



June 30, 1992

Thomas Peacock
Alameda County Department
of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, CA 94621

Re: STID #3719
Shell Service Station
6039 College Avenue
Oakland, California
WIC #204-5508-3301
WA Job #81-618-100

92 JUL -2 PM 1:50

Dear Mr. Peacock:

On behalf of Shell Oil Company, Weiss Associates (WA) is responding to your June 2, 1992 letter to Dan Kirk of Shell Oil Company requesting a workplan to investigate the vertical extent of hydrocarbons in the subsurface beneath the Shell station referenced above (Figure 1). We have reviewed soil analytic data from previous site investigations and ground water analytic data from quarterly monitoring well samplings. A description of the hydrocarbon distribution in soil and ground water and our recommendations for additional work are presented below.

HYDROCARBON DISTRIBUTION IN SOIL

In January and February 1990 and August 1991, Harding Lawson Associates (HLA) of Concord, California collected two to three soil samples each from soil borings B-1 through B-6 and from the borings for wells MW-2 through MW-5 to assess the vertical and horizontal extent of hydrocarbons in soil beneath the site (Figure 2). Total petroleum hydrocarbons as gasoline (TPH-G), diesel (TPH-D) and/or motor oil (TPH-MO) were detected primarily between 15 and 23 ft depth in the borings drilled near the underground fuel storage tanks (Tables 3 and 4,



Attachment A)¹. Hydrocarbon concentrations in soil samples from borings B-1, MW-2 and MW-5, which are upgradient, crossgradient and downgradient of the tanks, respectively, were near or below laboratory practical quantification limits (PQLs). Since the depth to water has fluctuated between 11.0 and 20.5 ft since November 1990², the seven to eight ft thick layer of hydrocarbon-bearing soil near the underground fuel storage tanks is probably caused by water table fluctuations smearing hydrocarbons across the soils.

Since hydrocarbon concentrations in soil samples collected from immediately above and below the water table from the borings drilled north, east and south of the tanks were below detection limits, the vertical and horizontal extent of hydrocarbons in soil are adequately defined near the tanks. Although the "zero line" of hydrocarbons in soil west of the tanks has not been fully characterized, hydrocarbons in soil probably do not extend very far to the west. This conclusion is based on the southwestward ground water gradient, which would limit the westward spread of hydrocarbons, and the location of borings B-3 and MW-3 relative to the tanks. Analytic results for the soil samples from these borings suggest that hydrocarbons are not widely distributed in unsaturated sediments in this area. Since the vertical and horizontal extent of hydrocarbons appear adequately defined, WA does not recommend drilling and sampling additional soil borings at this time.

How?

HYDROCARBON DISTRIBUTION IN GROUND WATER

On March 18, 1992, monitoring well MW-4 contained 0.24 ft of floating hydrocarbons and water samples from well MW-3 contained 6.1 ppm TPH-G. However, no hydrocarbons were detected in ground water samples from wells MW-1, MW-2 and MW-5 (Figure 2, Table 2 - Attachment B). To remediate the floating hydrocarbons detected at the site, Shell recently installed a floating hydrocarbon skimmer in well MW-4 that will be purged monthly.

¹ Harding Lawson Associates, October 10, 1991, Consultant's Quarterly Technical Report, Third Quarter 1991 prepared for Shell Oil Company regarding the Shell service station at 6039 College Avenue in Oakland, California, 9 pages and 7 appendices.

² Weiss Associates, May 20, 1992, Consultant's letter-report prepared for Shell Oil Company regarding quarterly ground water monitoring for the Shell service station at 6039 College Avenue in Oakland, California, 2 pages and 2 attachments.

Mr. Thomas Peacock
July 1, 1992

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Weiss Associates



Since the five existing monitoring wells sufficiently define the source areas and the horizontal extent of hydrocarbons in ground water, and since floating hydrocarbons are being skimmed from well MW-4, WA does not recommend installing any additional monitoring wells at this time.

In summary, since hydrocarbons in soil and ground water are characterized at the source areas and downgradient of the site, WA does not recommend any further investigation at this time.

We appreciate this opportunity to provide hydrogeologic consulting services on behalf of Shell Oil Company. Please call us if you have any questions.



