2-26-91

WEISS ASSOCIATES
Geologic and Environmental Services
Fax: 415-547-5043 Phone: 415-547-5420
5500 Shellmound Street, Emeryville, CA 94608

TRANSMITTAL LETTER

4QTRS mgp
no yeast c

FROM: Tom Fojut

DATE: February 26, 1991

TO: Lowell Miller
Alameda County Department
of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621-1426

VIA:
- X First Class Mail
- ___ Fax ___ pages
- ___ UPS (Surface)
- ___ Federal Express
- ___ Courier

SUBJECT: Shell Service Station
WIC #204-0072-0502
2160 Otis Drive
Alameda, California

JOB: 81-429-01

AS:
- ___ We discussed on the telephone on _____
- ___ You requested _____
- ___ We believe you may be interested
- X Is required

WE ARE SENDING:
- X Enclosed
- ___ Under Separate Cover Via _____

Quarterly status report for the subject site

FOR:
- ___ Your information
- X Your use
- ___ Your review & comments
- ___ Return to you

PLEASE:
- X Keep this material
- ___ Return within 2 weeks
- ___ Acknowledge receipt

MESSAGE: Please call if you have any questions.

cc: Kurt Miller, Shell Oil Company, P.O. Box 4023, Concord, California 94524

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Geologic and Environmental Services
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5500 Shellmound Street, Emeryville, CA 94608

February 26, 1991

Mr. Lowell Miller
Alameda County Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, CA 94621-1426

Re: Shell Service Station
WIC #204-0072-0502
2160 Otis Drive
Alameda, California
WA Job #81-429-01

Dear Mr. Miller:

This letter describes Weiss Associates' (WA) first quarter 1991 activities at the Shell service station referenced above (Figure 1). This status report satisfies the quarterly reporting requirements outlined in our March 19, 1990 workplan, and prescribed by California Administrative Code Title 23 Waters, Chapter 3, Subchapter 16, Article 5, Section 265.d. Included below are:

- Descriptions and results of activities performed to date in the first quarter 1991, and
- Proposed work for the remainder of the first quarter 1991 and the second quarter 1991.

FIRST QUARTER 1991 ACTIVITIES

During this quarter, WA:

- Collected ground water samples from the three site wells,
- Measured ground water depths and determined ground water elevations and the flow direction,
- Analyzed the ground water samples and tabulated the analytic results,

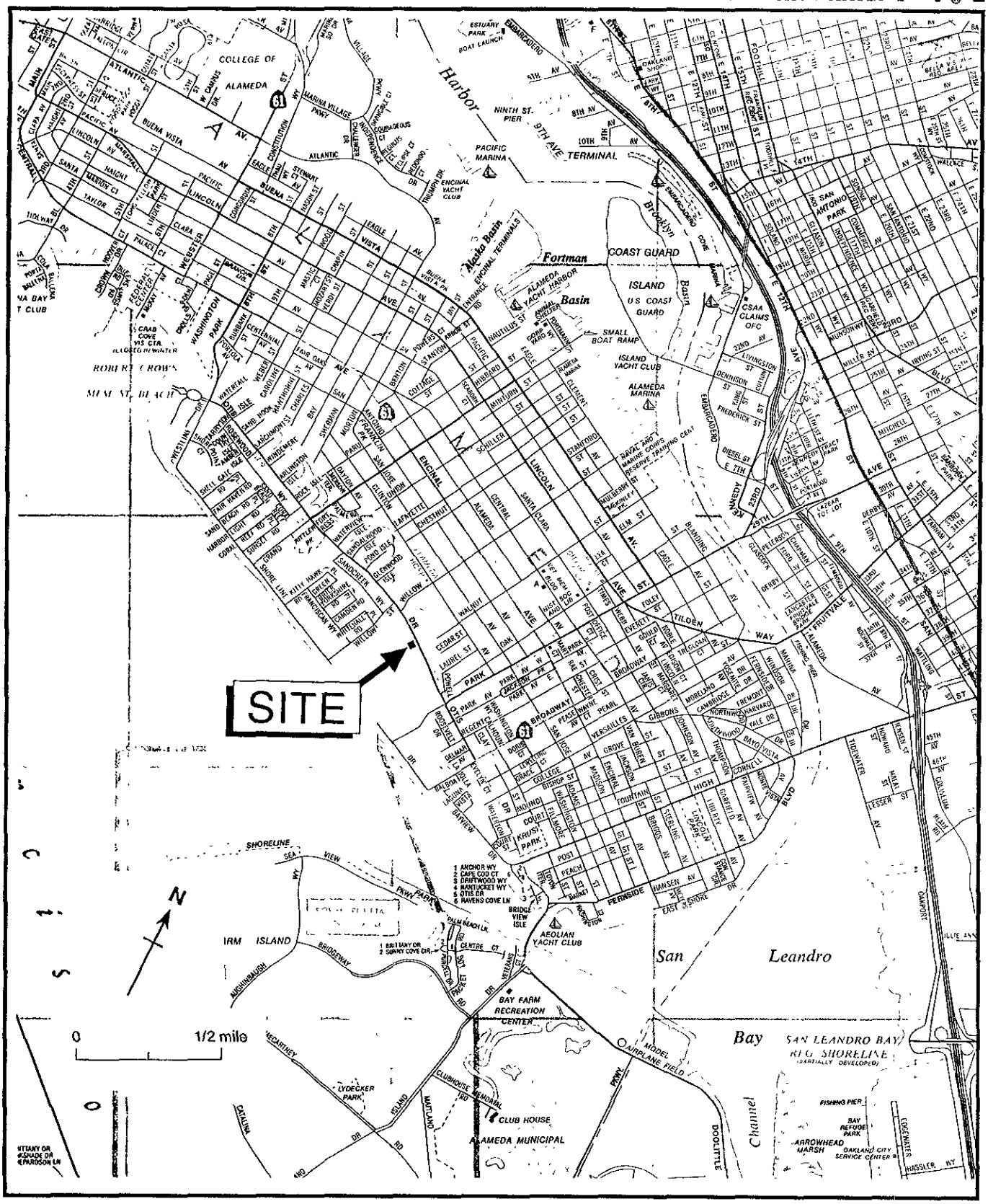


Figure 1. Site Location Map - Shell Service Station, WIC# 204-0072-0502, 2160 Otis Drive, Alameda, CA

8/21/90

- Investigated the historic chemical analytic results for ground water samples from monitoring well MW-2 (Figure 2), and

- Evaluated the site for sampling frequency reduction.

These activities are described below.

Ground Water Sampling

WA collected ground water samples from all three monitoring wells on January 17, 1991, as part of the quarterly ground water monitoring program at Shell Service Station WIC #204-0072-0502 in Alameda, California. Ground water samples from monitoring well MW-2 contained benzene, cis-1,2-dichloroethene (c-1,2-DCE), trans-1,2,-dichloroethene (t-1,2-DCE), trichloroethene (TCE), and vinyl chloride above the California Department of Health Services (DHS) maximum contaminant levels (MCLs) and 1,2-dichloroethane (1,2-DCA) at the DHS MCL for drinking water. Total petroleum hydrocarbons as gasoline (TPH-G) concentrations over the past four quarters in samples from well MW-2 are not entirely due to gasoline but mostly due to the presence of lower boiling point hydrocarbon compounds.

Sampling Personnel: WA Staff Geologist Tom Fojut

Monitoring Wells Sampled: MW-1, MW-2, and S-1

Method of Purging Wells:

- Dedicated PVC bailers

Volume of Water Purged Prior to Sampling:

- Wells were purged of four well-casing volumes, about 22 to 32 gallons each.

