20
Conductivity (umhos/cm)*	510	1000	860	685	520	500

* Indicates Stabilized Value

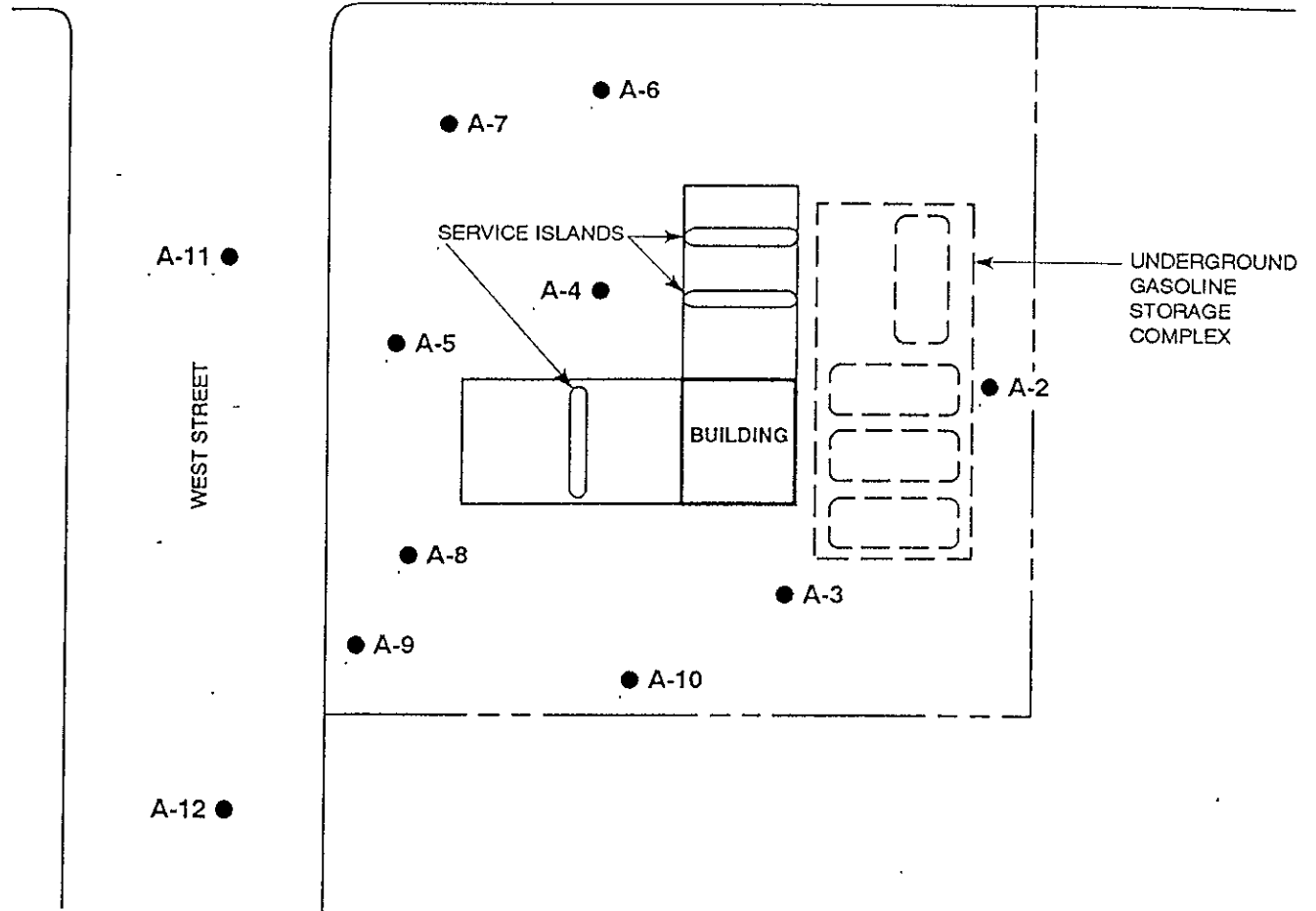
TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

<u>WELL I.D.</u>	A-8	A-9	A-10	A-11	A-12
Casing Diameter (inches)	3	6	3	3	3
Total Well Depth (feet)	----	38.9	24.0	27.8	29.4
Depth to Water (feet)	8.21	6.28	8.52	8.11	8.00
Free Product (feet)	0.66	none	none	none	none
Reason Not Sampled	free product	----	----	----	----
Calculated 4 Case Vol.(gal.)	----	195.20	23.50	29.90	32.60
Did Well Dewater?	----	no	no	no	no
Volume Evacuated (gal.)	----	244	33	37	40.5
Purging Device	----	Suction	Suction	Suction	Suction
Sampling Device	----	Bailer	Bailer	Bailer	Bailer
Time	----	10:30	14:51	11:21	10:35
Temperature (F)*	----	66.3	63.3	65.7	66.0
pH*	----	7.00	6.89	6.86	7.09
Conductivity (umhos/cm)*	----	600	710	620	615

* Indicates Stabilized Value

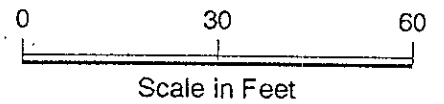


MACARTHUR BOULEVARD



EXPLANATION

● A-2 Monitoring well location



GeoStrategies Inc.