Sincerely,
Weiss Associates

N. Scott MacLeod
Project Geologist

Joseph P. Theisen, C.E.G.
Senior Hydrogeologist

TF/NSM/JPT:tf

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Attachments: A - Soil Analytic Tables
B - Ground Water Analytic Table

cc: Dan Kirk, Shell Oil Company, P.O. Box 5278, Concord, California 94520-9998
Lester Feldman, Regional Water Quality Control Board - San Francisco Bay, 2101 Webster Street, Suite 500, Oakland, California 94612

EXPLANATION	
⊙ MW-3	Monitoring well
● B-2	Soil boring
6.1	Total petroleum hydrocarbons as gasoline (TPH-G) concentration in ground water, parts per million (ppm)
FH	Floting hydrocarbons
-0.1	TPH-G isoconcentration contour for ground water, ppm, approximately located, dashed where inferred

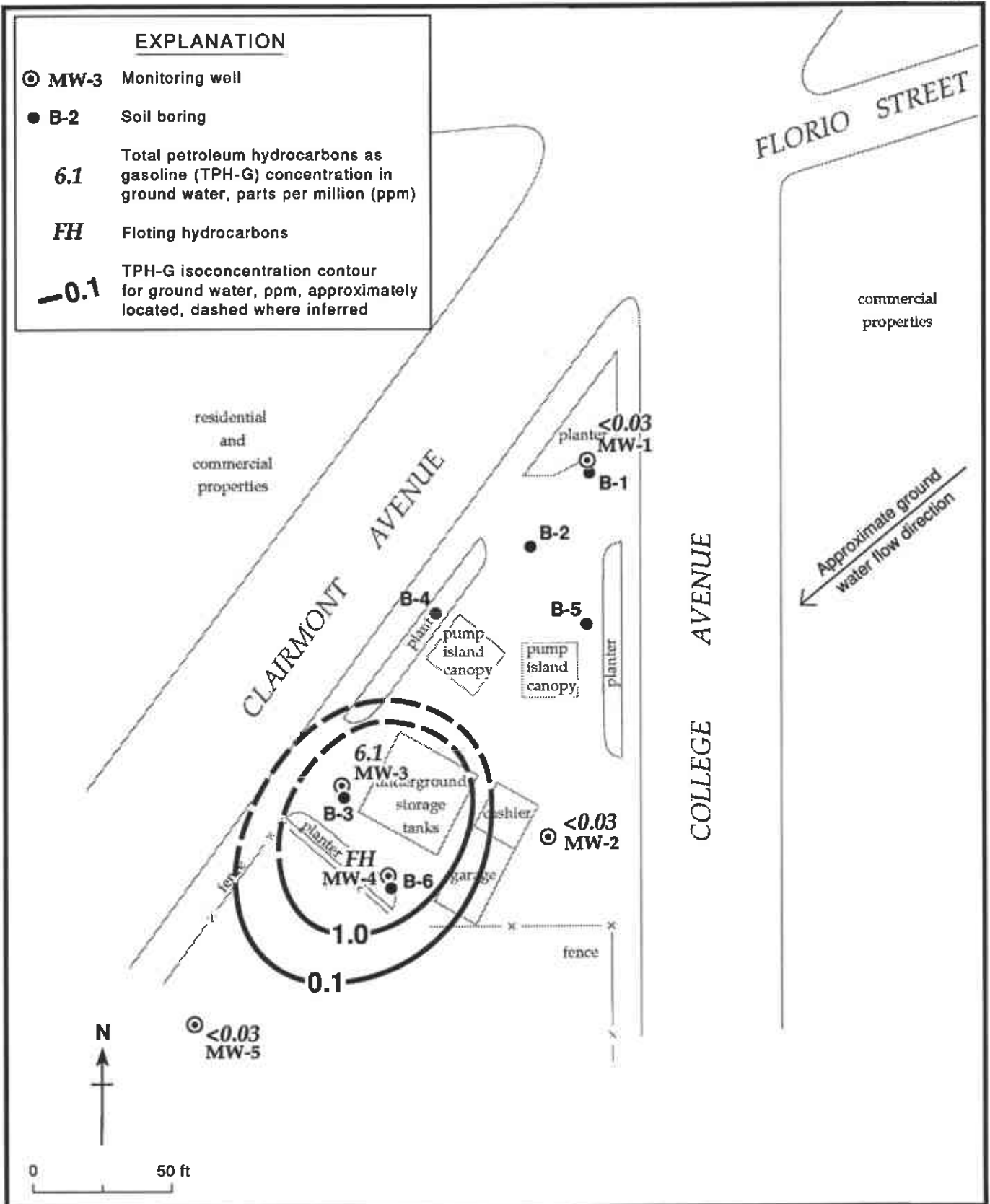


Figure 1. TPH-G Concentrations in Ground Water - March 18, 1992 - Shell Service Station WIC #204-5510-0303, 6039 College Avenue, Oakland, California

ATTACHMENT A
SOIL ANALYTIC TABLES

Table 3. Soil Analytical Results - Borings
Concentrations in Parts Per Million (ppm)