Method of Collecting Ground Water Samples:

- Drawn through the sampling ports on the sides of dedicated PVC bailers

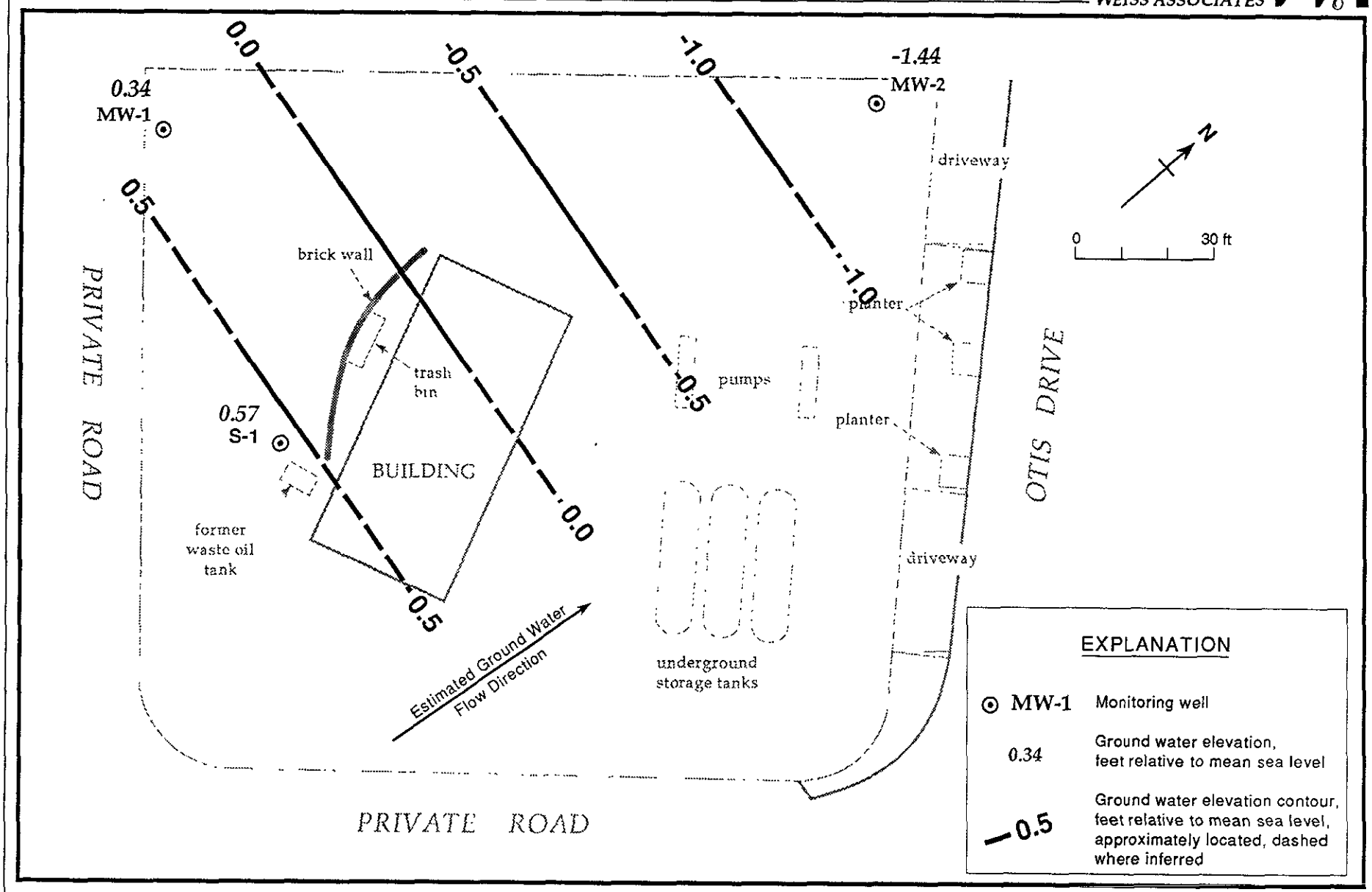


Figure 2. Monitoring Well Locations and Ground Water Elevation Contours - January 17, 1991 - Shell Service Station WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

2/22/91

Methods of Containing Ground Water Samples:

- 40 ml glass volatile organic analysis (VOA) vials, preserved with hydrochloric acid and packed in protective foam sleeves for TPH-G, benzene, ethylbenzene, toluene, and xylene (BETX), and halogenated volatile organic compound (HVOC) analyses

- 1000 ml amber glass bottles, preserved with hydrochloric acid and packed in protective foam sleeves for total petroleum hydrocarbons as diesel (TPH-D) analysis

All samples were refrigerated and transported under chain-of-custody to the analytical laboratory.

Water Samples Transported to:

- International Technology Analytical Services, Inc. (IT), San Jose, California, and were received on January 18, 1991

Quality Assurance/Quality Control:

- A travel blank was submitted for analysis.

- An equipment blank was not necessary because all bailers are dedicated to specific wells.

Water sample collection records and chain-of-custody forms are included in Attachments A and B, respectively.

Ground Water Elevations and Flow Direction

- The depth to water was measured in all wells on January 17, 1991. Ground water elevations are similar to those of the previous quarter.

- Ground water flows northward which is consistent with the flow direction over the past year.

Depth to water measurements and ground water elevations are presented in Table 1. Ground water elevation contours are plotted on Figure 2. Previous ground water elevation contour maps are included in Attachment C.

Table 1. Ground Water Elevation Data - Shell Service Station WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

Well ID	Date	Top-of-Casing Elevation (ft above msl)	Depth to Water (ft)	Ground Water Elevation (ft above msl)
MW-1	04-11-90	6.00	5.23	0.77
	07-10-90		5.40	0.60
	10-09-90		5.61	0.39
	01-17-91		5.66	0.34
MW-2	04-11-90	3.29	4.51	-1.22
	07-10-90		4.61	-1.32
	10-09-90		4.74	-1.45
	01-17-91		4.73	-1.44
S-1	09-11-90	5.10	4.29	0.81
	04-11-90		4.00	1.10
	07-10-90		4.25	0.85
	10-09-90		4.46	0.64
	01-17-91		4.53	0.57

Chemical Analyses

The Ground Water Samples were Analyzed for:	Wells
• TPH-G by modified EPA Method 8015	all wells
• TPH-D by modified EPA Method 8015	MW-2
• BETX by EPA Method 8020	all wells
• HVOCs by EPA Methods 601 and 8010	MW-2

The laboratory analyzed the samples on January 24, 25, and February 1, 1991. The results are presented in Table 2 and the analytic reports are included in Attachment B.

Table 2. Analytic Results for Ground Water - Shell Service Station WIC# 204-0072-0502, 2160 Otis Drive, Alameda, California

Sample ID	Date Sampled	Depth to Water (ft)	Analytical Lab	TPH-G	TPH-D	B	E	T	X	TOG	VOCs	Metals/ Others
				<----------parts per million (mg/L)---------->								
S-1	09/04/87[a]		IT	---	---	<0.005	<0.005	<0.005	<0.005	---	b	---
	09/11/89	4.29	IT	<0.050	<0.10	<0.0005	<0.001	<0.001	<0.003	<1.0	<0.005-0.050	c
	04/11/90	4.00	NET	<0.050	<0.050	<0.0005	<0.0005	<0.0005	<0.0005	<10	d	---
	07/10/90	4.25	NET	0.090	---	<0.0005	<0.0005	<0.0005	<0.0005	<10	<0.0004-0.010	---
	10/09/90	4.46	IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	<5	<0.0005	---
	01/17/91	4.53	IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	---	---	---
MW-1	04/11/90	5.23	NET	<0.050	<0.050	<0.0005	<0.0005	<0.0005	<0.0005	<10	<0.0004-0.010	---
	07/10/90	5.40	NET	0.10	---	<0.0005	<0.0005	<0.0005	<0.0005	<10	<0.0004-0.010	---
	10/09/90	5.61	IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	<5	<0.0005	---
	01/17/91	5.66	IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	---	---	---
MW-2	04/11/90	4.51	NET	0.20[e]	0.22	0.0027	<0.0005	0.0005	0.0024	<10	f	---
	07/10/90	4.61	NET	0.57[e]	0.45	0.15	<0.0005	0.0009	0.0031	<10	g	---
	10/09/90	4.74	IT	190[e]	0.051	55	<0.0005	<0.0005	<0.0005	<5	h	---
	01/17/91	4.73	IT	0.35[e]	<0.050	0.051	<0.0005	<0.0005	<0.0005	---	i	---
Trip Blank	07/10/90		NET	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	---	---	---
	10/09/90		IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	---	---	---
	01/17/91		IT	<0.050	---	<0.0005	<0.0005	<0.0005	<0.0005	---	---	---
DHS MCLs				NE	NE	0.0010	0.680	0.100[j]	1.75	NE	k	l