Site Plan
Arco Service Station
MacArthur Boulevard and West Street
Oakland, California

PLATE

1



INTERNATIONAL
TECHNOLOGY
CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

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

April 17, 1989

Work Order Number: S9-03-259

P.O. Number: 3909

This is the Certificate of Analysis for the following samples:

Client Project ID:	GR #3909, Arco, 731 West MacArthur Blvd. and West Street, Oakland, CA
Date Received by Lab:	3/21/89
Number of Samples:	12
Sample Type:	Water

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

Reviewed and Approved

David A. Pichette
Project Manager

DAP/an
2 Pages Following - Tables of Results

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

Page: 1 of 2
 Date: April 17, 1989
 Client Project ID: GR #3909, Arco,
 731 West MacArthur Blvd. & West Street,
 Oakland, CA

IT ANALYTICAL SERVICES
 SAN JOSE, CA

Work Order Number: S9-03-259

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-03-259-01	A-2	3/20/89	4/3/89	cool pH <2
S9-03-259-02	A-3	3/20/89	3/31/89	cool pH <2
S9-03-259-03	A-4	3/20/89	4/6/89	cool pH <2
S9-03-259-04	A-5	3/20/89	3/31/89	cool pH <2
S9-03-259-05	A-6	3/20/89	4/2/89	cool pH <2
S9-03-259-06	A-7	3/20/89	4/2/89	cool pH <2

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

ND = None Detected

Results - Micrograms per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Ethyl Xylenes			
			Benzene	Toluene	Benzene	(total)
S9-03-259-01	A-2	22,000.	1,200.	1,800.	1,200.	7,700.
Detection Limit		10,000.	100.	200.	200.	600.
S9-03-259-02	A-3	230.	1.6	ND	3.	3.
Detection Limit		50.	0.5	1.	1.	3.
S9-03-259-03	A-4	360,000.	1,500.	3,700.	6,500.	35,000.
Detection Limit		5,000.	50.	100.	100.	300.
S9-03-259-04	A-5	60.	0.5	1.	2.	10.
Detection Limit		50.	0.5	1.	1.	3.
S9-03-259-05	A-6	220.	33.	21.	9.	39.
Detection Limit		50.	0.5	1.	1.	3.
S9-03-259-06	A-7	ND	0.9	ND	ND	ND
Detection Limit		50.	0.5	1.	1.	3.

Page: 2 of 2
 Date: April 17, 1989
 Client Project ID: GR #3909, Arco,
 731 West MacArthur Blvd. & West Street,
 Oakland, CA

IT ANALYTICAL SERVICES
 SAN JOSE, CA

Work Order Number: S9-03-259

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-03-259-07	A-9	3/21/89	4/2/89	cool pH <2
S9-03-259-08	A-10	3/20/89	4/4/89	cool pH <2
S9-03-259-09	A-11	3/20/89	4/3/89	cool pH <2
S9-03-259-10	A-12	3/20/89	4/4/89	cool pH <2
S9-03-259-11	AF-6	3/20/89	4/3/89	cool pH <2
S9-03-259-12	Trip Blank	3/20/89	4/3/89	cool pH <2

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

ND = None Detected

Results - Micrograms per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Results - Micrograms per Liter			
			Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-03-259-07	A-9	50.	2.8	1.	1.	3.
S9-03-259-08	A-10	ND	ND	ND	ND	ND
S9-03-259-09	A-11	ND	ND	ND	ND	ND
S9-03-259-10	A-12	ND	ND	ND	ND	ND
S9-03-259-11	AF-6	ND	ND	ND	ND	ND
S9-03-259-12	Trip Blank	ND	ND	ND	ND	ND
Detection Limit		50.	0.5	1.	1.	3.

Settler - Ryan Inc.

59-03-259

Chain of Custody

COMPANY ARCO Products Company, S.S. #4931

JOB NO. 0224

JOB LOCATION 731 W. MacArthur Blvd / West St.

CITY Oakland, CA

PHONE NO (415) 782-7500

AUTHORIZED John Wurfel

DATE 3/20/89

P.O. NO. 3909

SAMPLE ID	NO OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID
01 A-2	3	Liquid	3-20/1543	THe (GOS) BTRE	Co0/0k
02 A-3			1151		
03 A-4			1131		
04 A-5			11337		
05 A-6			11208		
06 A-7			11244		
07 A-9			3-21/1030		
08 A-10			3-20/1451		
09 A-11			11121		
10 A-12			11035		
11 AF-6			11208		
12 A ^B ring blank	2	(None)			

RELINQUISHED BY:

Philly J. Ray 3/21/89 1146

RECEIVED BY:

Philly 3/21/89 11:47

RELINQUISHED BY:

Philly 3/21/89 14:35

RECEIVED BY:

RECEIVED BY LAB:

Philly 3/21/89 14:45

DESIGNATED LABORATORY:

IT SEN

DHS #

137

REMARKS:

Normal TAT

DATE COMPLETED

March 20, 1989

FOREMAN

Philly J. Ray

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