Sample Depth	B-1-22.5'	B-2-18'	B-2-24'	B-3-19'	B-3-21'	B-4-18.5'	B-4-25'	B-5-22'	B-5-23'	B-6-19.5'	B-6-22.5'
Approx. GW Depth	21'	22'	22'	18'	18'	20'	20'	19'	19'	18'	18'
Sample Date	01/04/90	01/05/90	01/05/90	01/05/90	01/05/90	01/04/90	01/04/90	01/04/90	01/04/90	01/05/90	01/05/90
Parameter /Method											
Benzene	ND @ 0.05	0.62	ND @ 0.05	0.24	0.19	0.57	ND @ 0.05	ND @ 0.05	ND @ 0.05	0.28	ND @ 0.05
Toluene	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.18	ND @ 0.1	0.11	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1
Ethylbenzene	ND @ 0.1	0.48	ND @ 0.1	4.1	0.53	0.65	ND @ 0.1	ND @ 0.1	ND @ 0.1	1.3	ND @ 0.1
Xylenes	ND @ 0.1	1.2	ND @ 0.1	9.8	0.68	1.3	ND @ 0.1	ND @ 0.1	ND @ 0.1	2.1	ND @ 0.1
/EPA 8020											
TPH as Gasoline	8.1	130	1.8	610	71	170	ND @ 1	ND @ 1	4.4	260	ND @ 1
TPH as Motor Oil	---	---	---	110000	14000	---	---	---	---	12000	320
TPH as Diesel	---	---	---	5900	750	---	---	---	---	600	16
/EPA 8015											
Oil and Grease	---	---	---	810	380	---	---	---	---	1100	91
/SM 503 D&E											
Halogenated VOCs	---	---	---	ND @ 0.5	ND @ 0.5	---	---	---	---	ND @ 0.05	ND @ 0.005
/EPA 8010				to 2.5	to 0.25					to 0.25	to 0.025
Cadmium	---	---	---	ND @ 0.5	ND @ 0.5	---	---	---	---	ND @ 0.5	ND @ 0.5
Chromium	---	---	---	48	61	---	---	---	---	86	73
Zinc	---	---	---	51	54	---	---	---	---	52	60
/EPA 6010											
Lead/EPA 7241	---	---	---	13	7.6	---	---	---	---	8.1	9.2

--- = Analysis not performed on sample

ND = Not present above the stated detection limit

Table 4. Soil Analytical Results - Well Borings
 Shell 6039 College Avenue, Oakland
 Concentrations in parts per million (ppm)

Sample/Depth Approx. GW Depth Sample Date	MW-2-11' 17' 2/08/90	MW-2-15.5' 17' 2/08/90	MW-2-20.5' 17' 2/08/90	MW-3-10' 16' 2/07/90	MW-3-15.5' 16' 2/07/90	MW-3-20.5' 16' 2/07/90	MW-4-10.5' 17' 2/07/90	MW-4-15.5' 17' 2/07/90	MW-4-20.5' 17' 2/07/90	MW-5-6' 17" 8/24/91	MW-5-16' 17' 8/24/91	MW-5-21' 17' 08/24/91
Parameter /Method												
Benzene	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	1.1	ND @ 0.05	ND @ 0.05	0.31	0.06	ND @ 0.005	ND @ 0.005	ND @ 0.005
Toluene	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.7	ND @ 0.1	ND @ 0.11	0.34	ND @ 0.1	ND @ 0.005	ND @ 0.005	ND @ 0.005
Ethylbenzene	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1	3.1	ND @ 0.1	ND @ 0.1	0.92	0.46	ND @ 0.005	0.028	ND @ 0.005
Xylenes /EPA 8020	ND @ 0.1	ND @ 0.1	ND @ 0.1	0.11	1.9	ND @ 0.1	ND @ 0.1	2.6	0.57	ND @ 0.005	0.10	ND @ 0.005
TPH as Gasoline	ND @ 1	ND @ 1	ND @ 1	12	230	28	ND @ 1	140	72	ND @ 1	23*	ND @ 1
TPH as Motor Oil	ND @ 10	ND @ 1	ND @ 10	ND @ 10	1,800	ND @ 10	ND @ 1	6,400	46,000	ND @ 12	13	ND @ 12
TPH as Diesel /EPA 8015	ND @ 1	ND @ 1	1.1	4.4	200	9.9	1.2	61	2200	ND @ 1.2	7**	ND @ 1.2
PCBs/EPA 8080	---	---	---	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	ND @ 0.05	---	---	---
TOG /503E	---	---	---	---	---	---	---	---	---	ND @ 50	ND @ 50	ND @ 50

- = Analysis not performed on sample
- ND = Not present above the stated detection limit
- TPH = Total petroleum hydrocarbons
- PCBs = Polychlorinated biphenyls
- TOG = Total oil and grease
- * = Compounds detected are due to petroleum mixture other than gasoline
- ** = Not characteristic of standard diesel pattern
- *** = Results include compounds apparently due to gasoline as well as those due to diesel.