Abbreviations:

TPH-G = Total petroleum hydrocarbons as gasoline by Modified EPA Method 8015
TPH-D = Total petroleum hydrocarbons as diesel by Modified EPA method 8015
B = Benzene by EPA Method 602, 624, or 8020
E = Ethylbenzene by EPA Method 602, 624, or 8020
T = Toluene by EPA Method 602, 624, or 8020
X = Xylenes by EPA Method 602, 624, or 8020
TOG = Total non-polar oil and grease by American Public Health Association Standard Methods 503A&E
VOCs = Volatile and halogenated volatile organic compounds by EPA Method 601 or 624
--- = Not analyzed
ppm = parts per million
NE = Not established
DHS MCLs = California Department of Health Services Maximum Contaminant Levels
<n = Not detected at detection limit of n ppm

Analytical Laboratories:

IT = International Technology Analytical Services, San Jose, California
NET = National Environment Testing Pacific Inc., Santa Rosa, California

Notes:

[a] = Sampled by Pacific Environmental Group
[b] = Unknown alcohol detected at 0.007 ppm; acetone at 0.27 ppm
[c] = Metals detected by EPA Method 6010: chromium at 0.090 ppm; lead at 0.090 ppm; zinc at 0.10 ppm; no cadmium (<0.010 ppm). No chlorodiphenyl (PCB) (<0.00005 ppm) or semi-volatile organic compounds (<0.005-0.010 ppm) detected by EPA Method 625.
[d] = Chloroform detected at 0.0017 ppm
[e] = Chromatographic pattern not typical for gasoline; according to the laboratory, the concentration is due mostly to lighter hydrocarbon compounds.
[f] = Chloroform detected at 0.0045 ppm; trans-1,2-dichloroethene (t-1,2-DCE) at 0.016 ppm; trichloroethene (TCE) at 0.0012 ppm
[g] = Chloroform detected at 0.0017 ppm; 1,2-dichloroethane (1,2-DCA) at 0.00044 ppm; t-1,2-DCE at 0.011 ppm; TCE at 0.00093 ppm.
[h] = Chloroform detected at 0.015 ppm; cis-1,2-dichloroethene (c-1,2-DCE) at 0.046 ppm; t-1,2-DCE at 0.0067 ppm; tetrachloroethene (PCE) at 0.0016 ppm; TCE at 0.0013 ppm; vinyl chloride at 0.0025 ppm
[i] = Chlorobenzene detected at 0.0005 ppm; chloroform at 0.0026 ppm; 1,2-DCA at 0.0005 ppm; c-1,2-DCE at 0.074 ppm; t-1,2-DCE at 0.012 ppm; PCE at 0.0006 ppm; TCE at 0.0012 ppm; vinyl chloride at 0.0030 ppm.
[j] = DHS recommended action level for drinking water.
[k] = DHS MCL for chlorobenzene = 0.030 ppm; 1,2-DCA = 0.0005 ppm; chloroform = 0.10 ppm; TCE = 0.005 ppm; PCE = 0.005 ppm; vinyl chloride = 0.0005 ppm; t-1,2-DCE = 0.010 ppm; c-1,2-DCE = 0.006 ppm
[l] = DHS MCL for chromium = 0.050 ppm; lead = 0.050 ppm; zinc = 5 ppm

Discussion of Analytic Results of Ground Water for this Quarter:

- Ground water samples from monitoring well MW-2 contained benzene, c-1,2-DCE, t-1,2-DCE, TCE, and vinyl chloride above and 1,2-DCA at DHS MCLs for drinking water.

- TPH-G and benzene concentrations in samples from well MW-2 decreased significantly from the previous quarter.

- No TPH-D was detected in samples from well MW-2 for the first time.

- No TPH-G or BETX were detected in samples from wells S-1 and MW-1 for the fourth consecutive quarter.

Laboratory Results of Samples from Monitoring Well MW-2

The MW-2 laboratory analytical results for the previous two quarters indicated that the detected TPH-G were mostly lower boiling point hydrocarbons. Therefore, WA reviewed all historic analytic results to determine whether the previously detected TPH-G could have, in fact, also been lower boiling point hydrocarbon compounds.

Laboratory personnel at the previous analytic laboratories, IT and National Environmental Testing (NET) Pacific, Inc. of Santa Rosa, California, indicated that all previous TPH-G chromatographs for MW-2 ground water samples were indicative of lower boiling point hydrocarbons, not gasoline hydrocarbons.

Sampling Frequency Modification

WA has developed criteria to determine when the ground water sampling frequency can be modified for ground water monitoring programs (Attachment D). Based on these criteria, WA recommends modifying the sampling frequency of the site wells as shown in Table 3.

Table 3. Modifications to Ground Water Sampling Schedule, Shell Service Station, WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

Well ID	Current Sampling Frequency	Recommended Future Sampling Frequency	Rationale for Recommended Sampling Frequency
S-1	Quarterly	Semi-Annually	Hydrocarbons not detected for 4 quarters; source area well
MW-1	Quarterly	Annually	Hydrocarbons not detected for 4 quarters; cross-gradient well
MW-2	Quarterly	Quarterly	Variable hydrocarbon concentrations; down-gradient well

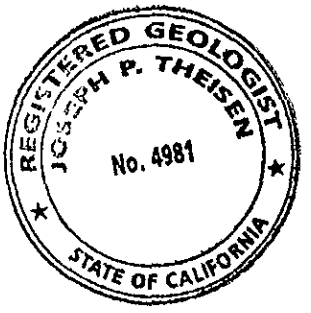
Subject to your approval, WA will initiate this program on the next sampling episode scheduled for April 1991.

ANTICIPATED WORK FOR SECOND QUARTER 1991

During the remainder of the first quarter 1991 and the second quarter 1991, on behalf of Shell Oil, WA plans to:

- Continue quarterly monitoring of ground water at this site,
- Prepare a quarterly status report presenting all data generated during the previous quarter including water sampling results and analysis, and
- Pursue WA's recommendations for sampling frequency modifications.

We trust that this submittal satisfies your requirements. Please contact Tom Fojut or Eric Anderson if you have any questions.



Sincerely,
Weiss Associates

Thomas J. Fojut
Staff Geologist

Joseph P. Theisen, R.G.
Senior Project Hydrogeologist

TJF/JPT:jg

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Attachments:
A - Water Sample Collection Records
B - Analytic Reports and Chain-of-Custody Form
C - Previous Ground Water Elevation Contour Maps
D - Sampling Frequency Modification Criteria

ATTACHMENT A

WATER SAMPLE COLLECTION RECORDS

WEISS ASSOCIATES

WATER SAMPLING DATA

Well Name MW-1 Date 1-17-91 Time of Sampling 12:40

Job Name SHELL ALAMEDA I Job Number 81-429-01 Initials TF

Sample Point Description M (M = Monitoring Well)

Location NW CORNER OF LOT

WELL DATA: Depth to Water 5.66 ft (static, pumping) @ 9:10 Depth to Product — ft.

Product Thickness — Well Depth 16 ft (spec) Well Depth — ft (sounded) Well Diameter 4 in

Initial Height of Water in Casing 10.3 ft. = volume 6.8 gal.

4 Casing Volumes to be Evacuated. Total to be evacuated 27 gal.

EVACUATION METHOD: 3½"x36" Pump # and type — Hose # and type —

Bailer# and type ~~4"~~ " PVC Dedicated Y (Y/N)

Other —

Evacuation Time: Stop 1220 ~~EST~~ —

Start 1150 ~~EST~~ —

Total Evacation Time 40min

Total Evacuated Prior to Sampling 27 gal.

Evacuation Rate 0.7 gal. per minute

Depth to Water during Evacuation — ft. — time

Depth to Water at Sampling 5.72 ft. 12:40 time

Evacuated Dry? N After — gal. Time —

80% Recovery = —

% Recovery at Sample Time — Time —

Formulas/Conversions

r = well radius in ft.

h = ht of water col in ft.

vol. in cyl. = $\pi r^2 h$

7.48 gal/ft^3

$V_{2"}$ casing = 0.163 gal/ft

$V_{3"}$ casing = 0.367 gal/ft

$V_{4"}$ casing = 0.653 gal/ft

$V_{4.5"}$ casing = 0.826 gal/ft

$V_{6"}$ casing = 1.47 gal/ft

V8 casing = 2.61 gal/ft

CHEMICAL DATA: Meter Brand/Number —

Calibration: — 4.0 — 7.0 — 10.0

Measured:	SC/µmhos	pH	T°C	Time	Volume Evacuated (gal.)

SAMPLE: Color CLEAR Odor NONE

Description of matter in sample: FINE SUSP SILT

Sampling Method: PUR FLR SAMP PORT

Sample Port: Rate — gpm Totalizer — gal.

Time —

# of Cont.	Sample ID	Cont. Type[1]	Vol[2]	Fil[3]	Ref[4]	Preservative (specify)	Analytic Method	Turn[5]	LAB
3	011-01	W/CV	40mL	N	Y	HCl	8015/8020	N	IT

1 Sample Type Codes: W = Water, S = Soil, Describe Other
Container Type Codes: V = VOA/Teflon Septa, P = Plastic, C or B = Clear/Brown Glass, Describe Other
Cap Codes: PT = Plastic, Teflon lined;
2 = Volume per container; 3 = Filtered (Y/N); 4 = Refrigerated (Y/N)
5 Turnaround [N = Normal, W = 1 week, R = 24 hour, HOLD (spell)]

ADDITIONAL COMMENTS, CONDITIONS, PROBLEMS:

WEISS ASSOCIATES

WATER SAMPLING DATA

Well Name MW-2 Date 1-17-91 Time of Sampling 13:20
Job Name SHELL ALAMEDA I Job Number 81-429-01 Initials TF
Sample Point Description M (M = Monitoring Well)
Location NE CORNER OF LOT — ON OTIS DR

WELL DATA: Depth to Water 4.73 ft (static, pumping) @ 9:20 Depth to Product ____ ft.
Product Thickness ____ Well Depth 17 ft (spec) Well Depth ____ ft(sounded) Well Diameter 4 in
Initial Height of Water in Casing 12.3 ft. = volume 8.0 gal.
4 Casing Volumes to be Evacuated. Total to be evacuated 32 gal.

EVACUATION METHOD: 3½"x3" ~~Pump # and type~~ PVC 4"x ___" Hose # and type ____
Bailer# and type PVC ~~4"~~ Dedicated Y (Y/N)
Other ____

Evacuation Time: Stop 11:15 13:15 ____
Start 10:55 13:05 ____
Total Evacuation Time 30min
Total Evacuated Prior to Sampling 32 gal.
Evacuation Rate 1.1 gal. per minute
Depth to Water during Evacuation ____ ft. ____ time
Depth to Water at Sampling 4.67 ft. 13:20 time
Evacuated Dry? N After ____ gal. Time ____
80% Recovery = ____
% Recovery at Sample Time ____ Time ____

Formulas/Conversions
r = well radius in ft.
h = ht of water col in ft.
vol. in cyl. = $\pi r^2 h$
7.48 gal/ft^3
V_2" casing = 0.163 gal/ft
V_3" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V8 casing = 2.61 gal/ft

CHEMICAL DATA: Meter Brand/Number ____
Calibration: ____ 4.0 ____ 7.0 ____ 10.0

Measured:	SC/µmhos	pH	T°C	Time	Volume Evacuated (gal.)

SAMPLE: Color LT BROWN Odor ~~NONE~~
Description of matter in sample: NONE
Sampling Method: BAILER FOR SAMPLE PORT
Sample Port: Rate ____ gpm Totalizer ____ gal.
Time ____

# of Cont.	Sample ID	Cont. Type[1]	Vol[2]	Fil[3]	Ref[4]	Preservative (specify)	Analytic Method	Turn[5]	LAB
3	011-02	W/CV	40mL	N	Y	HCl	8015/8020	N	IT
3	011-02	W/CV	40mL	N	Y	HCl	601	N	IT
2	011-01	W/RG-Y	1000mL	N	Y	HCl	8015 TPH-D	N	IT

1 Sample Type Codes: W = Water, S = Soil, Describe Other
Container Type Codes: V = VOA/Teflon Septa, P = Plastic, C or B = Clear/Brown Glass, Describe Other
Cap Codes: PT = Plastic, Teflon lined;
2 = Volume per container; 3 = Filtered (Y/N); 4 = Refrigerated (Y/N)
5 Turnaround [N = Normal, W = 1 week, R = 24 hour, HOLD (spell)]

ADDITIONAL COMMENTS, CONDITIONS, PROBLEMS:
NO PRODUCT MEASURED IN WELL

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WEISS ASSOCIATES

WATER SAMPLING DATA

Well Name S-1 Date 1-17-91 Time of Sampling 13:45
Job Name SHELL ALAMEDA I Job Number 81-429-01 Initials TF
Sample Point Description M (M = Monitoring Well)
Location BEHIND STN

WELL DATA: Depth to Water 4.53 ft (static) pumping @ 9:00 Depth to Product ___ ft.
Product Thickness 0 Well Depth 19 ft (spec) Well Depth ___ ft (sounded) Well Diameter 3 in
Initial Height of Water in Casing 14.5 ft. = volume 5.3 gal.
4 Casing Volumes to be Evacuated. Total to be evacuated 21.2 gal.

EVACUATION METHOD: 2"x60" Pump # and type ___ Hose # and type ___
Bailer# and type PVC ~~SS~~ Dedicated Y (Y/N)
Other ___

Evacuation Time: Stop 10:00 10:50 11:35 13:40
Start 9:50 1040 11:20 13:30
Total Evacuation Time 35 min 50 min 5 gal
Total Evacuated Prior to Sampling 22 gal.
Evacuation Rate ~~35~~ 0.6 gal. per minute
Depth to Water during Evacuation ___ ft. ___ time
Depth to Water at Sampling 14.29 ft. 13:45 time
Evacuated Dry? N After 7 gal. Time 10:00
80% Recovery = 7.4 ft DTW
% Recovery at Sample Time ___ Time ___

Formulas/Conversions
r = well radius in ft.
h = ht of water col in ft.
vol. in cyl. = $\pi r^2 h$
7.48 gal/ft^3
V_2" casing = 0.163 gal/ft
V_3" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V8 casing = 2.61 gal/ft

CHEMICAL DATA: Meter Brand/Number ___
Calibration: ___ 4.0 ___ 7.0 ___ 10.0

Measured:	SC/µmhos	pH	T°C	Time	Volume Evacuated (gal.)

SAMPLE: Color LT BROWN - CLEAR Odor NONE
Description of matter in sample: NONE
Sampling Method: DECANT FROM DED BLR
Sample Port: Rate ___ gpm Totalizer ___ gal.
Time ___

# of Cont.	Sample ID	Cont. Type[1]	Vol[2]	Fil[3]	Ref[4]	Preservative (specify)	Analytic Method	Turn[5]	LAB
3	011-S1	W/CV	40mL	N	Y	HCl	8015/8020	N	IT

1 Sample Type Codes: W = Water, S = Soil, Describe Other
Container Type Codes: V = VOA/Teflon Septa, P = Plastic, C or B = Clear/Brown Glass, Describe Other
Cap Codes: PT = Plastic, Teflon lined;
2 = Volume per container; 3 = Filtered (Y/N); 4 = Refrigerated (Y/N)
5 Turnaround [N = Normal, W = 1 week, R = 24 hour, HOLD (spell)]

ADDITIONAL COMMENTS, CONDITIONS, PROBLEMS:

WEISS ASSOCIATES

WATER SAMPLING DATA

Well Name TRIP BLANKS Date 1-17-91 Time of Sampling 10:20

Job Name SHELL ALAMEDA Job Number 4-429-01 Initials TF

Sample Point Description _____ (M = Monitoring Well)

Location _____

WELL DATA: Depth to Water ___ ft (static, pumping) Depth to Product ___ ft.