ATTACHMENT B
GROUND WATER ANALYTIC TABLE

Table 2
 Summary of Analytical Results
 First Quarter 1992
 milligrams per liter (mg/l) or parts per million (ppm)

Shell Station: 6039 College Avenue
 Oakland, California
 WIC #: 204-5508-3301

Date: 04/02/92
 Project Number: G67-39.01

Sample Designation	Water Sample Field Date	TPH-g	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH-d	TPH-mo
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
MW-1	11/27/90	NA	NA	NA	NA	NA	NA	NA
MW-1	03/08/91	ND	ND	ND	ND	ND	0.05	ND
MW-1	06/03/91	ND	ND	ND	ND	ND	ND	ND
MW-1	08/30/91	ND	ND	ND	ND	ND	0.52	ND
MW-1	03/18/92	<0.03	<0.0003	<0.0003	<0.0003	<0.0003	<0.05	NA
MW-2	11/27/90	ND	ND	ND	ND	ND	ND	ND
MW-2	03/08/91	ND	ND	ND	ND	ND	ND	ND
MW-2	06/03/91	ND	ND	ND	ND	ND	ND	ND
MW-2	08/30/91	ND	ND	ND	ND	ND	ND	ND
MW-2	03/18/92	<0.03	<0.0003	<0.0003	<0.0003	<0.0003	NA	NA
MW-3	11/27/90	0.54	0.018	0.0015	0.0087	0.0025	0.24	0.46
MW-3	03/08/91	3.4	0.63	0.033	0.27	0.018	2.1	ND
MW-3	06/03/91	1.7	0.26	0.013	0.098	0.024	0.69#	ND
MW-3	08/30/91	0.87	0.044	0.0061	0.01	0.0029	0.37+	0.5
MW-3	03/18/92	6.1	0.62	0.028	0.22	0.038	1.9	20.
MW-4	11/27/90	0.47	0.064	0.0012	0.0008	0.0027	2.4	1.0
MW-4	03/08/91	1.1	0.33	0.0035	0.088	0.0058	2.6	15.
MW-4	06/03/91	0.67&	0.24	0.0023	0.0016	0.0023	1.1+	ND
MW-4	08/30/91	0.57	0.064	0.0018	0.0009	0.0009	0.28+	2.0
MW-4	03/18/92	FP	FP	FP	FP	FP	FP	FP

TPH-g = total petroleum hydrocarbons as gasoline
 TPH-d = total petroleum hydrocarbons as diesel
 TPH-mo = total petroleum hydrocarbons as motor oil
 NA = not analyzed
 ND = none detected

= compounds appear to be the less volatile constituents of gasoline
 + = results include compounds apparently due to gasoline as well as those due to diesel
 & = compounds detected within the gasoline range are not characteristic of the standard gasoline chromatographic pattern
 FP = floating product; well contained floating product and was not sampled

Table 2
 Summary of Analytical Results
 First Quarter 1992
 milligrams per liter (mg/l) or parts per million (ppm)

Shell Station: 6039 College Avenue
 Oakland, California
 WIC #: 204-5508-3301

Date: 04/02/92
 Project Number: G67-39.01

Sample Designation	Water Sample Field Date	TPH-g	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH-d	TPH-mo
		(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
MW-5	08/30/91	ND	ND	ND	ND	ND	0.08+	ND
MW-5	03/18/92	<0.03	<0.0003	<0.0003	<0.0003	<0.0003	<0.05	NA
TB	11/27/90	ND	ND	ND	ND	ND	NA	NA
TB	03/08/91	ND	ND	ND	ND	ND	NA	NA
TB	08/03/91	ND	ND	ND	ND	ND	NA	NA
TB	08/30/91	ND	ND	ND	ND	ND	NA	NA
TB	03/18/92	<0.03	<0.0003	<0.0003	<0.0003	<0.0003	<0.05	NA

TPH-g = total petroleum hydrocarbons as gasoline

TPH-d = total petroleum hydrocarbons as diesel

TPH-mo = total petroleum hydrocarbons as motor oil

ND = none detected

+ = results include compounds apparently due to gasoline as well as those due to diesel

NA = not analyzed