Product Thickness ___ Well Depth ___ ft (spec) Well Depth ___ ft(sounded) Well Diameter ___ in

Initial Height of Water in Casing ___ ft. = volume ___ gal.

___ Casing Volumes to be Evacuated. Total to be evacuated ___ gal.

EVACUATION METHOD: Pump # and type ___ Hose # and type ___

Bailer# and type ___ Dedicated ___ (Y/N)

Other ___

Evacuation Time: Stop ___ ___ ___

Start ___ ___ ___

Total Evacation Time ___

Total Evacuated Prior to Sampling ___ gal.

Evacuation Rate ___ gal. per minute

Depth to Water during Evacuation ___ ft. ___ time

Depth to Water at Sampling ___ ft. ___ time

Evacuated Dry? ___ After ___ gal. Time ___

80% Recovery = ___

% Recovery at Sample Time ___ Time ___

Formulas/Conversions

r = well radius in ft.

h = ht of water col in ft.

vol. in cyl. = $\pi r^2 h$

7.48 gal/ft^3

$V_{2"}$ casing = 0.163 gal/ft

$V_{3"}$ casing = 0.367 gal/ft

$V_{4"}$ casing = 0.653 gal/ft

$V_{4.5"}$ casing = 0.826 gal/ft

$V_{6"}$ casing = 1.47 gal/ft

V8 casing = 2.61 gal/ft

CHEMICAL DATA: Meter Brand/Number ___

Calibration: ___ 4.0 ___ 7.0 ___ 10.0

Measured:	SC/µmhos	pH	T°C	Time	Volume Evacuated (gal.)

SAMPLE: Color CLEAR Odor ___

Description of matter in sample: NONE

Sampling Method: PRETREATED VOAS

Sample Port: Rate ___ gpm Totalizer ___ gal.

Time ___

# of Cont.	Sample ID	Cont. Type[1]	Vol[2]	Fil[3]	Ref[4]	Preservative (specify)	Analytic Method	Turn[5]	LAB
3	011-21	~~40mL~~ W/CV	40mL	N	Y	HCl	8015/8020	N	IT

1 Sample Type Codes: W = Water, S = Soil, Describe Other
Container Type Codes: V = VOA/Teflon Septa, P = Plastic, C or B = Clear/Brown Glass, Describe Other
Cap Codes: PT = Plastic, Teflon lined;
2 = Volume per container; 3 = Filtered (Y/N); 4 = Refrigerated (Y/N)
5 Turnaround [N = Normal, W = 1 week, R = 24 hour, HOLD (spell)]

ADDITIONAL COMMENTS, CONDITIONS, PROBLEMS:
BUBBLES IN VOAS

F:\ALL\ADMIN\FORMS\WATSAMP.WP

ATTACHMENT B

ANALYTIC RESULTS AND CHAIN-OF-CUSTODY FORM

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Shell Oil Company
Weiss Associates
5500 Shellmound Street
Emeryville, CA 94608
Tom Fojut

Date: 02/07/91

Work Order: T1-01-178

P.O. Number: MOH 880-021 Vendor #I0002402

This is the Certificate of Analysis for the following samples:

Client Work ID: 81-429-01, 2160 Otis, Alameda
Date Received: 01/18/91
Number of Samples: 4
Sample Type: aqueous

TABLE OF CONTENTS FOR ANALYTICAL RESULTS

Reviewed and Approved:

Suzanne Veaudry
Project Manager

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST NAME: **Petroleum Hydrocarbons**

SAMPLE ID: **011-01**
SAMPLE DATE: **01/17/91**
LAB SAMPLE ID: **T101178-01**
SAMPLE MATRIX: **aqueous**
RECEIPT CONDITION: **Cool pH < 2**

RESULTS in Milligrams per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		01/24/91
Low Boiling Hydrocarbons	Mod.8015		01/24/91

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	0.05	**None**
BTEX		
Benzene	0.0005	**None**
Toluene	0.0005	**None**
Ethylbenzene	0.0005	**None**
Xylenes (total)	0.0005	**None**

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST NAME: **Halocarbons by 8010/601**

SAMPLE ID: **011-02**
SAMPLE DATE: **01/17/91**
LAB SAMPLE ID: **T101178-02**
SAMPLE MATRIX: **aqueous**
RECEIPT CONDITION: **Cool**
EXTRACTION DATE: **N/A**
ANALYSIS DATE: **02/01/91**

RESULTS in Milligrams per Liter

PARAMETER	DETECTION LIMIT	DETECTED
Bromodichloromethane	0.0005	None
Bromoform	0.0005	None
Bromomethane	0.0005	None
Carbon tetrachloride	0.0005	None
Chlorobenzene	0.0005	0.0005
Chloroethane	0.0005	None
Chloroform	0.0005	0.0026
Chloromethane	0.0005	None
Dibromochloromethane	0.0005	None
1,2-Dichlorobenzene	0.0005	None
1,3-Dichlorobenzene	0.0005	None
1,4-Dichlorobenzene	0.0005	None
Dichlorodifluoromethane	0.0005	None
1,1-Dichloroethane	0.0005	None
1,2-Dichloroethane	0.0005	0.0005
1,1-Dichloroethene	0.0005	None
cis-1,2-Dichloroethene	0.001	0.074
trans-1,2-Dichloroethene	0.0005	0.012
1,2-Dichloropropane	0.0005	None
cis-1,3-Dichloropropene	0.0005	None
trans-1,3-Dichloropropene	0.0005	None
Methylene chloride	0.0005	None
1,1,2,2-Tetrachloroethane	0.0005	None
Tetrachloroethene	0.0005	0.0006
1,1,1-Trichloroethane	0.0005	None
1,1,2-Trichloroethane	0.0005	None
Trichloroethene	0.0005	0.0012
Trichlorofluoromethane	0.0005	None
1,1,2-Trichlorotrifluoroethane	0.0005	None
Vinyl chloride	0.0005	0.0030

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST NAME: **Petroleum Hydrocarbons**

SAMPLE ID: **011-02**
SAMPLE DATE: **01/17/91**
LAB SAMPLE ID: **T101178-02**
SAMPLE MATRIX: **aqueous**
RECEIPT CONDITION: **Cool pH < 2**

RESULTS in Milligrams per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		01/24/91
Low Boiling Hydrocarbons	Mod.8015		01/24/91
High Boiling Hydrocarbons	Mod.8015	01/23/91	01/25/91

PARAMETER	DETECTION LIMIT	DETECTED	
Low Boiling Hydrocarbons calculated as Gasoline	0.05	0.35	&
BTEX			
Benzene	0.0005	0.051	
Toluene	0.0005	None	
Ethylbenzene	0.0005	None	
Xylenes (total)	0.0005	None	
High Boiling Hydrocarbons calculated as Diesel	0.05	None	

Comments:
& Compounds detected and calculated as low boiling hydrocarbons consist of compounds eluting within the chromatographic range of gasoline, but are not characteristic of the standard gasoline standard pattern.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST NAME: **Petroleum Hydrocarbons**

SAMPLE ID: **011-S1**
SAMPLE DATE: **01/17/91**
LAB SAMPLE ID: **T101178-03**
SAMPLE MATRIX: **aqueous**
RECEIPT CONDITION: **Cool pH < 2**

RESULTS in Milligrams per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		01/24/91
Low Boiling Hydrocarbons	Mod.8015		01/24/91

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	0.05	None
BTEX		
Benzene	0.0005	None
Toluene	0.0005	None
Ethylbenzene	0.0005	None
Xylenes (total)	0.0005	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST NAME: **Petroleum Hydrocarbons**

SAMPLE ID: **011-21**
SAMPLE DATE: **01/17/91**
LAB SAMPLE ID: **T101178-04**
SAMPLE MATRIX: **aqueous**
RECEIPT CONDITION: **Cool pH < 2**

RESULTS in Milligrams per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		01/25/91
Low Boiling Hydrocarbons	Mod.8015		01/25/91

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	0.05	**None**
BTEX		
Benzene	0.0005	**None**
Toluene	0.0005	**None**
Ethylbenzene	0.0005	**None**
Xylenes (total)	0.0005	**None**

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

QUALITY CONTROL REPORT

TEST NAME: **Petroleum Hydrocarbons**

Method Blank

LAB SAMPLE ID: T101142-MB
ANALYSIS DATE: 01/23/91

Summary of Method Blank Analyses

RESULTS in Milligrams per Liter:

PARAMETER	DETECTION LIMIT	DETECTED
Gasoline	50.	None

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

IT ANALYTICAL SERVICES
SAN JOSE, CA

Work Order: T1-01-178

QUALITY CONTROL REPORT

TEST NAME: **Halocarbons by 8010/601**

Method Blank

LAB SAMPLE ID: **49-10128-MB**
ANALYSIS DATE: **01/28/91**

Summary of Method Blank Analyses

RESULTS in Milligrams per Liter

PARAMETER	DETECTION LIMIT	DETECTED
Bromodichloromethane	0.0005	None
Bromoform	0.0005	None
Bromomethane	0.0005	None
Carbon tetrachloride	0.0005	None
Chlorobenzene	0.0005	None
Chloroethane	0.0005	None
Chloroform	0.0005	None
Chloromethane	0.0005	None
Dibromochloromethane	0.0005	None
1,2-Dichlorobenzene	0.0005	None
1,3-Dichlorobenzene	0.0005	None
1,4-Dichlorobenzene	0.0005	None
Dichlorodifluoromethane	0.0005	None
1,1-Dichloroethane	0.0005	None
1,2-Dichloroethane	0.0005	None
1,1-Dichloroethene	0.0005	None
cis-1,2-Dichloroethene	0.0005	None
trans-1,2-Dichloroethene	0.0005	None
1,2-Dichloropropane	0.0005	None
cis-1,3-Dichloropropene	0.0005	None
trans-1,3-Dichloropropene	0.0005	None
Methylene chloride	0.0005	None
1,1,2,2-Tetrachloroethane	0.0005	None
Tetrachloroethene	0.0005	None
1,1,1-Trichloroethane	0.0005	None
1,1,2-Trichloroethane	0.0005	None
Trichloroethene	0.0005	None
Trichlorofluoromethane	0.0005	None
1,1,2-Trichlorotrifluoroethane	0.0005	None
Vinyl chloride	0.0005	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

QUALITY CONTROL REPORT

TEST NAME: **Halocarbons by 8010/601**

Matrix Spike (MS) and Matrix Spike Duplicate (MSD)

SAMPLE ID: **17011-E3**
LAB SAMPLE ID: **T101179-01**
ANALYSIS DATE: **01/19/91**

Summary of Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Analyses

RESULTS in Milligrams per Liter:

PARAMETER	Amt in Sample	Amt of Spike	MS Result	MSD Result	MS %Rec	MSD %Rec	RPD
Chlorobenzene	None	40.0	38.3	43.8	96.	110.	14.
1,1-Dichloroethene	None	40.0	42.7	47.6	107.	119.	11.
Trichloroethene	47.9	40.0	89.5	90.8	104.	107.	3.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Company: Shell Oil Company
Date: 02/07/91
Client Work ID: 81-429-01, 2160 Otis, Alameda

Work Order: T1-01-178

TEST CODE **601** TEST NAME **Halocarbons by 8010/601**

The method of analysis for volatile halocarbons is taken from EPA Methods 601 and 8010. Samples are examined using the purge and trap technique. Final detection is by gas chromatography using an electrolytic conductivity detector.

TEST CODE **TPHN** TEST NAME **TPH High Boiling by 8015**

The method of analysis for high boiling hydrocarbons s taken from the LUFT field manual. Samples are extracted with solvent and examined by gas chromatography using a flame ionization detector. Results in soils are corrected for moisture content and are reported on a dry soil basis unless otherwise noted.

TEST CODE **TPHVB** TEST NAME **TPH Gas,BTEX by 8015/8020**

The method of analysis for low boiling hydrocarbons is taken from EPA Methods modified 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 in series with a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline. Results in soils are corrected for moisture content and are reported on a dry soil basis unless otherwise noted.

T1-01-178

Page 1 of 1

WEISS ASSOCIATES
5500 Shellmound St., Emeryville, CA 94608
Phone: 415-547-5420 FAX: 415-547-5043

Shell Service Station Address: 2160 Otis Drive, Alameda, CA

Shell Contact: ~~E. Paul Hayes~~ KURT MILLER

WIC #: 204007205 02

AFE #: 086635

Please send analytic results and a copy of the signed chain of custody form to:

~~Eric Anderson~~ TOM FOJUT

Project ID: 81-429-01

CHAIN-OF-CUSTODY RECORD AND ANALYTIC INSTRUCTIONS

Lab Personnel:
1) Specify analytic method and detection limit in report.
2) Notify us if there are any anomalous peaks on GC or other scans.
3) ANY QUESTIONS/CLARIFICATIONS: CALL US.

Sampled by: TOM FOJUT

Laboratory Name: IT

No. of Containers	Sample ID	Container Type[1]	Sample Date	Vol[2]	Fil[3]	Ref[4]	Preservative (specify)	Analyze for	Analytic Method	Turn[5]	COMMENTS
3	011-01	W/CV	1-17-91 TF	40ml	N	Y	HCl	TPH-G/BETX	8015/8020	N	PLEASE SEND US QA/QC
3	011-02	W/CV	1-17-91	40ml	N	Y	HCl	TPH-G/BETX	8015/8020	N	
3	011-02	W/CV	1-17-91	40ml	N	Y	HCl	HVOCs	601	N	
2	011-02	W/BG-Py	1-17-91	1l	N	Y	HCl/NONE	TPH-D	8015	N	
3	011-S1	W/CV	1-17-91	40ml	N	Y	HCl	TPH-G/BETX	8015/8020	N	
3	011-21	W/CV	1-17-91	40ml	N	Y	HCl	TPH-G/BETX	8015/8020	N	

1 Tom Fojut 1-18-91 9:15AM
Released by (Signature), Date

3 [signature] 1-18-91
Released by (Signature), Date

5 [signature] 1/18/91 1935
Released by (Signature), Date

1 _____
Affiliation

3 Weiss Assoc
Affiliation

5 _____
Affiliation

2 [signature] 1-18-91 9:15 am
Received by (Signature), Date

4 [signature]
Shipping Carrier, Method, Date

6 Jason J. Koehn 1/18/91 1935
Received by Lab Personnel, Date

Seal intact? yes

2 Weiss Assoc.
Affiliation

4 IT 187
Affiliation

6 ITAS 943-1540
Affiliation, Telephone

1 Sample Type Codes: W = Water, S = Soil, Describe Other; Container Type Codes: V = VOA/Teflon Septa, P = Plastic, C or B - Clear/Brown Glass, Describe Other;
Cap Codes: PT = Plastic, Teflon Lined 2 = Volume per container; 3 = Filtered (Y/N); 4 = Refrigerated (Y/N)
5 Turnaround [N = Normal, W = 1 Week, R = 24 Hour, HOLD (write out)]

ADDITIONAL COMMENTS, CONDITIONS, PROBLEMS:

Stored in locked building overnight

F:\ALL\ADMIN\FORMS\COCSHELL.WP2

ATTACHMENT C

PREVIOUS GROUND WATER ELEVATION CONTOUR MAPS

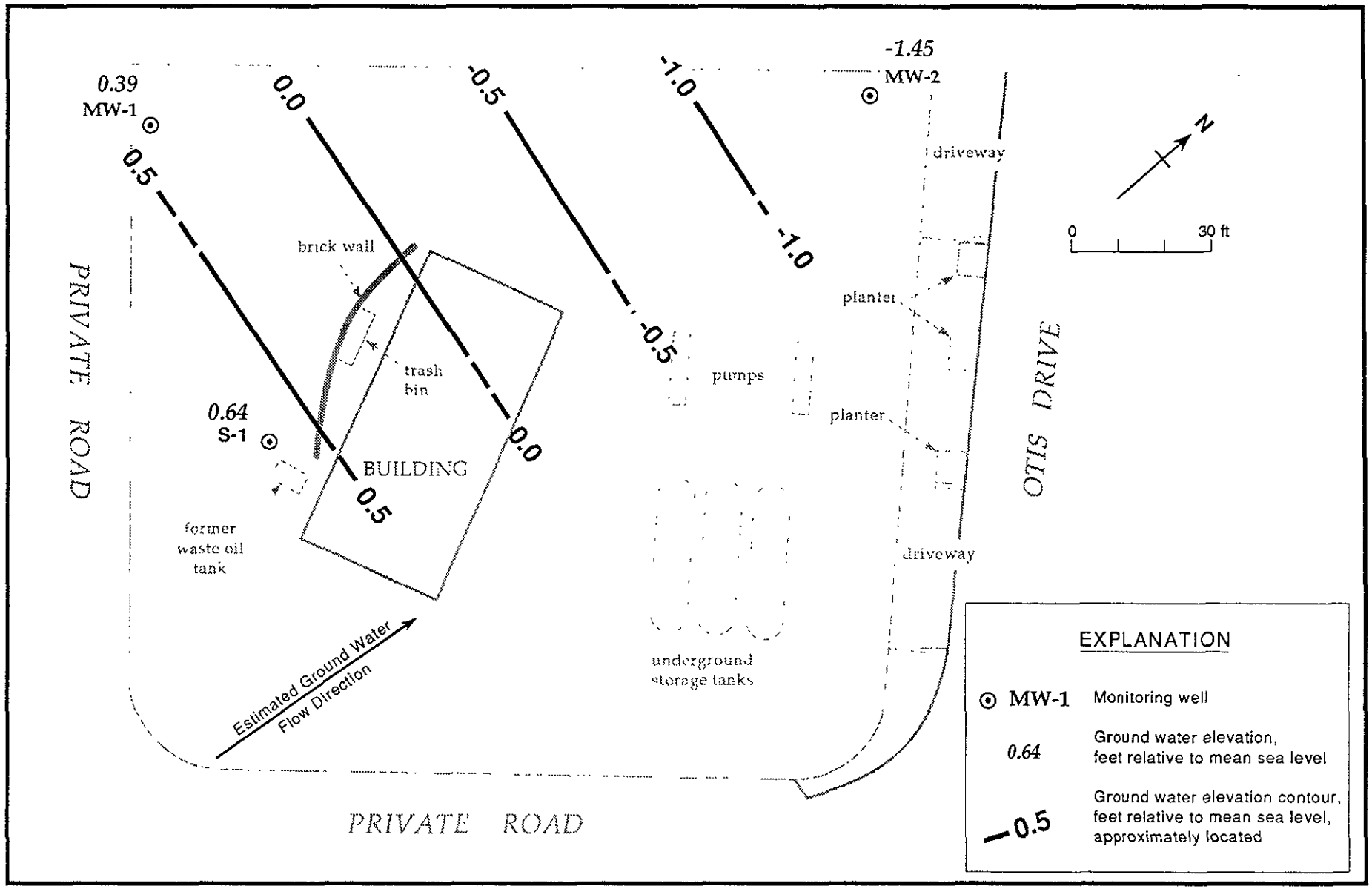

Figure 2. Monitoring Well Locations and Ground Water Elevation Contours - October 9, 1990 - Shell Service Station WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

1/14/91

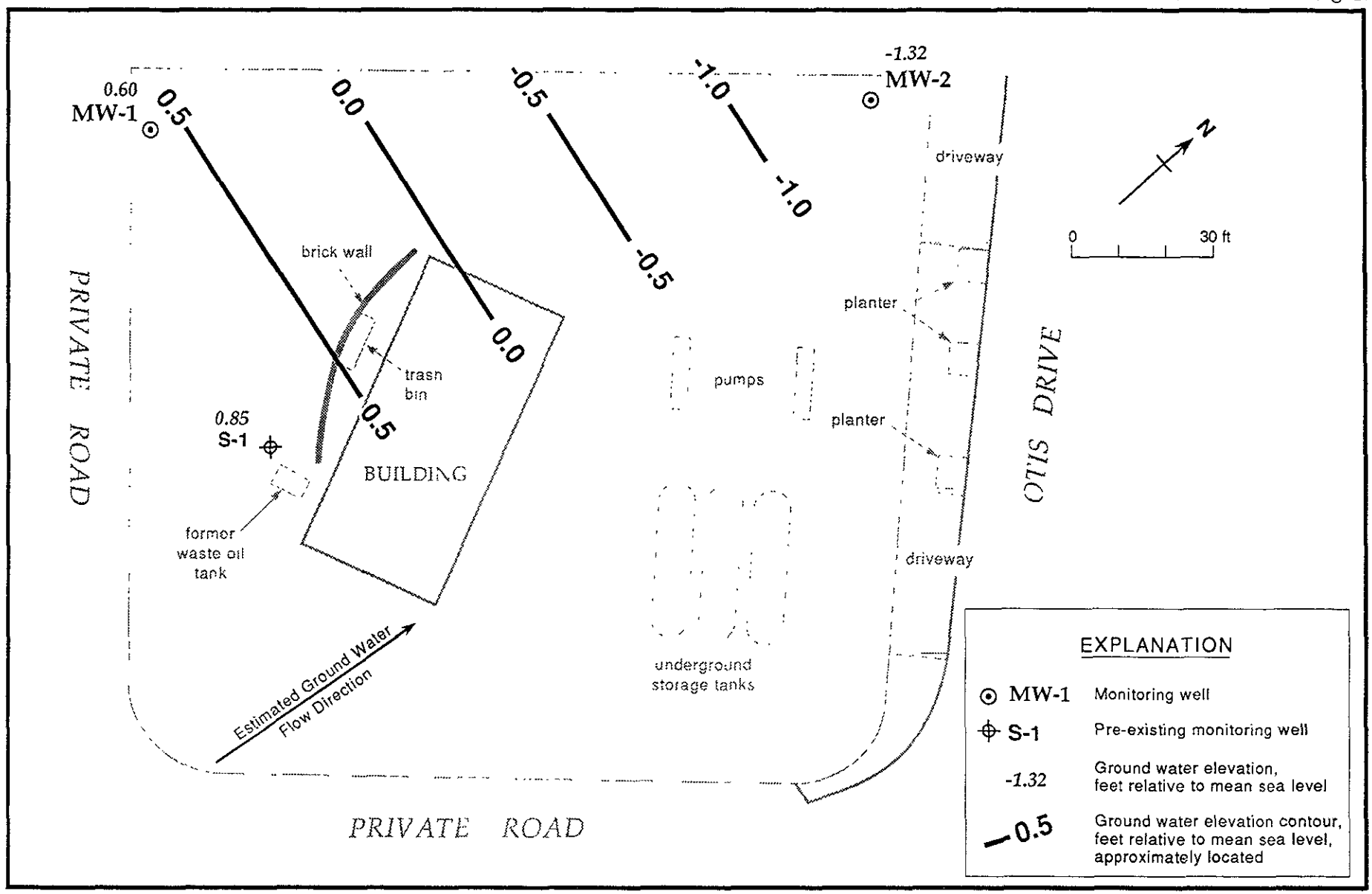

Figure 2. Monitoring Well Locations and Ground Water Elevation Contours - July 10, 1990 - Shell Service Station WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

1/14/91

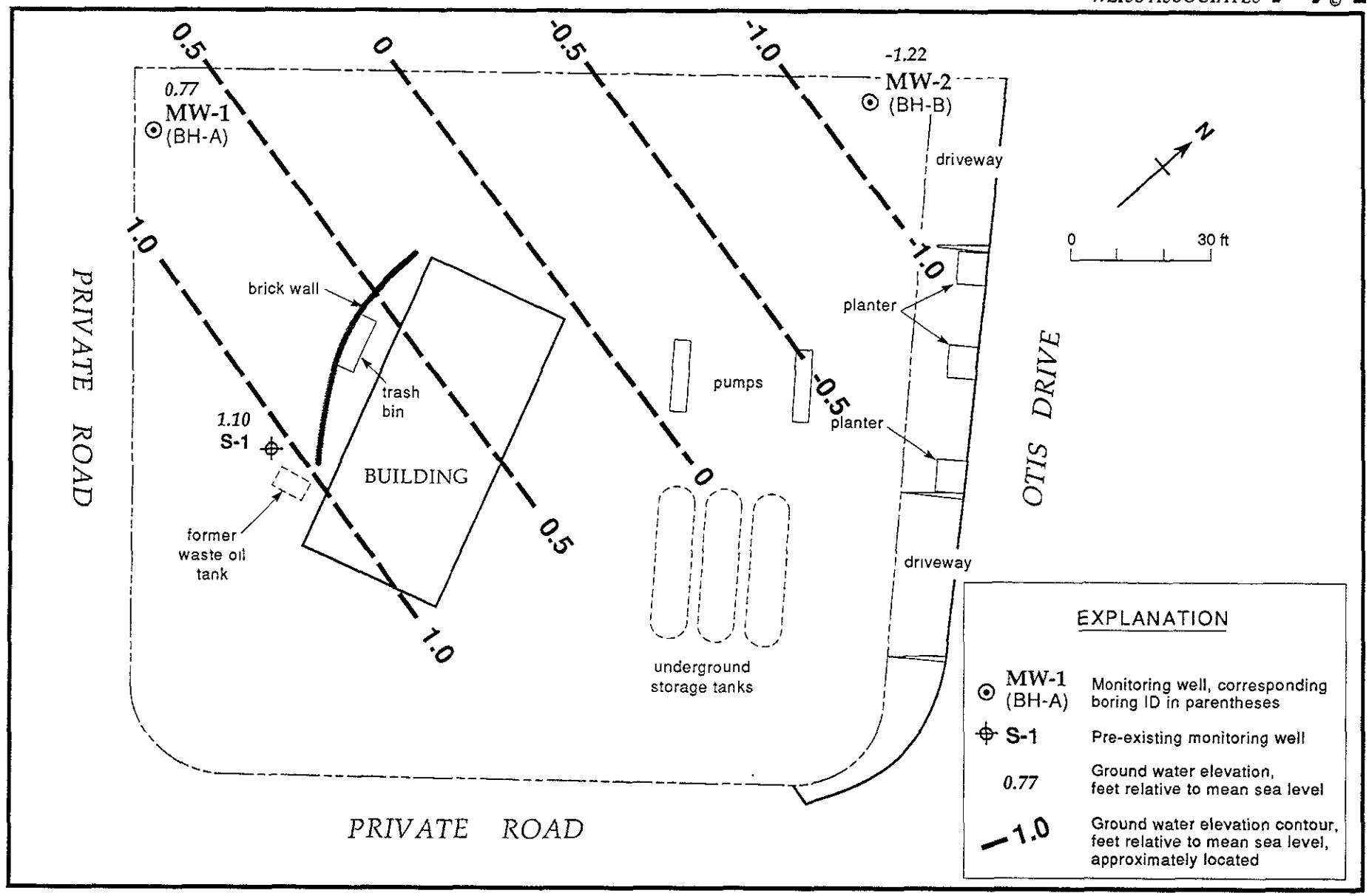

Figure 2. Ground Water Elevation Contours - April 4, 1990 - Shell Service Station WIC #204-007-205, 2160 Otis Drive, Alameda, California

1/14/91

ATTACHMENT D

SAMPLING FREQUENCY MODIFICATION CRITERIA

ATTACHMENT D

SAMPLING FREQUENCY MODIFICATION CRITERIA

Shell typically samples ground water on a quarterly basis at their operating or former service stations. The California Water Quality Control Board's ground water monitoring guidelines state that: "Quarterly (ground water) monitoring is the maximum sampling interval typically allowed when ground water contamination is present unless other arrangements are made with Regional Water Quality Control Board staff"[1]. California Regional Water Quality Control Board - San Francisco Bay Region (RWQCB-SFBR) personnel have indicated that the board will allow reduction of the sampling frequency on a site-specific basis if the frequency modification is justified by site conditions[2]. Therefore, WA has developed generalized criteria for determining when sampling frequency should be modified.

The recommended sampling frequency for specific monitoring wells is based upon the following factors:

- The reliability of the ground water quality analytic data,
- The trend of the dissolved hydrocarbon concentration in the well, and
- The location of the well in relation to the hydrocarbon source.

Each of these factors is discussed below.

Reliability of Ground Water Quality Analytic Data

Since the reproducibility of ground water analytic data is highly sensitive to hydrogeologic conditions as well as field sampling and laboratory analytic procedures, ground water analytic data often shows variability between sampling episodes. Seasonal ground water fluctuation can also affect hydrocarbon concentrations in ground water. Therefore, WA will reduce the sampling frequency only for wells which:

- Have been sampled on a quarterly basis for at least one year, and
- Have consistent historical analytic results allowing a reliable assessment of the representative hydrocarbon concentration in the well. If the variability of the analytic data prevents a reliable assessment of concentration, then we will continue to sample the well(s) quarterly until a reliable assessment can be made.

---

1 North Coast, San Francisco Bay, Central Valley Regional Water Quality Control Boards, June 2, 1988 (revised May 18, 1989), "Regional Board Staff Recommendations for Initial Evaluation and Investigation of Underground Tanks; pg.12.

2 Personal communication between Joseph Theisen, WA Project Geologist and Diane White, RWQCB-SFBR, November 29, 1989.

Trend of Hydrocarbon Concentration

Sampling frequency will be reduced only for wells showing stable or decreasing concentrations. Wells showing increasing trends will be sampled quarterly to monitor the trends and determine whether the hydrocarbon concentration in a particular well is approaching a threshold concentration such as the saturation concentration, maximum contaminant level (MCL) or a California Department of Health Services action level.

Well Location

Ground water monitoring wells generally fall into one of following classifications relative to the suspected hydrocarbon source:

1) Clean up- and cross-gradient wells,

2) Clean down-gradient wells,

3) High concentration source-area wells, and

4) Low to high concentration intermediate wells.

WA's recommended sampling frequency for each of these classifications as follows:

1) If no offsite source is indicated by the initial sampling of the up-gradient and cross-gradient site wells and the subject wells are clean, WA recommends sampling these wells annually.

2) Since clean down-gradient wells define the "leading edge" of dissolved hydrocarbons in ground water, and hence are used to determine hydrocarbon breakthrough and the need for additional wells and/or remediation, WA recommends sampling these wells quarterly.

3) High concentration source-area wells are used to monitor stable or increasing source-area concentrations and the effectiveness of natural biodegradation. WA recommends sampling these wells semi-annually unless the hydrocarbon concentrations are found to be increasing, in which case, the wells will be sampled quarterly. High concentration source area wells with a history of floating hydrocarbons will be inspected quarterly, and sampled if possible.

4) Intermediate wells, located at a distance from the source area, may contain low to high dissolved hydrocarbon concentrations, depending on their distance from the source and hydrogeologic factors. Although these wells are not used to track the migration of the dissolved-hydrocarbon front, they can be used to track the migration of the dissolved hydrocarbon plume and the rates of natural biodegradation. Therefore, WA recommends sampling these wells semi-annually.